

6.0 Water

STRATEGIC OBJECTIVES

**Support the critical needs of regional industries and communities by ensuring water security and quality of supply
Provide flood mitigation and evacuation for the Hawkesbury-Nepean Valley in Greater Sydney**

KEY CHALLENGES

- Adapt to climate variability and a likely reduction in the availability of water
- Improve water management in 'hot spot' river catchments
- Provide greater water security in high priority regional towns
- Ensure that drinking water and waste water services in all regional NSW towns meet contemporary standards
- Plan for the future, including making the right infrastructure investments to achieve long-term water security and building resilience and redundancy into water infrastructure
- Identify how to recover the costs of investment through regulated pricing
- Improve flood mitigation and preparedness in the Hawkesbury-Nepean Valley

OPPORTUNITY

KEY Infrastructure NSW RECOMMENDATIONS

COSTS & FUNDING

Deliver critical water infrastructure projects in priority catchments

- Deliver critical water infrastructure projects in the priority inland catchments of the Gwydir, Macquarie and Lachlan Rivers, and in the coastal catchment of the Upper Hunter

Reservation of \$1 billion from the *Rebuilding NSW* initiative

Secure water supplies in high priority regional towns

- Identify and assess options for secure town water supplies for Broken Hill and Cobar

Funded from reservation above

Bring all regional towns up to water quality and environmental standards

- Finalise business cases for 71 backlog projects in regional towns to ensure drinking water supplies meet minimum guidelines and waste water services meet environmental standards

Funded from reservation above

Pricing and cost recovery for water security investment

- NSW Office of Water to maintain and further develop the Catchment Needs Assessment Framework developed for this report
- Water NSW to develop a best practice 20-year capital plan for bulk water supply to provide the evidence base for pricing applications going forward
- The NSW Government to request IPART to advise on how capital investment for water security over the next 20 years can be recovered, considering the Basin water charging objectives and principles (BWCOP)

Costs are not material

Hawkesbury-Nepean flood mitigation options

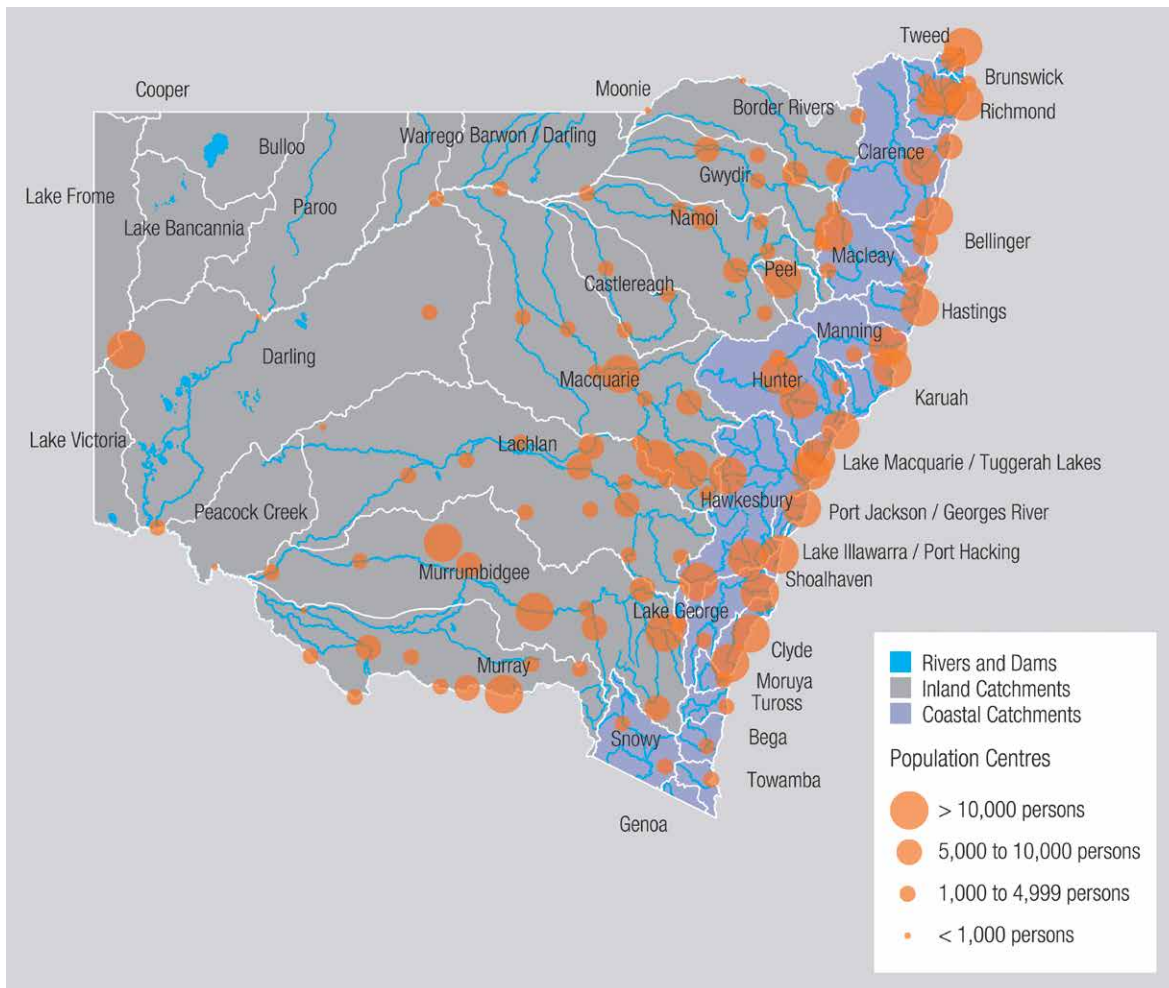
- Identify funding sources to deliver flood and evacuation works for the Hawkesbury-Nepean Valley in anticipation of the Taskforce report to the Government in mid-2015

