12.0 Water infrastructure

Summary

- Every NSW community needs water infrastructure that meets national health and environmental guidelines or standards and guarantees a secure and affordable water supply.
- Being prepared for inevitable drought is more productive than restricting supply. Infrastructure NSW recommends the development of a comprehensive, prioritised program of new and augmented dams across NSW.
- Infrastructure NSW recommends aggregation of 105 local water and wastewater delivery authorities into around 30 regional delivery authorities to maximise efficiency and manage affordability (as previously recommended to the NSW Government).
- Infrastructure NSW recommends a prioritised program of work to bring all regional town water and sewerage systems up to required minimum drinking quality and environmental standards.
- Augmentation of supply for the Hunter region is needed within the next 10 years.
- Given the multi-source complexity of water supply systems and the long lead times, planning for Sydney's next supply should commence as part of the updated Metropolitan Water Plan.
- Infrastructure NSW recommends the NSW Government review all the major flood mitigation options available, including raising the Warragamba Dam wall to significantly reduce the potential economic and social impact of flooding in the Hawkesbury Nepean Valley. If major flood mitigation is not provided, roads in the Valley will need to be upgraded to ensure people can evacuate.

12.1 Water snapshot

- The NSW Government has about $20 billion[1] invested in the water sector in Sydney Water, Hunter Water, Sydney Catchment Authority and State Water.
- Local government-owned water utilities deliver water and wastewater services in other parts of the state. There are 105 non-metropolitan local water utilities.
- Other Government agencies with water responsibilities include NSW Treasury (as the shareholder of Government water business), NSW Office of Water (NOW),the Department of Finance and Service (Metropolitan Water Directorate). The Office of Environment and Heritage (OEH) regulates environmental performance and NSW Health regulates public health standards.
- Metropolitan investment is subject to oversight by Independent Pricing and Regulatory Tribunal (IPART) and planning for regional investment is reviewed by NOW and costs are recovered in user charges.
- Over the past five years, capital expenditure across the metropolitan utilities has averaged $1.4 billion per annum, which included investment in the desalination plant. Budget forecasts for the next four years show a decline to $1 billion per annum for the metropolitan utilities.
- Capital expenditure by the local government-owned water utilities has averaged $0.6 billion per annum over the past five years.

1 NSW Government, 2012-13 Budget.

12.2 Demand and supply

12.2.1 Background

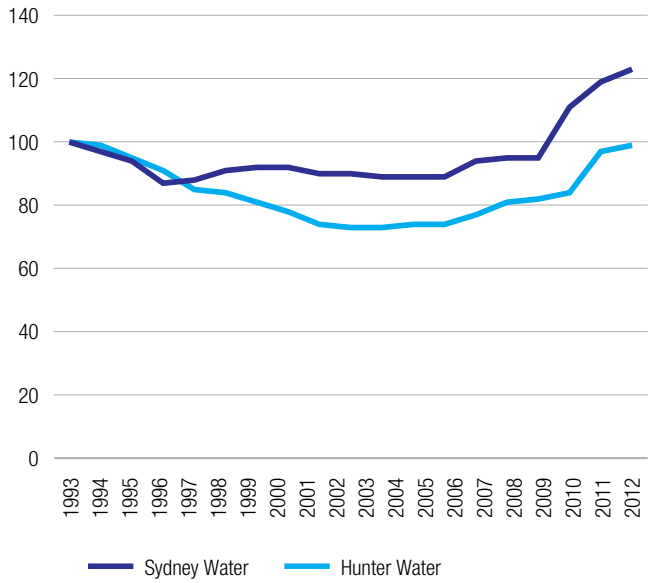
Over recent years, water demand has been declining largely due to drought restrictions and successful demand management programs.

Water conservation measures implemented in Sydney and in regional areas have been outstandingly successful in managing demand. The total demand of the metropolitan region is similar to the level in the 1970s despite an additional one million in population. For non-metropolitan NSW, the average annual residential water supplied per connected property has fallen by 52 per cent over the last 20 years.

However, caution is required. Since water restrictions have been removed, NSW generally has experienced two wet summers, resulting in low water consumption. On the other hand, the demand curve has been hardened due to the uptake of water efficient appliances and plumbing fixtures which lock-in water efficiency. Future demand management gains and water restriction savings may be more difficult and costly to achieve and more difficult to estimate.

