



Flood Emergency Response Plan

for

Thornton Central Village

for Thornton Operations Pty. Ltd.



Contents

Report details	3
Flood Response Summary.....	4
Introduction.....	8
Methodology and Available Data	10
Flood Behaviour	11
Flood and Evacuation Warnings	16
Flood Response Personnel.....	19
Evacuation Centres and Routes	21
Floor Levels and On-Site Refuge.....	24
Emergency Contact.....	25
Flood Response Preparation	26
Flood Response Actions	29
Revision of this Flood Evacuation Plan.....	31
Conclusion.....	32
References	33

Report details

Project: Thornton Central Village Lots 3003, 3004, 3005
Project Ref: SY210649_E01
File Location: \\incl-fp\job_files1\SYDNEY 2021\SY210649 - Thornton Lots\E - Reports\SY210649_E01_Flood_Emergency_Response_Plan_[B].docx

Revision History

Revision	Report Status	Prepared	Reviewed	Issue Date
1	Draft for Client Review	R Suckling	L Gitzel	14/09/21
2	Draft	R Suckling	L Gitzel	21/09/21
A	Final for DA	R Suckling	L Gitzel	1/11/21
B	Revised for DA	R Suckling	L Gitzel	15/11/21

Limitation Statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Thornton Operations Pty Ltd.

The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

Except where expressly permitted in writing or required by law, no third party may use or rely on this report unless otherwise agreed in writing by Northrop.

Where this report indicates that information has been provided to Northrop by third parties, Northrop has made no independent verification of this information except as expressly stated in the report. Northrop is not liable for any inaccuracies in or omissions to that information.

The report was prepared on the dates shown and is based on the conditions and information received at the time of preparation. It makes no comment or assertions on the structures or their ability to withstand flooding or flood forces.

This report should be read in full, with reference made to all sources. No responsibility is accepted for use of any part of this report in any other context or for any other purpose. Northrop does not purport to give legal advice or financial advice. Appropriate specialist advice should be obtained where required.

To the extent permitted by law, Northrop expressly excludes any liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this report

		Date
Prepared by	RS	15/11/2021
Checked by	LG	15/11/2021
Admin	BBR	15/11/2021

Flood Response Summary

The following provides a summary of the findings of this Flood Emergency Response Plan including a summary of the flood behaviour, floor levels with respect to the flood behaviour, the recommended flood response actions, and the recommended off-site flood refuge locations. Additional information is available in the body of the Flood Emergency Response Plan.

Flood Levels

Table 1 – Summary of Flood Behaviour (Subject Site)

Event	PMF
Flood Level (mAHD)	30.4
Flood Depth (m)	~3.0 - 4.0
Velocity (m/s)	~0.5 – 1.0
Hazard Category	H5

Floor Levels

Table 2 - Internal Floor Levels

Floor	Level (m AHD)	Relationship to Flood Levels
Basement Carpark	23.70	Above the 1% AEP and Below PMF
Substation	Varies 27.20 & 27.70	Above the 1% AEP and Below PMF
Ground Floor	Varies 26.35 - 27.40	Above the 1% AEP and Below PMF
Level 1	Varies 31.40 - 31.80	Above the 1% AEP and PMF
Level 2+ (Residential only)	Varies 34.60 - 35.80	Above the 1% AEP and PMF

Key Personnel

Table 3 – Key Personal Summary

Person Organisation	Name	Number
Chief Flood Warden (Building Manager)		
Flood Warden		
SES	-	132 500
Police / Fire / Ambulance	-	000
Cranebrook High School	-	(02) 4729 0777
Penrith High School	-	(02) 4721 0529

Flood Response Actions

Table 4 – Flood Response Actions Summary

WHEN	WHAT	BY WHO
Prior to Flooding	Assemble Emergency Kit	Flood Wardens Residents
	Check Floodsafe Kit every three months	Flood Wardens Residents
	Coordinate Evacuation Drills twice per year (minimum)	Chief Flood Warden
	Sign up, maintain and review Early Warning Network subscription and warnings.	Chief Flood Warden Flood Wardens
	Monitor weather situation daily	Chief Flood Warden Flood Wardens
	Perform inductions for new Tenants & Staff to include flood risk associated with the subject site and evacuation procedures.	Chief Flood Warden Flood Wardens
Evacuation	Receive Warning of a Moderate flood depth at the Victoria Bridge with a gauge depth greater than or equal to 8.2m (22.3m AHD)	Chief Flood Warden
	Make decision to Evacuate and Notify Police & SES. Confirm off-site refuge shelter and evacuation route with SES and relay advice to Flood Wardens prior to sounding alarm.	Chief Flood Warden
	Sound Alert and message on PA System notifying tenants and residents of flood emergency and SES nominated off-site evacuation shelter.	Chief Flood Warden
	Collect Floodsafe Kit and any additional items. Note that off-site refuge could continue for several days.	Chief Flood Warden Flood Wardens Residents
	Leave signage notifying any emergency responders, or residents that may be returning to the site, that the site has been evacuated and to were.	Flood Wardens
	Evacuate via the nominated evacuation route and remain at a safe location until given all clear.	All
	Staff and Visitors in the commercial tenancies may return home if it is safe to do so. If unable to do so, staff and visitors are to proceed to the nominated off-site evacuation shelter.	All
Once Risk has Passed / After a Flood	Check all services and structural stability of buildings.	Qualified persons
	Return to operation.	All

Evacuation Routes

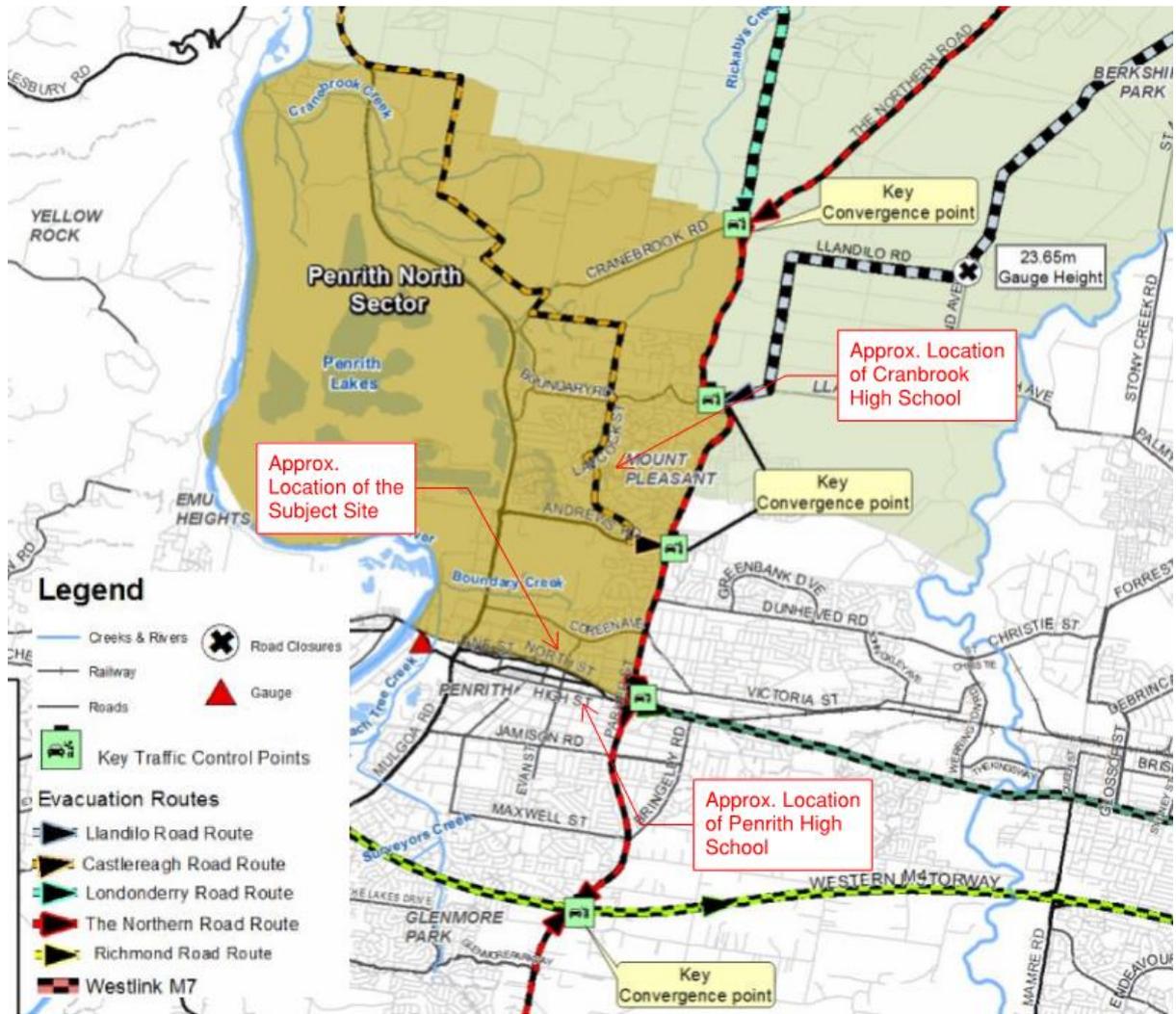


Figure 1 - Primary Evacuation Routes (Hawkesbury-Nepean Flood Plan, 2015)

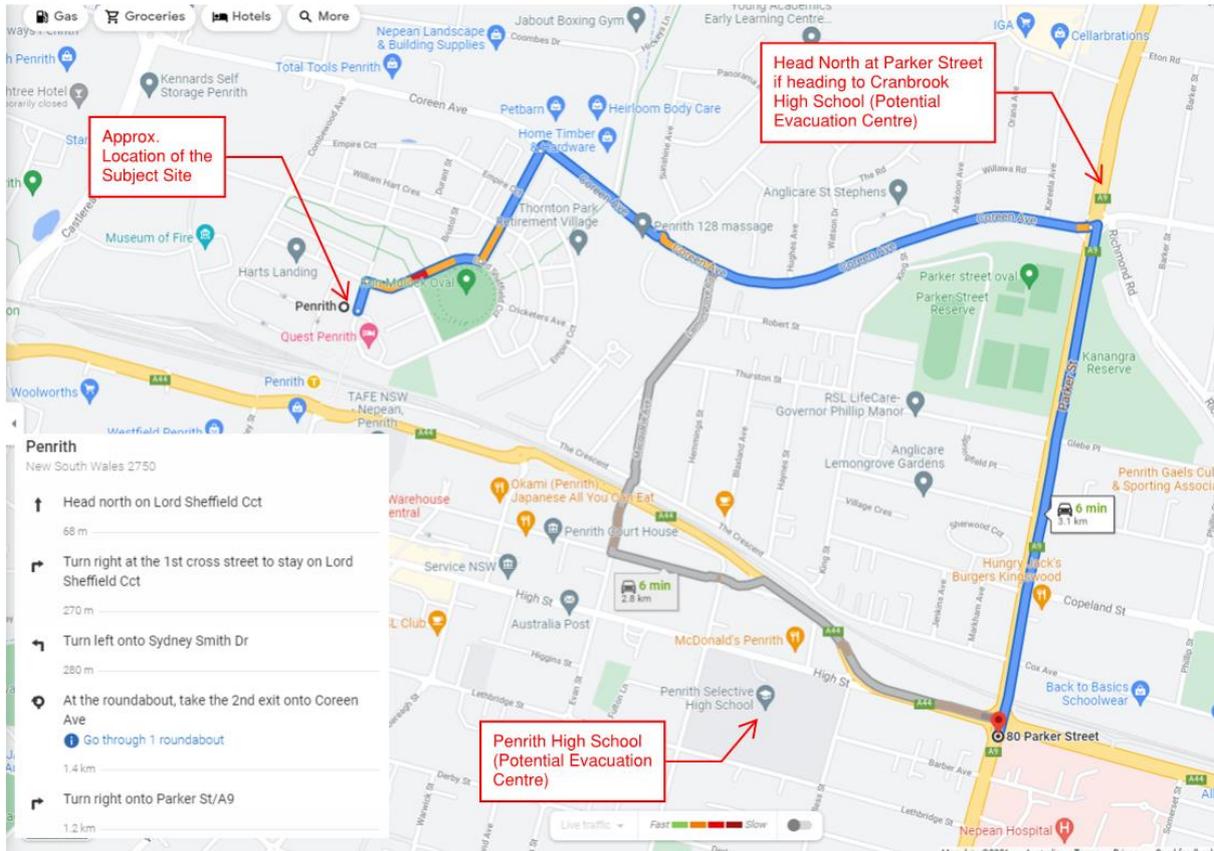


Figure 2 - Localised Route to Primary Evacuation Route (Google Maps)

Introduction

Northrop Consulting Engineers have been engaged by Thornton Operations Pty Ltd to prepare a Flood Emergency Response Plan (FERP) for the proposed development located at 41, 184 & 192 Lord Sheffield Circuit, Penrith NSW.

This report has been prepared to support the State Significant Development Application (SSDA) and submission to Penrith City Council.

This report has been prepared based on the Vision outlined in the “Resilient Valley, Resilient Communities” strategy prepared by Infrastructure NSW for the Hawkesbury-Nepean Valley. Implementation of this plan is expected to assist the community 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.

Subject Site

The subject site is located within Penrith, approximately 200m west of Ron Mulcock Oval and is contained within Lots 3003, 3004 and 3005 in DP1184498 as shown in the below Figure 3. The subject site is bounded by Lord Sheffield Circuit to the north and east, Dunshea Street to the west and Penrith train station to the south.

The subject site is located approximately 1.2km east of the Nepean River and the greater Hawkesbury-Nepean Floodplain. Although the subject site is located a relatively long distance from the Nepean River, the floodplain is extensive with the potential for the subject site to experience flooding from this source during rare to extreme flood events.



Figure 3 - Locality Plan (obtained from SIX Maps www.maps.six.nsw.gov.au)

This Flood Emergency Response Plan (FERP) has been prepared to:

- Promote satisfactory awareness of the expected flood behaviour and flood risks associated with the subject site.
- Nominate roles and responsibilities when preparing for and responding to a flood emergency.
- Identify measures to monitor weather forecasts and highlight warning systems available.
- Provide education and awareness material for training programs with respect to flooding of the subject site.
- Identify potential evacuation and evasion procedures including evacuation routes and flood refuge opportunities.