Funding sources to be identified by mid-2015

Snapshot

- The water story in NSW is different west and east of the Great Dividing Range (see Figure 6.1):
 - West of the Divide represents 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. Long, slow-moving rivers flow south westward across flat, dry land to empty into the ocean at the mouth of the Murray River near Adelaide in South Australia. The regulation of this water resource is under the Murray Darling Basin Plan.
 - East of the Divide represents 17.5 per cent of the area of NSW and 88.4 per cent of the population. This coastal strip includes Sydney and the major cities of Newcastle and Wollongong, as well as regional towns. The terrain is steeper and the climate wetter with faster flowing rivers that run east into the ocean. The regulation and sharing of water is managed under NSW Government Water Sharing Plans, with additional strategic management plans in place for the Greater Metropolitan Region and the Lower Hunter.
- The water sector in NSW is heavily regulated and asset intensive. Long-term planning for new investment, as well as improving operations and asset management to maximise capital utilisation, are key challenges for the sector.
- Climate variability as well as population growth will influence investment decisions, but metropolitan and regional centres, smaller towns and regional industries, such as irrigation and mining, each face quite different challenges:
 - The metropolitan urban areas in Sydney, Illawarra, the Central Coast and Newcastle in the Lower Hunter are in reasonable shape due to a decade of intensive capital investment coupled with the success of demand management programs during recent prolonged drought. Long-term planning for these areas is on track and the metropolitan water utilities are self-funding and continue to comply with their operating licences.
 - The key infrastructure risk to be addressed for metropolitan Sydney is flood mitigation in the Hawkesbury- Nepean valley.
 - The operation of water infrastructure is considerably more complex in regional NSW than in metropolitan areas. The non-metropolitan water supply infrastructure west of the Great Dividing Range provides water to 1.9 million people and is managed by both the State government (with 6,300 licensed water users, 20 dams and over 250 weirs), as well as 105 local water utilities.
 - Regional towns have not seen the same levels of infrastructure spending as in metropolitan areas. A number of regional towns require investment to ensure that water services are secure and/or meet health and environmental standards.

Figure 6.1 NSW river catchments, with major rivers and towns



Source: Infrastructure NSW

6.1 Summary

Water is a limited and precious resource and must be managed both for immediate needs and for long-term economic and environmental sustainability.

Every NSW city, town and suburb needs water infrastructure that meets national health and environmental standards and guarantees a secure water supply. NSW also requires water security for economic growth in productive sectors such as agriculture (\$11 billion in 2011/12) and mining (\$22 billion in 2011/12), which jointly contribute over 7 per cent of GSP and provide about 100,000 jobs across the State.

In the next 20 years, the most important environmental change – and one with significant implications for infrastructure – is likely to be a reduction in the availability of water for use by productive industries and in the security of supply for some communities. Contributing factors to this reduction in water supply include changing rainfall patterns and increases in the allocation of water for important environmental uses.

The challenge is to take a long-term view about economic and social outcomes that rely on water security and supply, considering climate variability and population growth. Major capital investment should focus on high priority catchments, assets, towns and projects. Capital investment decisions also need to be considered within the framework of the National Water Initiative 2004 and the Commonwealth Government’s Murray Darling Basin Plan. The National Water Initiative sets out principles governing the sustainability of water resources, trade in water and a user pays approach to water use. The Basin Plan requires surface water extractions to be reduced by 2019.

To ensure future water security and supply, Infrastructure NSW recommends that \$1 billion be reserved from the *Rebuilding NSW* initiative for a program of well-targeted water infrastructure projects. Infrastructure NSW has identified 'hot spot' river catchments and high priority regional towns where effective action should be prioritised. However, it should be noted that no investment can result in increased surface water extractions without adjustment to the Basin Plan.

Investment decisions should be made within regulatory limits with the potential to revisit the Basin Plan in the decades ahead.

The inland catchments of the Gwydir, Macquarie and Lachlan Rivers, and the coastal catchment of the Upper Hunter River, are nominated as the highest priority river valleys for potential investment in the next decade.

The regional towns assessed as the highest priority for potential investment to address water security issues are Broken Hill and Cobar. Seventy one backlog projects have also been identified for assessment to bring regional towns across the State up to contemporary standards for drinking water and waste water disposal.

In the Sydney metropolitan area, the highest major infrastructure risk is flood mitigation in the Hawkesbury-Nepean valley. Allocations for infrastructure will be dependent on the Infrastructure NSW led review being undertaken by the Hawkesbury-Nepean Valley Flood Management Taskforce.

The issue of who should pay for water security should be part of any consideration of the best mix of water infrastructure investment for NSW. Infrastructure NSW is recommending a number of actions to review water pricing and cost recovery for capital investment in water security. In addition, the Commonwealth Government is an important partner on water security, and has allocated \$9 billion to fund water infrastructure and licence buybacks across the Murray Darling Basin.

6.2 Progress since 2012

Key activities in the water sector since 2012 include:

- Signing the Inter-governmental Agreement on implementing water reform in the Murray Darling Basin Plan (see box below)
- Planning for Greater Sydney and the Lower Hunter region to ensure that water supply, and projected water demands, are balanced in the metropolitan regions. The Lower Hunter Water Plan is complete and the latest revision to the Greater Sydney Water Plan is expected to be finalised in 2015.
- Initiatives to mitigate flooding in the Hawkesbury-Nepean Valley. Initial investigations into Hawkesbury-Nepean Valley flood management are complete and have been presented to the Government. Flood protection options identified for further investigation include investment to raise Warragamba Dam wall, upgrading evacuation routes (roads) and communication systems, and improving emergency

Murray Darling Basin Plan

The Murray Darling Basin Plan was signed into law by the Commonwealth Government and commenced on 24 November 2012. The NSW Government signed the Inter-Governmental Agreement in February 2014, agreeing to implement the provisions of the Basin Plan.

The Basin Plan includes enforceable limits on the quantities of surface water and groundwater that can be taken from the Murray Darling Basin. The sustainable diversion limits (SDLs) are set initially at 2,750 gigalitres (2750 billion litres), less than current diversions in the rivers. This reduction in water use is to be achieved by 2019 with the water being recovered by the Commonwealth to provide additional water for the environment.

Inland NSW makes up the largest proportion of the Murray Darling Basin. Most NSW river valleys have experienced significant buyback of water licences and removal of water from agricultural and other industrial production as the Commonwealth proceeds to obtain the volumes required to meet the SDLs.

As part of the Basin Plan implementation, the Commonwealth has allocated around \$9 billion to fund water infrastructure investment and water licence buybacks across the Basin. This includes around \$700 million for water savings projects and \$650 million for irrigators to improve their operations in NSW.

services coordination. A Taskforce set up by the NSW Government to undertake the second stage review will report in mid-2015.

- Continuing to support and invest in non-metropolitan urban water supply. The Independent Local Government Review Panel made a number of recommendations on the reform of local government-owned water utilities in regional NSW in late 2013 with a view to improving service quality and efficiency. In September 2014, the NSW Government announced a \$1 billion fund to support voluntary local government mergers and improve management systems.
- Maintaining and securing infrastructure for water storage and delivery. Since 2012, drought conditions have returned to large parts of NSW. Restart NSW is funding a regional water security program, of which \$37.5 million has been allocated in 2013/14 and \$325 million is reserved for 2014/15.
- Commencing a reform of the provision of bulk water in NSW: In March 2014, the NSW Government announced the administrative alignment of the Sydney Catchment Authority with the State Water Corporation to form Water NSW.

