

## Hawkesbury-Nepean Valley Excursion Plan

The opportunity to travel along the floodplain of the Hawkesbury-Nepean Valley allows students to see areas subject to flooding and to examine at first hand the issues associated with mitigating and managing flooding in this extensive area of western Sydney.

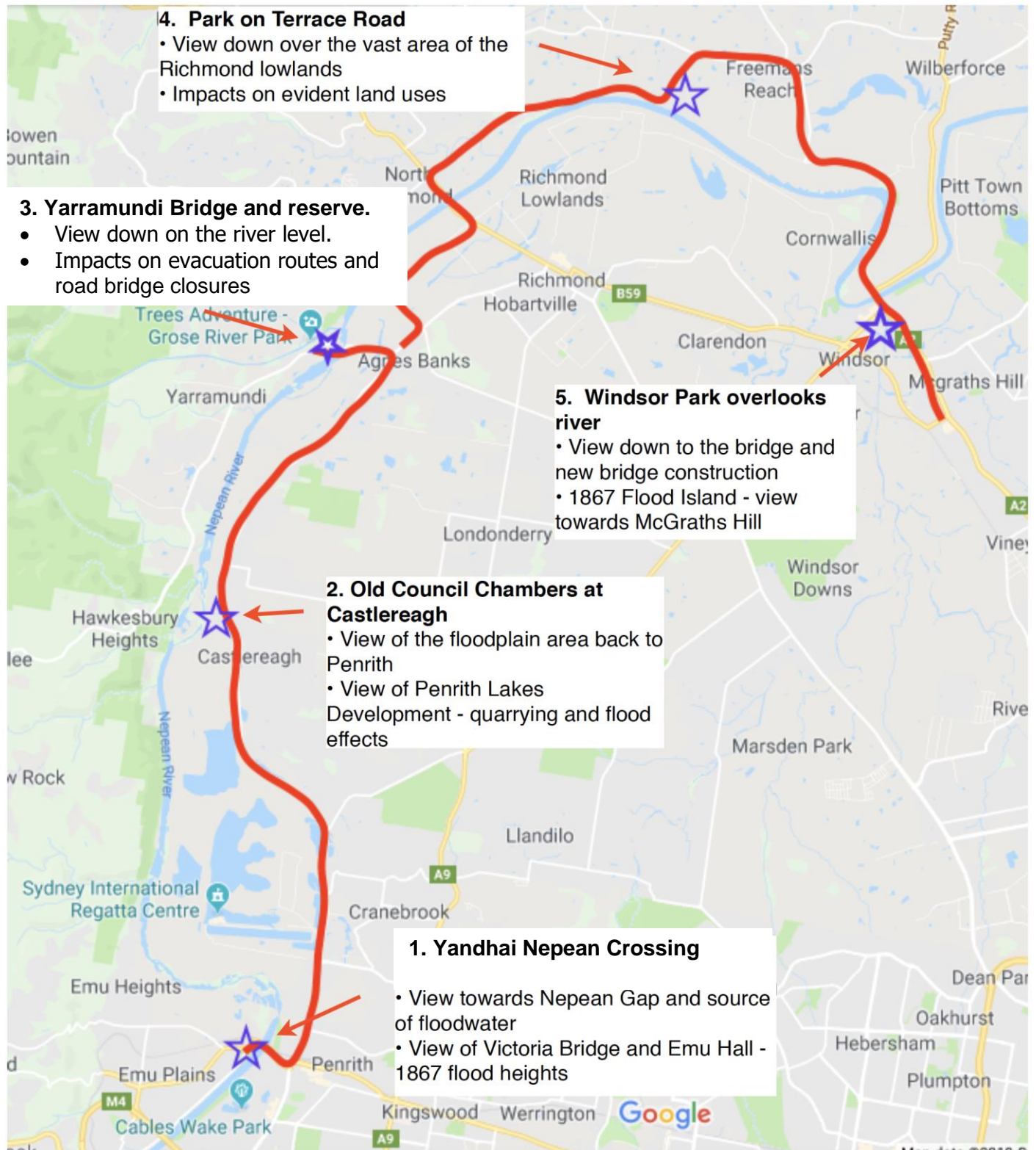
The program is designed for progressing from Penrith to Windsor or in the reverse order. It is suggested that if two busloads of students are required, they start at opposite ends.

All stopping sites can cater for a bus and 60 students. Toilet and picnic facilities are available at Stops 1, 4 and 5. At Stops 2 and 3 there are smaller toilet facilities nearby to allow for students' urgent need.

Stops 1, 2, 4 and 5 are core to the program and Stop 3 can be added if time permits.

### Excursion Timing (Suggestions only):

Stop/Transit	Where	Time
1	Yandhai Nepean Crossing, Penrith	30–40 minutes
Travel 1–2		10 minutes
2	Old Council Chambers, Castlereagh	20 minutes
Travel 2–3		10 minutes
3	Yarramundi Reserve	30–40 minutes
Travel 3–4		15 minutes
4	Streeton Park lookout, Freemans Reach	30–40 minutes
Travel 4–5		10 minutes
5	Thompson Square and Howe Park, Windsor	30–40 minutes



