TTW Structural Civil Traffic Façade

Flood Emergency Response Plan

Box Hill Public School & High School

Prepared for Department of Education / 21 July 2025

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Contents

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1.0 Introduction

This Flood Emergency Response Plan (FERP) has been prepared by TTW (NSW) Pty Ltd on behalf of the Department of Education (DoE) to assess the potential environmental impacts that could arise from the new Box Hill Public School and Box Hill High School (the activity) at 50-52 Terry Road, Box Hill (the site).

The purpose of this FERP is to summarise the flood risks associated with the site, identify preparation measures that should be undertaken to mitigate such risks, and provide an action plan with steps to be completed during a flood event. The details of this report are based on currently available information and correspondence undertaken at the time of writing.

1.1 Guidance Documents

The following documents have been reviewed and referenced in preparing this report:

- Australian Institute of Disaster Resilience (AIDR) Guideline 7-3: Flood Hazard (2017);
- The Hills Development Control Plan (DCP) 2012;
- The Hills Local Environmental Plan (LEP) 2019;
- The Hills Shire Council Flood Modelling and Stormwater Design Guideline, Revision 1, February 2024;
- The Hills Shire Council and NSW State Emergency Services (SES) The Hills Shire Flood Emergency Sub Plan (2023)
- Department of Planning and Environment (2021) Considering Flooding in Land Use Planning Guideline;
- Department of Planning and Environment (2023) Flood Impact and Risk Assessment – Flood Risk Management Guide LU01;
- NSW Department of Planning and Environment (2022) Guidelines for Division 5.1 assessments, June 2022;
- NSW Department of Planning, Housing and Infrastructure (2024) Guidelines for Division 5.1 assessments – Consideration of environmental factors for health service facilities and schools – Addendum October 2024;
- Department of Planning, Housing and Infrastructure (DPHI) – Planning Circular PS 24-001, Update on addressing flood risk in planning decisions, 1st March 2024;
- NSW Department of Planning, Housing and Infrastructure (2025) Shelter-in-place guideline for flashing flooding;
- NSW Department of Planning and Environment (2023) Flood Risk Management Manual https://www.environment.nsw.gov.au/topics/water/floodplains/floodplain-manual;
- NSW Department of Planning and Environment (2023) Support for Emergency Management Planning – Flood Risk Management Guideline EM01; and
- NSW Planning Portal Spatial Viewer (Spatial Collaboration Portal - Map Viewers (nsw.gov.au)).

1.2 Project Description

This report accompanies a Review of Environment Factors (REF) that seeks approval for the new Box Hill Public School and Box Hill High School, which involves the following works:

- Demolition, tree removal and site preparation works.
- Construction of a new 1,000 student Public School of up to 3-storeys in height, and a 1,000 student High School of up to 4-storeys in height, including co-located halls.
- Construction of a 60-place preschool.
- Associated site landscaping, fencing and open space including sports fields and games courts.
- Changes to vehicular access including internal access road and car parking, new bus zone and kiss and drop zones, pedestrian access, waste storage and loading areas.

- Augmentation of services and utilities to support the new school.

The Review of Environmental Factors prepared by Ethos Urban provides a full description of the proposed works.

1.3 Proposed Development

The proposed new buildings are sited on the east, west and north of the site with playing fields in the centre and car parking to the west and south sides which are accessed from Keeneland Street and Terry Road.

School operations are generally grouped as follows:

- Preschool and facilities on the west side
- Primary School and facilities along the west – north sides
- High School and facilities along the north-east-south sides
- A shared building, halls, and outdoor facilities within the central portion of the school extending from north to south sides.

The proposed ground level site plan is provided in Figure 1 below and showcases the proposed building alignments, carparking alignment and site entry at boundary alignments. The indicative location of the proposed sports field is in the central portion of the school, close to the southern boundary.