6.3 Ongoing challenges

6.3.1 Climate variability

The climate of NSW is changing (see Figure 6.2 below). Average temperatures have been steadily rising since the 1960s. The period from 2000-2009 was the State's hottest decade on record. NSW is expected to become hotter (1-3°C), with the greatest increases in maximum temperatures expected to occur in the north and west of the State. North eastern NSW is likely to experience a slight increase in summer rainfall (0-10%) while in the south-western regions there is likely to be a significant decline in winter rainfall (20-50%). Many parts of the State will experience a shift from winter-dominated to summer-dominated rainfall. The higher temperatures are likely to result in higher evaporation across much of the State, offsetting most of the expected increases in summer rainfall. In northern NSW, these changes to rainfall and evaporation appear to be within recorded levels of variability. However, the drying of the autumn, winter and spring seasons in the south is expected to fall outside the natural climate variability.⁸⁶

Studies predict that the Murray–Darling Basin climate is likely to become drier and more variable in the future.⁸⁷ 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

86. NSW Office of Environment and Heritage (www.environment.nsw.gov.au/climatechange/RegionallimpactsofClimateChange.htm), accessed 12 November 2014

87. See for example SEAC(2010)

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 risk of such events is 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.⁸⁸ The priorities for long-term infrastructure investment are to ensure resilience and redundancy, to both provide water security in times of drought and to capitalise on and withstand flood waters.

6.3.2 Identifying 'hot spot' catchments and possible solutions

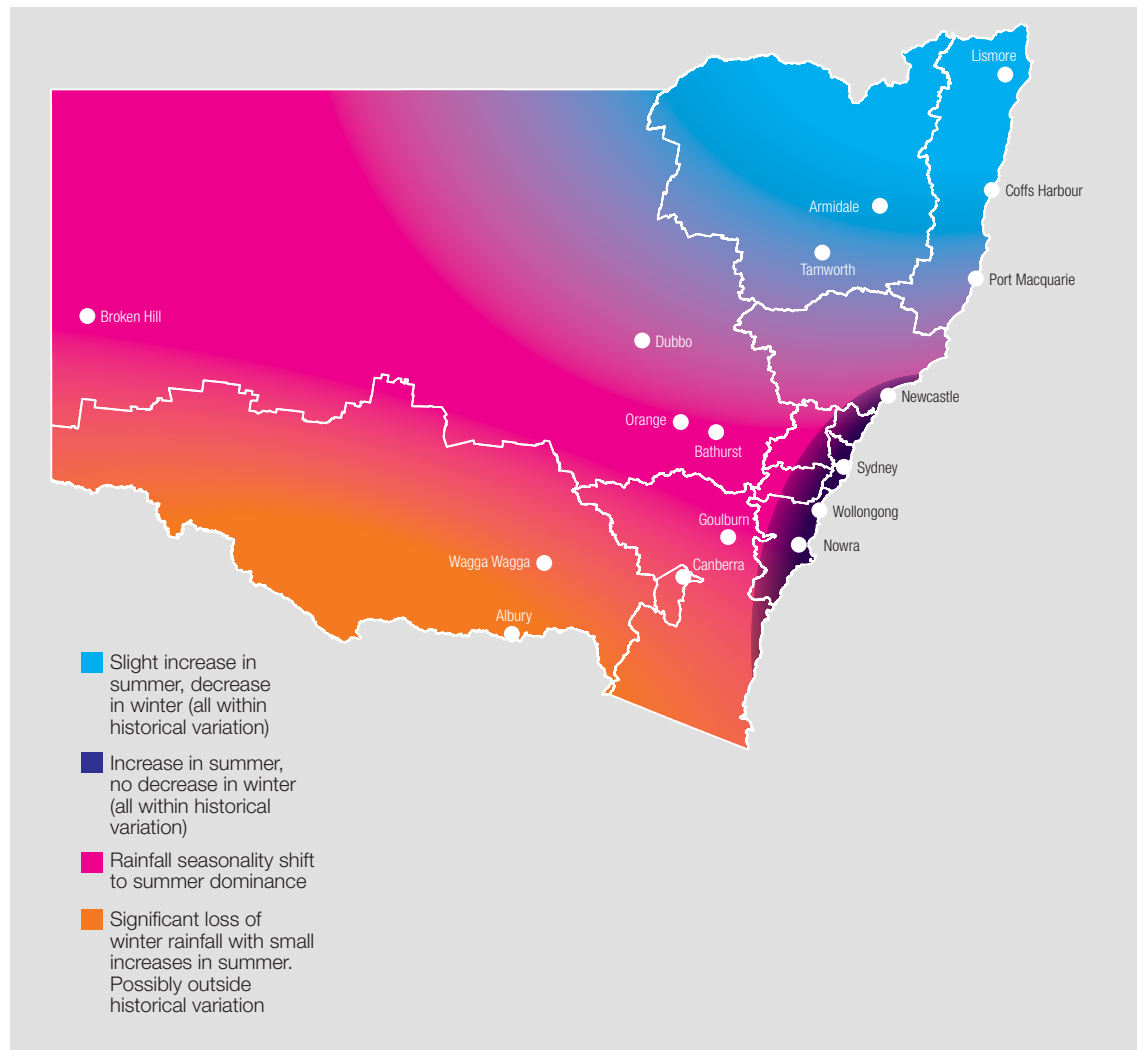
In preparing this report, Infrastructure NSW developed a needs identification framework to identify the regulated river valleys facing the most significant water management challenges, using four indices as described in Table 6.1.

These indices are quantitative and were calculated the same way for each of the regulated river valleys based on river modelling, using the last 100 years of climatic data, and current asset performance.

There is also 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

88. House of Representatives Standing Committee on Economics, June 2011

Figure 6.2 Predicted rainfall changes to 2050



Source: Department of Environment, Climate Change and Water (2010)

Table 6.1 Needs identification framework for regulated river valleys

Water Management Assessment Index	Description
Irrigation Drought Security Index	This measure describes the reliability of water available for use – primarily irrigation. It is an indicator of a river valley’s vulnerability to DRY conditions. The measure is based on the water allocation being exceeded 80% of the time, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a high occurrence of DRY conditions in the catchment and years of low agricultural production.
Flow Utilisation Index	This measure describes how much of the available water is used for consumptive purposes, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a relatively low proportion of the total flow that is extracted and therefore, there may be capacity to grow the AVERAGE water use.
Flood Management Index	The measure describes the capacity of major dams to provide flood mitigation of the events that occur. It is determined by calculating the total spare storage capacity (including flood surcharge) relative to the flood volume that is exceeded 5% of the time, calculated using river basin modelling and climate data for the last 100 years. A low index suggests there is a relatively low capacity for the current infrastructure to capture and mitigate the WET conditions river flows. The index does not reflect situations where there may be significant inflows downstream of the major dams.
Delivery Efficiency Index	This measure describes the efficiency of the water delivery system. It is calculated by comparing the total extractions to the amount of water released from the headwater storages to meet those extractions, calculated using river basin modelling and climate data for the last 100 years. A low index suggests the valley is relatively inefficient at delivering water to end-users. Inefficiency can be a major problem in DRY years, but also reduces a Valley’s productivity on AVERAGE.

periods, without necessarily increasing the long-term average usage. An improvement in *Flood Management* could also enable an improvement in Drought Security through additional or augmented storage capacity.