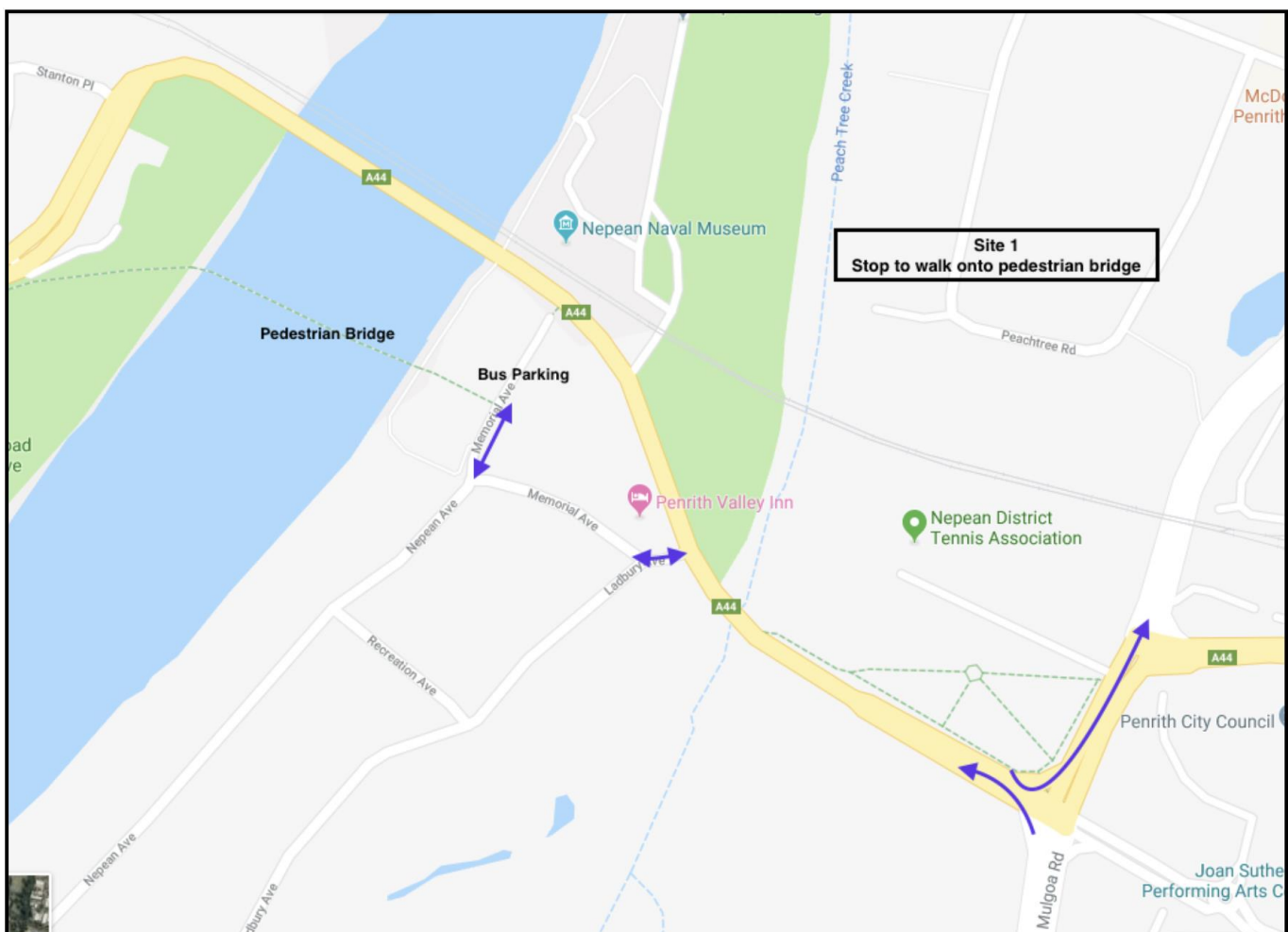
Google Maps, 2019

## Site 1: Yandhai Nepean Crossing and Victoria Bridge

Arrive via Mulgoa Rd exit from M4 freeway, turn into Great Western Highway towards mountains and take first left into Ladbury Avenue then right into Memorial Ave to the orange bridge where bus can be parked.

Walk across the Yandhai Nepean Crossing to the centre. View upriver (south) to Nepean Gorge and M4 Motorway Bridge. The size of 1867 flood height can be compared against Victoria Bridge to the north. Students estimate the height of the bridge.

Students complete cloze passage with teacher/guide assisting with necessary information.



Google Maps, 2019

**Note:** If a morning or afternoon break is planned here there is the option of walking to the western side of the bridge where there is a park and toilet facilities. The bus can then come across Victoria Bridge to pick up. There is a McDonalds as you travel out of Penrith on Castlereagh Road, but it is strongly suggested that students bring their own food.

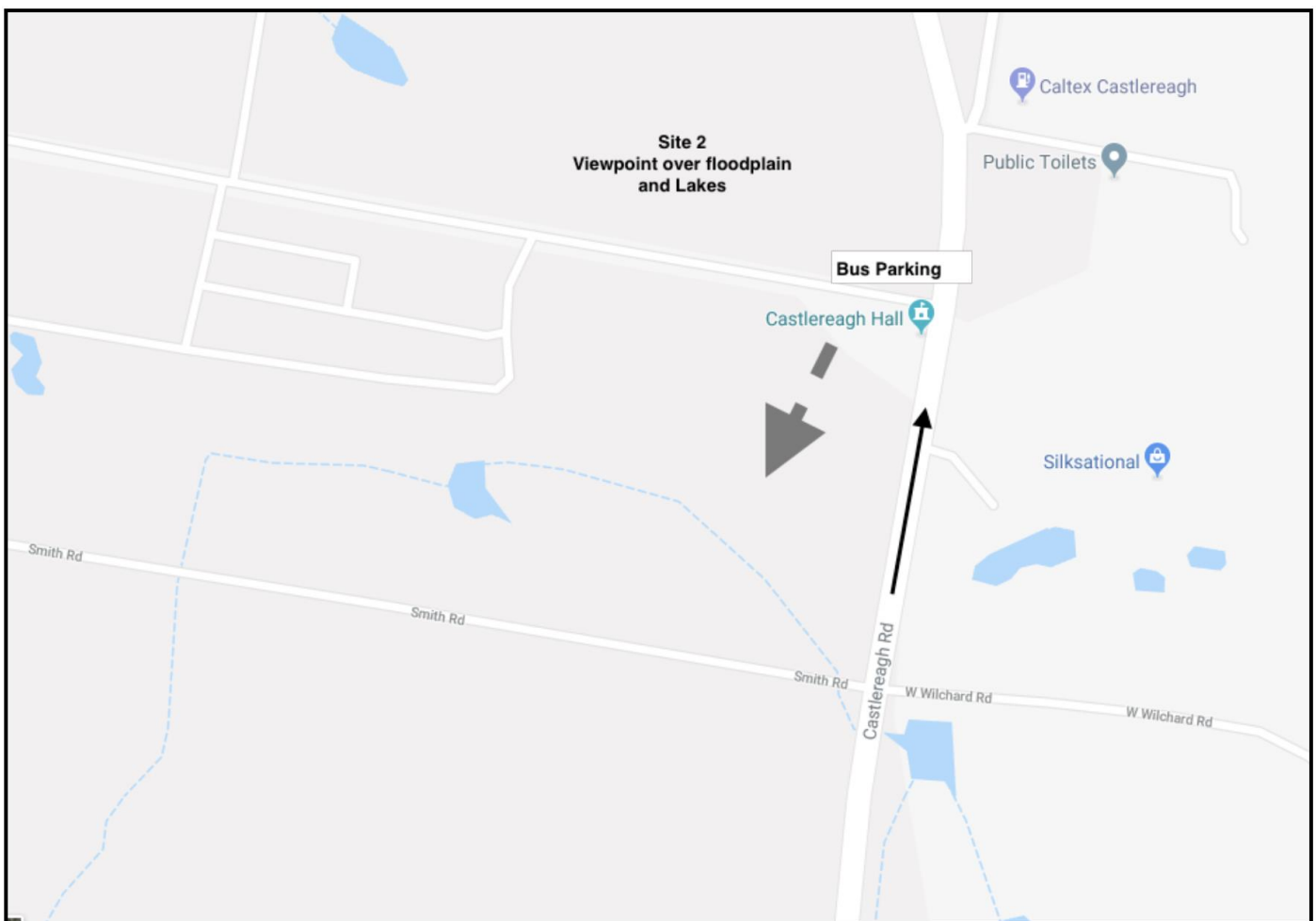
Travel to Stop 2 via Castlereagh Rd past the Penrith Lakes observing high ground to the east and Blue Mountains escarpment to the west.