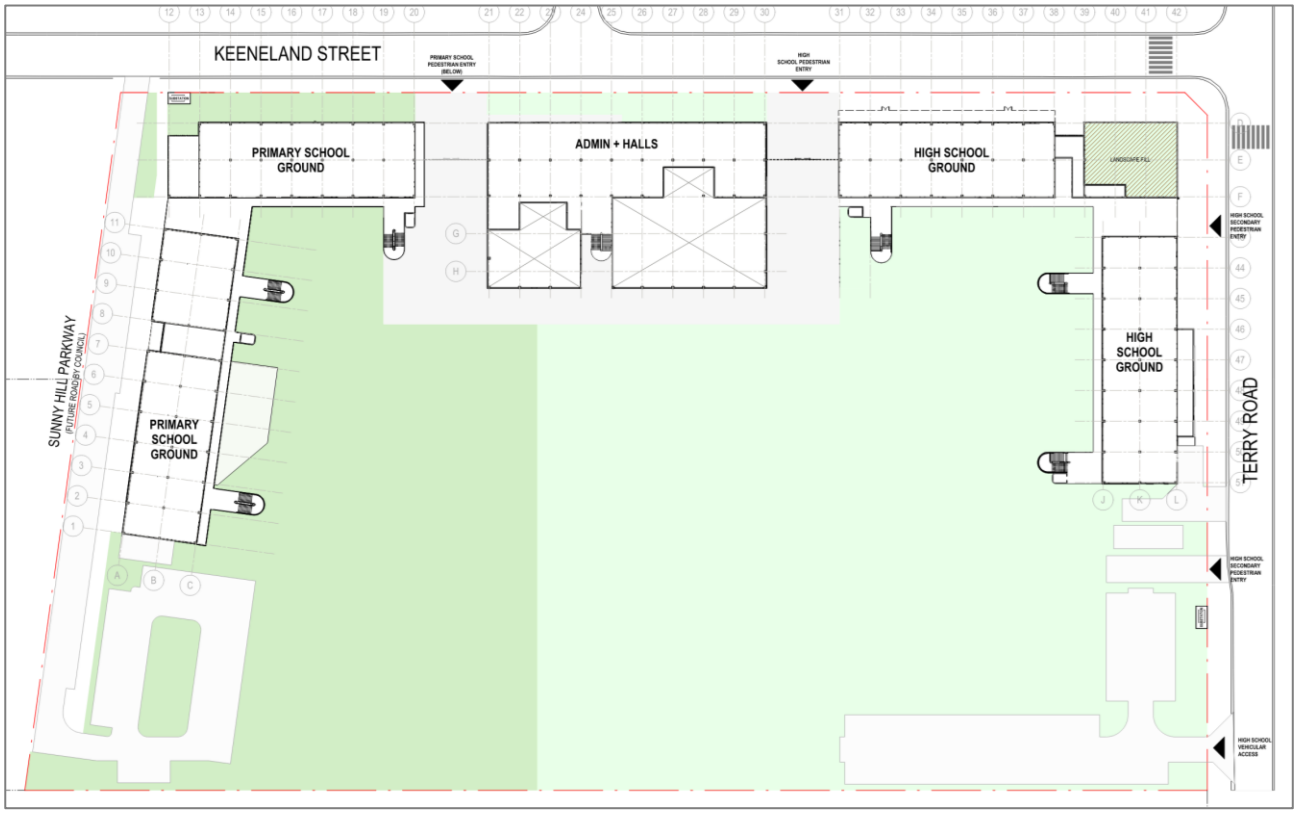

Figure 1: Draft Architectural Ground Floor Plan (Source: Architectus)

1.4 Site Description

The site is located at 50 and 52 Terry Road, Box Hill. The site comprises two (2) separate lots, which have a combined area of 4.7ha, within a broadly rectangular parcel of land. The legal description of the site includes Lot 299 in DP 1285364 (50 Terry Road) and Lot 10 in DP 1285590 (52 Terry Road). An aerial map of the site is provided in Figure 2.