Contained herein is a description of the methodology and information used to prepare this report, a summary of the likely flood behaviour, recommendations for flood preparation and recommended response actions during a flood event.

Methodology and Available Data

This plan was developed based on the flood information provided by Penrith City Council, (correspondence dated 25/08/21), in conjunction with additional information with respect to the flood behaviour and evacuation strategies which has been obtained from the following reports:

- The Resilient Valley, Resilient Communities strategy prepared by Infrastructure NSW for the Hawkesbury-Nepean Valley and dated January 2017.
- The Nepean River Flood Study, prepared by Advisian (Worley Group) and dated the 12th of November 2018.
- The Hawkesbury Nepean Flood Plan – A Sub Plan of the State Emergency Management Plan (EMPLAN) dated September 2015.
- Penrith Local Emergency Management Plan dated November 2020.
- Penrith City Local Flood Plan – A sub-plan of Penrith Local Disaster Plan (DISPLAN) dated April 2012.
- Penrith CBD Floodplain Risk Management Study and Plan prepared by Molino Stewart, March 2020.

The expected flood behaviour for the subject site is based on the above flood information and is summarised in the **Flood Behaviour** section of this plan.

A review of the Bureau of Meteorology (BoM) and State Emergency Service (SES) guidelines have been undertaken to report on the likely warning types described in the **Flood and Evacuation Warnings** section of this plan.

Consideration has been given to the personnel most likely to be on-site and responsible for flood emergency response. This is outlined in the **Flood Response Personnel** section of this plan.

Analysis of the site and nearby topography, in combination with the likely flood behaviour has informed the assembly points, evacuation routes and on-site refuge points nominated in the **Assembly Point and Evacuation Routes** and **Floor Levels and On-site Refuge** sections of this plan.

Contact numbers for relevant emergency response agencies and the proposed local evacuation centre are noted in the **Emergency Contact** section of this plan.

Finally, a review of the Penrith City Council Development Control Plan and aforementioned flood studies, NSW State Flood Plan and Emergency Business Continuity Plan have contributed to the recommended preparation and response actions outlined in the **Flood Response Preparation** and **Flood Response Actions** sections of this plan.

Flood Behaviour

Flood Source and Behaviour

Flooding of the site and the broader Penrith region is expected to occur from three potential sources namely the Regional and Local catchments as well as via Warragamba Dam Break.

Regional Catchment Flooding

Regional catchment flooding is derived from the upper Nepean River with the extents detailed in the Nepean River Flood Study (Advisian, 2018). Flooding from the regional catchment is expected to occur during rare to extreme events with the Nepean River Flood Study (Advisian, 2018) suggesting flooding of the subject site is expected to occur in events in excess of the 0.5% AEP (commonly referred to as the 1 in 200-year flood event).

During a regional catchment flood event, flooding of the subject site is expected to occur when the Nepean River breaks its banks with flood water also spilling into broader Penrith region. Due to the large upstream catchment of the Nepean River, peak flood depths are expected to be reached during long periods of sustained heavy rainfall. The Bureau of Meteorology (BoM) anticipates warning times for flooding across the subject site are in the order of 6-8 hours prior to the peak.

During a regional flood event, deep, fast flowing flood water is expected across the subject site with floodwater likely to cut off a number of access roads in the area. Similarly, due to the extent of the floodplain (covering the broader Penrith region), the road network may become congested. It is critical evacuation occurs early to ensure all residents, staff, customers, and visitors have enough time to exit the affected area.

The SES has provided a useful resource to assist in understanding the existing flood risk as a result from a regional catchment event for the Hawkesbury-Nepean region. This can be accessed via the following link; <https://www.ses.nsw.gov.au/hawkesbury-nepean-floods/>

Local Catchment Flooding

The Penrith CBD Floodplain Risk Management Study and Plan (Molino Stewart, 2020) identifies localised flooding along the south of the site between the existing carpark and rail corridor. The 1% AEP flood level for surface water adjacent to the site as provided by Penrith City Council to be approximately RL26.90m AHD. It is proposed that the proposed development will be protected from local surface flooding by providing an earth bund or low height flood wall along the southern perimeter of the development to provide 500mm freeboard.

The flood waters are not observed to enter the site in the 1% AEP event or PMF event. As such, the flood evacuation response will only consider the regional catchment flooding and the appropriate flood response.

Warragamba Dam

There is also a risk of flooding of the subject site as a result of failure of Warragamba Dam, located upstream of the subject site. There is the potential for flooding derived from a Dam Break event to occur suddenly, with little warning time even during dry weather conditions.

It is important to monitor news reports and flood warnings broadcast by the Bureau of Meteorology (BOM) and emergency services on a regular basis. Remember to never enter floodwater and if in a life-threatening situation, contact emergency services as soon as possible.

Peak Flood Levels, Depth and Velocities

Flood behaviour across the subject site during the regional Nepean River Probable Maximum Flood (PMF) event are summarised in Table 5 overleaf. The flood information presented has been obtained from an interpretation of the Nepean River Flood Study (Advisian, 2018) as well as correspondence received from Penrith City Council (dated 25/08/21).

It is important to note that the events presented herein are rare to extreme events which are not expected to occur every time it rains. The 1% AEP is commonly referred to as the “100-year flood event” and has a 1% change of occurring in an given year while, the PMF has a nominal Annual Exceedance Probability of 1 in 10 million.

Table 5 – Regional Nepean River Peak Flood Behaviour

Behaviour	PMF
Flood Level (mAHD)	30.4
Flood Depth (m)	~3.0 - 4.0
Velocity (m/s)	~0.5 – 1.0
Hazard Category	H5

The peak flood depth across the subject site and vicinity during the PMF event is presented in the below Figure 4.

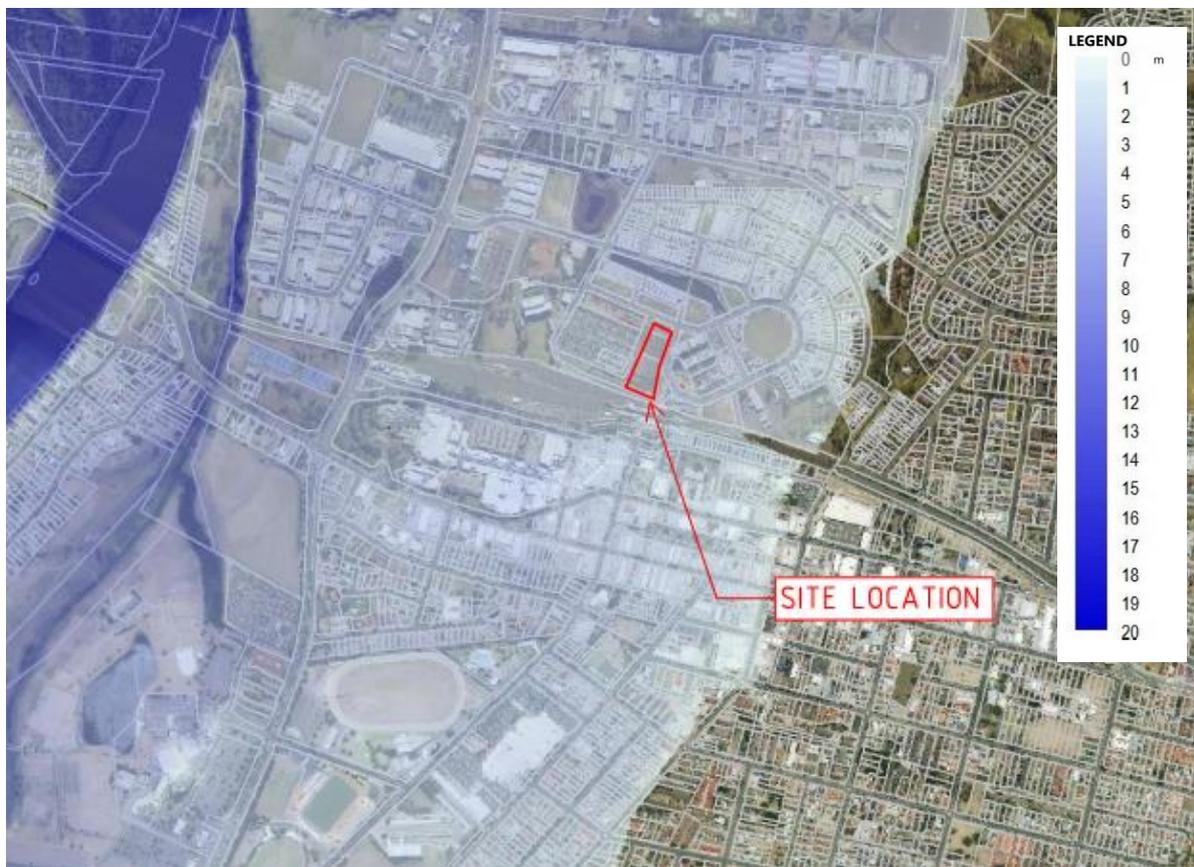


Figure 4 - PMF Peak Flood Depth (Nepean River Flood Study; Advisian, 2018)

Flood Hazard and Risk to Property and Life

Flood hazard conditions across the subject site and vicinity during the 1% AEP and PMF design storm events are shown in Figure 6 and Figure 7 respectively.

Figure 5 shown overleaf, presents a summary of the hazard categories as well as a brief description for each classification. The provisional hydraulic hazard categories presented in the Nepean River Flood Study (Advisian, 2018) were based on the Australian Rainfall and Runoff hazard categories (AR&R 2016, Book 6, Chapter 7).

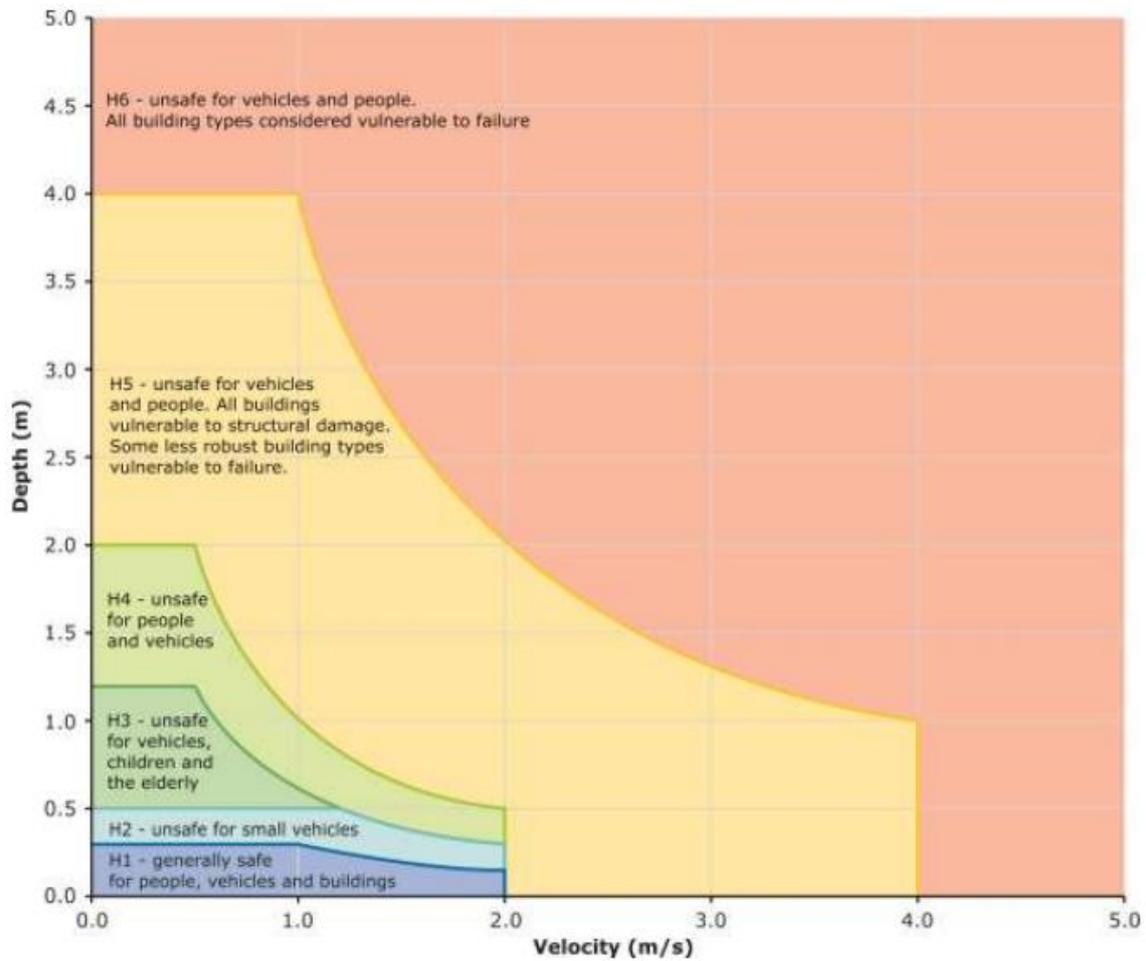


Figure 5 - Hydraulic Hazard Classification (AR&R 2019)

During the regional 1% AEP design storm event, the below Figure 6 suggests the subject site is relatively flood free. During a local catchment flood event, this may not be the case with the potential for a number of local roads cut off due to flooding.

The following Figure 7 shows the subject site is located within the H5 hazard category during the PMF event. The above Figure 5 suggests this flood behaviour is unsafe for vehicles, people and vulnerable buildings may be experience structural damage or failures. It is critical that prior to a Regional Nepean River PMF flood event, the subject site be evacuated in order to reduce the risk of loss of life during this extreme event.

Do not Drive or Walk through Floodwater.

Remember, If It's Flooded, Forget It!