## Site 2: Old Castlereagh Council Chambers and view back over floodplain and Penrith Lakes

After passing the work going on around the Penrith Lakes Scheme the road begins to rise beyond Smith Rd.

There is an area for the bus to stop at the back of the old Castlereagh Council chambers/hall to the left side.

There is a great view of the extent of the floodplain here. Observe the narrow area that creates the “bathtub effect” here. Students could complete the labels on the line drawing. Discuss with students geographical terms such as directions, maps of Penrith Lakes and land uses. Some information could include: the reasons for quarrying; the power of floods to move and deposit 175 million tonnes of sand and gravel found here; and how it has been used in the building of Sydney infrastructure.



Google Maps, 2019

**Note:** There is small toilet block in the park opposite, but the doors are often locked during the week. This stop is not for any great length of time.

Travel along Castlereagh Rd towards Richmond, observing that the road follows the higher terrace above the river that will be an evacuation route in major floods.



### Site 3. Yarramundi Bridge (and Yarramundi Reserve for a break?)

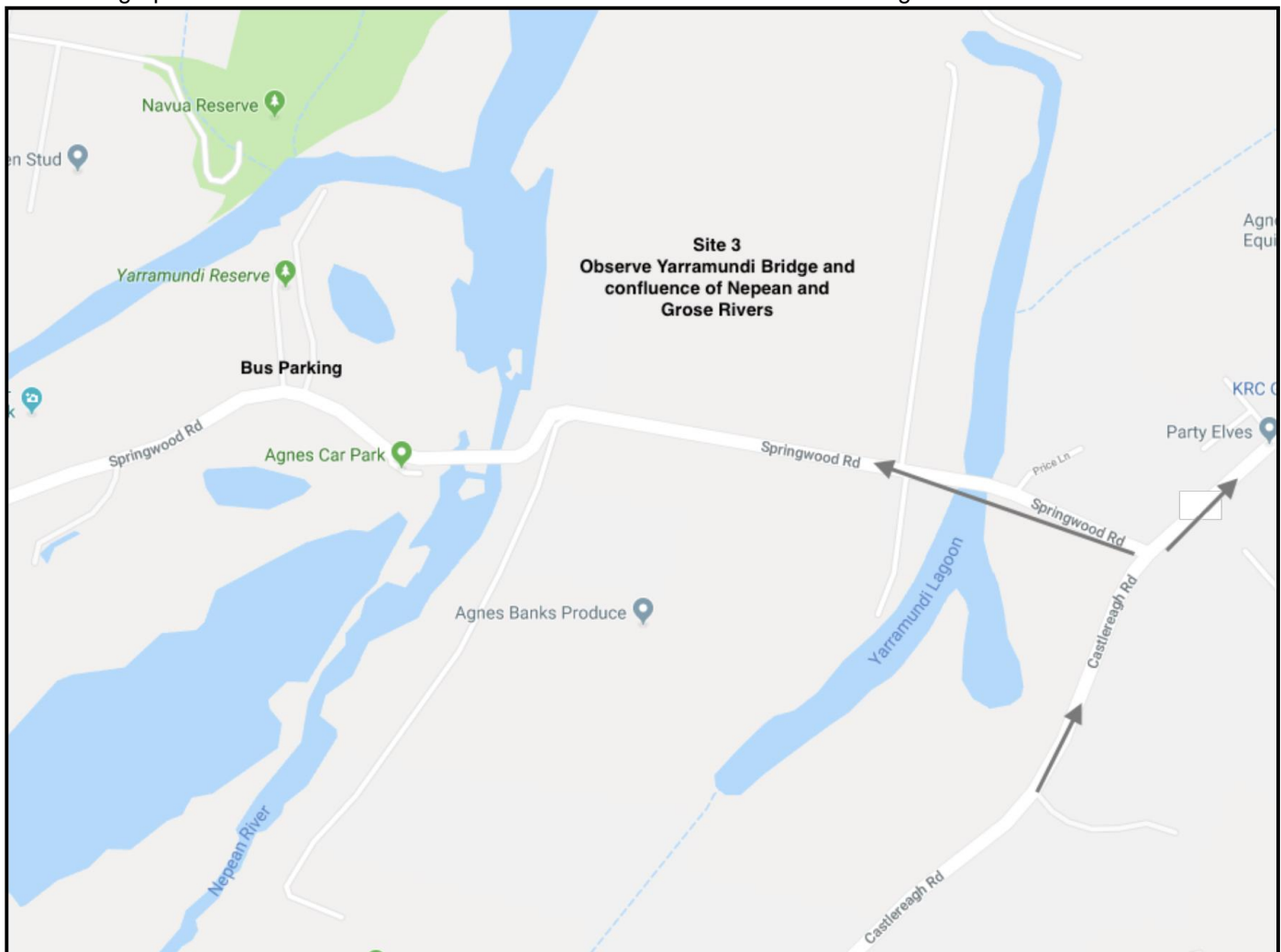
**This is an optional stop depending on time available.**