Each regulated river valley in NSW was assessed, using hydrological modelling, against each of the indices and scored to identify 'hot spots' as shown in Figure 6.3. In summary, this needs analysis identified the highest priority inland river catchments as the Gwydir, Macquarie and Lachlan. All three catchments have low *Irrigation 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 also a priority, given the lack of airspace in existing dams.

Recommendation

The Regional Water Security and Supply Fund can support the Regional Water Priority Catchments Program which includes the inland catchments of Gwydir, Macquarie and Lachlan and the coastal catchment of the Upper Hunter. A mix of works including dams and delivery efficiency schemes has been identified.

\$ Recommendation

Infrastructure NSW recommends a reservation of \$1 billion be made from the *Rebuilding NSW* initiative to establish the Regional Water Security and Supply Fund to support recommended programs and projects (as follows).

East of the Great Divide, the highest priority catchment identified is the Upper Hunter due to low *Flow Utilisation*, which indicates a capacity for growth, and low *Drought Security*. This finding is set against the Hunter Valley's transition from a predominantly agricultural base to include a strong and growing mining sector and corresponding growth in water demands. There are also some observed changes in water demand patterns, with high security water entitlements transferring to mining from agricultural holdings that, as a result, now rely on general security supply, leaving this sector very vulnerable to drought.

The *Hunter Economic Infrastructure Plan* recommended analysis of forecast industry water demand as a possible constraint to growth, particularly in drought conditions. For the purpose of this report, Infrastructure NSW commissioned hydrological and economic modelling. Foregone mining royalties were used as a proxy to evaluate the potential impacts on mining contributions to the State economy under different drought and commodity export price scenarios over the next 20 years. This work indicates that constraints in water supply may have a significant adverse impact on the economy.⁸⁹ More work is warranted, including for other significant water users such as agribusiness and power generation, to identify the best delivery efficiency enhancing options to manage water security and drought in the catchment, given there is opportunity for additional extractions, albeit no additional entitlement.

89. NSW Department of Primary Industries, Upper Hunter water security evaluation (Phase 2), October 2014, notes the range of value loss from mining royalties foregone could be \$150 million to \$360 million.

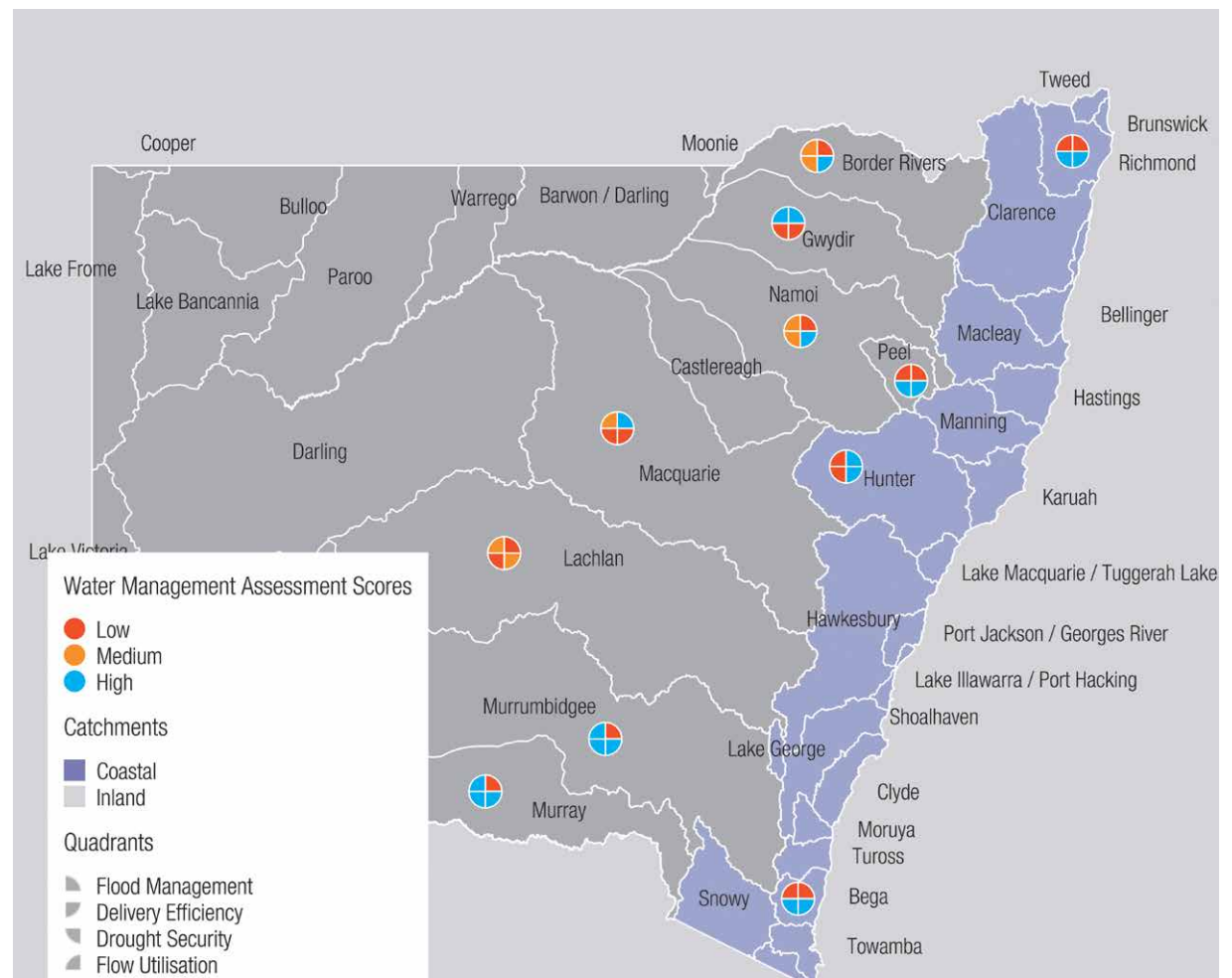
Recommendation

Infrastructure NSW recommends that further modelling, including all major licensed water users in the Upper Hunter, be completed in the next six months to identify the best mix of delivery efficiency investments to take advantage of unutilised flows and underutilised infrastructure, such as the Lostock Dam. Options include a pipeline linking the Lostock and Glennies Creek dams.

