Resilient Valley, Resilient Communities

Hawkesbury-Nepean Valley
Flood Risk Management Strategy
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Executive summary

Resilient Valley, Resilient Communities – the Hawkesbury-Nepean Valley Flood Risk Management Strategy (the Flood Strategy) is a comprehensive long-term framework for the NSW Government, local councils, businesses and the community to work together to reduce and manage the flood risk in the Hawkesbury-Nepean Valley.

This Flood Strategy addresses flooding from the Hawkesbury-Nepean River between Bents Basin, near Wallacia, and the Brooklyn Bridge. This area – referred to as the Hawkesbury-Nepean Valley (the Valley) – covers 425 square kilometres of floodplain and falls mainly within four fast-growing Local Government Areas in Western Sydney: Penrith City, Hawkesbury City, The Hills Shire and Blacktown City. It includes the population centres of Penrith, Richmond and Windsor and many surrounding suburbs.

The Valley has a high flood hazard, with both historical and geological evidence of widespread flooding across the Valley. Climate change may further increase the severity and frequency of the flood hazard in the future.

There is also a high level of flood exposure as the floodplain is located in an area with a large and growing population, and one of Australia's most significant and diverse economies. Expanding urban development across the Valley means that flood exposure will increase in the future. Up to 134,000 people live and work on the floodplain and could require evacuation. This number is forecast to double over the next 30 years. Over 25,000 residential properties and two million square metres of commercial space are currently subject to flood risk, and this will increase significantly in the coming years.

Strategy objectives and vision

The objective of the Flood Strategy is to reduce flood risk to life, property and social amenity from regional floods in the Hawkesbury-Nepean Valley now and in the future.

The Flood Strategy's vision is for Hawkesbury-Nepean Valley communities and all levels of government to adapt to flooding by working together to:

- **understand** and be **fully aware** of flood risk
- **act** to reduce flood risk and manage growth
- be **ready** to respond and recover from flooding.

The flood risk is heightened by a number of factors:

- insufficient road capacity to safely evacuate the whole population in a timely fashion
- a fragmented approach to managing flood risk
- low community awareness about the flood risk.

The Insurance Council of Australia considers this Valley to have the highest single flood exposure in New South Wales, if not Australia.

A Stakeholder Reference Panel was established to enable collaboration with local councils on the Penrith and Richmond-Windsor floodplains (Penrith City Council, Hawkesbury City Council, The Hills Shire Council and Blacktown City Council), Western Sydney Regional Organisation of Councils (WSROC), Sydney Water Corporation, Floodplain Management Australia and the Insurance Council of Australia.

The Taskforce developed a methodology to select the best mix of infrastructure and non-infrastructure measures to reduce flood risk in the Valley for inclusion in the Flood Strategy. This approach is outlined in the following box.

The results of the Taskforce's investigation of current and future conditions and flood risk are provided in section 2. The shortlisting, evaluation and selection of options are described in section 3.

The Flood Strategy is aligned with the 2011 National Strategy for Disaster Resilience and the broader emergency management framework set out in the *State Emergency and Rescue Management Act 1989*. These aspects of the Taskforce's work are presented in section 4.

Notes

2. Further information on the 2013 Review Reports is available at <http://www.water.nsw.gov.au/water-management/water-availability/flood-management/hawkesbury-nepean-valley-flood-management-review>.

The Taskforce's approach

The Taskforce developed the following methodology to select the best mix of infrastructure and non-infrastructure measures to reduce flood risk for inclusion in the Flood Strategy:

1. **Establishing the different levels of urban development (population) that could occur in the Valley by 2041**
2. **Assessing current and future flood risk in terms of flood damages and risk to life, including consideration of climate change**
3. **Further investigating infrastructure options identified in the 2013 Review to create a shortlist for final evaluation**
4. **Evaluating infrastructure options for the development of the Flood Strategy.**

1. Establishing levels of urban development to 2041

An urban forecasting methodology and spatial database of current forecast urban development were developed for the Valley. These were based on information from the NSW Department of Planning and Environment, Bureau of Transport Statistics (BTS, part of Transport for NSW), local councils, NSW Land and Property Information and the Australian Bureau of Statistics. They provided the information for assessing flood risk to life and damage.

The Taskforce assumed that the identified potential urban development would largely occur by 2041. This 25 year time horizon was considered reasonable for strategic planning and as a baseline to assess the impact of different measures to reduce flood risk.

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Climate change may increase the Valley's flood hazard

The Valley's high flood hazard may increase in the future as a result of climate change. Climate change has the potential to alter the frequency and severity of rainfall extremes, change rainfall patterns and increase the likelihood of flooding in the Valley.

In 2016, the Australian Government updated Australian Rainfall and Runoff (AR&R)[5] – the national guideline for estimating flood characteristics in Australia. AR&R indicates that there is likely to be increased rainfall intensity with an associated increase in flooding in Australia generally and in the Valley as a result of climate change.[6] For example, a 2°C increase in temperature would result in a 10% increase in rainfall intensity.[7]

In coastal NSW, including the Valley, flash flooding, river flooding, hail, wind and coastal erosion due to very rough seas, are often associated with low-pressure systems off the Australian east coast. These weather systems are referred to as East Coast Lows (ECLs) and occur on average 10 times each year. Floods in the Valley are usually associated with ECLs, as are most floods in coastal south-eastern Australia.[8]

The Eastern Seaboard Climate Change Initiative – East Coast Lows (ESCCI-ECL) program is a research cooperative led by the NSW Office of Environment and Heritage that provides information on future possible changes in the frequency and intensity of ECLs as a result of climate change. It has found that while there may be a decrease in the number of small to moderate ECLs in the cool season with little change in these storms during the warm season, extreme ECLs in the warmer months may increase in number, further increasing the flood risk.[9]

Patterns of the El Niño–Southern Oscillation (ENSO) cycle and other climatic influences may also be affected by climate change, leading to increased flooding. Although large uncertainties exist about the future pattern, El Niño years experienced in NSW are likely to continue to result in lower than average rainfall and become hotter.[10] By comparison, La Niña years are expected to continue to result in higher than average rainfall and become warmer, with storms producing heavy downpours likely to become more frequent, with flooding increasing during these years.[11]

A high flood risk

A large and growing urban population

Although large flood events are infrequent, they have high economic and social consequences that will increase with population growth, residential and commercial development.

The Hawkesbury-Nepean Valley is changing from a semi-rural landscape to an urbanised floodplain, and includes parts of Greater Sydney's rapidly growing North West Growth sector. Up to 134,000 people live and work on the floodplain and could require evacuation. This number is forecast to double over the next 30 years.

Over 25,000 residential properties and two million square metres of commercial space are currently subject to flood risk, and this will significantly increase in the coming years.