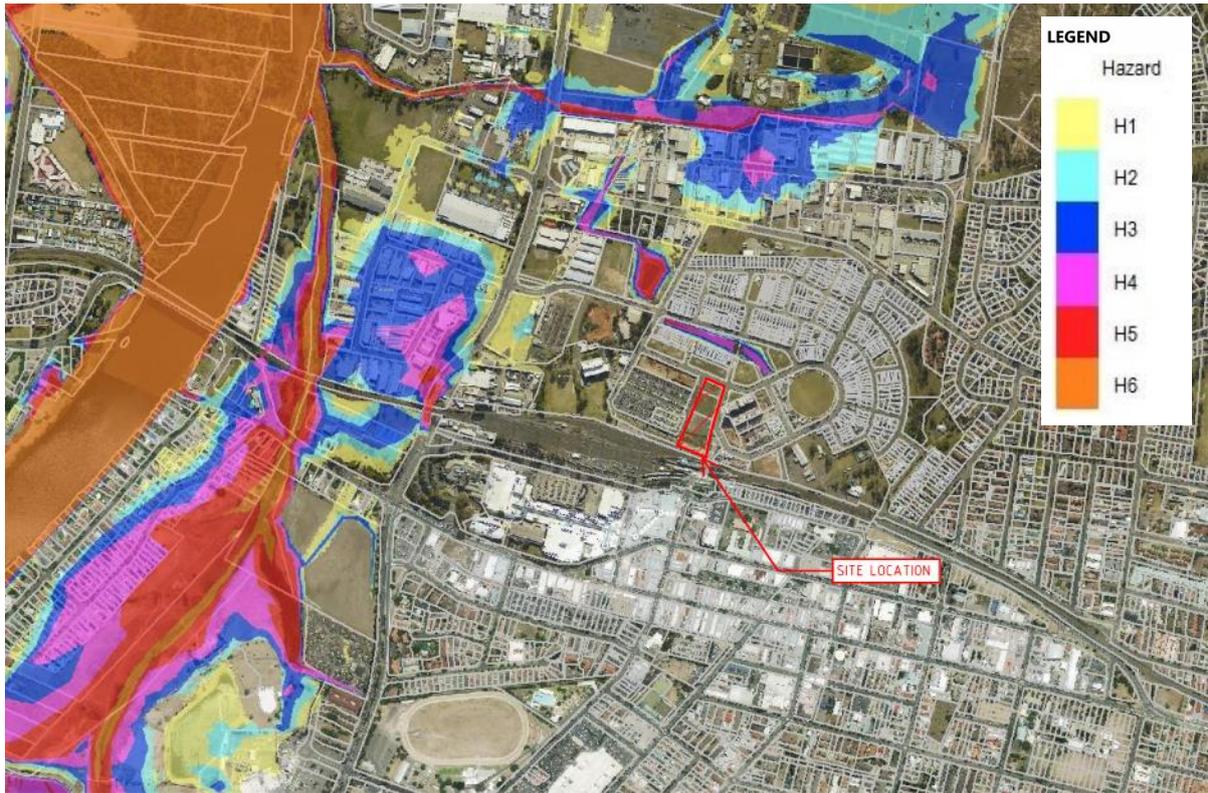


Figure 6 - 1% AEP Provisional Flood Hazards (Nepean River Flood Study; Advisian, 2018)

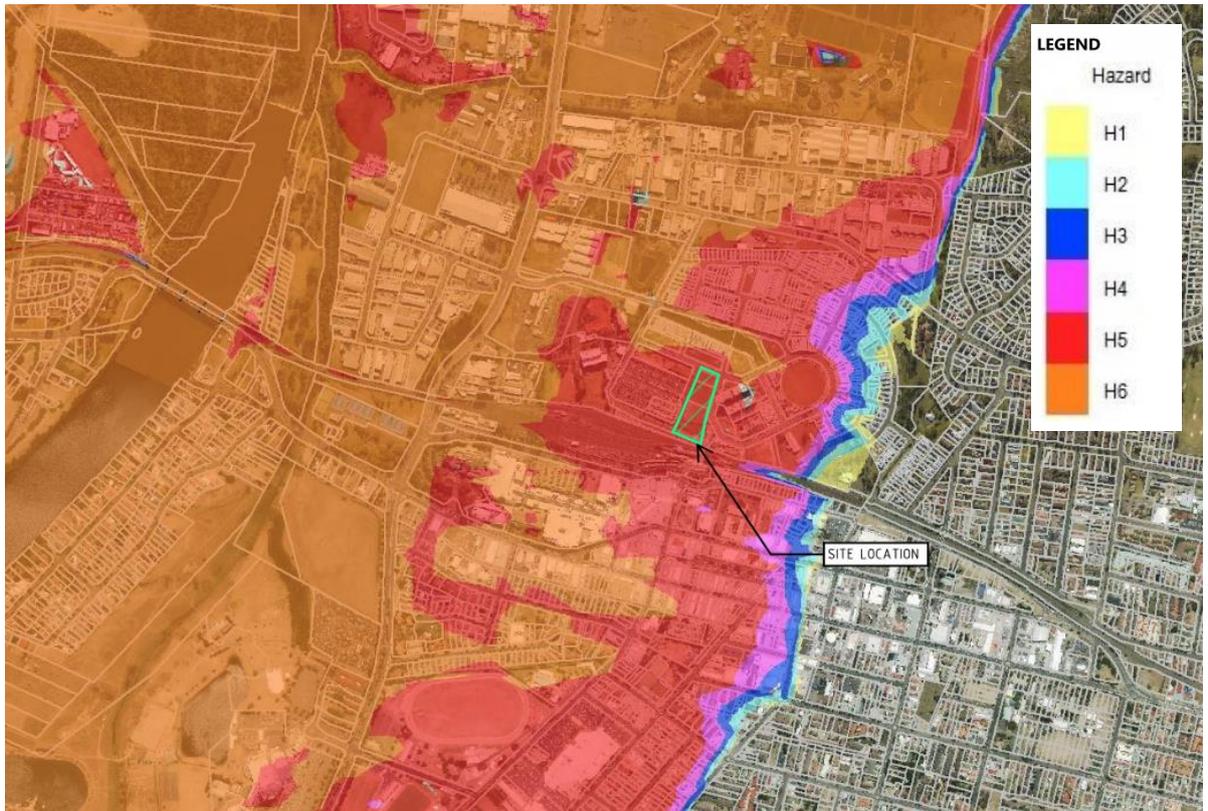


Figure 7 - PMF Provisional Flood Hazard (Nepean River Flood Study; Advisian, 2018)

Warragamba Dam

The site is located downstream from the Warragamba Dam which is categorised with an Extreme Consequence Category Dam by the NSW Dams Safety Committee. Whilst the dam is expected to currently be in good condition, an unsafe or emergency condition could still occur at any time.

Although the likelihood of dam failure is often increased during the rare to extreme flood events presented above, warnings or evacuation orders may also be given at any stage including during dry conditions.

It is important to note that flood events are dynamic and constantly changing. The content provided herein is not intended to overrule any instruction provided by emergency services. It is important to always follow the direction of emergency services.

SES Fact Sheets

The SES has prepared some fact sheets for the region which present some additional information including historic flood events and the likelihood of a flood event occurring again. These fact sheets are titled;

- “It Will Flood Again” (<https://www.ses.nsw.gov.au/media/3172/it-will-flood-again-fact-sheet.pdf>); and
- “What is the ‘chance of a flood’ in the Hawkesbury-Nepean Valley?” (<https://www.ses.nsw.gov.au/media/3870/what-is-the-chance-of-a-flood-in-the-hawkesbury-nepean-valley.pdf>)

These fact sheets have also been provided as Appendix A.

Do not Drive or Walk through Floodwater.

Remember, If It’s Flooded, Forget It!

Flood and Evacuation Warnings

The site is located within the Hawkesbury-Nepean floodplain for which the Hawkesbury Nepean Flood Plan (2015) prepared by the NSW Government and the NSW SES applies. The Hawkesbury-Nepean floodplain contains a number of monitored river gauges for the region which are managed by the Bureau of Meteorology (BoM) and/or the NSW SES. These provide information to the Bureau of Meteorology (BoM) as one source of information informing their flood warning system.

The Bureau should issue one of five types of warnings through local radio, television and through their website <http://www.bom.gov.au>. In addition, the SES may issue a flood bulletin, evacuation warning or evacuation order.

Due to the sensitive nature of this location, it is recommended the Chief Flood Warden and Flood Wardens register for automatic text and email notifications from the Early Warning Network which filters and passes on BoM warnings.

The warning types are as follows:

Severe Weather Warning

Severe weather warnings are issued by the Bureau for potentially dangerous weather conditions. A description of the threat will be included in the warning along with the time for next issue. It is noted that a severe weather warning does not imply that flooding will eventuate. Warnings are generally updated every six hours, or as the event dictates.

Severe Thunderstorm Warning

A severe thunderstorm warning will be issued if there is strong evidence that a severe thunderstorm will develop, or if a severe thunderstorm is reported. These storms can occur for a range of events from short-lived localised events to long-lasting widespread storm systems. Weather phenomena accompanying these storms include any combination of large hail, damaging or destructive winds, tornadoes and intense rainfall leading to local flash flooding. Warnings are generally updated every three hours or shorter as required.

Flood Alert/ Watch/ Advice

A flood alert/ watch/ advice will be issued if flood producing rain is expected. This provides an early warning that flooding may occur based on an assessment of catchment conditions and forecast rainfall. This information is incorporated into NSW SES flood bulletins for distribution to media outlets.

Quantitative Flood Warning

A quantitative flood warning is to be issued when flooding is expected to occur in a given area. Six to eight hours warning time is expected from issue of warning to peak flood level as per the "Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 3.13" (Bureau of Meteorology, 2013).

This is the most likely warning type for the subject site should evacuation need to occur.

Generalised Flood Warning

A generalised flood warning is to be issued when flooding is expected to occur in a given area. Three hours warning time is expected from issue of warning to peak flood level as per the "Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 3.13" (Bureau of Meteorology, 2013).

Minor/ Moderate/ Severe Flood Warning

A more detailed flood warning may be issued based on any additional information available. Three hours warning time is expected from issue of warning to peak flood level.

All warnings will be issued through the SES/BOM website, radio and television. Radio frequencies include 702 ABC Sydney (702 AM), 2CG (1170AM), 2DAY FM, (104.1FM), 2GB (873AM), 2ME, 1638AM, 2SM/Gorilla (1269AM), 2UE (954AM), 2VTR Hawkesbury (89.9FM), BLU FM (89.1FM), MIX 106.5 (106.5FM), NOVA (96.9FM), Radio 2Moro (1620FM), Radio 2RDJ (88.1FM), SBS Radio (97.7FM), Sydney's 95.3 (95.3FM), Triple M (104.9FM) and WSFM (101.7FM).

All public and commercial television stations should broadcast warnings.

SES Flood Bulletins

The SES may issue a flood bulletin to radio stations or other media outlets informing people about what is expected to happen during flooding. These bulletins contain information on the likely flood consequences and recommended actions to protect persons and property.

Evacuation Warning

The SES may issue an evacuation warning, advising the community to prepare for likely evacuation. The warning advises people what to do and what to prepare to take with them.

Evacuation Order

The SES will issue an Evacuation Order if evacuation is required. If this occurs **evacuation must be undertaken**. The orders will advise the community, or specific parts of a community to evacuate by a specified time in response to an imminent threat. The evacuation order will advise where people should go and may advise which evacuation routes to take.

Broadcast will be via radio/ TV, door knock, automated telephone message or SMS.

All Clear

The NSW SES will advise the evacuated community that it is safe for people to return to the area and inform people of any residual risks that may be present.

On-Site Emergency Communication

The PA system is recommended it be configured to sound an emergency tone and message telling all staff, tenants, customers and visitors to prepare for evacuation of the facility. The tone will be tested every three months as a minimum.

Should a PA system be unavailable or inoperable in the event of an emergency, a two-way radio, air horn and handheld loudspeaker is located within each Flood Warden's Flood Emergency Kits. These will be used to obtain people's attention and direct them to evacuation offsite. The contact details for each Flood Warden should also be contained within the Flood Safe Emergency Kit.

Early Warning Network Automated Text and Email Service

The Chief Flood Warden and Flood Wardens are to register for automatic alerts with the Early Warning Network (www.ewn.com.au) which will filter the above BoM warnings and send texts and emails to notify of the situation.

Dam Emergency Warnings

Dam emergency alerts will be issued by Water NSW to NSW SES and are used to trigger appropriate response actions. The response escalates as the alert level migrates from white to red. The meaning of each alert levels are as follows:

- **White:** Preliminary alert to assist the NSW SES in its preparation. This is not a public alert. It indicates a potential issue/condition that has been observed at the dam and is being investigated.
- **Amber:** Alert level necessitating the warning of the population at risk to prepare for evacuation.
- **Red:** Alert level requiring the immediate evacuation of the downstream population at risk.

The NSW SES will disseminate dam failure warnings to the public based on advice from Water NSW.

Dam failure warnings base be triggered at any time, and not necessarily correlate to extreme rainfall or weather events.

Floods Near Me App

Recently the NSW SES and NSW Public Works have created a Beta version of Floods Near Me NSW which is both a webpage (<http://www.floodsnearme.com.au/>) and phone Application.

The application is expected to also filter BoM warnings relevant to the user and may be used by the Chief Flood Warden and Flood Wardens as an additional resource.

The application also provides real time river flood depths for the Nepean River which may enable the Chief Flood Warden and Flood Wardens to monitor the flood situation as required.

SES Fact Sheet

Additional information regarding the types of warnings expected for the area are discussed in the SES Fact Sheet titled;

- “Knowing the Signs” (<https://www.ses.nsw.gov.au/media/3233/knowing-the-signs-of-flooding-fact-sheet.pdf>).

The Fact Sheet has also been included in Appendix A.

Flood Response Personnel

Summarised in Table 6 below are the facilities nominated emergency personnel, their location and responsibilities in managing flood response.