Figure 6.3 shows the result of the water management needs assessment using the indices described in Table 6.1 and highlights the priority catchments.

The full assessment of river catchments is set out in Table 6.2, which includes the potential infrastructure options. This analysis has helped to identify potential projects that are a good fit with the identified catchment needs; it also highlights gaps in current planning. The highest priority projects should improve the priority index scores in each valley. Projects in the highest priority valleys are considered the most important for further analysis.

Figure 6.3 Water management for regulated catchments



Source: Infrastructure NSW (2014)

Table 6.2 Catchment status for the regulated river catchments

River Catchment	Index Assessment				Area	Population	Major existing Infrastructure
	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency			
Macintyre/Border Rivers	M	M	L	H	24,212 sq. km	30,517 people	Glenlyon Dam: 254GL Pindari Dam: 312GL
Key Issues					Plan Limit: 188 GL (<1% towns, >99% industry)		
<ul style="list-style-type: none"> Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> New Mole River Dam 		
Gwydir	L	H	H	L	26,600 sq. km	24,343 people	Copeton Dam: 1,364GL
Key Issues					Plan Limit: 324 GL (1% towns, 99% industry)		
<ul style="list-style-type: none"> Low Drought Security Low Delivery Efficiency Copeton is a large dam but only regulates a small part of the valley as 90% of the catchment is below the dam. On-farm storages downstream of the dam are shallow with high evaporation losses. There are high distribution losses from long effluent streams. Moree is the largest town in the Gwydir and main commercial centre for surrounding agricultural areas. Major water users include local councils and water utilities, dryland agriculture, livestock grazing and irrigated agriculture predominantly cotton. 					Possible Solutions <ul style="list-style-type: none"> New re-regulating Dam at Gravesend or New Horton River Dam Delivery Efficiency projects The likely solution for the Gwydir would be a mix of deep storage, on-river re-regulation storages and reconfigured, efficient distribution networks. 		
Peel (with enlarged Chaffey)	H	L	L	H	4,669 sq. km	51,187 people	Chaffey Dam: 62GL (augmentation to 100GL under way)
Key Issues					Plan Limit: 16 GL (56% towns, 44% industry)		
<ul style="list-style-type: none"> Low Flow Utilisation Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> Recent augmentation of capacity at Chaffey Dam has improved drought security. 		

Index Assessment

River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Namoi	M	M	L	H	37,372 sq. km	41,250 people	Split Rock Dam: 397GL Keepit Dam: 426GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> Low Flood Management 					<ul style="list-style-type: none"> Apsley River project could improve the Flow Utilisation and Drought Security Indices Projects to improve the Flood Management Index are yet to be identified 		
Macquarie	L	M	H	L	74,840 sq. km	179,364 people	Windamere Dam: 368GL Burrendong Dam: 1,190GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> Low Drought Security Low Delivery Efficiency Burrendong dam is the largest but small compared to environmental and irrigation demands resulting in low water reliability. High distribution losses due to long rivers and effluent creeks. Major cities and towns reliant on the rivers in this catchment include Bathurst, Orange and Oberon upstream of Burrendong dam and Dubbo, Wellington and Nyngan below the dam. Mudgee, Peak Hill, Narromine, Warren, Lithgow and Brewarrina also draw water from rivers in this catchment. Water users include local councils and water utilities, dryland agriculture, livestock grazing and irrigated agriculture including cotton. 					<ul style="list-style-type: none"> Augmentation of Burrendong Dam for Drought Security New re-regulating storage for Delivery Efficiency Delivery Efficiency projects may have favourable BCRs e.g. Cobar pipeline The likely solution for the Macquarie would be a mix of increased storage capacity (on-river and/or re-regulation) and works to address current inefficient water delivery. 		

Index Assessment

River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Lachlan	L	M	L	M	86,290 sq. km	91,683 people	Wyangala Dam: 1,218GL Carcoar Dam: 36GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> • Low Drought Security • Low Flood Management • The Lachlan has low water security due to high distribution losses from long rivers, anabranches and effluent streams. Also high evaporation losses from large, shallow lakes (Brewster and Cargellio) and insufficient storage capacity for multi-year droughts. • Major towns drawing supply in this catchment include Cowra, Parkes, Forbes and Young. • Land use in the catchment is primarily agricultural including 15% for dryland cropping and 75% livestock grazing. Major water users include local councils and water utilities, mining and agriculture including dairy, wool, beef and lamb, as well as irrigated crops such as cereals, lucerne and cotton. 					<ul style="list-style-type: none"> • Additional storage for Drought Security and Flood Management, including The Needles and Cranky Rock sites, to be investigated • Delivery Efficiency projects, Booligal, Willandra and Wallamundry Creeks • The likely solution for the Lachlan would be a mix of increased storage capacity (on-river and/or re-regulation) and works to address current inefficient water delivery. 		
Murrumbidgee	H	H	L	H	71,144 sq. km	217,756 people	Burrinjuck Dam: 1,028GL Blowering Dam: 1,628GL
Key Issues					Possible Solutions		
<ul style="list-style-type: none"> • Low Flood Management 					Irrigators have suggested the following projects: <ul style="list-style-type: none"> • Augment capacity of Burrinjuck Dam or • New Dam at Gundagai for flood mitigation • Projects to resolve the Tumut River Choke could be developed for delivery efficiency 		
					Plan Limit: 295 GL (6% towns, 94% industry)		
					Plan Limit: 1,769 GL (1% towns, 99% industry)		

Index Assessment

River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
NSW Murray	H	H	L	H	35,366 sq. km	101,598 people	Hume Dam: 3,038GL Dartmouth (Vic): 3,856GL Lake Victoria: 680GL
Key Issues <ul style="list-style-type: none"> • Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> • No projects proposed 		
Richmond	H	L	L	H	7,043 sq. km	121,121 people	Toonumbar Dam: 11GL
Key Issues <ul style="list-style-type: none"> • Low Flow Utilisation • Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> • Augmentation of Toonumbar Dam and linking with Local Water Utility Infrastructure (NOROC Project) 		

