



2019  
Community  
Update



Floodwaters at Windsor 1988. Photo: RAAF

Flood  
Strategy

# New flood study for the Hawkesbury-Nepean

There have been about 130 moderate to major floods in the valley since records began in the 1790s.

Although there have been no serious floods in the Hawkesbury-Nepean River since the early 1990s, the valley has a long history of damaging and dangerous floods.

The best available flood information is needed to manage the significant risk to people's lives and property.

Flood modelling and science have changed considerably since the last region-wide flood studies were produced more than 20 years ago.

As a key part of *Resilient Valley, Resilient Communities* - Hawkesbury-Nepean Valley Flood Risk Management Strategy (Flood Strategy), the NSW Government has prepared a new regional flood study providing the most up to date information on river flooding.

The Hawkesbury-Nepean Valley Regional Flood Study 2019 (Regional Flood Study) describes the

existing flood behaviour of the river from Bents Basin near Wallacia to Brooklyn Bridge, and backwater flooding in South Creek and Eastern Creek caused by the river flooding.

The Regional Flood Study uses the latest data available and a sound scientific approach, and has been reviewed by independent flood experts. It was completed in liaison with councils in the Hawkesbury-Nepean Valley. You can find out more about the Regional Flood Study at [www.insw.com/flood-strategy](http://www.insw.com/flood-strategy).

**A flood study** is a technical investigation of the way floods happen within a river catchment. It is a vital part of floodplain management. The aim of a flood study is to define existing flood behaviour, particularly the chance and severity of different sized floods happening.

# Types of flooding

In Australia, the most common form of flooding is along rivers after heavy rainfall. This is called river or riverine flooding. This type of flooding from the Hawkesbury-Nepean River covers a large area, is deep and can last for days.

The Regional Flood Study provides the best available regional flood information for river flooding in the Hawkesbury-Nepean Valley.

Local flooding caused by runoff during rain events and from the overflow of urban drainage systems - known as overland or flash flooding - can also be a major problem, particularly in heavily populated areas. Detailed studies of this shorter duration, overland flooding are normally undertaken by local councils.

Low lying coastal areas can be inundated by a third type of flooding - storm surges - usually caused by tropical cyclones.