Table 6 - Flood Response Personnel

Role	Location	Responsibilities
Chief Flood Warden	On-site	<ul style="list-style-type: none"> • Ensure residents and tenants are notified of existing site flood conditions and are trained for evacuation. • Coordinate flood evacuation drills. • Monitor weather daily for upcoming major or extreme rainfall events. • Receive notifications from the Early Warning Network • Decide when evacuation is required. • Liaise with SES to confirm off-site evacuation shelter during evacuation. • Communicate decision for evacuation to Flood Wardens and activate alarm and evacuation message. • Remain calm and direct staff, residents, customers, and visitors and through the evacuation procedures. • Liaison with SES or Emergency Services personnel if they attend site.
Deputy Chief Flood Warden	On-Site	<ul style="list-style-type: none"> • Undertake Chief Flood Warden duties when Chief Flood Warden is unavailable. • Remain calm and direct staff, residents, customers, and visitors through the evacuation procedures.
Flood Wardens	On-Site	<ul style="list-style-type: none"> • Assist Chief and Deputy Chief Flood Warden with evacuations. • Prepare and maintain Flood Emergency Kits. • Remain calm and direct staff, customers, and visitors and through the evacuation procedures. • Prepare and coordinate assistance for staff, residents, customers, and visitors with mobility difficulties.
Staff and Residential Tenants	On-site	<ul style="list-style-type: none"> • Maintain calm, follow evacuation process and assist to direct visitors onsite through evacuation processes.

Role	Location	Responsibilities
Cranebrook High School	Hosking Street, Cranebrook	<ul style="list-style-type: none"> Nominated Primary Off-Site refuge facility (Hawkesbury Nepean Flood Plan; SES, 2015) Phone Number: (02) 4729 0777
Penrith High School	158-240 High Street, Penrith	<ul style="list-style-type: none"> Additional Off-site refuge facility (Hawkesbury Nepean Flood Plan; SES, 2015) Phone Number: (02) 4721 0529

Note; Additional evacuation shelters are defined in the Hawkesbury Nepean Flood Plan (SES, 2015) and the below Evacuation Centres and Routes Section of this report. Seek advice on the most suitable shelter from the SES (132 500) prior to commencement of evacuation.

It is anticipated the Building Manager (or similar), will be nominated the role of Chief Flood Warden. It is recommended the Chief Flood Warden be assigned to someone who is on-site on a regular basis.

Similarly, staff members and residents who are on-site on a regular basis should be nominated the role of Deputy Chief Flood Warden and general Flood Wardens. It is recommended that at least one Flood Warden is assigned in each retail/commercial tenancy.

Additional emergency management training is strongly recommended for all Flood Wardens.

All remaining staff and tenants are to assist the Flood Wardens with evacuation during a flood emergency.

Evacuation Centres and Routes

Evacuation Centres

A number of potentially suitable evacuation shelters have been nominated by the SES during minor to moderate flood events. Only one more of these shelters may be open at any one time. It is recommended that the Chief Flood Warden contact the SES prior to declaring the evacuation to confirm the most suitable evacuation shelter for the facility.

The information provided by the SES should then be relayed to the Flood Wardens who shall the assist to distribute the information to all evacuees. The internal PA system should also be programmed to enable automated alarms and they should have the capacity to send a message alerting building occupants of the information provided by the SES.

Two potential shelters are highlighted herein. This is based on the nominated evacuation shelter for the Penrith North Sector as defined by the Flood Plan (SES, 2015), as well as the closest facility to the subject site. These are presented below as the **Cranebrook High School**, located at Hosking St Cranebrook and the **Penrith High School**, located at 158-240 High Street, Penrith respectively.

The below Table 7 presents these and additional potential shelters that may be used as evacuation centres within the Penrith LGA as presented in the Flood Plan (SES, 2015).

Table 7 - Potential Evacuation Centres

Location	Address
Cranebrook High School	Hosking St, Cranebrook
Penrith High School	158-240 High St, Penrith
Jamison High School	Evan & Maxwell Sts, Penrith
Nepean College of TAFE – Kingswood	12-44 O’Connell St, Kingswood
Nepean Campus UWS	O’Connell St and Second Ave
Kingswood High School	Corner of Bringelly Rd, and Smith St, Penrith
Colyton High School	Carpenten St, St Marys
Cambridge Park High School	Harrow Rd, Cambridge Park
Cranebrook High School	Hosking St Cranebrook.

During a major flood event, the Flood Plan (SES, 2015) suggests a major evacuation centre may also be established elsewhere in Sydney. It is possible, an alternative location to those presented in **Table 7** above may be recommended by the SES.

When seeking advice from the SES, it may also be an opportunity to obtain advice about which evacuation route staff, residents, customers and visitors should take and the location of additional available evacuation centres. Additional information such as animal holding facilities may also be provided. It is critical the SES instructions are followed during a flood event as the SES will be coordinating the capacity of each facility as the event unfolds.

It is the responsibility of the Chief Flood Warden to activate the evacuation procedure and to notify the flood wardens of the information provided by the SES. The flood wardens are then to relay this information to all staff, customers, visitors and residents in conjunction with the message relayed through the internal PA system.

Evacuation Route

Evacuation should be undertaken via the nominated evacuation routes under the control of the Flood Wardens and guidance of staff. The evacuation route for the Penrith North Sector, for which the site is located, is detailed in the Hawkesbury-Nepean Flood Plan (SES, 2015), reproduced in Figure 8. The Flood Plan (SES, 2015) suggests all traffic from within the Penrith North Sector is expected to utilise the Northern Road Evacuation Route as shown in Figure 8. Emergency services are expected to manage Key Traffic Control / Conversion Points shown in Figure 8 and detailed in the Flood Plan (SES, 2015).

It is recommended staff, visitors, and residents proceed to the evacuation shelters via the nominated evacuation routes. Evacuation via car or bus is preferred as it is possible rail transport may be unavailable during the peak of a flood event. It is recommended that evacuees utilise carpooling enable provide transportation to those who may otherwise not have access to a vehicle. If possible, it is recommended to move vehicles outside the extent of the floodplain to limit damage to property as much as possible.

Special arrangements may need to be organised for the childcare centre to ensure evacuation of any children that cannot be safely collected prior to the evacuation time. This is expected to be managed by the local Flood Warden (likely the childcare centre manager). In addition, it is recommended each individual retail / commercial facility prepare their own individual evacuation plan and procedure (generally in accordance with this Plan) to ensure evacuation of the facility occurs in an efficient and timely manner.

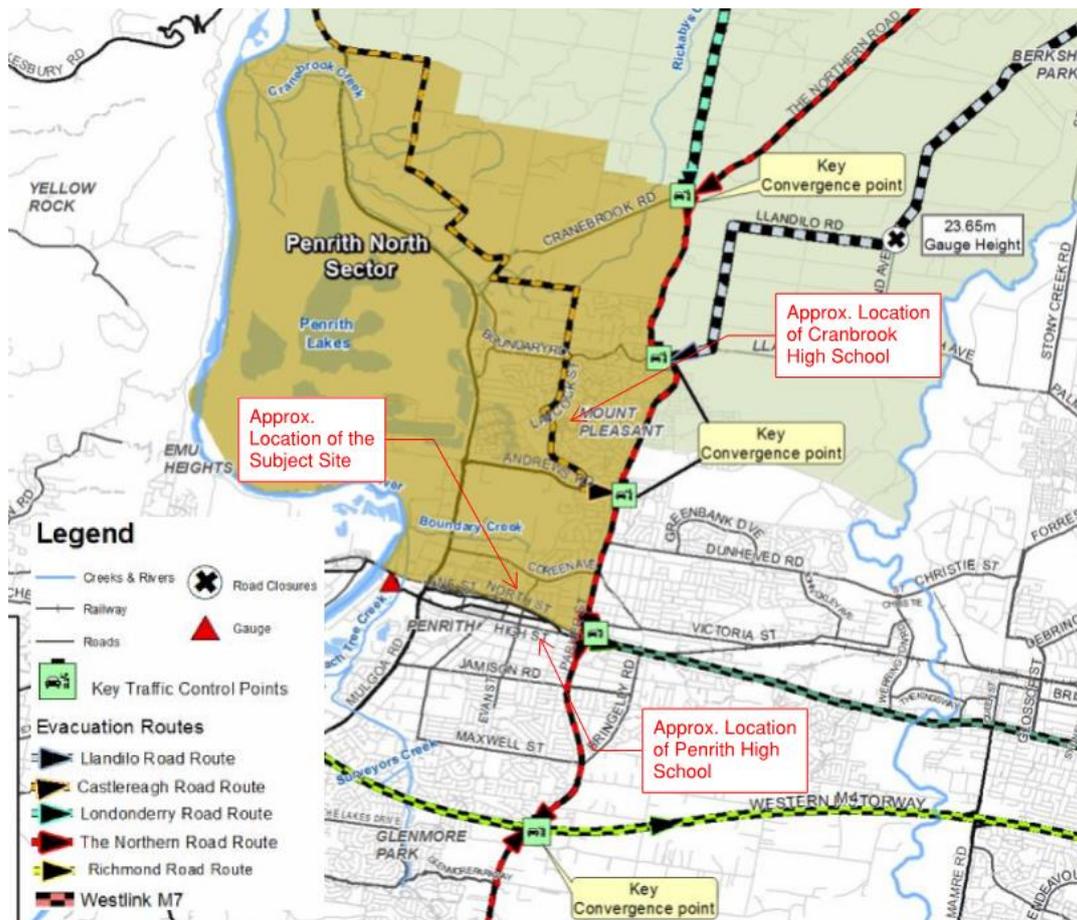


Figure 8 - Evacuation Routes (Hawkesbury-Nepean Flood Plan, 2015)

An evacuation route from the subject site to the Northern Road evacuation route may be undertaken by the route presented in Figure 9 below. It is noted, the SES may direct an alternative route during a flood event. Any advice given by emergency services during a flood event should take precedence over the information presented herein.

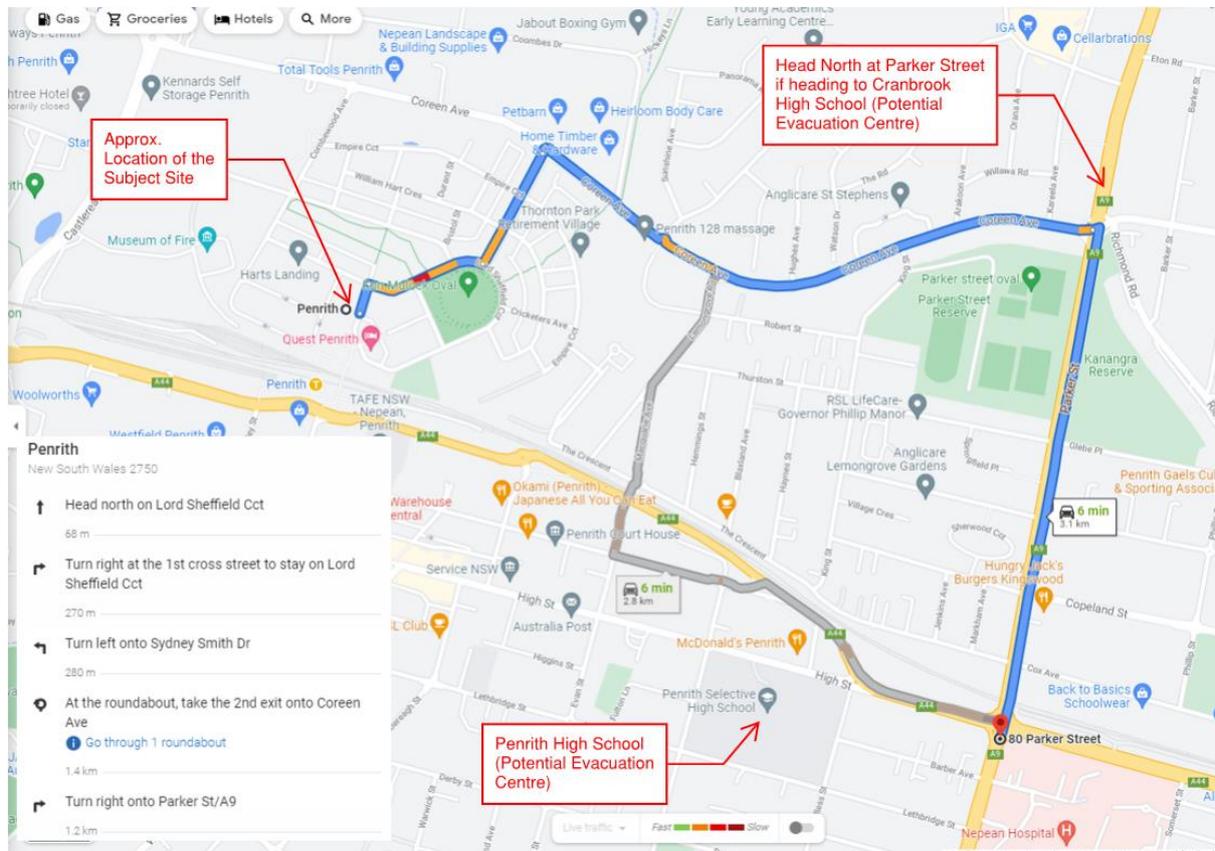


Figure 9 - Map of Local Evacuation Route to Northern Road Route (Google Maps)

The exit point for the Northern Road Route may be extended from the intersection of the Great Western Highway and Parker Street to the intersection of The Northern Road Kingswood, and the M4 Western Motorway at South Penrith depending on traffic conditions.

An additional evacuation information Fact Sheet has been prepared by the SES for the Hawkesbury-Nepean region. This Fact Sheet is titled:

- “Know how to get out” (<https://www.ses.nsw.gov.au/media/3174/know-how-to-get-out-fact-sheet.pdf>)

This fact sheet has also been provided in Appendix A.

Floor Levels and On-Site Refuge

Floor Levels

The proposed development contains multiple floors, including commercial and non-residential habitable spaces. The level of each floor is presented below in Table 8. The floor levels with respect to the 1% AEP and PMF flood events are also presented in the below Table 8.

Table 8 - Internal Floor Levels

Floor	Level (m AHD)	Relationship to Flood Levels
Basement Carpark	23.70	Above the 1% AEP and Below PMF
Substation	Varies 27.20 & 27.70	Above the 1% AEP and Below PMF
Ground Floor	Varies 26.35-27.40	Above the 1% AEP and Below PMF
Level 1	Varies 31.40-31.80	Above the 1% AEP and PMF
Level 2+ (Residential only)	Varies 34.60-35.8	Above the 1% AEP and PMF

On-Site Refuge

On-site refuge is not recommended during a regional flood event. The capacity of the building to withstand flood forces during more significant events (greater than the 1% AEP) is unknown. Extreme flood events that require evacuation are likely to last for many hours or even several days resulting in any personnel seeking refuge becoming trapped for multiple days.