As the road slopes down and the lagoon appears, take the left turn to Springwood. The road heads down to the Yarramundi Bridge - there is room for a bus on the right side at Yarramundi Reserve. There is a small toilet block in the car park and picnic shelters near the river.

Walk to the confluence of the Nepean River and Grose River – where it then becomes the Hawkesbury River. Here is an opportunity to get down to river level and observe the river flow and bank height. There is sometimes debris in trees to show previous flood heights. A small sign has a quote regarding early explorers (1789) finding evidence of huge floods.

Estimate the height of the bridge and calculate river levels when the bridge becomes submerged and access to Springwood is cut.

There is a graph that shows the relative contribution of rivers downstream of Warragamba Dam later in this document.



Google Maps, 2019

In transit a couple of routes are available but the road down near the river amongst market gardens, sports fields and horse studs gives a view of some land uses of the floodplain. Left to North Richmond and across the bridge. At the traffic lights turn right to Terrace Road to the next stop.

## Site 4: Streeton Lookout, Terrace Road Park, Freemans Reach

The view here over the northern floodplain towards Richmond is spectacular. Students can imagine this as an inland sea during a major flood and see the land uses at risk.

The worksheet map shows the extent of flooding under high flood scenarios and the roads that would be impacted.



Google Maps, 2019

**Note:** This small park provides toilet facilities and a few picnic tables and would be a useful place to stop for an extended lunch or morning break as it is reasonably self-contained and away from the public.

Travel via Freemans Reach (past Hawkesbury High School) and down to the plain heading towards Windsor.

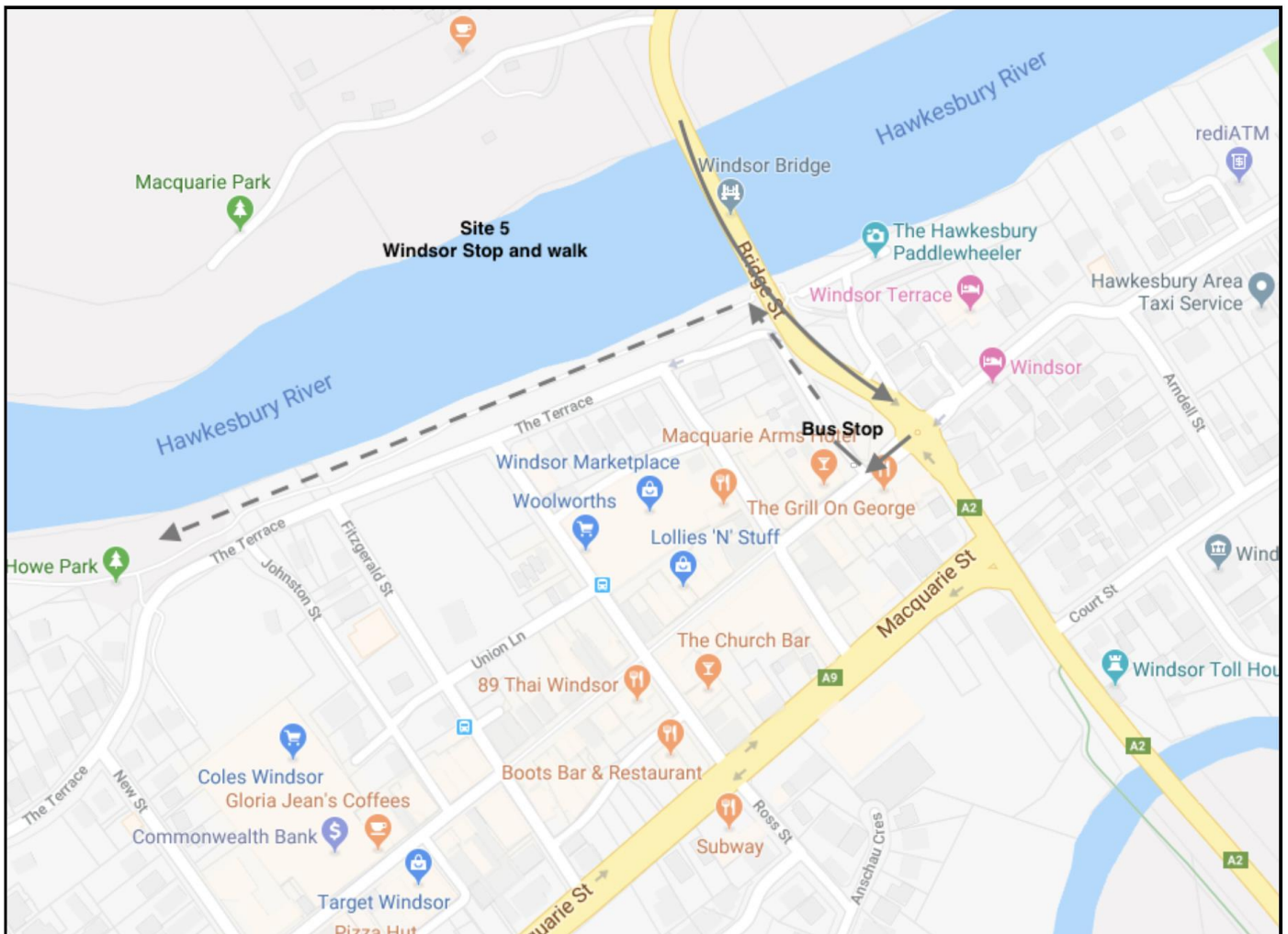
## Site 5. Windsor Town (Thompson Square or close by)

Turn into George Street and then Thompson Square. There is a bus stop on the right near the small park to set down students.