The site is bound to the north by Keeneland Street, to the east by Terry Road, No. 48 Terry Road (Lot 30 DP10157) to the south, and by grassland to the west.

The site is located in Box Hill in The Hills Shire Council Local Government Area (LGA) in the north-west of Sydney. Box Hill is part of the North-West Growth Centre, which is being re-developed from rural/residential land to low- and medium-density residential subdivisions. The area was rezoned in 2013 to form the Box Hill Release Area. By completion, Box Hill will be home to approximately 42,480 residents (13,276 dwellings).

Figure 2: Aerial image showing site location (Source: Nearmap / Ethos Urban, March 2025)

1.5 Significance of Environmental Impacts

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- The extent and nature of potential impacts are low, and will not have significant adverse effects on the locality, community and the environment;
- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal effect on the locality, community and the environment.

1.6 REF Reporting Requirements

Refer to Table 1 for the relevant REF requirements covered within this report.

Table 1: REF Reporting requirements and the relevant section of this report.

Item	REF Requirement	Relevant Section of Report
1.0	**Flood Hazard**	
1.1	consider the timeframe for flood waters to inundate the site and timeframe for water to hit peak levels?	Section 2.2
2.0	**Risk/Impact of flood on the activity**	
2.1	whether the proposal provides for safe occupation and efficient and effective evacuation in flood events and how it is to be achieved?	Section 3.1, 3.2.2
2.2	any known evacuation constraints such as the flood emergency response classification for the area and available warning times (including rate of rise and when the evacuation route is cut off by floodwater)?	Section 2.2
3.0	**FERP**	
3.1	If the site or key access routes are impacted by flood waters, does the REF include a preliminary Flood Emergency Response Plan (FERP) that has been prepared in consultation with NSW SES?	Section 1.7, 3.0, 7.0
3.2	Does the plan clearly and simply detail: the flood potential of the site?	Section 2.1
3.3	detail roles and responsibilities across the department and relevant emergency response agencies?	Section 5.0
3.4	flood monitoring and warning systems consistent with advice received to date from NSW SES?	Section 4.0
3.5	flood warning times and notifications?	Section 2.2, 4.0
3.6	emergency management triggers, including rainfall and water levels?	Section 4.3
3.7	the emergency response to a flood event or events where different flood mechanisms impact a site?	Section 2.0, 3.0
3.8	messaging and communication protocols?	Section 6.0
3.9	assembly points and flood free routes (where required)?	Section 2.2
3.10	shelter in place locations (where required as last resort) that are able to withstand flood and debris forces of the PMF?	Section 3.2.2
3.11	mechanisms and requirements for regular review?	Section 6.0
3.12	awareness training for employees, contractors, visitors, students and caregivers and induction of new staff members?	Section 6.1

1.7 Consultation

The Hills Shire Council were contacted by TTW to obtain more information on the site and flood behaviour in the immediately vicinity. Correspondence from this consultation is contained within Appendix A.

A letter was also provided to NSW SES on 12 May 2025. Correspondence from this consultation is contained within Appendix B. This letter detailed the existing flood behaviour at the site, alongside the proposed flood emergency response strategy to be contained within TTW's Flood Emergency Response Plan for the site. NSW SES's full response is attached in Appendix B. Recommendations provided by NSW SES are outlined in Table 2.