As such, closure of the facility is required when evacuation orders are issued by NSW SES or via a qualitative flood depth at the Victoria Bridge Flood Gauge (Penrith Gauge) exceeds 8.2m (22.3 AHD).

If trapped on-site during a flood event, contact the SES immediately on 132 500.

If you are in a life-threatening situation please call Police, Fire or Ambulance on 000.

Do not Drive or Walk through Floodwater.

Remember, If It's Flooded, Forget It!

Emergency Contact

For emergency assistance during flood events, please call the **SES** on **132 500**.

If you are in a life-threatening situation please call **Police, Fire or Ambulance** on **000**.

For road blockages, fallen trees and other local asset issues, please call **Penrith City Council's Emergency Hotline** on (02) 4732 7777.

Flood Response Preparation

It is the responsibility of the Chief Flood Warden to prepare the facility for a flood event. This will be achieved through; induction training provided by the operator, nomination of flood wardens, education of flood risks and behaviour and the preparation and maintenance of *Floodsafe Emergency Kits*.

The information presented above is a summary of the flood behaviour and considered key to understanding the risks associated with the hazard. This should be displayed in conjunction with other emergency information (such as fire, etc.) throughout the facility.

Notification to Residents of Site Flood Conditions

Prospective residents are to be notified that the site is flood prone with the site flood emergency information and procedures relayed prior to issue of the lease agreement contract.

Induction Training

Induction training is also recommended for all new residents and commercial staff which is to occur on the first day of occupation or employment. Induction training should identify the site flooding conditions and expected flood behaviour. The evacuation procedures are also to be relayed to the residents and staff during the induction training as well as all additional information contained within this plan.

Records should be kept which detail who has had the training, when they were trained, the name of the trainer as well as reference to the material used in the training course.

Evacuation Drills

Evacuation drills are designed to increase flood awareness within the centre. These drills are to be undertaken twice per year to familiarise staff, residents and facility users of the procedures when responding to a flood event.

It is also an opportunity to outline expected flood levels and dangers of entering flood water. The following link can be used as a resource for evacuating personnel that are mobility impaired: <https://www.ses.nsw.gov.au/floodsafe/what-floodsafe-means-for-you/mobility-impaired/>.

Additional guidance is provided by the Australian Disability Network and if required, a Personal Emergency Evacuation Plan (PEEP) may be prepared. Additional information for preparation of a PEEP can be found on the Australian Network on Disability website:

<https://www.and.org.au/pages/evacuation-procedures.html>

For new staff it is expected they will be made familiar with the site flooding conditions and made familiar with the emergency procedures and response during an initial site induction.

Education and awareness are considered two critical aspects of Disaster Risk Reduction. These two elements are introduced through notification and induction training and further reinforced through evacuation drills.

Floodsafe Emergency Kit

Whilst on-site refuge is not recommended, a Floodsafe Emergency Kit should be prepared for each of the commercial and retail tenancies that may be brought along during any evacuation.

Potential items for a floodsafe emergency kit are outlined at;

<https://www.ses.nsw.gov.au/floodsafe/prepare-your-home/emergency-kit/>.

Items outlined on the SES website and some additional items are presented below:

- Drinking water, medicines and non-perishable food items.

- A copy of the facilities emergency management plan.
- Chemical register.
- Air horn and hand-held loudspeaker.
- Portable radios with spare batteries.
- Torches with spare batteries.
- Lanterns with spare batteries.
- Two-way radio with spare batteries.
- A first aid kit.
- Candles and waterproof matches.
- Waterproof bag for valuables.
- A copy of emergency numbers.
- Individual Health Care Plans including asthma puffers, diabetes medication, epi pens, etc.

Commercial tenancies may also consider packing the below:

- Register of Staff and Visitors on-site.
- Sign in book for visitors and contractors.

When flooding and evacuation is likely and if time permits, it is recommended all residential tenants consider adding the following items to their Floodsafe Emergency Kit prior to leaving the site

- Enough clothes for several days.
- Any special requirements for babies and the disabled, infirm or elderly.
- Strong covered shoes.
- Fresh food and drinks.
- Toiletries
- Important papers, valuables and mementoes.
- Electronic devices and charges as required.

It is the responsibility of the tenants to maintain their individual Floodsafe Emergency Kits, which are to be prepared immediately following occupation.

TRIGGER FOR REVIEW AND EDUCATION:

- Three monthly checking of the emergency kit to ensure all items are in suitable working order.
- Six monthly evacuation drills and reminder of the flood risks.
- Inductions for new staff, highlighting the flood risk associated with the subject site.

BY WHO: Chief Flood Warden and Tenants

Storage of Sensitive Goods

All sensitive goods which are susceptible to damage from flood waters or, if exposed to floodwaters would have significant ramifications to the surrounding area, must not be stored in the basement carparks or ground floors which are susceptible to flooding. The first floor is above the PMF level and are therefore considered appropriate place to store goods which are sensitive to water.

Monitoring of Weather Situation

It is the responsibility of the Chief and Deputy Chief Flood Warden to monitor the weather situation and be aware if a warning has been issued. This will be achieved through automatic text messages and emails from the Early Warning Network and checking of the local radio stations and the Bureau website. The Floods Near Me app may also be used to monitor the flood situation.

It is recommended that each individual residential tenants and the nominated Flood Wardens in the monitor the weather situation to ensure they remain informed and prepare appropriately for any upcoming flood events.

TRIGGER FOR MONITORING:

- Continuous, 4pm daily

BY WHO: All Flood Wardens and Residents

Signage

Flood warning signage is to be placed throughout common areas in the facility (i.e. lift lobbies and common halls). It is also recommended that a copy of the Flood Response Summary provided at the beginning of this plan be placed within each individual tenancy. All flood warning signage is to be laminated and must identify that the site is flood prone.

It is the responsibility of each individual tenant to ensure signage within the tenancies are up to date and displaced as recommended above.

Similarly, the Chief Flood Warden is to ensure signage throughout the common areas are displayed and maintained as recommend above.

SES Fact Sheets

Additional area-specific Flood Response Preparation Fact Sheets has been prepared by the SES for the Hawkesbury-Nepean region. This Fact Sheet is titled:

- “Your Get Ready to Go Kit” (<https://www.ses.nsw.gov.au/media/3411/your-get-ready-to-go-kit-fact-sheet.pdf>)
- “Keeping Your Animals Safe in an Emergency” (https://www.ses.nsw.gov.au/media/4120/hn_keeping-animals-safe_final.pdf)

These fact sheets have also been provided in Appendix A.

Flood Response Actions

Cancellation of Operations

In order to minimise the risk to life, it is recommended the building be closed if a Quantitative Flood Warning with a flood level at Victoria Bridge (Penrith) exceeding that as presented in Table 9.

Table 9 - Triggers for cancellation & evacuation

Flood Classification	Penrith Flood Gauge Depth (Victoria Bridge) (m)
Minor	3.9
Moderate	7.9
Evacuation Trigger	8.2m (22.3m AHD)
Major	10.4

Closure and Evacuation of the facility should be undertaken once the warning for a flood gauge depth of 8.2m (22.3m AHD) at the Victoria Bridge is received.

The aim is to eliminate/reduce the risk to life by removing as many staff, residents and visitors from the floodplain as possible.

The Chief Flood Warden is responsible for reviewing the weather forecasts daily and notifying facility users, staff and residents of the decision to close the building and evacuate.

When a warning is received, consideration should be given to:

- Cancelling services and appointments for the day of the event (Commercial Areas).
- Blocking floor wastes and toilets on lower levels.
- Securing objects that are likely to float and cause damage.
- Relocating chemicals above the predicted water level.
- Moving vehicles away from the site where possible.

The evacuation procedure should generally follow:

- **Chief Flood Warden** receive Quantitative Flood Warning with predicted **Victoria Bridge Flood depth of 8.2m** (22.3m AHD) or greater.
- Chief Flood Warden to contact the SES to receive advice on most suitable location for off-site refuge and evacuation routes.
- Chief Flood Warden to relay decision to evacuate and SES flood advice to the Flood Wardens.
- **Chief Flood Warden to Sound** alarm and broadcast message on PA system to notify residents, staff, customers and visitors of evacuation and location for off-site refuge.
- **Flood Warden for childcare centre to inform parents and emergency contacts to collect children where possible. Flood Warden to implement emergency transportation strategies to evacuate children who are unable to be collected in time.**
- **Tenants to gather FloodSafe Kit and belongings and proceed** to the nominated evacuation centre via the preferred evacuation route.

- **Staff and Visitors in the Commercial tenancies may Return home** if it is safe to do so and wait out the storm event (otherwise follow evacuation requirements as advised by the Chief Flood Warden).
- When evacuating the facility, Flood Wardens are to leave signage undercover, and notify Police/ SES that evacuation has occurred, and to where.
- **Flood Wardens** clear commercial tenancies.
- **If staff or customers are unable to return home, they shall also proceed to the nominated evacuation routes.** The Flood Wardens are to assist in facilitating additional transport if required.
- **Wait it out** at the designated refuge points.

Emergency Services Attending Site

It is noted self-motivated evacuation, such as that proposed in this plan, reduces strain on emergency services. There is a possibility that emergency services such as Police, Fire, Ambulance or SES may attend site and assume control from the Chief Flood Warden. Once this has occurred, they are in control of the site and any response operations.

TRIGGERS FOR EMERGENCY SERVICES TAKE CONTROL:

- Police, Fire, Ambulance or SES attending site.

RESPONSIBLE FOR THE DECISION; Chief Flood Warden

After a Flood

Once a Final Flood Warning or SES “All Clear” has been received:

- A thorough check of services such as electricity, sewer, water and gas should be undertaken by qualified persons.
- Advice should be sought from a suitably qualified engineer as to the structural integrity of buildings prior to their use.
- Personal protective equipment should be worn during the clean-up and disinfectant used.

TRIGGER FOR RETURN:

- All clear given by SES or emergency services and building inspected by qualified persons.

BY WHO: SES, Emergency services, Flood wardens, Suitably Qualified Engineer

Revision of this Flood Evacuation Plan

This plan should be revised if any of the below studies are revised or if a new flood study is prepared for the area.

- The Resilient Valley, Resilient Communities strategy prepared by Infrastructure NSW for the Hawkesbury-Nepean Valley and dated January 2017.
- Nepean River Flood Study, prepared by Advisian & Penrith City Council dated 12th of November 2018.
- Hawkesbury Nepean Flood Plan – A Sub Plan of the State Emergency Management Plan (EMPLAN) dated September 2015.
- Penrith Local Emergency Management Plan dated November 2020.
- Penrith City Local Flood Plan – A sub-plan of Penrith Local Disaster Plan (DISPLAN) dated April 2012.
- Penrith Overland Flow Flood Study (OFFS) prepared by Cardno and dated August 2006.

Notwithstanding the above, this plan shall be reviewed prior to Occupation Certificate to ensure it remains up to date with the available information in the area prior to implementation.

As a minimum, this plan should be **revised every three years** or when there is a major operational change or flood event.

Revisions should be undertaken by a suitably qualified flood emergency response consultant.

Conclusion

The subject site is affected by flooding generated by the regional catchment and the Nepean River. A review of the proposed development has been undertaken in conjunction with the expected flood behaviour and it was concluded that:

- Evacuation of the facility is required where a **Quantitative Flood Warning with a flood gauge depth of 8.2m (22.3m AHD)** at the Victoria Bridge is received or an Evacuation Order is issued by NSW SES.
- **Closure and evacuation of the facility via the nominated evacuation routes to** areas not affected by flooding or to evacuation centres as established and advised by NSW SES shall occur with residents and staff that are unable to return home following receipt of the aforementioned flood warning.

Through adoption of this plan, the proposed development adequately minimises the flood risks associated with the subject site. The recommendations contained herein assist in managing the risk to life of the staff, facility users and visitors to the subject site.

References

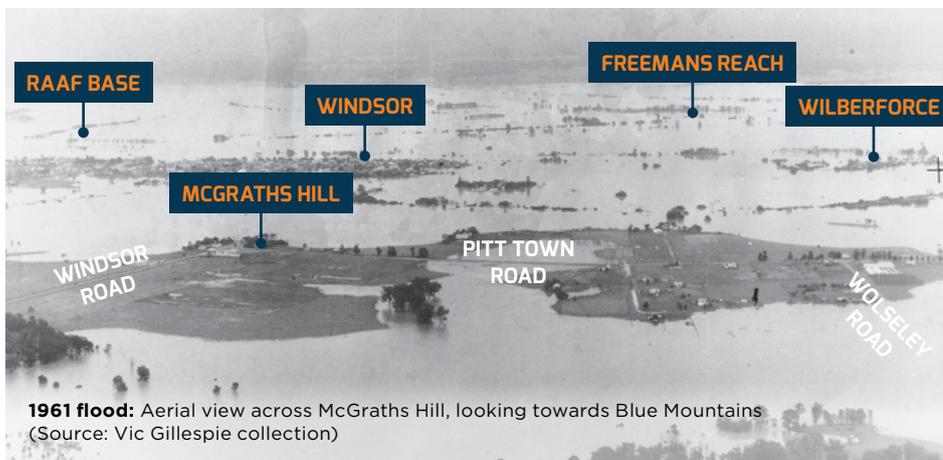
- SES (2015) Hawkesbury Nepean Flood Plan – A Sub Plan of the State Emergency Management Plan (EMPLAN) accessed from: <https://www.ses.nsw.gov.au/media/1627/plan-hawkesbury-nepean-flood-plan-sept-2015-endorsed.pdf> 7 September 2021
- SES (2019) *Flood Disaster Website* accessed from: <https://www.ses.nsw.gov.au/disaster-tabs-header/flood/> 8 September
- SES (2018) *Emergency Business Continuity Plan* accessed from: <http://www.sesemergencyplan.com.au/business/index.php> 8 September 2021
- SES (2018) *Flood Planning for the Mobility impaired* accessed from: <https://www.ses.nsw.gov.au/floodsafe/what-floodsafe-means-for-you/mobility-impaired/> 8 September 2021
- Bureau of Meteorology (2013) Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 3.13 accessed from: http://www.bom.gov.au/nsw/NSW_SLS_Current.pdf 8 September 2021
- Penrith City Council (2018) Nepean River Flood Study Volume 1 & 2 accessed from <https://www.penrithcity.nsw.gov.au/services/other-services/floodplain-management> 7 September 2021
- Penrith City Council (2012) Local Flood Plan – A Sub-Plan of Penrith Local Disaster Plan (DISPLAN) accessed from <https://www.ses.nsw.gov.au/media/1625/plan-city-of-penrith-lfp-apr-2012-endorsed.pdf> 8 September 2021
- Penrith City Council (2020) Penrith Local Emergency Management Plan Accessed from: https://www.penrithcity.nsw.gov.au/images/final_penrith_em_plan_2020-public_version.pdf 8 September 2021
- Penrith City Council (2020) Penrith CBD Floodplain Risk Management Study and Plan Accessed from <https://www.penrithcity.nsw.gov.au/services/other-services/floodplain-management> 29 October 2021
- Infrastructure NSW (2017) The Resilient Valley, Resilient Communities strategy Accessed from: <https://www.infrastructure.nsw.gov.au/media/2855/infrastructure-nsw-resilient-valley-resilient-communities-2017-jan.pdf> 13 September 2021

Appendix A – Hawkesbury-Nepean Floodplain Fact Sheets

It will flood again

FREQUENCY OF FLOODING IN THE HAWKESBURY-NEPEAN

The Hawkesbury-Nepean Valley has a long history of dangerous and damaging floods. Since records began in the 1790s, there have been about 130 moderate to major floods in the valley, including five major and 20 other serious floods since Warragamba Dam was completed in 1960.