From here you can see the “Doctor’s House” and further on can look down on the old bridge and new bridge across the river. The 1867 flood level can be seen against the Doctor’s house opposite. There is a walkway along the river and a flood level marker near the bridge.

Follow along the path to Howe Park which is a good break for something to eat and use the public toilets just across the road.

A look the other way toward McGraths Hill shows why Windsor becomes an island in a major flood. A newer bridge across the wetlands and South Creek can be observed.



Google Maps, 2019

**\* This may be the last stop and you can head back to school. The program can also be followed in reverse from Stop 5 through to Stop 1 at Penrith.**

## Student Worksheet

### Yandhai Nepean Crossing (Stop 1)

The crossing was completed in **2018**. From here you can see the Freeway Bridge and **Nepean** Gap towards the **south**. Most of the catchment and flood waters come from this direction. Further south is **Warragamba** Dam on the Warragamba River, the source of most of Sydney's **water**.

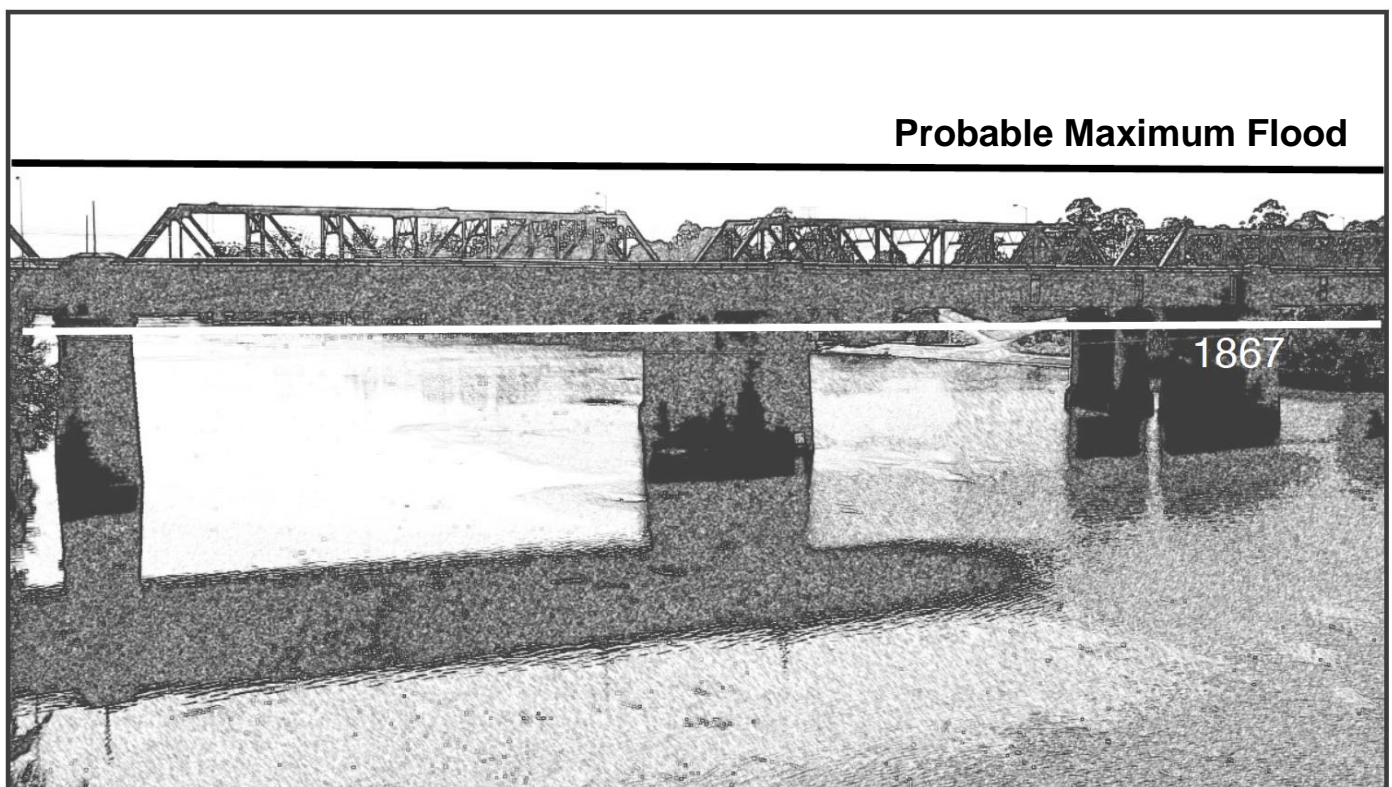
To the **north** you can see the older Victoria Bridge for vehicles and a metal **railway** bridge behind it.

During the biggest flood recorded in **1867**, the flood reached almost to the road surface of Victoria Bridge.

To the east of the bridge is the city of Penrith, while to the west beyond Emu Plains is the Blue Mountains escarpment

**Word List:** 1867, 2018, 22, Warragamba, East, South, North, west, water, catchment, Nepean, railway, escarpment

Estimate the height of the road on Victoria bridge above the current river level \_\_\_\_\_ metres



*Victoria Bridge, Penrith, showing 1867 flood height and Probable Maximum Flood height*

**Discussion Question:** Roads and the railway flood on both sides of the bridge during an 1867 size flood or greater. What impacts would this have on evacuation routes and economic activity?



## Old Castlereagh Council Chambers (Stop 2)

Here we are looking back towards Penrith in the south. The Blue Mountains escarpment to the west limits the Nepean River, which is below the escarpment.