Index Assessment

River Catchment	Irrigation Drought Security	Flow Utilisation	Flood Management	Delivery Efficiency	Area	Population	Major existing Infrastructure
Hunter	L	L	H	H	21,460 sq. km	371,455 people	Glenbawn Dam: 750GL Glennies Ck Dam: 283GL Lostock Dam: 20GL
Plan Limit: 84 GL (8% towns, 92% industry)							
Key Issues <ul style="list-style-type: none"> Forecast Low Drought Security with expected increased demand for water for mining and population growth Low Flow Utilisation The Upper Hunter has low water reliability because although Glenbawn and Glennies Creek dams are large they only regulate a small proportion of the valley. Also Lostock which has the potential yield is a small dam. The eastern catchment is high yielding but largely unregulated and disconnected from the demands for mining and power stations located in the central catchment. Newcastle is the second largest city in NSW. Other major towns include Maitland, Singleton, Cessnock, Muswellbrook and Raymond Terrace. The Hunter supports a large population and a diverse range of important water users including Hunter Water Corporation, local councils, power generators (providing most of the electricity used in NSW), major coal mines (Newcastle Port is one of the largest coal facilities in the world), other heavy industry, world renowned horse and cattle studs and wineries, as well as other agriculture and dairy farms. 					Possible Solutions <ul style="list-style-type: none"> Augmentation of Lostock Dam and or a water transfer scheme linking Lostock and Glennies Creek Dams to improve flow utilisation and drought security. The likely solution for the Upper Hunter would be a mix of increased storage capacity (Lostock augmentation) and works to take advantage of the low flow utilisation. 		
Bega/Brogo	H	L	L	H	2,834 sq. km	20,001 people	Brogo Dam: 9GL Cochrane Dam: 0.4GL
Plan Limit: 28 GL (43% towns, 57% industry)							
Key Issues <ul style="list-style-type: none"> Low Flow Utilisation Low Flood Management 					Possible Solutions <ul style="list-style-type: none"> No projects proposed 		

6.3.4 Pricing and cost recovery for water security investment

Infrastructure NSW has identified a number of new storages or storage augmentations as potential infrastructure priorities. The enforceable limits on the quantities of surface water and groundwater that can be extracted from the Murray Darling Basin establish a trading market for a commodity that is capped. While traded prices for water within this market will reflect the highest value use at a point in time, there is a disconnect between the prices in the traded water market and new major capital investment decisions for the NSW Government.

The case for recovering costs through pricing for capital investment in new storages by the NSW Government must pass regulatory tests, including how these tariffs will contribute to achieving Basin water charging objectives and principles (BWCOP).⁹⁰ In June 2014, the ACCC determined State Water's pricing application to 2016/17. The ACCC considered that State Water's proposed 80:20 fixed to variable tariff structure would not contribute to the BWCOP.⁹¹ The ACCC did not consider that transferring volume risk for water in dry times to customers contributed to the Basin pricing principles.

The issue of who should pay for water security over the next 20 years warrants review as part of considering the best mix of infrastructure investments to achieve water security for regional NSW. Capital investment by the NSW Government in new or augmented dams must be

efficient, with cost recovery achieved through regulated pricing. These regulated decisions will need to reflect the BWCOP and avoid perverse outcomes such as the potential to transfer value to water entitlement holders, at no cost to them, by making the availability of the water resource more secure.

Recommendation

Infrastructure NSW recommends that:

The catchment needs assessment framework developed for this report should be maintained and further improved by the NSW Office of Water.

The newly created agency for bulk water management, Water NSW, should develop a best practice 20 year capital plan to provide the evidence base required for pricing applications going forward.

The NSW Government should request IPART to review and advise on how the capital investment required for water security over the next 20 years can be recovered, considering the Basin water charging objectives and principles (BWCOP).

6.3.5 Priority regional towns

To identify the needs of regional towns, Infrastructure NSW assessed each of the 105 Local Water Utilities in relation to security of supply, quality of drinking water and effectiveness of sewerage services. The indices used were:

- Water Supply Deficiency Index – a measure of the projected 2036 water demand, relative to the available supply of water (Figure 6.4).
- Drinking Water Quality and Sewerage Index – as determined for the *Country Towns Water Supply and Sewerage Program* to prioritise the projects for this report (Figure 6.5).

The highest priority regional towns for water security are Broken Hill and Cobar. Both are in the Darling catchment and both are assessed as having high *Water Supply Deficiency* with inefficient delivery systems, high temperatures, high evaporation and low rainfall. Broken Hill relies predominantly on an ephemeral water source, the Menindee Lakes, and Cobar relies on the Macquarie River, over 200 kilometres to the east, in the neighbouring Macquarie catchment, which is also assessed as low for drought security (see Figure 6.4).

Broken Hill

The city of Broken Hill, with a population of 19,000, is heavily dependent on water pumped from Menindee Lakes through a 120 kilometre pipeline which is about 80 years old, unreliable and increasingly costly to maintain and repair. In dry times, the water quality in the Lakes declines, producing increasing levels of salinity with the result that the water eventually does not meet Australian

90. (Commonwealth) *Water Act 2007*, Schedule 2

91. ACCC Final Decision on State Water Pricing Application 2014/15 to 2016/17

Drinking Water Guidelines (ADWG). The current water treatment plant in Broken Hill cannot remove or reduce the salinity. During the Millennium Drought, Broken Hill purchased a modular desalination unit.

During times of drought, the demand on the Broken Hill town water supply remains high due to the high levels of lead, arsenic and other metals in the soil from mining activity in the past. Soil moisture needs to be maintained to preserve groundcover and avoid raised dust. For this reason, domestic water restrictions are rarely imposed in Broken Hill. The presence of lead dust also precludes the use of rainwater tanks. Cartage of any significant quantities of water for Broken Hill's town water supply is logistically impractical and extremely expensive. About every 10 years or so, in times of drought, significant costs are incurred in providing water to Broken Hill, a boom-bust cycle in the absence of a permanent secure town water supply.

The Commonwealth has identified \$180 million in funding available for structural works and operational changes at Menindee Lakes to provide water savings required under the Basin Plan. As part of the options analysis to achieve these water savings, NSW is investigating an option for Broken Hill to use groundwater as an emergency drought supply when needed. This is a potentially high cost option (in excess of \$40 million) requiring desalination of highly saline groundwater and remediation works to the existing Menindee Lakes pipeline.

Considering the condition and associated maintenance costs of the existing pipeline from Menindee Lakes to Broken Hill, and the water quality and security issues, a longer term option for a permanent, secure town water supply for Broken Hill should be identified. Infrastructure NSW commissioned a scoping study⁹² on the construction of a pipeline from the Murray River to Broken Hill, to be assessed together with the options for the Menindee Lakes system.