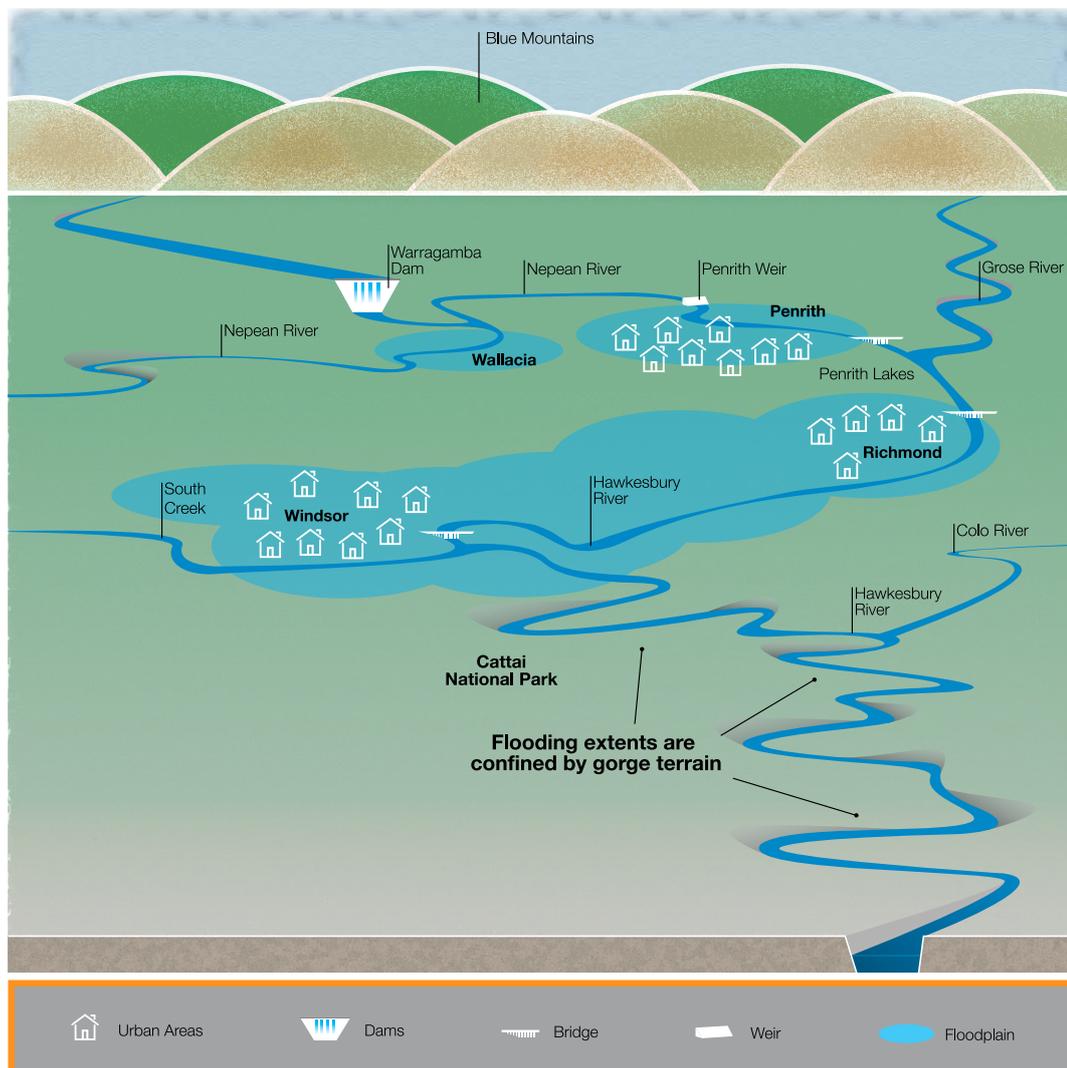
# A unique floodplain

Modelling river flooding in the Hawkesbury-Nepean Valley is complicated because of the many tributaries and their catchments that contribute to the floods.

The main tributaries are:

- » Nepean River
- » Warragamba River
- » Grose River
- » South Creek
- » Colo River
- » Macdonald River.

Floodwaters from these tributaries back up behind natural choke points created by narrow sandstone gorges (see illustration below). This can cause rapid, deep and widespread flooding.



**Floodwaters back up in the Hawkesbury-Nepean Valley in three main floodplains at Wallacia, Penrith/Emu Plains, and Richmond/Windsor.**

## How does the new flood study affect me?

Over coming months, the Regional Flood Study will be used to help people living in the valley understand their flood risk and hazards.

The Regional Flood Study will also inform and support:

- » **emergency management and evacuation plans** – including the NSW State Emergency Service's *Hawkesbury Nepean Flood Plan* – which require a detailed understanding of how floods behave and vary
- » **regional land use and road planning** including a new regional land use planning framework and road evacuation masterplan
- » **local council planning** including local environmental plans, development control plans and other council flood plans and policies
- » **more accurate pricing of flood risk** to help property owners make decisions about flood risk mitigation, and for the insurance industry to more accurately price insurance premiums.



### Did you know?

The technical term used to describe the chance of a flood happening is Annual Exceedance Probability (AEP).

The AEP is normally expressed as the likelihood of a particular size flood, or larger, happening in any given year. The terms '1 in 100 AEP, or '100 year flood' refers to a flood that has a 1 in 100 (or 1%) chance of happening or being exceeded in any one year. It does not mean that the flood will happen once every hundred years.

Another way to think about a 1 in 100 chance per year flood is that it has a 55% chance of happening in an 80 year lifespan.

## Regional Flood Study results

The Regional Flood Study provides the most up-to-date information for events ranging from frequent to very rare floods. It details flooding for 11 different flood events, ranging from frequent floods with a 1 in 5 (20%) chance per year, through to the rarest event, known as the probable maximum flood (PMF).

### Key findings

This Regional Flood Study reinforced why the flood risk in the Hawkesbury-Nepean Valley is so high – the flooding can be so much deeper in this valley than in other floodplains.

#### » **Difference between 1 in 100 (1%) chance per year flood and PMF**

In the Hawkesbury-Nepean there is large range in depth between the 1 in 100 (1%) chance per year flood and the PMF. In most floodplains the difference is typically two to three metres. However, in this valley the difference is seven metres at Penrith/Emu Plains, and nine metres at Richmond/Windsor.

#### » **Extent of flooding**

In a 1 in 500 (0.2%) chance per year event, the flood can be up to 20 kilometres wide in the Richmond/Windsor floodplain. This is similar to the worst flood on record (1867 flood). A flood like this has a 15% chance of happening in an 80 year lifetime.