1961 flood: Aerial view across McGraths Hill, looking towards Blue Mountains
(Source: Vic Gillespie collection)

The largest flood in living memory was in November 1961, when the water reached 14.5 metres above normal river height at Windsor. During this flood the Nepean Rowing and Powerboat Club was destroyed, Yarramundi Bridge was flipped over and widespread devastation occurred across the Hawkesbury-Nepean Valley.

The largest flood on record was in 1867 when floodwaters reached **19 metres** above normal river height at Windsor.

Large floods don't happen often, but when they do they have very significant impacts on the community.



View of Penrith from the Great Western Road during the 1867 flood
(Source: *Illustrated Times* (London), 7 September 1867 p 145; State Library of NSW)

Largest flood on record

There's a **15%** chance of a flood

as large as 1867 happening in an 80-year lifetime.

Observers from that time described a huge inland sea that stretched from Pitt Town to Kurrajong and from Riverstone to the Blue Mountains. Windsor, Richmond and Pitt Town became small flood islands. In Penrith, floodwaters nearly reached the corner of High and Woodriff Streets and most of Emu Plains was under water.

IF A FLOOD SIMILAR TO THIS RECORD FLOOD HAPPENED IN THE VALLEY NOW,

 **MORE THAN 90,000** PEOPLE WOULD NEED TO BE EVACUATED FROM THE FLOODPLAIN AND

 **MORE THAN 12,000** HOMES WOULD BE IMPACTED BY FLOODWATER.

When is the next big flood due?

There has not been a major flood since 1990. That's 28 years, and it's not unusual with the cycle of droughts and floods in the valley.

Hydrological research has shown that the region is characterised by drought-dominated and flood-dominated cycles that can last for decades (see diagram below). In fact, it is highly likely that a drought will be broken by a flood, and that more floods will follow.

Currently, we are in a drought-dominated cycle and records show it is likely to be followed by a flood-dominated regime.

On top of these underlying patterns, there are large annual variations of rainfall and runoff. Ultimately, floods are naturally occurring events. It will flood again in the Hawkesbury-Nepean Valley, we just can't predict when.

What you can do to prepare?

Make sure you talk with your family and friends about what you will do in a flood so that everyone knows what to do and what to expect. Prepare **NOW** and follow these six steps to save lives.

1. Know your risk

Visit www.ses.nsw.gov.au/hawkesbury-nepean-floods and view flood maps.

Contact your local council for property-level information.

2. Understand where to go

Find out about flood evacuation routes on the flood website.

Check with friends and relatives outside the floodplain area to organise a place to go.

3. Know who to call

Keep local emergency numbers in your mobile or on your fridge. For emergency help in floods and storms, call the NSW SES on 132 500. In a life-threatening emergency, call 000 (triple zero).

4. Prepare a Home Emergency kit

Visit www.ses.nsw.gov.au/hawkesbury-nepean-floods to see what to include.

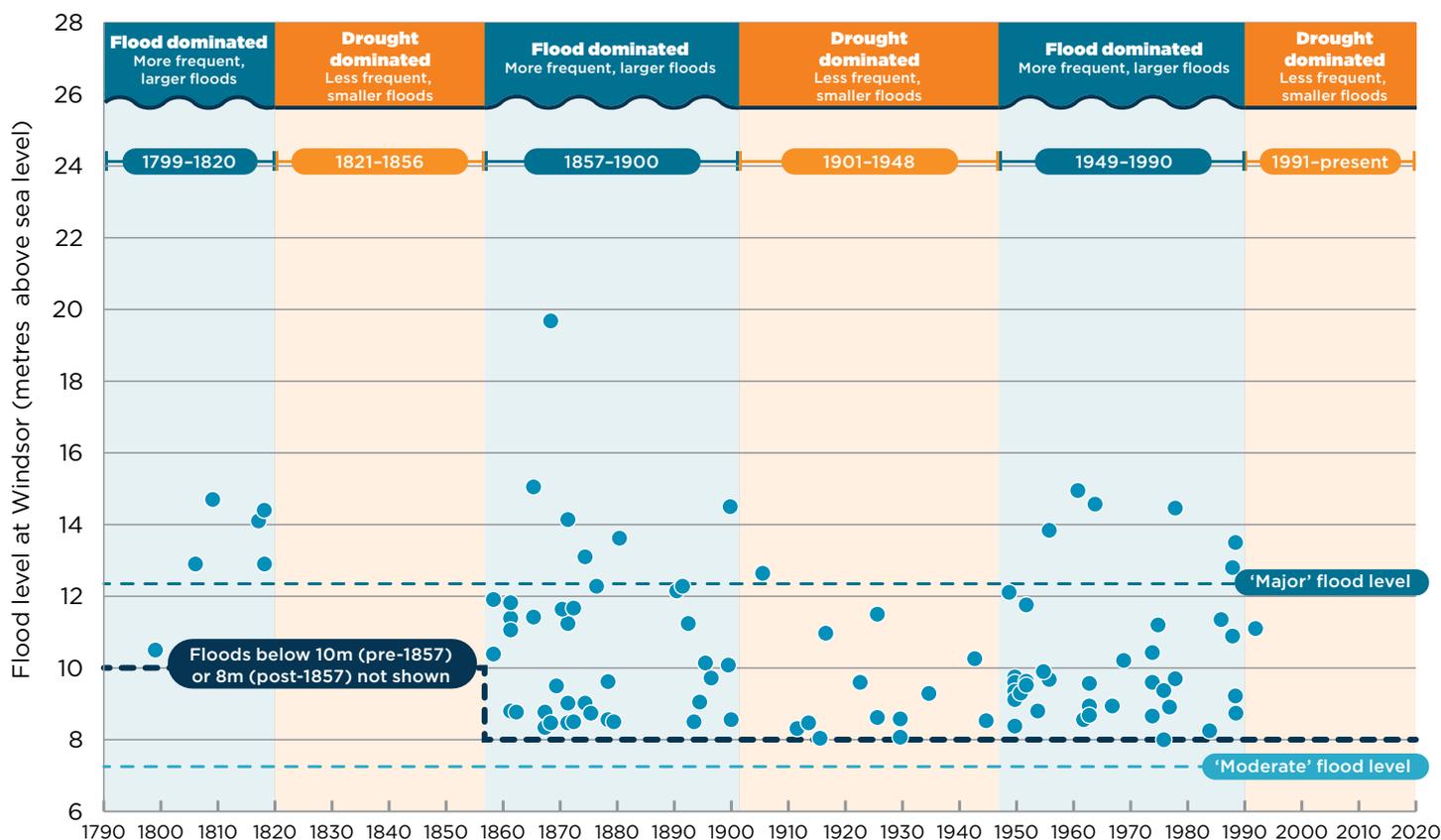
5. Check your insurance

Make sure your insurance is suitable to your situation and risk, and it is current.

6. Know when to act during a flood emergency

See information on flood warning signs at www.ses.nsw.gov.au/hawkesbury-nepean-floods. Listen to local and ABC radio for updates and follow NSW SES Facebook or NSW Police Facebook or Twitter.

Pattern of floods in the Hawkesbury-Nepean Valley





What is the 'chance of a flood' in the Hawkesbury-Nepean Valley?

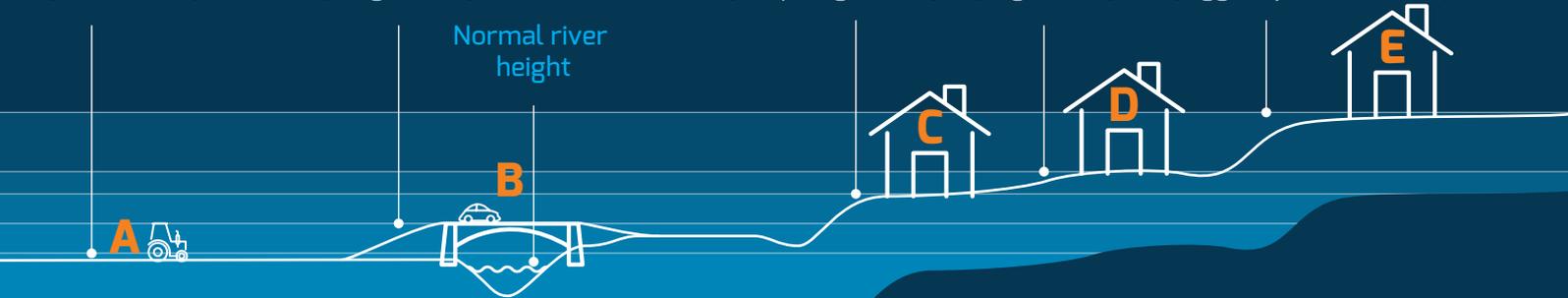
Very high chance
(Small flood)

High chance
(Large flood)

Medium chance
(Very large flood)

Low chance
(Huge flood)

Extremely low chance
(Biggest possible flood)



Site A has a:

100%
chance

of flooding in an
80-year lifetime
OR a 20% chance
each year.

This is also called
a 1 in 5 chance
per year flood.

This flood is similar
in size to the
February 2020 flood.

Site B has a:

98%
chance

of flooding in an
80-year lifetime
OR a 5% chance
each year.

This is also called
a 1 in 20 chance
per year flood.

This flood is
similar in size to
the 1990 flood.

Site C has a:

55%
chance

of flooding in an
80-year lifetime
OR a 1% chance
each year.

This is also called
a 1 in 100 chance
per year flood.

Site D has a:

15%
chance

of flooding in an
80-year lifetime
OR a 0.2% chance
each year.

This is also called
a 1 in 500 chance
per year flood.

This flood is
similar in size
to the 1867
record flood.

Site E has a:

<0.1%
chance

of flooding in an
80-year lifetime.

This is the largest
possible flood in the
Hawkesbury-Nepean
Valley. It is based on
computer modelling
by flood experts and
is extremely unlikely
to happen. It is also
known as the probable
maximum flood (PMF).

Knowing the signs

WHAT ARE THE WARNING SIGNS FOR A FLOOD IN THE HAWKESBURY-NEPEAN VALLEY?

What causes significant floods here

Most significant floods in the Hawkesbury-Nepean Valley are caused by intense low-pressure systems called East Coast Lows.

These weather systems can happen at any time and can occur several times a year. They tend to be more common in Autumn and Winter and often intensify rapidly overnight. This makes them one of the most dangerous weather systems to affect the region.

The unique geography in the valley also affects the extent and depth of flooding in the region. Most river valleys tend to widen as they approach the sea. The opposite is the case in the Hawkesbury-Nepean Valley. Narrow downstream sandstone gorges between Sackville and Brooklyn create natural choke points that cause the 'bathtub effect'.

Floodwaters back up and rise rapidly, causing deep and widespread flooding across the floodplain. Much like a bathtub with five taps (the major tributaries) turned on, but only one plug hole to let the water out.

There is a pattern of flood-dominated and drought-dominated cycles in the Hawkesbury-Nepean Valley. These cycles typically last from 30 to 50 years. We are currently around 30 years into a drought-dominated period. It's not a matter of 'if' another major flood will happen, it's a matter of 'when'.

Recent floods like those in Townsville have shown that a drought affected region with low dam levels and water restrictions in place can become one facing devastating floods in a matter of weeks.

What are the natural warning signs?

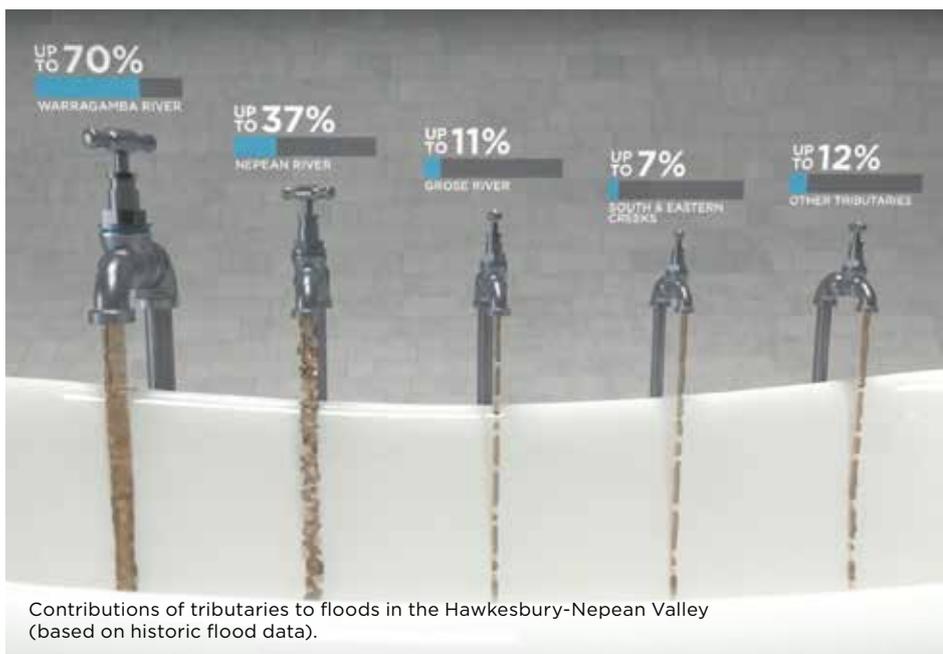
Every flood is different, so you can't rely on what you might have experienced or heard about in the past.