Recommendation

Infrastructure NSW recommends that the Regional Water Security and Supply Fund can support the preferred option for a secure/permanent town water supply for Broken Hill, which could include a pipeline from the Murray River.

Cobar

The Nyngan-Cobar Water Supply Scheme was built after the drought in the 1940s. Today it supplies water to more than 7,600 people in the towns of Cobar and Nyngan. The water supply is extracted from the Macquarie River near Warren and is delivered over 70 kilometres to the Nyngan weir pool through the unlined Albert Priest Channel. From the Nyngan weir pool, water is delivered the 130 kilometres to the town of Cobar (and to the

Cobar mines, irrigators and livestock producers) by pipeline. During prolonged dry periods, water losses from the channel due to evaporation, seepage and transpiration can result in 50 per cent of the annual allocation of 8 GL not arriving at the Nyngan weir pool.

In June 2014, the NSW Government accepted the recommendation of Infrastructure NSW that \$10 million be allocated from the Restart NSW Fund to construct an off-river storage at Nyngan as the first stage of a water security program for Cobar. This additional storage is expected to be completed in 2017. The Gross Regional Product of the Cobar silver and gold mines is estimated to be worth \$630 million per annum.⁹³ In addition to securing the town water supply in dry times, high security water is required for mining operations, agriculture and livestock.

Recommendation

Infrastructure NSW recommends the Regional Water Security and Supply Fund can support the preferred option for a pipeline to replace reliance on the Albert Priest Channel as a longer term solution to secure the Cobar water supply.

92. NSW Public Works, Murray River to Broken Hill Bulk Raw Water Transfer Pipeline and Associated Works – Initial Options Assessment, October 2014.

93. Nyngan and Cobar Raw Water Security: Business Case 2014, Bogan Shire Council January 2014, p. 21.

6.3.6 Backlog projects for regional towns

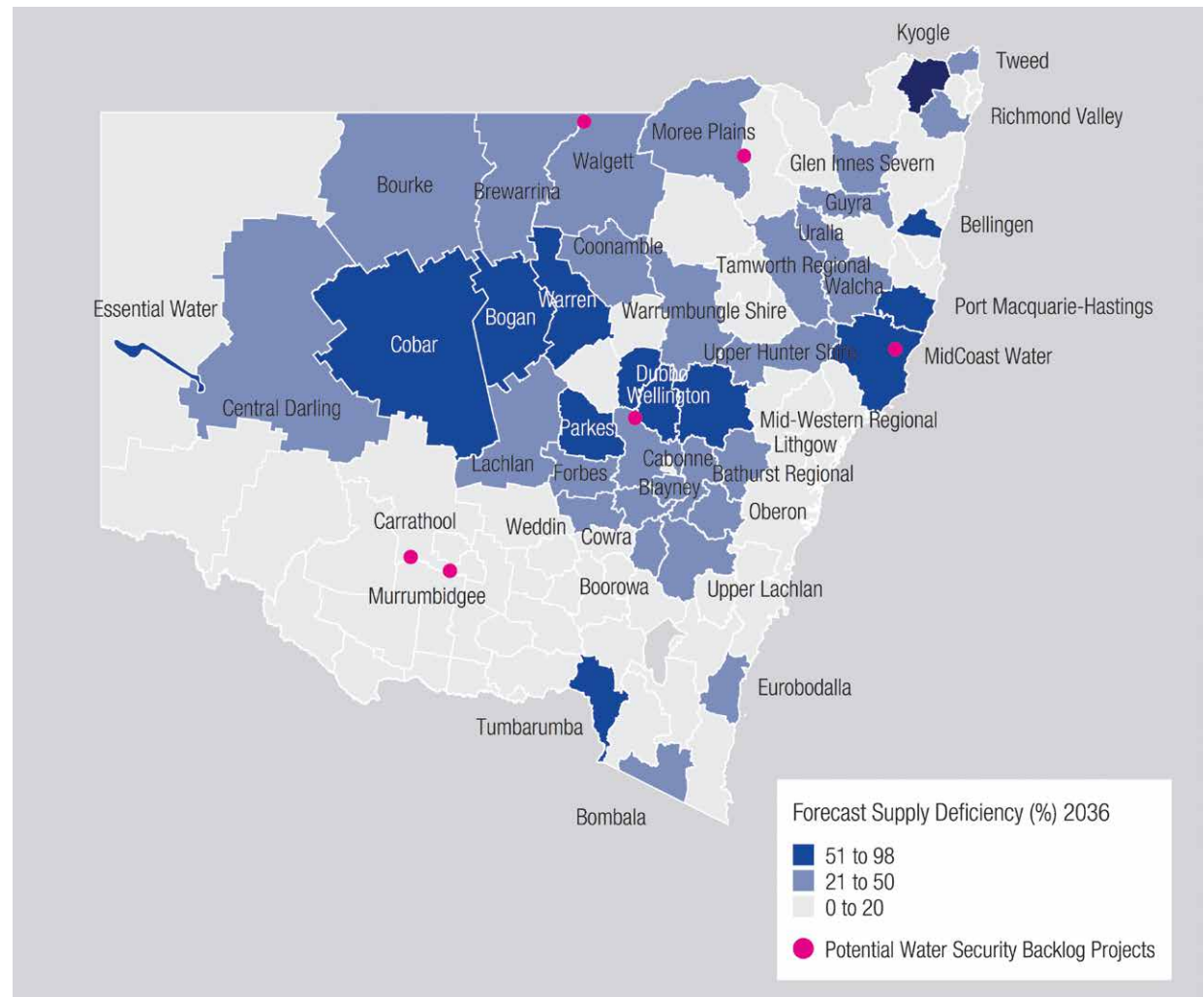
To ensure that all towns in regional NSW have drinking water and waste water services that meet standards, 71 projects have been identified.

A lack of or inadequate water supply and sewerage services are the single most important factors in protecting public health and reducing faecal pollution in receiving waters. Studies have shown that the risk of diarrhoeal disease is between 2.5 and 3.85 times higher, and there is an elevated risk of diseases such as respiratory illness, amongst communities in un-sewered, non-reticulated towns and villages.

Recognising the fundamental importance of improved sanitation, successive NSW State Governments over many years have invested in upgrading water and sewerage infrastructure in regional NSW. The 71 backlog projects assessed by Infrastructure NSW as potential priorities are all that remain of the original Country Town Water Supply and Sewerage (CTWSSP) Program that began in 1996. To date, this program has completed over 500 projects with a total asset value of approximately \$4 billion.