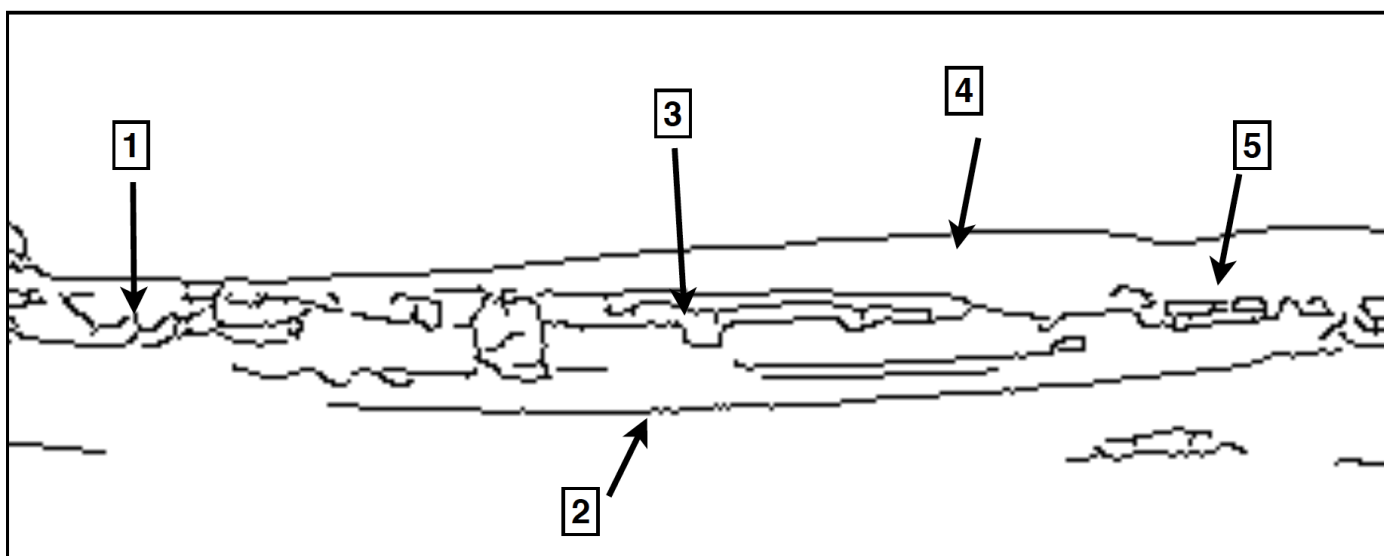
The river has changed course over many thousands of years across this area of floodplain. As it slows and meanders after coming out of the mountains it has deposited millions of tonnes of sand and gravel over the low area between the mountains and the higher ground to the east.

This material has then been buried under several metres of sediment deposited each time the river floods. The good alluvial soils resulted in this being prime farming land since European settlement.

The sand and gravel has been quarried for building products such as concrete and road base and the resulting holes have been turned into a series of lakes.

**Word List:** sediment, escarpment, concrete, houses, floodplain, gravel, mountains

Complete the legend for the line drawing below:



- ☐ Smith Road    ☐ Blue Mountains    ☐ Lake    ☐ Road to Penrith  
☐ Farm on Higher Ground

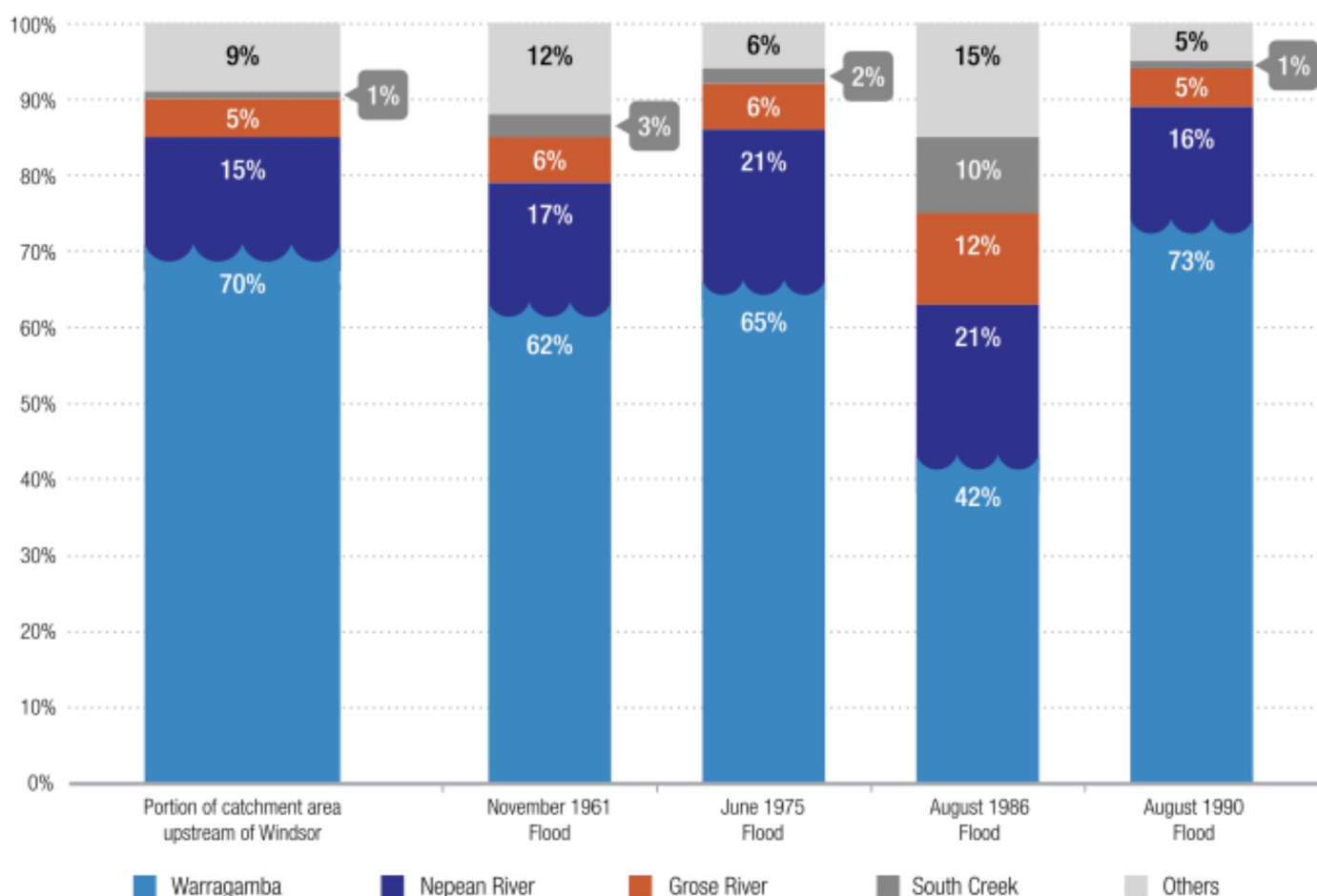
**Discussion Question:** What things may need to be considered if further residential development was proposed in this part of the valley?