While demand has fallen, total water bills remained relatively stable due to the falling regulated price, until the 2008-12 Sydney Water and Hunter Water pricing determinations. Sydney prices increased sharply in 2008 when the allowed capital included the desalination plant. This is shown in the Figure 12.1.

Figure 12.1 Index of Residential Water and Sewerage Charges 1992/93-2010/11 (real)



Source: IPART.

12.2.2 Metropolitan strategy

The Sydney metropolitan water supply and wastewater sector is in reasonable shape with respect to meeting future short term growth in demand from forecast population increases due to high levels of capital investment in desalination, accessing deep water storages and demand management programs during the recent prolonged drought. The desalination supply is climate independent; the capacity could be expanded to provide up to 18 percent of demand and 36 percent with Stage 2.

The 2010 Metropolitan Water Plan's[2] water supply modelling indicates that, with recycling and efficiency measures, Sydney has enough water for future droughts and growing population until at least 2025. The Plan also allows for the Shoalhaven Transfer system to be augmented and operational from around 2025.

The Metropolitan Water Plan is being reviewed and will model a 50 year horizon. It is taking into account changing water demand, Government decisions about environmental flows, potential impacts of climate change and the extent to which recycled water schemes and demand management programs can contribute to the supply demand balance.

The current Metropolitan Water Plan reports that there are a number of potential water source infrastructure options proposed including:

- the doubling of the desalination plant – the modelling assumes investment in Stage 2 plant to increase the capacity to 36 percent
- further drought response measures or augmentations such as additional recycling schemes
- augmentation of existing dams
- expansion of the Shoalhaven transfer tunnel between Burrawang and Avon Dam (to operate when dam levels fall below 85 percent compared to current 75 percent)
- upgrade of the Upper Canal to facilitate additional transfers from coastal dams and provide greater redundancy and security for the water supply system.

2 NSW Government 2010, 2010 Metropolitan Water Plan.

Recommendation Given the multi-source complexity of water supply systems and the long lead times in commissioning infrastructure projects, Infrastructure NSW recommends that infrastructure planning for Sydney's next supply commence as part of the current review of the 2010 Metropolitan Water Plan.

12.2.3 Upper Canal Program

The Sydney Catchment Authority plans to invest $1.5 billion[3] for the expansion of the Upper Nepean transfer scheme. Over the next 10 to 20 years the proposal is to upgrade the transfer system from the Broughton's Pass to Prospect Water Filtration Plant via either an underground tunnel or pipe to transfer the water which is currently transported in an open canal (Upper Canal).

Infrastructure NSW has concluded that the Upper Canal Program should not proceed until the Metropolitan Water Plan update is completed. This work will determine whether the Upper Canal needs to be expanded in the future to supply more water for Sydney from coastal dams and the Shoalhaven River, the cost of which would be paid by Sydney Water customers. A decision on the proposal should be made when the review is complete.

The proposed canal upgrade is also being driven by risks associated with operating and maintaining the 124-year-old infrastructure and by encroaching development and developer demands on this major component of Sydney's water supply infrastructure.

Infrastructure NSW supports further investigation into how developers might contribute to the capital costs associated with development proposals that impact on the canal's operation and pay for the capital costs directly driven by the impact of their activities on the Upper Canal.

The decisions about these investments are made more difficult by the current organisational arrangements. Infrastructure NSW has found that responsibility for planning for Sydney's water supply is disaggregated.

In the next 20 years, significant investment is required for water for the Sydney area, the scale of which is many times the Sydney Catchment Authority's capital program average spend which is $40 million per annum. Sydney Water receives 99 percent of Sydney Catchment Authority's water and pays a largely (80 percent) fixed charge. This means that there is no effective efficiency or competitive incentive arrangement between Sydney Catchment Authority and Sydney Water. The cost burden of two separate organisations is passed to customers.

Infrastructure NSW notes that potential benefits of transferring water assets would be improved execution efficiency capability, and reduced capital and operating cost.

12.2.4 Hunter and Central Coast regions

The Hunter region's water supply is far less secure than that of the Sydney metropolitan area. Water storages in the Hunter are relatively small or shallow and subject to significant evaporation losses in drought conditions. However, unlike metropolitan Sydney, the Hunter region has useful groundwater resources. These should be further investigated and considered in future supply planning, particularly as drought reserves.

During the recent drought affecting the Central Coast, a water transfer pipeline was constructed connecting the Hunter Region with the Central Coast. The ability to move water between these two regions increases security of supply and resilience.