Table 2: Consultation with NSW SES

Item	NSW SES Recommendations	Response
1	We recommend implementing early triggers in the Flood Emergency Response Plan (FERP), such as monitoring Severe Weather Warnings and Flood Warnings and consider closing the school ahead of the start of the school day, particularly considering the flash flooding risk in the area. A strategy of isolation or sheltering in buildings	This is recommended in this FERP. Monitoring flood warnings has been detailed as a trigger for the site, and pre-emptive evacuation is the recommended strategy where possible.

	surrounded by flood water are not equivalent, in risk management terms, to evacuation.	
2	We recommend pursuing, if relevant, site design and stormwater management that reduces the impact of flooding and minimises any risk to the community. Any improvements that can be made to reduce flood risk will benefit the community.	This is noted. The site design has considered flooding and minimising risk to the community, with a bund incorporated at the south of the site to ensure offsite impacts are avoided. This is discussed in the Flood Impact and Risk Assessment (FIRA) Report (dated 21 July 2025 and submitted alongside this report).
3	We recommend exercising flood emergency plans regularly, similar to building fire evacuation drills. The NSW SES also recommends updating the FERP at regular intervals and whenever additional flood information is available or highlighted during the drills or flood events. The frequency of exercising and updating emergency plans should be detailed within the FERP itself.	This is recommended in this FERP (refer Section 6.2).
4	Considering the impact of climate change on the flood risk and incorporating that into any updated FERPs.	The impact of climate change has been considered in Section 7.2 of the FIRA. This FERP considers flooding up to and including the PMF, as specified in The Hills Shire Council Flood Modelling and Stormwater Design Guideline.

2.0 Flood Behaviour

To assess flood behaviour at the site, Council's hydraulic model has been modified by TTW and assesses overland flow in the 10%, 5%, 1% 0.2% AEP and PMF events. The modelling methodology and the flood impact associated with the development are described in detail in the Flood Impact and Risk Assessment (FIRA) Report prepared by TTW (dated 21 July 2025) and submitted together with this FERP.

A hazard assessment was also conducted using the flood hazard vulnerability curves set out in 'Handbook 7 – Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia' of the Australian Disaster Resilience Handbook Collection (2017).

These curves assess the vulnerability of people, vehicles and buildings to flooding based on the velocity and depth of flood flows. The flood hazard categories are outlined in Figure 3, ranging from a level of H1 (generally safe for people, vehicles and buildings) to H6 (unsafe for vehicles and people, with all buildings considered vulnerable to failure). Table 3 outlines the threshold limits for each hazard category.