It's important to pay attention to weather reports and be aware of some of the early warning signs such as:

- predictions of heavy and/or prolonged rainfall
- East Coast Lows affecting the region
- heavy, sustained rainfall is occurring in upstream catchments such as the Blue Mountains, the Southern Highlands, Goulburn and Wollondilly regions.

In the Hawkesbury-Nepean Valley, there may be **only a few hours warning** between heavy rainfall and being told to evacuate.

In most cases you won't see flooding in your neighbourhood before being told to evacuate. This means your best source of information is the official warnings.



Contributions of tributaries to floods in the Hawkesbury-Nepean Valley (based on historic flood data).



Windsor and McGraths Hill in 1988

Official warnings and advice

Official warnings and flood advice are provided by The Bureau of Meteorology (the Bureau) on their website and the NSW State Emergency Services (NSW SES) on radio stations and NSW SES social media.

The Bureau uses rainfall and flood gauges to predict the arrival time and depth of floodwater. Working in cooperation with NSW SES, the Bureau issues three types of related forecasts and warnings:

- **A Flood Watch** provides early advice that flood-producing rain is expected to happen in the near future. Note: a flood watch is updated daily but it is *not a warning of imminent flooding*.
- **A Flood Warning** is issued when the Bureau is more certain that flooding is expected in a specific area and is typically issued when rainfall has started to fall.
- **A Severe Weather Warning** is issued for very heavy rain that may cause flash flooding or abnormally high tides that can affect flooding. Localised flash flooding occurs after intense rainfall and is also referred to as overland flooding.

Leading up to and during a flood, NSW SES issues:

- **Flood Bulletins** that provide information on likely flood consequences and what actions you should take to protect yourself and your property.
- **Evacuation Warnings** that warn when evacuation routes are likely to be cut or when floodwaters are expected to inundate property. These warnings aim to get people prepared to evacuate and to respond quickly if an Evacuation Order is issued.
- **Evacuation Orders** that advise people what to do in an evacuation and where to go. You might hear an evacuation order that is relevant to you on radio stations, or by automated telephone and/or SMS, NSW SES social media, or door knocks.

It is vital that you leave if you receive an Evacuation Order.

Improving flood forecasting in the valley

The Bureau of Meteorology is working to enhance flood forecasting for the Hawkesbury-Nepean Valley to support improved emergency planning and response.

This has included improving forecasts, new flood modelling and better understanding of timing, behaviour and heights of floods. The new system is expected to be rolled out in late 2019.

Know how to get out

FLOOD EVACUATION ROUTES IN THE HAWKESBURY-NEPEAN VALLEY

Floods in the Hawkesbury-Nepean Valley can happen with little warning. You may only have a few hours to get out following an evacuation order. You need to be prepared and get to know your evacuation routes.

Knowing when and how to leave

The Hawkesbury-Nepean Valley has a long history of damaging and dangerous floods. You need to follow evacuation orders to keep you, your family and pets safe. You will typically be asked to leave well before you see any sign of floodwater in your neighbourhood. It is not safe to stay and shelter in your home once you have been ordered to evacuate.

To find out about evacuation orders and which routes are open listen to your local and ABC radio, or follow NSW SES Facebook, or NSW Police Facebook and Twitter.

Get familiar with the routes

There are 12 designated evacuation routes that provide the quickest and safest way to exit the Wallacia, Penrith-Emu Plains, Richmond-Windsor, South and Eastern Creek floodplains. (See map on reverse of fact sheet).

You need to be aware of more than one route because each flood behaves differently and evacuation routes will get cut by floodwater at different points. Some routes can get cut quite early in relatively small floods. For example, Windsor Road is cut by a flood that has a 98% chance of happening in an 80-year lifetime (also known as a 1 in 20 chance per year flood).

Even relatively new infrastructure can be affected by large floods. The Jim Anderson bridge at Windsor would be cut in a flood with a 55% chance of occurring in an 80-year lifetime (1 in 100 chance per year flood).

Once you know your best routes, have a conversation with friends or relatives to organise a place to go to. Remember, as each flood can be different, it's important to follow evacuation orders when they are given.

Follow the signs

More than 150 new flood evacuation signs have been installed across the Hawkesbury-Nepean Valley to guide drivers. There are 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.

Signs to guide people along the regional flood evacuation routes towards safer areas.

4 Direction at the intersection



3 Advance notice of turns

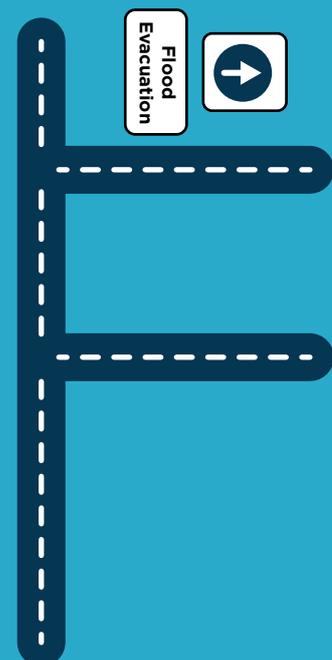


200m

2 Shows you're still on the route



1 At the start of the route





Flood Evacuation Routes

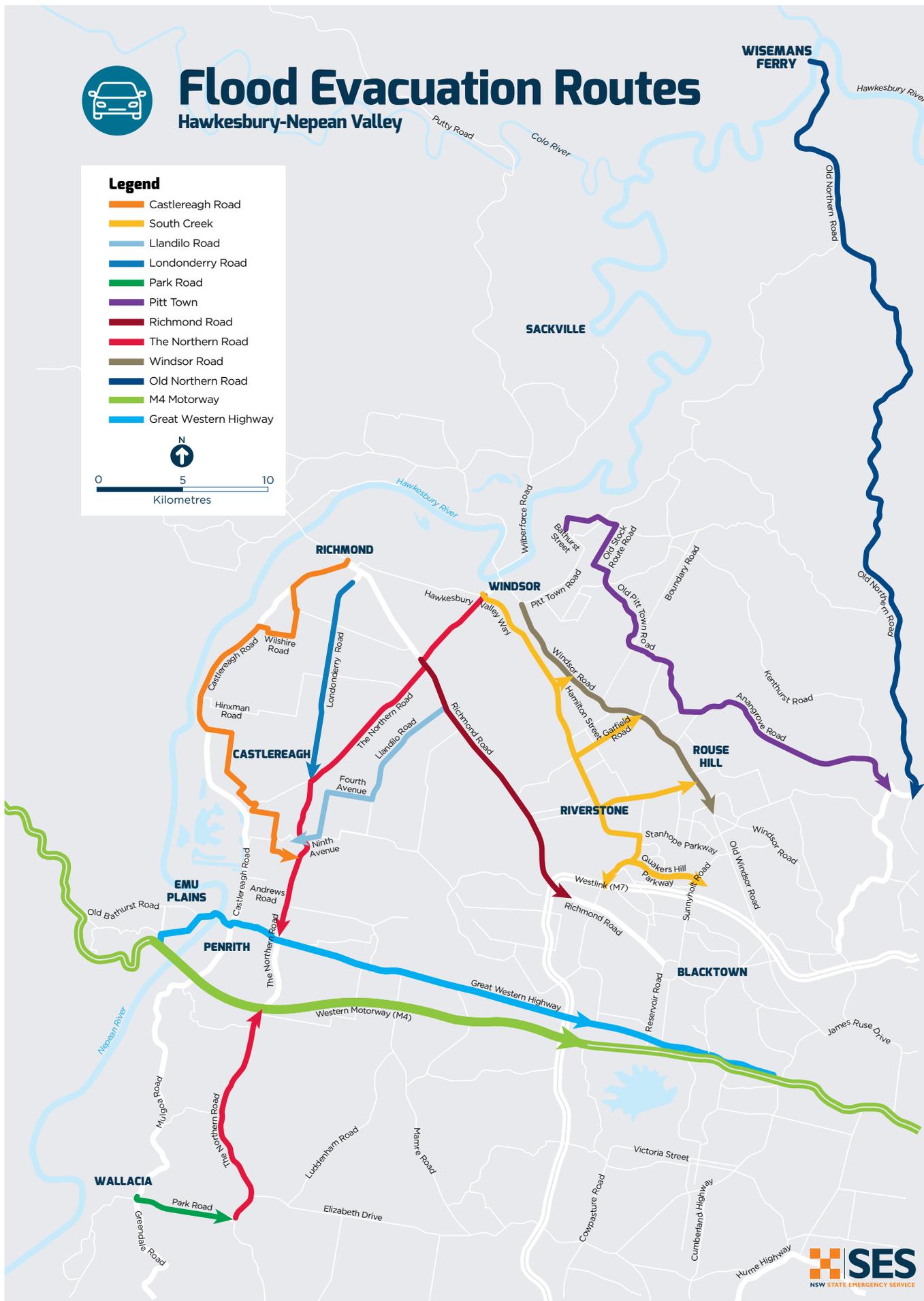
Hawkesbury-Nepean Valley

Legend

- Castlereagh Road
- South Creek
- Llandilo Road
- Londonderry Road
- Park Road
- Pitt Town
- Richmond Road
- Windsor Road
- Old Northern Road
- M4 Motorway
- Great Western Highway



0 5 10
Kilometres



Your Get Ready to Go kit

HOW TO PREPARE A KIT FOR EVACUATIONS

Due the depth and danger of floods in the Hawkesbury-Nepean Valley, when an Evacuation Order is issued you may only have a few hours to leave.

Why you need a kit

- A significant flood in the Hawkesbury-Nepean Valley will cause damage to people's homes. It will also cause major disruptions to essential services such as water, electricity, gas, roads and rail lines.
- By the time you know a flood might impact your property, there may be very little time before you have to leave. A key step to getting ready for floods (or for any other natural hazard) is to prepare a Get Ready to Go kit.
- The kit should contain what you will need during and immediately after evacuation, whether you are going to family and friends, or to an evacuation centre.

What to do now

-  Either scan, photograph or upload to the cloud, key records and documents (insurance, ID, passports etc)
-  Put key contact information into your mobile phone (eg doctor, electricity and water utilities etc)
-  Photograph or scan medication scripts
-  Check your home and contents insurance policy cover

What you can place in your kit earlier

-  Portable radio with spare batteries
-  Torch with spare batteries
-  First aid kit (with supplies necessary for your household)
-  Candles and waterproof matches
-  Personal hygiene supplies
-  Waterproof bag for valuables such as important documents (eg passports or insurance) and valuables (photos, jewellery etc)

What to add to your Get Ready to Go kit when you are leaving

-  A few toys or family games
-  A good supply of required medications
-  Any special requirements and supplies for babies, the disabled, infirm and/or elderly
-  Fresh food and drinking water
-  Appropriate clothing and footwear for multiple changes for all household members
-  Mobile phone and charger



For pets and animals you need a separate kit:

Consider restraint and transport, food, water, toileting, medications, first aid, housing and bedding:



Cages or pet carriers for each animal; or



Bowl or feed bucket; can opener and spoon



Litter and litter tray for cats



Muzzle and leash; or lead rope and head collar for each animal



Woollen blanket, towels or bedding



Poo bag for dogs



3-7 days of food and water for each animal



Animal medications and first aid items



Pet toys



Take a photo of your pet's vaccination certificate

Maintaining and storing your kit

Your kit should be kept in a waterproof storage container and stored in a safe place that is easy to access.

On a regular basis, check your Get Ready to Go kit (remember to check use-by dates on batteries and medications) and restock items if you need to.

Also, keep a list of emergency numbers near your phone or on your fridge.



Keeping Your Animals Safe in an Emergency

in the Hawkesbury–Nepean region

Are you ready? Make a plan for ALL your family

This publication contains general information only and should not be construed as advice. It does not take into account individual circumstances. Users relying on this information do so at their own risk. Users of this general information cannot claim loss or damages arising out of the use of this general information.

Version 2 – August 2020

Are you an animal owner?



Floods, fires and other emergencies can happen at any time and with little warning.

Your animals WILL affect how quickly and easily you can evacuate if there is an emergency.

This brochure will help you to:

- determine the risk to you and your animals
- develop a PLAN, which includes your animals
- identify where to take your animals and how you will get there safely
- understand emergency warnings and act early
- make ALL your animals identifiable for their safety
- prepare a 'Grab and Go' kit
- plan for the unexpected — in case you are not at home
- make preparations for the animals you can't take with you
- build an 'Animal Ready Community'

Am I at risk?

To make a good plan, you need to know the risks in your local area.

Do you live in or near a floodplain, near a creek or in a low-lying area? Is your area subject to flash flooding? Do you know what height your property is?

If you live in the Hawkesbury-Nepean you are on a floodplain and need to understand your risk of flooding.

Do you live in or near bushland, a nature reserve, National Park or close to grasslands?

If you live in the Hawkesbury-Nepean you need to understand if you live in a high fire risk area.

You may also be at risk from severe storms and heatwaves.

It's important to think about any severe weather events you may experience at your property or in your local area. Also consider you could be affected by road closures or power outages.

How do I find out what my risks are?

- For bush fire on the NSW Rural Fire Service website: www.rfs.nsw.gov.au/plan-and-prepare/know-your-risk
- For flood on the NSW State Emergency Service website: www.ses.nsw.gov.au/your-local-risk/
- For flood information in Hawkesbury-Nepean by suburb: www.myfloodrisk.nsw.gov.au
- Visit your local council's website for information





Hawkesbury–Nepean Valley

The Hawkesbury-Nepean Valley has a long history of flooding. There have been about 130 moderate to major floods in the valley since records began in the 1790s.