### Yarramundi Bridge (Stop 3)

We are at the confluence of the Nepean and Grose rivers. When they combine they become the Hawkesbury River. During flood events, this combination contributes to a choke point and the river backs up towards Penrith. The bridge here at Yarramundi is flooded first, blocking the route to Springwood. A little later the North Richmond bridge is submerged, isolating North Richmond and the western side from Richmond and Sydney to the east. People need to be alerted early to get back to their homes and families on the hilly western side or to evacuate.

River flow here during dry times comes from releases from Warragamba Dam for downstream water supply, runoff from the local area, seepage from sandstone valleys, groundwater and from treatment plants upstream.

**Word List:** Springwood, recycling, Hawkesbury, western, confluence



**Figure 4** Relative contribution of different river catchments in previous floods in the Hawkesbury-Nepean Valley

*Resilient Valley, Resilient Communities. Hawkesbury-Nepean Valley Flood Risk Management Strategy, (2017).*  
[http://www.insw.com/media/1534/insw\\_hnvfloodstrategy\\_1\\_v2.pdf](http://www.insw.com/media/1534/insw_hnvfloodstrategy_1_v2.pdf)

**Discussion Question:** Why would the contributions of each of these rivers/streams vary between floods?



## Streeton Lookout, Terrace Road, Freemans Reach (Stop 4)

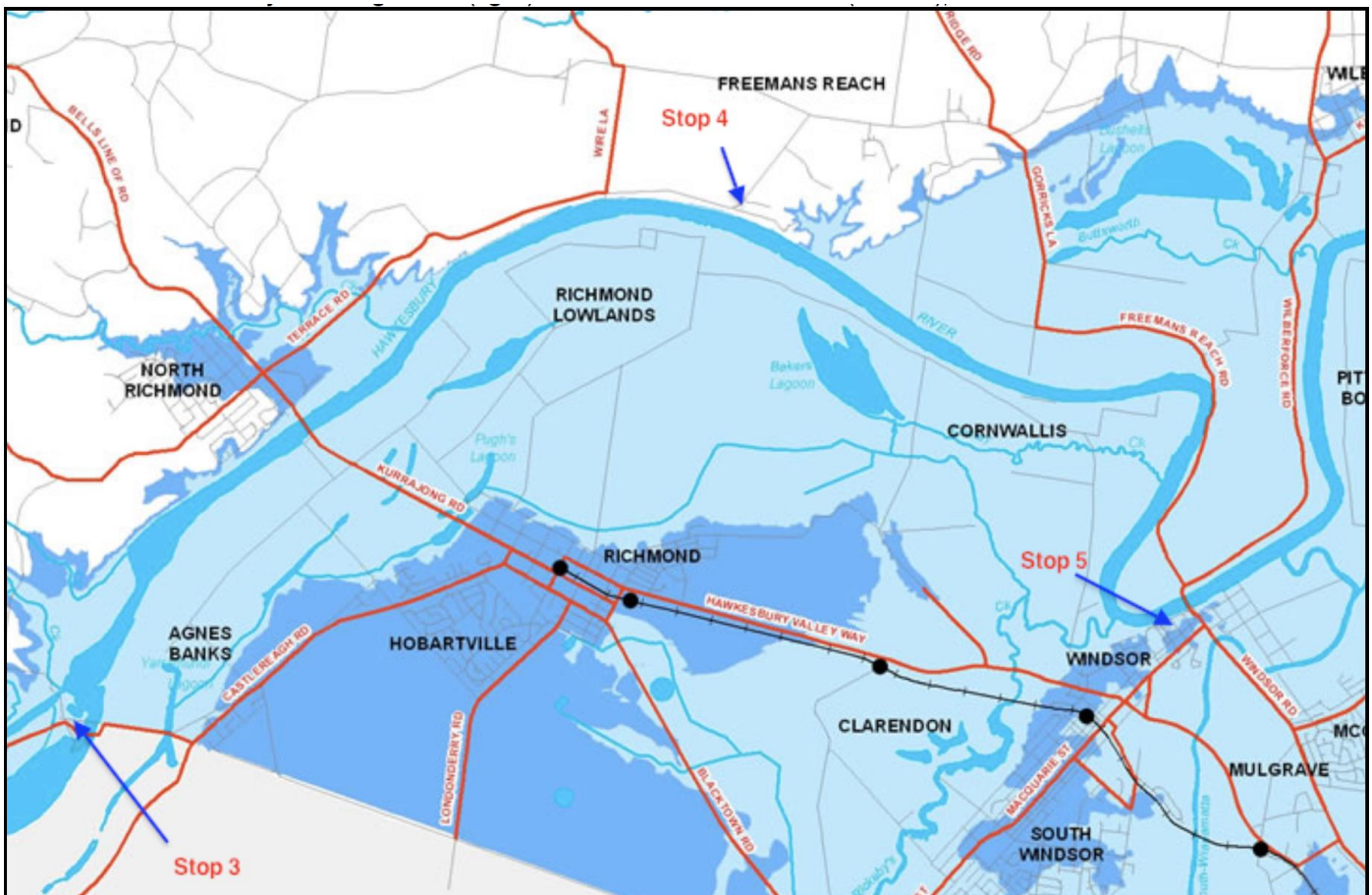
This stop provides an excellent view over the **floodplain** towards Richmond. The area in the foreground is called the Richmond Lowlands because it is the lower river terrace. The viewpoint is on the **high terrace** above flood levels.