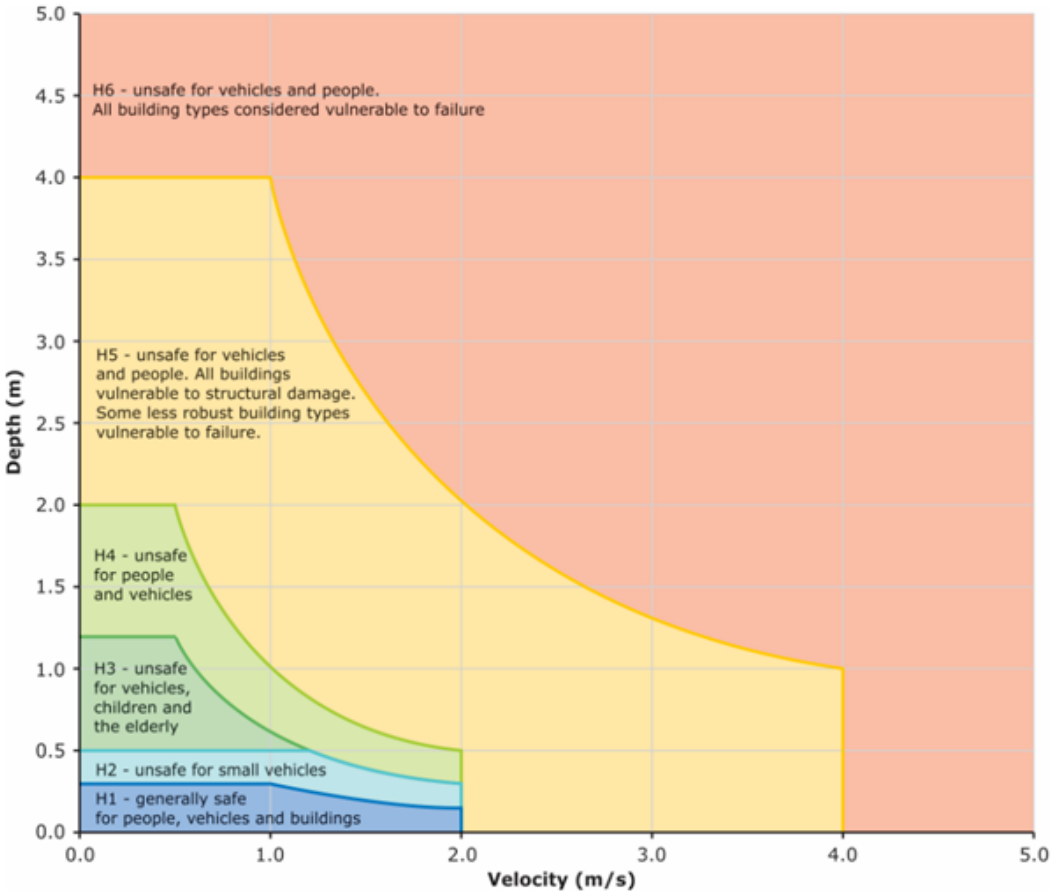

Figure 3: Flood hazard vulnerability curve (Source: Flood Risk Management Guide FB03 - Flood Hazard, NSW Department of Planning and Environment, 2022)

Table 3: Hazard vulnerability threshold limits

Hazard	Description	Classification Limit (m2/s)	Limiting still water depth (D) (m)	Limiting velocity (V) (m/s)
H1	Generally safe for people, vehicles and buildings	D x V ≤ 0.3	0.3	2.0
H2	Unsafe for small vehicles	D x V ≤ 0.6	0.5	2.0
H3	Unsafe for vehicles, children and the elderly	D x V ≤ 0.6	1.2	2.0

H4	Unsafe for people and vehicles	D x V ≤ 1.0	2.0	2.0
H5	Unsafe for people and vehicles. All buildings vulnerable to structural damage.	D x V ≤ 4.0	4.0	4.0
H6	Unsafe for people and vehicles. All building types considered vulnerable to failure.	D x V > 4.0	No Limit	No Limit

2.1 Post-Development Flood Behaviour

Post-development flood behaviour at the site is described in detail in the Flood Impact and Risk Assessment submitted alongside this report.

2.1.1 1% AEP Event

The peak flood levels and depths during the 1% AEP event are shown in Figure 4, while the peak flood hazard is depicted in Figure 5.

- The 1% AEP flood extent is mostly outside of the school site boundary, aside from a small portion directly south of the sports pitch. Flood level here reaches between approximately 36.5m AHD to 37.9m AHD, with peak depths of 0.25m.
- No. 48 is considerably flood-affected in the 1% AEP event, with a peak flood level of 40.6m AHD close to Terry Road, and peak depths of approximately 0.75m.
- Within the site, any floodwaters are H1 hazard. South of the site, hazard is H1-H3, though there is a small area of H5-H6 within the southwestern portion of No.48 Terry Road.
- The driveway entrances to both the high school and primary school carparks are flood-free in the 1% AEP.

