

# ***Resilient Valley, Resilient Communities*** **Hawkesbury-Nepean Valley** **Flood Risk Management Strategy**

## **Frequently asked questions**

### **Flooding in the Hawkesbury-Nepean Valley**

#### **What is the largest flood that has happened in the Hawkesbury-Nepean Valley?**

The largest flood since European settlement happened in June 1867 - 150 years ago this year. That flood was a rare and catastrophic event, reaching around 19.7 metres above normal river height at Windsor. It is estimated to have been a flood with a 1 in 250 to a 1 in 500 chance of happening in any given year (depending on location).

By way of comparison, the major flood in Brisbane in 2011 has been described as being around a 1 in 100 (or a 1%) chance per year event in some locations.

#### **When will the next major flood happen in the Hawkesbury-Nepean Valley?**

It's impossible to say when the next major flood will happen. History has shown that major floods can happen numerous times within a single decade, or they may not happen again for many years. For example, the Hawkesbury River at Windsor experienced five major floods in 13 years from 1806 to 1819, and three major floods - including the two highest floods on record - in only six years from 1864 to 1870.

More recently, there were three major floods from 1956 to 1964, two of which were after Warragamba Dam was built. The last major flood at Windsor was in 1990. The absence of major floods since then in no way suggests that this relatively flood-free period will continue.

#### **What if a flood happened now in the Hawkesbury-Nepean Valley?**

In recognition of the major flood risk in the valley, the NSW State Emergency Service (SES) has prepared the Hawkesbury-Nepean Flood Plan to help manage floods in the region. This plan allocates responsibilities to the agencies and organisations that manage the preparation for, response to, and recovery from floods. This plan is reviewed regularly.

#### **How do people know if they are in a flood-prone area?**

Local councils are primarily responsible for managing flood-prone land in their local government area. Residents can contact their local council to request flood information related to their property.



## **What can people do to prepare for a flood?**

It's important for people living and working in the valley to understand their flood risk and be prepared. Information on flood emergency management and what people can do to prepare for a flood can be found on the NSW SES website – [www.ses.nsw.gov.au](http://www.ses.nsw.gov.au). It is vital that people be alert to flood warnings and respond to evacuation orders.

## **The Flood Strategy**

### **Why do we need a flood strategy for the Hawkesbury-Nepean Valley?**

The Hawkesbury-Nepean Valley has the highest single flood exposure in NSW, if not Australia. Due to the unique landscape of this highly populated area, floods in the valley pose a significant potential risk to life and property.

For example, a flood similar to the 2011 Queensland floods would require the evacuation of over 64,000 people in the Hawkesbury-Nepean Valley and cause damage to thousands of homes and businesses, costing at least \$2 billion.

### **Why is there such a high flood risk in the Hawkesbury-Nepean Valley?**

Most rivers widen as they approach the sea. This isn't the case in the Hawkesbury-Nepean, where narrow downstream gorges between Sackville and Brooklyn create 'choke points' slowing the escape of floodwaters.

This contributes to extensive, deep and prolonged regional flooding when large inflows from major river tributaries back up in the floodplain. Much like a bathtub with several taps turned on, but only one plug hole to let the water out.

### **What is the Flood Strategy?**

The Flood Strategy is a long-term plan for the NSW Government, local councils, businesses and the community working together to manage the risk posed by regional floods in the Hawkesbury-Nepean Valley. It aims to reduce the potential flood risk to life, the community and the economy.

Phase One (2016 to 2020) is focused on shorter term actions to reduce flood risk, including:

- detailed design work, environmental impact and planning assessment leading to a full business case for raising Warragamba Dam by around 14 metres for flood mitigation
- a regional approach to flood risk land use, road and emergency planning
- better information for the community about flood risk and being prepared for floods
- improved evacuation road signage
- an improved flood forecasting model to support evacuation
- ongoing improvements to flood emergency response and recovery
- business cases for priority local evacuation road infrastructure upgrades.

### **What area does the Flood Strategy cover?**

The Flood Strategy covers the Nepean and Hawkesbury river floodplains - from Bents Basin near Wallacia to the Brooklyn Bridge - taking in approximately 425 square kilometres. It includes four fast-growing local government areas - Penrith City, Hawkesbury City, The Hills Shire and Blacktown City.

## **Who is implementing the Flood Strategy?**

This is a whole of government exercise involving many agencies and local councils in consultation with the community. Infrastructure NSW (INSW) is managing and coordinating Phase One through to 2020.

Local councils will remain primarily responsible for managing flood prone land in their local government areas.