A number of creeks and wetlands or **lagoons** are scattered across the area. The land is highly valued for farming because of the rich **alluvial** soil washed in by the river. The creeks and lagoons provide water sources. They are also valuable as **habitat** for birds, frogs and reptiles and for recreation.

**Word List:** terrace, alluvial, habitat, lagoons, floodplain

Extent of areas affected by regional flooding in 1867 (light blue) and Probable Maximum Flood (darker blue).

-  Hawkesbury-Nepean Flood 1867
-  Probable Maximum Flood



INNSW 2019

**Discussion Question:** How would evacuation routes be affected for people in Windsor and Richmond during floods of 1867 size or larger?

## Thompson Square, Windsor (Stop 5)

The old and new bridges can be seen from this small park. The new bridge will provide more time for residents to **evacuate** than the old bridge that is submerged much sooner in major floods.

The two-storey house across the road on the corner is the “Doctor’s House”. The 1867 flood reached just below the **verandah** on the upper floor.



*Thompson Square Windsor, 1879, Doctor’s House on far right; State Library of NSW*

Down below the house near the river is a flood marker - estimate the height of the 1867 flood above the river level = \_\_\_\_\_ m

Flooding is significant in this area because of the “**bathtub**” effect”, when extra water flows in from the catchment and cannot move out quickly through the narrow **gorges** downstream. During major floods Windsor town centre can become an “**island**” surrounded by flood waters. This happened during the 1867 flood and rescue of people in the surrounding area was complicated by darkness, heavy rain and the wind whipping up **waves** on the expanse of water. **Thirteen** people lost their lives. Today the area has a much larger **population** and more people also travel away from the area for work.

**Word List:** gorges, verandah, waves, population, island, bathtub, escape, thirteen

**Discussion Question:** What should residents of Windsor and surrounds consider when a flood warning occurs?



The article below can be read by the teacher to provide an insight into the effect of flooding. It could be read while at Windsor or as part of the reflection/discussion on return to school.

## **Great Flood of 1867 still unsurpassed but not unrepeatable**

Justine Doherty and Rod Shaw Hawkesbury Gazette



*Historian John Miller at the Doctor's House in Thompson Square. In the 1867 flood, a man stepped off the upper balcony of the house into a boat.*

This month it's (over)150 years since the Hawkesbury's biggest flood which claimed 20 lives and had such a catastrophic effect on our district it's still remembered and referenced.

The flood waters which reached almost 20m at Windsor drowned 12 members of the Eather family: two women and 10 of their children.

Raging waters struck the families' farmhouses at Cornwallis on June 21. Those lost were sisters-in-law Catharine and Emma Eather, all of Catharine's children: Catharine, Charles, Clara, Mary Ann and William, and five of Emma's six children: Emma, James, Elizabeth, Angelina and Annie.

Only the women's husbands — brothers Thomas and William Eather — and one of Thomas' children, Charles Frederick, aged 16, survived.

An inquest was held at the Commercial Hotel in Windsor on June 26. William Eather was recorded as saying he last saw his family alive on June 21 on the roof of his brother George's house.

"I was with them; we were about 200 yards from my brother Thomas's; I was taking my eldest boy into my arms, when I was washed away by the waves; I saw a tree close by me after I came to the surface, I managed to make for it. I heard the screams of my wife and children but could not see them; I fastened myself to the tree, and in a short time was rescued by a boat."

Only six bodies were recovered at first. Several days later, the body of James Eather was found and an inquest into his death was held on June 29. Two months later the body of eight-year-old Elizabeth was found on a sandbank near Freemans Reach about a mile from where the tragedy took place. All deaths were recorded as accidental drowning. The recovered bodies were buried in Windsor Catholic Cemetery. The only headstone is that of Catherine Eather and her five children, erected by her father, Michael McMahon. Four bodies were never found.

The flood was the region's largest on record, rising 63ft from contemporary records. It created an inland sea up to 30 kilometres across, from Pitt Town to Kurrajong and Riverstone to the Blue Mountains. Windsor, Richmond and Pitt Town became small islands.

Besides the Eathers, the waters also claimed another eight lives. It began to rain on Monday, June 17, with heavy rain starting the next day and continuing through the week. The river broke its banks on Thursday, covering most of the Hawkesbury lowlands with water.

By Friday, June 21, extra boats were sent by train from Sydney. The Macquarie Towns, picked as they were on high ground, became islands filled with people who had been evacuated, many of whom had lost everything. In Windsor they were housed in various public buildings including the School of Arts and some of the churches.

Trains couldn't get through and the telegraph stopped working. Windsor became totally isolated.

It peaked on June 23.

Rescue boats collected people who had taken refuge on their roofs or even in trees. One of the largest mass rescues occurred at McGraths Hill where about 80 people of all ages had taken refuge in an old building.

Thirty of them were taken on the first rescue boat with the rest climbing onto other boats later. It was reported the last person was saved only minutes before waters covered the entire building.

Boats continued working after dark, sometimes at great risk to the crews. Stranded people could only signal craft by firing guns or waving lit torches. Farm animals drowned in large numbers and many buildings, including people's homes, were swept away. Reports also told of large numbers of people, sometimes scantily dressed, wandering cold and hungry. By June 24 the water level had decreased by 3.5 metres and fell steadily after that.

Hundreds of families were left homeless and debris and dead animals clogged streets and littered open country.

In the aftermath a committee was formed to help the hundreds of destitute residents and to distribute assistance from the Government. The Benevolent Society helped the Hawkesbury Flood Relief Committee. It was reported: "The loss is incalculable. The people are beggared ... Hundreds of men, women and children are houseless, homeless and hungry." A public appeal was set up and thousands of pounds raised.