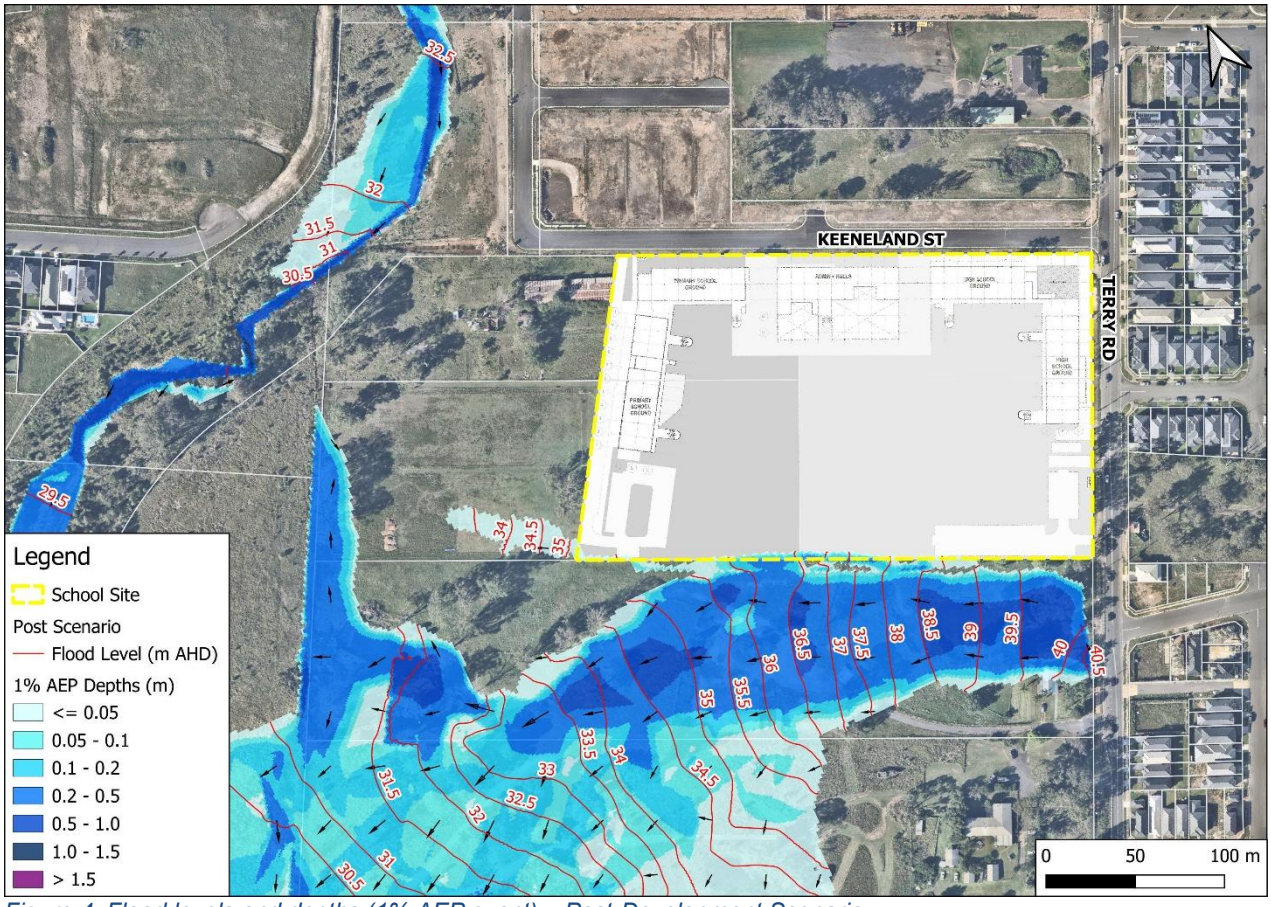

Figure 4: Flood levels and depths (1% AEP event) – Post-Development Scenario

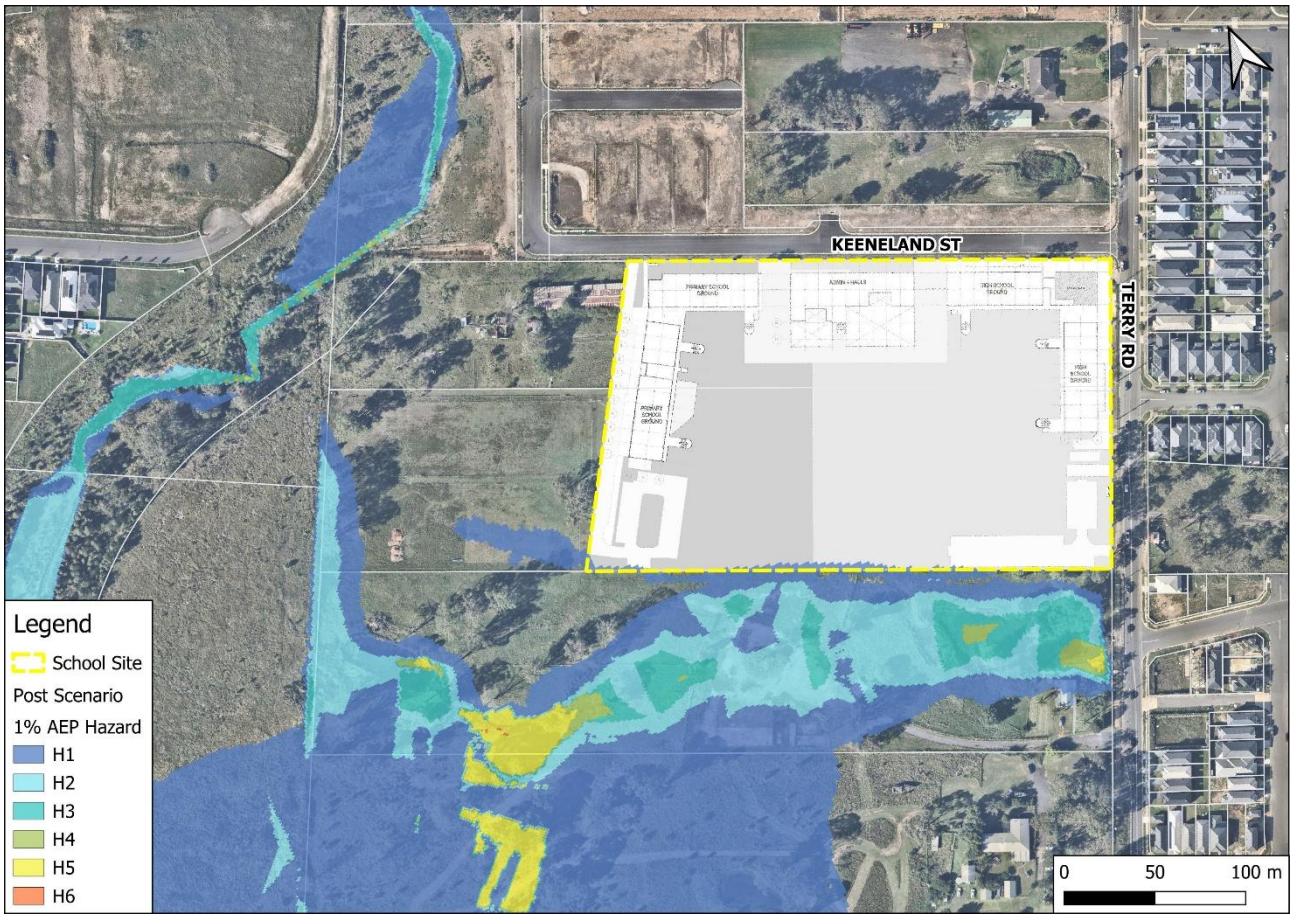

Figure 5: Flood hazards (1% AEP event) – Post-Development Scenario

2.1.2 PMF Event

The peak flood levels and depths during the PMF event are shown in Figure 6, while the peak flood hazards are depicted in Figure 7.

- The southwestern primary school and preschool car park is impacted by some overland flooding in the PMF, with peak depths of 150-170mm. Flood hazard here remains H1.
- The high school car park to the southeast of the site is impacted by ponding of floodwaters, with depths ranging from 0.1m to a peak of almost 0.9m at the southwestern corner of the car park. Flood hazard ranges from H1 to H4.
- Despite this, access to and from the car park is retained, with the driveway entry free of floodwaters. Flooding on Terry Road directly adjacent to the driveway entrance remains at H1 hazard.
- Offsite flood hazard is H5 across most of the No. 48 property south of the site.