Hunter Water is developing an Interim Drought Management Plan. This plan outlines measures that would be undertaken on the demand and supply side for commercial industrial customers and households should the Hunter region experience dry conditions.

The NSW Government has identified the need for a new water plan for the Lower Hunter, and the Metropolitan Water Directorate is developing the Lower Hunter Water Plan. A key element of the new Lower Hunter Water Plan will be a suite of drought response measures.

Infrastructure NSW has concluded that the Hunter will need a major new water supply source by around 2020, the time to be verified by the Metropolitan Water Director's plan. The decision not to proceed with the Tillegra Dam means that a further option(s) is required within the next 10 years. Hunter Water is currently developing options as part of its water management planning exercise (in conjunction with the Metropolitan Water Directorate). The NSW Government (State Water) is investigating Lostock Dam.

Options include:

- water sharing arrangements with the Central Coast including the option of water banking and transfers

3 NSW Government, 2012-13 Budget Paper 4; NPV total project nominal cost $2.1 billion.

- new or upgraded storage dams including Chichester, Lostock and Grahamstown options
- desalination and water recycling
- accessing groundwater reserves – particularly during times of drought and then replenishing during good times to allow the reserves to recover
- demand management.

Recommendation Infrastructure NSW recommends augmentation of supply for the Hunter region within the next 10 years.

12.3 Regional water and wastewater

12.3.1 Local water utilities

Local Government-owned local water utilities (LWUs) are responsible for non-metropolitan water supply and wastewater management systems that have not seen the same increases in infrastructure spending as the metropolitan network.

As water supply and wastewater treatment options become increasingly more complex, the ability of small remote LWUs to deliver required services and maintain assets efficiently is severely constrained.

A number of reports to the NSW Government have recommended a review of the arrangements and aggregation of the NSW non-metropolitan sector.

Over the next 20 years, water and wastewater systems in regional areas are forecast to require significant investment for renewal and development of new facilities in regional areas. While this is largely funded through user charges, the Government provides direct support to local councils to ensure minimum standards. These requirements need to be prioritised with other competing State infrastructure needs for limited available funding.

To maximise the efficiency of water and wastewater management, aggregation of water and wastewater delivery needs to occur across Regional NSW. This process would be aligned with decisions about water infrastructure investment programs.

Recommendation Infrastructure NSW recommends the various key conclusions for changes to regional water supply arrangements be considered, including aggregation of (from 105 to around 30 authorities) water and wastewater delivery authorities.

12.3.2 Quality of service

Generally, regional water quality and wastewater performance is lower than metropolitan water utilities (particularly in relation to water quality). Ensuring compliance with national health and environmental guidelines and standards therefore is a major driver of the need for additional infrastructure investment in regional water and sewerage systems.

The Government has been funding backlog infrastructure to bring all schemes to the national health and environment guidelines. The majority of these (70 per cent) have related to sewerage works required to address health and environmental requirements.

The NSW Office of Water (NOW) estimates that just under $1 billion is needed to bring all water supply systems to minimum drinking quality guidelines/ standards and to bring all sewerage systems to minimum environmental standards, incorporating $300 million of new State Government funding. A cost benefit analysis and assessment of affordability and funding share are yet to be carried out for this work.

Recommendation Infrastructure NSW recommends a prioritised program of work is undertaken across Regional NSW to bring water and sewerage systems up to required minimum drinking quality and environmental standards.

12.3.3 Regional water security

Total demand in regional areas has fallen by over 30 per cent in the past 10 years. Most LWUs applied water restrictions during this time.

Future demographic changes, including declining populations in some areas and the impacts on demand of new mining and energy developments in other areas, make demand forecasting difficult. NSW Government policy and objectives for growth in the regions may also generate additional demand. The Office of Water estimates that regional water utilities have not in general factored successful implementation of the NSW 2021 Plan into infrastructure plans.

Climate variability is a major issue for forecasting secure water supply. The Office of Water has conducted pilot studies that indicate that LWUs face varying levels of threat to system yield from projected impacts of climate variability

over the next 30 years. Impacts are predicted to be lowest on the Central and North Coast and highest (approximately 30 percent reduction in yield) for inland utilities in mid and southern NSW.

The NSW Parliament's Standing Committee on State Development is conducting an inquiry into the adequacy of water storages in NSW, which will examine these issues and proposals. While the Inquiry is yet to report, it is clear that new water supply sources are needed for Regional NSW over the next 10 years. A number (yet to be determined) of new dams are needed. Infrastructure NSW notes that dams need to be planned before the next drought cycle.