#### » **Variability of flooding**

The Regional Flood Study has reinforced that every flood is different.

The study shows that at North Richmond, the rate of rise can vary between 0.3 to 1.4 metres/hour, even when the same peak is reached (19.8m for a 1 in 500 chance per year event). This knowledge is important for evacuation planning.

The study also allows for different initial storage levels in Warragamba Dam. If the storage level behind the dam is very low, it can help hold back inflows during floods. However, in large rainfall events, the dam can fill and spill quickly.

If the storage is close to full, the dam cannot hold these inflows back. History shows that most large floods occur during wet periods when the dam is nearly full. This variability is taken into account in the new study.

# My flood risk – find out more?

The results of the Regional Flood Study have been used to develop new Hawkesbury-Nepean resources on the NSW SES website.

This new information makes it easier for people living and working in the valley to understand their risk and prepare for floods. The resources include maps with information on key risk areas, along with videos, fact sheets and Q&As. You can find the new resources at [www.ses.nsw.gov.au/hawkesbury-nepean-floods](http://www.ses.nsw.gov.au/hawkesbury-nepean-floods)

Later in 2019, the website will be further enhanced with a new interactive flood mapping tool being developed so people can search for maps and information related to their particular suburb in the floodplain.



New Hawkesbury-Nepean flood risk information is available on the NSW SES website.

## Building community resilience

The community's awareness and preparedness can significantly reduce the risk to life from floods.

Community preparedness can also influence property damage and post-flood recovery. 'Flood-ready' households may raise and relocate movable items, invest in flood-compatible building materials, and take out flood insurance.

There are around 100,000 people who live in the Hawkesbury-Nepean River floodplain. Many more people could also be affected in a major flood due to loss of transport, power, telecommunications and other services.

Social research in 2018 showed that only 18% of valley residents thought there was a high flood

risk, while 31% believed there was no risk of flooding. Around 79% of residents said they have done nothing to prepare for flooding.

The Flood Strategy includes a Community Resilience Program which aims to increase the community's awareness and preparedness for floods now and into the future. It includes a flood awareness campaign, resources and emergency planning for schools, and work to build the resilience of people and communities most vulnerable to floods. For more information visit [www.insw.com/flood-strategy](http://www.insw.com/flood-strategy)



Awareness and training for agencies responsible for vulnerable sectors of the community are key to building resilience.

## A focus on the future

The NSW Government and Western Sydney University have partnered to develop a curriculum-linked high school geography resource based on a case study of flooding in the Hawkesbury Nepean Valley

The new resource for Stage 4 “Water in the World” aims to help high school students understand the risks and potential impact of flooding. It will provide ongoing and sustainable awareness for local and other NSW students about the unique flood risk in the valley.

The classroom resource has been developed in collaboration with all sectors of the education system, and will be piloted in schools in the coming months. It is expected to be available to teachers in late 2019.

## Horse Safety and Care Open Day

Over 90% of owners consider their animals to be part of their family and will want to save them in an emergency.

On Sunday 14 July 2019, horse owners from across the valley headed to the Richmond TAFE Equine Unit to take part in a specialised Horse Care and Safety Open Day.

The day featured masterclasses with former National Champion rider and coach Colleen Brook, film and TV horse trainer Cody Rawson Harris, and high performance showjumping manager Todd Hinde.

NSW SES Volunteer and Large Animal Rescue expert David King urged animal owners to think ahead about what they would do with their animals in an emergency.

“In an emergency, people’s affection for their animals will influence their decision to relocate or evacuate in a timely way,” he said.

“If you own animals it is essential that you develop a plan, for what you would do for all your family – including your animals – in case of severe storms and floods, bush fires, heat waves and other extreme weather events.”

For more information about keeping your animals safe in an emergency go to [www.ses.nsw.gov.au/hawkesbury-nepean-floods](http://www.ses.nsw.gov.au/hawkesbury-nepean-floods)



**Having access to a well-maintained float is vital if you need to evacuate your horse ahead of a flood.**

## Preparing the aged care sector for flooding

Residential aged care providers are a high priority in an emergency due to the high needs of their residents and the complexity of evacuating people with significant mobility and health concerns.

In March 2019, the NSW Government hosted an all-day workshop and training session to help the residential aged care sector prepare for flooding in the Hawkesbury-Nepean Valley.

The workshop was a partnership with Infrastructure NSW, NSW Health, NSW SES and NSW Police. Over 19 residential aged care facility managers, board members and key staff attended.