Floods in the Hawkesbury-Nepean pose a significant risk to people's lives, livelihoods and homes because of the valley's unique landscape and the size of its population.

The Hawkesbury-Nepean floodplain is fed by five rivers. When there is heavy rainfall, water from the rivers flows into the floodplain, but is held back on its way to the ocean by more than 100 kilometres of narrow gorges. This causes floodwaters in this area to back up and rise rapidly, causing wide, deep and dangerous floods.

The largest flood in living memory happened in November 1961, when the water reached 14.5 metres above normal river height at Windsor, flooding several hundred homes.

Remember that floods can happen in any year and sometimes without much warning. It's important for everyone who lives in the floodplain to be prepared.

For more information you can visit www.myfloodrisk.nsw.com.au

Bush fire is also a significant risk to many families and properties throughout the Hawkesbury-Nepean Valley. Large portions of the Hawkesbury are bush fire prone.

Animals in an Emergency

Be aware that your animals may behave differently in an emergency.

Animals, like humans, can feel stressed and anxious in an emergency. They may also pick up on your stress.

Animals will be affected by environmental changes that occur in an emergency — like floodwater, smoke, heat, flames, loud noises and sirens.

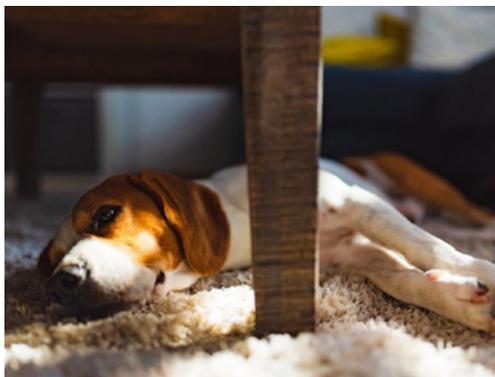
When animals are frightened they can become aggressive, can bite, scratch or kick (even if this is not part of their normal behaviour).

If animals are anxious, they could hide, run away or be difficult to move.

Prepare your animals early.

- With smaller animals you can put them in their crate, or in a room, where they are safe and contained.
- With larger animals, you can load them on a float or trailer, or move them close at hand in preparation for when you leave.
- If your animals are secure and safe, this will leave you free to take care of other members of your family.

If you act early your WHOLE family will be ready to leave when you need to move to safety.



How you can prepare as an animal owner

Over 90% of owners consider their animals to be family. Your animals WILL affect how quickly and easily you can evacuate if there is an emergency.

Most people have close bonds with their animals and will want to save them in an emergency — even if that means putting their own safety at risk. So it is important to be prepared, and to have plans for what you will do in an emergency, like a flood or bush fire.

To keep your animals safe in an emergency, make them a part of your plan.

Remember, you are responsible for your animals. Don't expect someone to come and rescue them for you. Have a plan for ALL your animals. You need to plan for the animals you can take with you and any animals you may need to leave behind.

Your best approach is to:

- understand your level of risk
- have a plan and be as self-reliant as you can
- discuss your plan with family, friends and neighbours
- be alert to worsening weather conditions and official warnings
- identify options to keep your animals safe
- act early



Develop a plan ... and include all your animals

This is a plan for what you would do for your family, including your animals, in the event of severe storms and floods, bush fires, heat waves and other extreme weather events.

Remember: In an emergency **you** are responsible for the welfare of your animals. You are also responsible for managing your animals so they do not present a danger to other people or animals.

What should my plan include for my animals?

- Where to go and how to get there — planning to stay with family or friends is often the most comfortable and convenient option.
- What to take for your animals — prepare a 'Grab and Go' kit.
- How to identify, secure and transport your animals.
- If you have large animals like horses and livestock, a plan to relocate them early to a safer area.

Remember to practice your plan at least once a year.



Plan on a Page

What I will do with my animals during an emergency

Animals need to go with you if you have to evacuate your home. It is safer for them and for you.

Please take a few minutes to complete this plan.

STEP 1 What I will take for my animal(s) if we have to leave

Decide the essential things your animal(s) needs for 3-7 days. You may not be able to get home for a while. You can pack them into a *Grab and Go Bag*, so you are ready to leave quickly. Remember to take it with you wherever you go.

My Grab and Go Bag is located here:

- Food and Treats
- Bowls/Buckets/Tubs
- Any medicines
- Toys
- Bedding
- Identification Tags
- Photo with owner
- Toileting requirements
- Registration and vaccination papers

Microchipping your animal and registering them with the NSW Pet Registry at www.petregistry.nsw.gov.au will help reunite them with you if separated during an emergency.

STEP 2 How I will contain and transport my animal(s)

Check you have enough crates, carriers, cages and leads. Also work out with your transport how many trips you will need to take.

- Crate/Carrier
- Cage/Other container
- Lead/Harness
- Car/Float
- Friends Car
- Public Transport

Remember to secure/contain your animals asap, so they are safe while you get ready and close at hand so you can leave quickly.

STEP 3 When and where I will go to be safe with my animal(s)

Leaving early and going to stay with family/friends is often most comfortable and convenient.

Evacuation centres may be opened and you can always take your animals along with you.

Stay informed by listening to ABC and local radio and going to the emergency service links provided below.

- I will be going to family/friends house with my animal(s). Their details are:

Name: _____ Phone: _____
Address: _____

- If I am not home, our family/friend/neighbour knows what to do. Their details are:

Name: _____ Phone: _____
Address: _____

- I will relocate my animal/livestock early to:

Name: _____ Phone: _____
Address: _____

STEP 4 This plan is on my fridge, in my phone and given to my family/friend/neighbour

Names: _____

Thanks for making a plan. Stay safe, and remember to leave early if you need to evacuate

www.getreadyanimals.nsw.gov.au



GET READY
Animals

Where are you taking your animals?

Decide well in advance the safest locations for your animals.

- Discuss with your friends and family if you can stay with them in an emergency and if you can bring your animals.
- Talk with your pony or equestrian club or reach out to animal groups on how you can support one another in an emergency. Create a network to communicate and act if you need to relocate your larger animals (e.g. horses, alpacas).
- Work with neighbours and friends to plan together.

Think about ...

- How you will transport your animals? Will you need to make more than one journey? How long will it take?
- Do you have a cage for each cat? Do you have a collar and leash or crate for each dog? Does your dog need a muzzle?
- Have you practised loading your horses onto a float?
- Do you own a float? Is it registered and well maintained? If not, can you borrow a float?



How will you get to safety?

Think about the routes you could take to relocate your family and animals.

Develop your plan to allow for changes such as bridges being cut or if roads become heavily congested, blocked or even closed.

Leaving early is the safest option.

During flooding events there are special evacuation routes to get you and your family to safety. Follow the flood evacuation route signs (see right) and listen to ABC Radio for current evacuation information.

Bush fires can move extremely fast. During a bush fire always follow the advice of the authorities.

Listen to media announcements (television, radio and online) as well as local radio and ABC local radio (702 AM).



Listen to warnings ...

- Pay attention to your local weather forecasts, bush fire alert levels or local flood watch (indication of a developing weather pattern that might cause floods in one or two days).
- Monitor media, especially ABC Radio and local community radio for emergency information.
- Social media and mobile apps may also provide valuable information, e.g. NSW SES Facebook page, NSW SES Hawkesbury and Penrith units Facebook pages, NSW RFS 'Fires Near Me' app.

.... and act early

- Stay calm, think clearly and put your plan into action
- Give yourself plenty of time to deal with any unforeseen problems
- Put your plan into place early — if you need to make more than one trip and/or to move large animals to a safe location
- Check with your local council and Live Traffic for road closure information www.livetraffic.com

Be prepared and relocate your animals to safety early — this can reduce stress for them and for you.



Animal identification



Permanently identify your animals. This will help reunite you and your animals if separated during an emergency.

- Microchips are best for most animals.
- Ensure your personal details are up-to-date on the NSW Pet Registry.
- Take clear photos of your animals showing any distinct markings.
- Place a collar on your smaller animals with your name and phone number.
- Place ID tags or labels on any pet carriers.
- Horses can have emergency contact information attached to their mane through a tag e.g. Manestay.

Ensure your small acreage has a Property Identification Code (PIC)

A PIC number helps NSW Department of Primary Industries, Local Land Services and emergency services to know what animals you have in case of emergency.

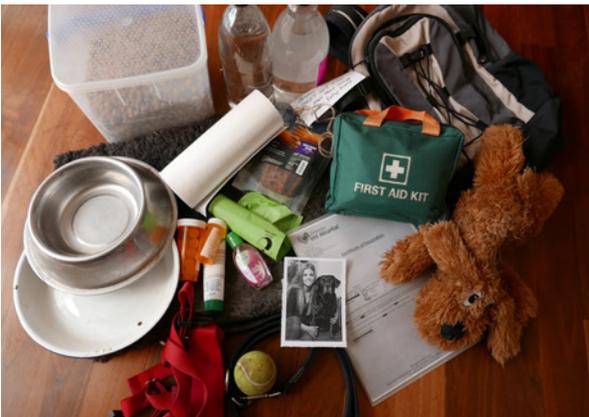
Contact your Local Land Services office for advice.

Prepare a ‘Grab and Go’ kit

Prepare an evacuation kit for all your animals. You should be able to maintain your animals for 3 to 7 days.

Consider restraint and transport, food, water, toileting, medications, first aid, housing and bedding:

- cages or pet carriers for each animal; or
- muzzle and leash; or lead rope and head collar for each animal
- 3-7 days of food and water for each animal
- bowl or feed bucket
- can opener and spoon
- woollen blanket, towels or bedding
- animal medications and first aid items
- take a photo of your pet’s vaccination certificate
- litter and litter tray for cats
- poo bags for dogs
- toys
- and whatever else you feel is essential for the first 3 to 7 days.



Store your ‘Grab and Go’ kit where it’s easy to locate. If you can’t store everything — have a checklist of what you need to grab before you go!

What if you're not at home?

When developing a good plan, be aware that you might not be at home.

When an emergency strikes you could be at work, on holidays or restricted from getting home (e.g. road closures).



So make sure:

- everyone who lives, works or agists at your property knows your plan
- your neighbours, friends and family know your plan
- spare keys to padlocked gates are available for others to use if necessary
- you have a list of people you can call who are willing and able to help relocate or evacuate your animals if you are not at home.



Remember that in an emergency phone lines can be down and people might be hard to reach. Talking about your plan with family, friends and neighbours BEFORE an emergency gives you the best chance to keep your animals safe.

What if you can't take all your animals with you?



Sometimes you may not be able to take your animals with you. Be prepared to give them the best chance to stay safe.

- Ensure all animals have access to feed and fresh water in a heat resistant trough for at least 3-7 days as you may not be able to return to your property.
- Allow animals to roam freely. Do not tether them.
- For stock, horses or non-indoor pets, prepare a safe paddock or refuge.
- If a safer refuge is unavailable, fix internal gates in an open position or cut internal fencing. This can give large animals opportunity to escape danger.
- NEVER open the external gates to your property. Animals loose on external roads are at great danger to themselves, other drivers and emergency services.
- Leave indoor pets inside in separate rooms with small or no windows.
- Ensure all animals can be identified, such as with brands, microchips, NLIS, tags or have photos of distinctive markings in case they become lost. A mobile number written on both sides of large animals can assist.
- Remove rugs, halters, and if possible metal shoes, as they may be flammable, melt, cause burns or snag.



Create a refuge

- Minimise trees and/or use low flammability trees.
- Identify and then clear away any obstacles that could burn or entangle your animals.
- Provide multiple solid water troughs.



Fire

- Heavily graze or plough a paddock to remove fuel for fire, use a green summer crop and/or use firebreaks at least 6m wide.
- Use low flammability hedges, walls/buildings or earth banks to provide protection from radiant heat.

Flood

- Locate or build an area of higher ground above the area of your property that will be affected by floodwaters.

Build an ‘Animal Ready Community’



Help other animal owners in your community to become ‘Animal Ready’. Here’s how:

- have a conversation with your neighbours about their plan for their animals in an emergency.
- have a conversation at your local pony club or sports club to share ideas and options for keeping your animals safe in an emergency.
- buddy-up with friends or neighbours and make plans to help each other if you are not there — or can’t get back in an emergency.
- share information with other animal owners e.g. talk with people who agist on the same property and see how you can make plans to support each other.
- research your options — where could you relocate your animals that is outside your local area?
- keep up to date with community initiatives — like ‘Get Ready’ events.
- join online communities — for example, animal-related groups on Facebook where you can share ideas and plan to support each other in an emergency.

This booklet has been created to provide general information to animal owners in the Hawkesbury-Nepean to become an 'Animal Ready Community'.

An 'Animal Ready Community' aims to understand the risks and challenges facing animals and those people who care for them during emergencies, and works together to prepare for future events.

The production of this booklet was made through the assistance and support of the NSW SES Hawkesbury Unit, Greater Sydney Local Land Services, NSW Department of Primary Industries, Agnes Banks Equine Clinic, Hawkesbury City Council, NSW Rural Fire Service, Dr Mel Taylor, Bushfire and Natural Hazards Cooperative Research Centre and Infrastructure NSW.

Thank you to Blue ARC and the Blue Mountains Resilience & Preparedness group for their support of this booklet and the creation of the original Keeping Your Animals Safe in an Emergency — in the Blue Mountains region.

Where to find more information

Department of Primary Industries — www.dpi.nsw.gov.au

- Before an emergency
- Pet safety in emergencies
- Horse safety in emergencies
- Livestock safety in emergencies

Local Land Services — www.greatersydney.lls.nsw.gov.au

- Property Identification Codes

NSW Pet Registry — www.petregistry.nsw.gov.au

- Update your personal details

RSPCA — www.rspcansw.org.au

- Owning a pet — Disaster Management Plans

NSW State Emergency Service — www.ses.nsw.gov.au

- Get Ready Animals
- Home Emergency Plan
- Animal Emergency Plan
- FloodSafe for your pets and animals
- StormSafe: Pet Fact Sheet

NSW Rural Fire Service — www.rfs.nsw.gov.au

- Your guide to making a bush fire plan
- Fires Near Me
- Prepare Your Horse for a Bush Fire

WIRES (NSW Wildlife Information, Rescue and Education Service Inc.) — www.wires.org.au

- Injured wildlife