NSW Office of Water estimates that $2.6 billion may be required for higher economic growth with $1.3 billion required to counter the impacts of climate variability over 30 years. This work is in addition to the utilities current 30-year capital program of nearly $11 billion[4].

A cost benefit analysis and assessment of affordability, impact on water markets and "take" levels under Federal agreements are yet to be carried out for this work.

The Government is considering a number of dams for urban and industrial demand in regional centres including:

- Lostock Dam augmentation in the Hunter catchment
- a second Fish River storage in the Macquarie catchment
- a 'New Carcoar' dam in the Lachlan catchment.

These projects are yet to be appraised and considered for funding.

Infrastructure NSW has noted that responsibilities for dams are disaggregated across the sector, partly due to the previous Government's 'no new dams' policy.

Responsibility is divided between the Metropolitan Water Directorate, NSW Office of Water, State Water, local water authorities and advisory bodies including the Dam Safety Committee and the Office of Environment and Heritage.

Development of a comprehensive, state-wide program for dams (both water supply and flood mitigation functions) needs to be scoped, a business case prepared and program assessed as a matter of priority.

Recommendation Infrastructure NSW recommends the development of a comprehensive, prioritised program of new and refurbished regional dams throughout NSW to address the impacts of climate variability and drought scenarios.

12.4 Private supply of water services and connection infrastructure

A large proportion of future investment in new reticulation and connection is infrastructure in greenfield property and business developments. Competition has been in place since 2006 under the *Water Industry Competition Act 2006*. Developers are able to engage with private water utilities to provide decentralised schemes to shorten lead times for land release or reduce the cost of connection infrastructure.

However there are barriers to private participation including:

- demand forecasts and urban planning information are not generally known to the market
- lack of agglomeration of connection sites – a private supplier requires around 1,500 customers in one area to be viable.

The private market has focussed over recent years on decentralised systems and provision of recycled water as a bundled product.

Infrastructure NSW notes that increased involvement of the private sector potentially changes the demand for direct Government investment over the longer term. The NSW Government has announced measures to introduce contestability in the provision of water and road infrastructure required for new developments (homes or businesses). Contestability is already in place for new electricity infrastructure.

Road, water and electricity infrastructure accounts for the majority of the increased cost of suburban development. Private supply of water services and connection infrastructure is expected to significantly lower this cost.

12.5 Flood mitigation

12.5.1 Protecting people and the NSW economy

Just as drought is a certainty in Australia, and central to water supply questions, floods are another natural disaster that must be regularly confronted and managed by both the community and government.

4 NSW Office of Water.

In response to issues relevant to the resilience of NSW infrastructure in severe flood events, outlined in the Greater Sydney section 4. Infrastructure NSW commissioned a study to update data on flood impacts in the Hawkesbury Nepean Valley (HNV)[5].

12.5.2 Findings HNV flood damages study

In 2012, there are 21,000 residential buildings in the flood plain, more than 5,000 more than previously estimated. There is an additional 143 hectares of commercial and industrial property that has been added to the floodplain since 1990.

A repeat of the 1867 flood, the largest on record, could be expected to cause direct damages in the order of $1.7 billion and $3 billion in total tangible damages. Included in the damages cost is flooding of 7,600 homes above floor level and the destruction of 1,200 homes.

A flood with a 1 in 1,000 chance occurrence per year, such as occurred in some Queensland catchments in 2011, would be expected to cause $4.3 billion in direct damages and an estimated $8 billion in total tangible damages in the HNV. It would flood 14,000 homes above floor level and destroy 6,500 homes. At risk would be 43,000 residents and 9,000 employees of local businesses. The impact of such a disaster would be felt across the NSW and Australian economy and impact negatively on people and businesses outside the HNV. The western railway line, for example, would be disrupted for up to six months which affects coal and other freight exports from Central and Western NSW. It would also disrupt 6,000 daily train commuters from the Blue Mountains and passenger services from Central and Western NSW.

Flooding is a significant planning issue in the HNV. While in general, development is allowed at or above 1 in 100 year flood planning levels, the capacity of designated evacuation routes is a major constraint. Infrastructure NSW has been made aware of approximately 8,000 residential lots and 60 hectares of commercial and industrial land that have not been developed due to evacuation constraints. (This is not a comprehensive survey of existing constraints)[6].