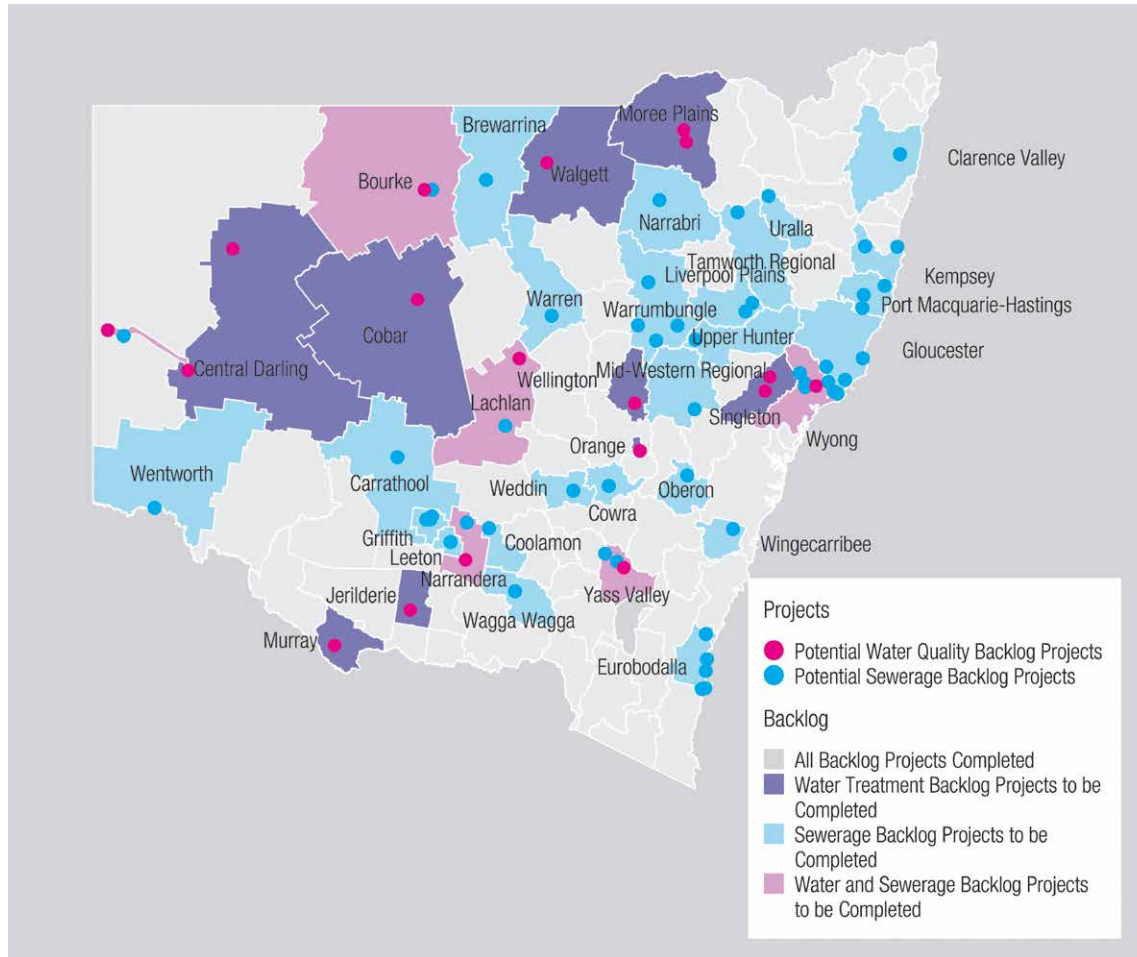
Providing water supplies that meet minimum drinking water quality guidelines, and waste water services that meet environmental standards, will improve the public health and wellbeing of residents in remote regional communities by reducing the incidences of gastroenteritis and water borne diseases, greatly adding to their quality of life.

Figure 6.4 Forecast water supply deficiency for local water utilities in 2036



Source: Infrastructure NSW

Figure 6.5 Regional backlog water quality and sewerage projects



Source: Infrastructure NSW

Recommendation

Infrastructure NSW recommends that the Regional Water Security and Supply Fund can support the preferred option for the 71 backlog projects identified in regional towns to ensure drinking water supplies meet minimum guidelines and waste water services meet environmental standards.

Figure 6.4 shows the projected Water Security Index for each Local Water Utility in regional NSW. The Index forecasts the potential shortfall in water supply compared to forecast water demand to 2036. Local Water Utility areas have been shaded based on the average of the projected security for each of the towns within their boundaries. This map identifies the highest priority Local Water Utilities in regional NSW and the projects to address water security.

Figure 6.5 shows the remaining high priority backlog of projects for consideration to bring regional towns up to drinking water and wastewater standards. The Local Water Utility areas are shaded to identify incomplete water and/or wastewater treatment services.

6.3.7 Flood mitigation in the Hawkesbury-Nepean Valley

The NSW Government accepted the advice of Infrastructure NSW in 2012 that, to significantly reduce the potential economic and social impact of flooding in the Valley, the Government should “*review the major flood mitigation options available in the Hawkesbury-Nepean Valley, including the options of raising the Warragamba Dam wall and road upgrades*”.⁹⁴

In 2012, it was estimated that a repeat of the 1867 flood, the largest on record, could be expected to cause direct damages of \$1.7 billion and \$3 billion in total tangible damages. Significant population growth – accompanied by the requisite housing, commercial and industrial development and provision of infrastructure – has occurred in the floodplain since the 1990s, making flooding a key planning issue.

In early 2014, the NSW Government endorsed the recommendations of the first stage of the Hawkesbury-Nepean Valley Flood Management Review. The Review found that flood management in the Hawkesbury-Nepean Valley will require an integrated and well-coordinated approach. There is no single option or solution that can address all of the flood risk in the valley. However, the Review has identified that infrastructure options can significantly reduce, but not eliminate, the flood risk in the valley.

A Taskforce was established in April 2014 to lead the next stage of the work to improve flood management and preparedness in the Hawkesbury-Nepean Valley. The Taskforce is developing a strategy which includes options to upgrade roads for evacuation, flood mitigation infrastructure (such as changes to Warragamba Dam), measures to increase flood awareness and preparedness in the community, improvements to emergency planning, response and recovery, and better consideration of flood risk in land use planning. The immediate priority of the Taskforce is to build the flood resilience and preparedness of communities and businesses in the Hawkesbury-Nepean Valley ahead of any major infrastructure upgrades.

The strategy will identify the priority areas for potential infrastructure investment required in the next 10 years, with final costs to be determined through the Taskforce process.

Recommendation

Infrastructure NSW recommends that funding sources be identified to deliver flood mitigation and evacuation works, when the Hawkesbury-Nepean Valley Flood Management Taskforce reports to Government in mid-2015.

94. Infrastructure NSW 2012, *First Things First*