Participants were given a detailed overview of flooding in the valley and the risks to residential aged care. They worked through flood scenarios to identify the issues or gaps in their current plans in a significant flood event.

Around 82% of participants said the workshop had assisted them to feel better prepared for natural disasters such as floods. A follow up workshop is being held in September 2019.

## Beyond the emergency assembly point

One of the main reasons people drive back into areas after an emergency evacuation has been ordered is because they are concerned about their children.

The NSW Government has partnered with the Australian Red Cross to deliver workshops for children's services in the Hawkesbury-Nepean Valley to better prepare them and their clients for emergencies.

The Red Cross 'Beyond the Emergency Assembly Point' workshops drew on the expertise of the NSW SES, Rural Fire Service, NSW Police and Fire and Rescue. The workshops covered all local hazards with a focus on flooding in the region.

Workshop feedback included:

*'The emergency services gave accurate and in-depth information about what their roles are and what we do in real-life situation'*

*'Really interesting. I was somewhat naive to the impact or likelihood of emergency directly surrounding our services'*

Three workshops have been held in Penrith and Windsor with support from local councils.



**Workshops in emergency preparedness for children's services in the Hawkesbury-Nepean Valley have been well received.**

# Cross-agency exercise tests emergency response

In June 2019, emergency service agencies and 500 role-players converged on Qudos Bank Arena in Sydney Olympic Park to simulate the NSW Government’s response to a major flood in the Hawkesbury-Nepean Valley.

During the exercise, the arena was turned into a mass care facility for evacuees, including those with pets, following a major flood evacuation.

All the relevant experts came together to ensure that when a major flood does happen they are ready and able to serve the community. It provided an important practice opportunity for emergency management arrangements for a flood similar to the worst on record in the valley.

The exercise was part of a series of scenarios and workshops, known as Exercise Deerubbin, which tested aspects of emergency preparedness, response and recovery as part of the Flood Strategy for the Hawkesbury-Nepean Valley.

NSW SES Commissioner Kyle Stewart said “these exercises assist in ensuring all emergency services and the community are ready to respond should a major flood occur in the valley.”



Hundreds of volunteers and emergency services personnel tested the activation of Sydney Olympic Park as a mass care facility in response to a major flood. Photos: NSW Police



# New flood signage

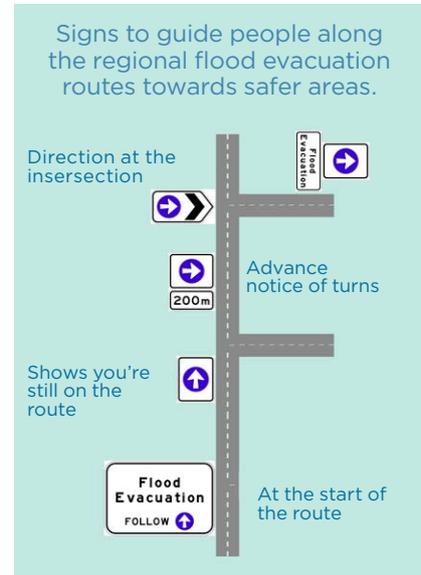
More than 150 new flood evacuation signs have been installed across the Hawkesbury-Nepean Valley.

The new signage system will help guide drivers along key flood evacuation routes in Penrith, Hawkesbury, The Hills and Blacktown council areas.

The system features several different types of signs, including a number of folded signs designed to be opened during a flood emergency to provide extra direction for drivers.

This is the first strategic regional approach to flood evacuation signage in New South Wales and has been a collaboration between Infrastructure NSW, Roads and Maritime Services, the NSW SES, and local councils.

The design of the signage system was tested on 100 local residents using driving simulators before it was rolled out.



# How can I prepare for floods?



The community has an important role to play in getting ready for flood. The risk to life in a flood emergency increases if people aren't aware of, or don't understand their flood risk.

If you live or work in the valley, know your flood risk and be prepared. The NSW SES recommends these key steps to get ready for floods now:

1. Know your risk
2. Know where to go
3. Know who to call
4. Know your plan
5. Get your kits together
6. Prepare now to act early
7. Check your insurance
8. Listen to local radio



Visit the **NSW SES website** to find out more about how to prepare for a flood [www.ses.nsw.gov.au](http://www.ses.nsw.gov.au)

## More information

Check out our website for updates and upcoming events.



[www.insw.com/flood-strategy](http://www.insw.com/flood-strategy)



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