## **How much will the Flood Strategy cost?**

The NSW Government has allocated \$58 million over four years (2016-2020) to implement Phase One of the strategy. Thirty million dollars has been allocated to undertake detailed concept designs, environmental assessments and preparation of the full business case for raising Warragamba Dam by around 14 metres to provide flood mitigation.

An additional \$28 million has been allocated to deliver non-infrastructure actions including: community engagement and education, new evacuation signage, better flood forecasting, and integrating flood risk management with regional land use planning.

The longer-term cost of implementing the strategy, including raising Warragamba Dam, is expected to be around \$800 million (2015 dollars). The dam wall raising is estimated to cost about \$690 million (2015 dollars).

## **Was climate change considered in developing the Flood Strategy?**

Yes. Understanding future climate conditions was an important part of the flood modelling done to assess likely future flood risk. The frequency of major floods is influenced by the climate at the time, so floods were modelled under current and projected climate conditions through to 2090. With projected climate change, the flood risk could increase. The Flood Strategy will be periodically reviewed to take account of the latest information on climate change.

## **Proposal to raise Warragamba Dam**

### **Why raise Warragamba Dam?**

Warragamba Dam is on the Warragamba River – one of the major tributaries to the Hawkesbury-Nepean River. Warragamba is Sydney's largest water storage dam. It is not built or operated to manage or mitigate floods.

In developing the Flood Strategy, one infrastructure option investigated was to raise the height of the existing Warragamba Dam to provide flood mitigation by creating 'airspace' behind the raised dam. This would reduce flood risk by temporarily holding back and releasing floodwaters coming from the large Warragamba Catchment. The dam raising would significantly reduce the flood risk to life and property, including the worst floods on record, and increase the certainty of time for evacuation.

It was found that raising the dam by around 14 metres is the infrastructure option with the highest benefit – significantly reducing the risk to life downstream, and reducing flood damages by around 75% on average.

### **Would raising Warragamba Dam by more than 14 metres eliminate flood risk in the Hawkesbury-Nepean Valley?**

No. The dam raising will significantly reduce the flood risk, including the worst floods on record, but not eliminate it completely. It is not possible to build a dam high enough to capture the most extreme, rare floods possible in the valley.

Modelling shows that the optimal height to maximise flood mitigation benefit is about 14 metres. This reduces the chance of regional floods impacting the most highly populated areas of the Hawkesbury-Nepean Valley.

And while flows from Warragamba Dam are involved in all major regional flood events that pose greatest risk to life and property, localised and low level regional flooding will still occur in the Valley. This is due to rainfall in areas outside the Warragamba Catchment. For example, in August 1986 and May 2016, the comparatively low flood peaks at Windsor were caused primarily by inflows from the Nepean River, Grose River and South Creek, with much lesser contribution from Warragamba Dam.

### **What are the next steps in the Warragamba Dam raising project and what opportunities are there for community consultation?**

WaterNSW, as the owner and operator of Warragamba Dam, is leading the dam raising project and over three years (2017-2019) will prepare detailed concept designs and a comprehensive environmental impact statement (EIS) to obtain environmental and planning approvals. Community and stakeholder consultation is an important part of this EIS process.

A final business case will be prepared for consideration by the NSW Government. Construction, which is estimated to take four years to complete, can only begin when the environmental and planning approvals are granted.

### **Land use in the Hawkesbury-Nepean Valley**

#### **What impact will the Flood Strategy have on development in the Hawkesbury-Nepean Valley?**

The Department of Planning and Environment is leading development of a Regional Land Use Planning Framework for the valley. This regional framework will take into account new region-wide flood and evacuation modelling, and a Regional Evacuation Road Masterplan. This work is underway.

#### **Will more land be released in the valley if Warragamba Dam is raised?**

The Warragamba Dam raising is designed to reduce flood risk for the current and future population. As the dam raising will not eliminate that risk entirely, land use will still need to be carefully managed. The area subject to current flood-related development controls (based on the 1 in 100 chance per year flood level) would still be subject to those controls to ensure the benefits from the dam raising are maintained over time.

### **Want to know more?**

#### **How can I find out more or keep updated about implementation of the Flood Strategy?**

The full Flood Strategy is available in an online accessible version at [www.insw.com/flood-strategy](http://www.insw.com/flood-strategy). As we implement the Flood Strategy, updates and further information will be available on this website.

If you have a question or would like to share information about flooding in the Hawkesbury-Nepean Valley, you can email the Hawkesbury-Nepean Valley Flood Risk Management Directorate in Infrastructure NSW at [floodstrategy@insw.com](mailto:floodstrategy@insw.com)