There are a number of other developments currently in the planning phase where it is likely that flooding constraints will be a significant factor including Penrith Panthers Redevelopment, Riverstone West Industrial Development, Schofields Precinct Development and Marsden Park Development. These include more than 8,500 residential lots and over 150 hectares of commercial and industrial land[7].

The State Emergency Service (SES) currently has plans to evacuate tens of thousands of people in floods above the 1 in 40 event with up to 60,000 needing evacuation in a repeat of the 1867 flood. Recent studies suggest the number is now closer to 90,000.

A 2011 report specifically on flood evacuation in the HNV[8], commissioned by the (then) Department of Planning, identified that in a major flood event today, in some scenarios, more than 22,000 people would not have time to evacuate due to inadequate road evacuation infrastructure. To remove the evacuation constraints major road upgrades are required, including upgrading the M4 Motorway or the Great Western Highway to prevent queuing for Penrith and Richmond evacuation traffic.

It is estimated the cost for upgrading the roads to allow people in the HNV to safely evacuate is at least $400 million to $600 million. At a minimum, this action should be taken if major flood mitigation is not provided in the HNV. Should the population in the Valley continue to increase as planned then further road upgrades will be required.

As part of its study[9] Infrastructure NSW had a cost benefit analysis undertaken of providing significant flood mitigation to the HNV by raising Warragamba Dam wall. The project has one of the highest benefit to cost ratios (BCR) of the projects recommended by Infrastructure NSW. At an estimated cost of at least $0.5 billion the minimum BCR, based on a range of sensitivities, was higher than one, with an expected level of over two. These estimates are based on the expected average impact of all possible flood events (minor and major) and do not give any extra weight to severe events to reflect risk aversion (though that could be justified given the major impacts a major flood would have on the NSW economy). In addition the quantified benefits are limited primarily to property damage to homes and businesses and are believed to be conservative. They exclude, amongst other things, the cost of total building failures and business failures, and intangible costs such as risk to human life and trauma.

5 Molino Stewart 2012, Hawkesbury – Nepean Flood Damages Report.

6 Molino Stewart 2012, Flood Mitigation in the Hawkesbury – Nepean Valley: Answers to some recent questions.

7 Molino Stewart 2012, Flood Mitigation in the Hawkesbury – Nepean Valley: Answers to some recent questions.

8 Molino Stewart 2011, North West Sector Flood Evacuation Analysis.

9 Molino Stewart 2012, Hawkesbury – Nepean Flood Damages Report.

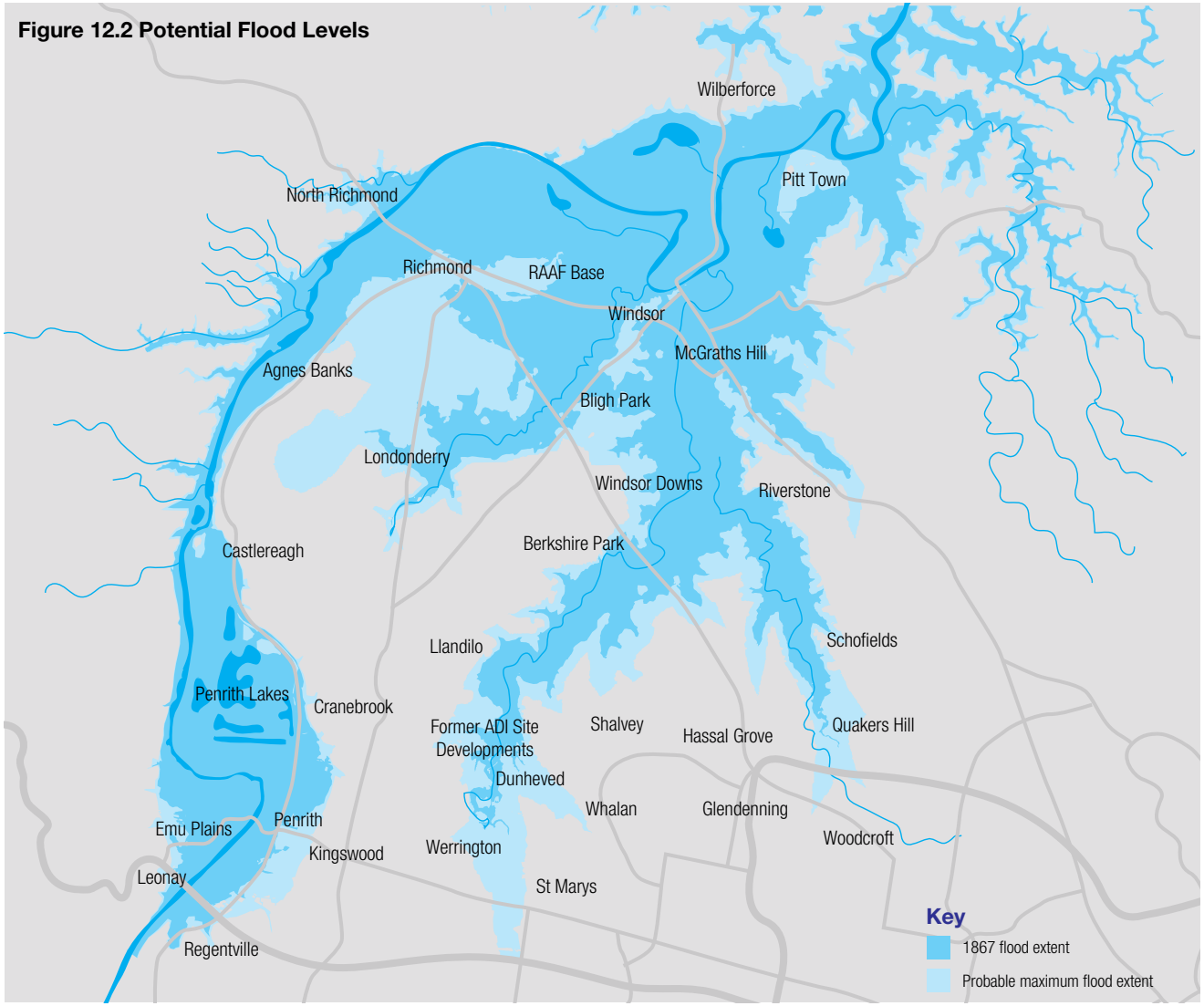
A more detailed review of all the options to mitigate flooding in the HNV needs to be undertaken using the latest data available.

The decision taken in the 1990s of managing the issue through evacuation and planning has had either limited impact or benefit, or has been completely inadequate in reducing the social and economic impacts of flooding in the HNV.

Recommendation Infrastructure NSW recommends the NSW Government review all the major flood mitigation options available, including raising the Warragamba Dam wall, to significantly reduce the potential economic and social impact of flooding in the Hawkesbury Nepean Valley.

If major flood mitigation is not provided, roads in the HNV should be upgraded to ensure people can evacuate.

Figure 12.2 Potential Flood Levels



12.5.3 Governance of flood management in NSW

Infrastructure NSW has noted that an underlying problem inhibiting effective flood management in NSW is the lack of clear governance. Current arrangements spread responsibility for flood management across multiple Government agencies and local councils. The lack of clear accountability creates the risk of inadequate risk management, and the dispersion of responsibility to councils without adequate overarching governance creates the risk of sub-optimal flood management, which in some cases may be reflected in excessively stringent planning development controls (with consequences for housing supply), as well as insufficient management of major risks.

To ensure that flood management issues are adequately addressed, including assessment of the option to raise the Warragamba Dam wall, it is recommended that the Government immediately conduct a review of current responsibilities with a view to ensuring a single entity has clear accountability for flood management within the State Government.

12.6 Recommended actions

The key strategies for water infrastructure are summarised below.

	Recommendation	Time years	Type	Cost and funding implications
51	**Hawkesbury Nepean floodplain implement mitigation measures**	0 – 5	Major project	Scoping of $500 million, depending on option approved. Costs recoverable through user charges if included in regulated asset base.
52	**Merge regional water authorities from 105 to around 30**	0 – 5	Review	Assume revenue neutrality for Government.
53	**Water and wastewater upgrades in regional towns to meet national standards**	5 – 20	Program	Scoping of $700 million, of which $200 million assumed to be user funded.
54	**Regional dam construction and safety upgrades**	5 – 20	Program	Scoping of $400 million.
55	**Augment Hunter region water supply**	5 – 10	Major project	Scoping of $500 million. Costs recoverable through user charges over time.
56	**Augment metropolitan Sydney water supply**	10 – 20	Major project	No reliable cost estimate available until next revision of Metropolitan Water Plan.