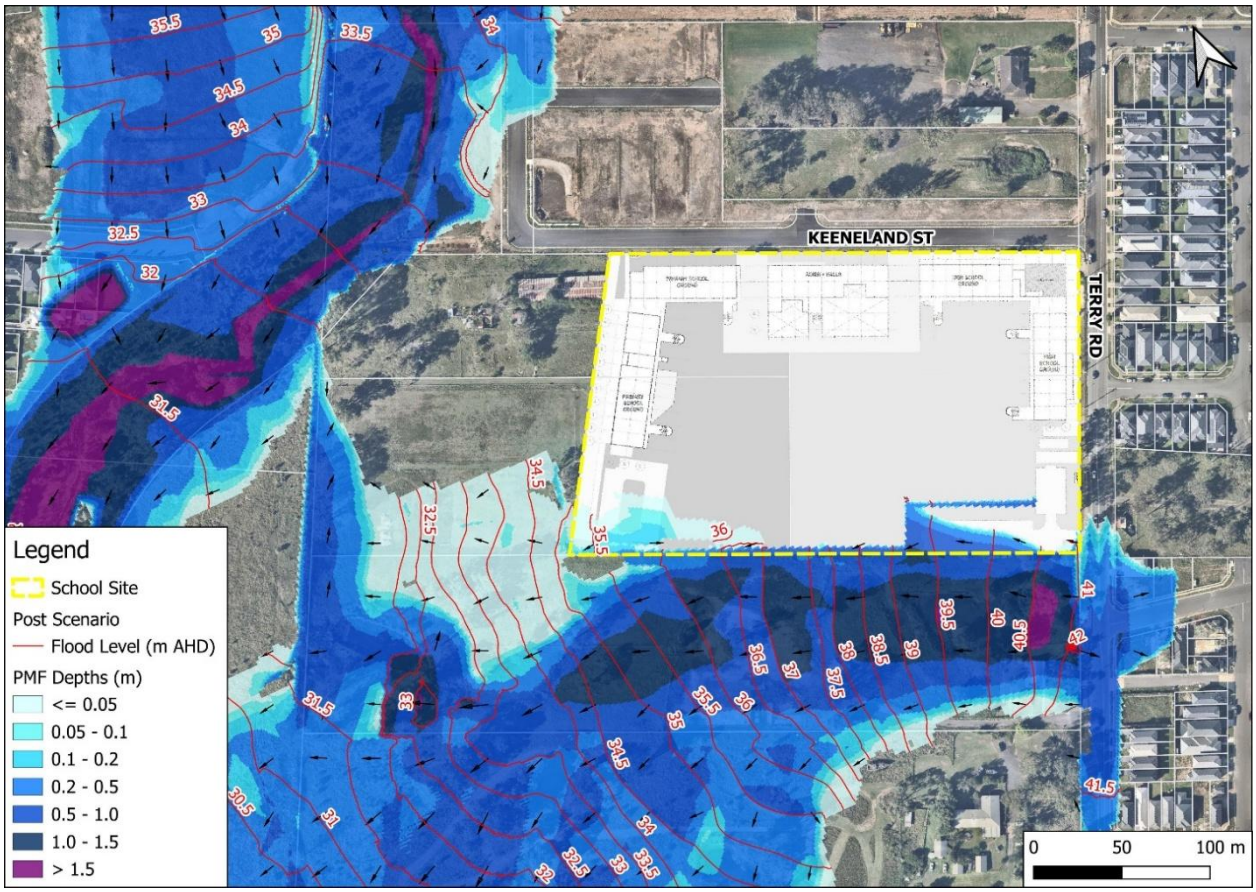

Figure 6: Peak flood levels and depths (PMF event) – Post-Development Scenario

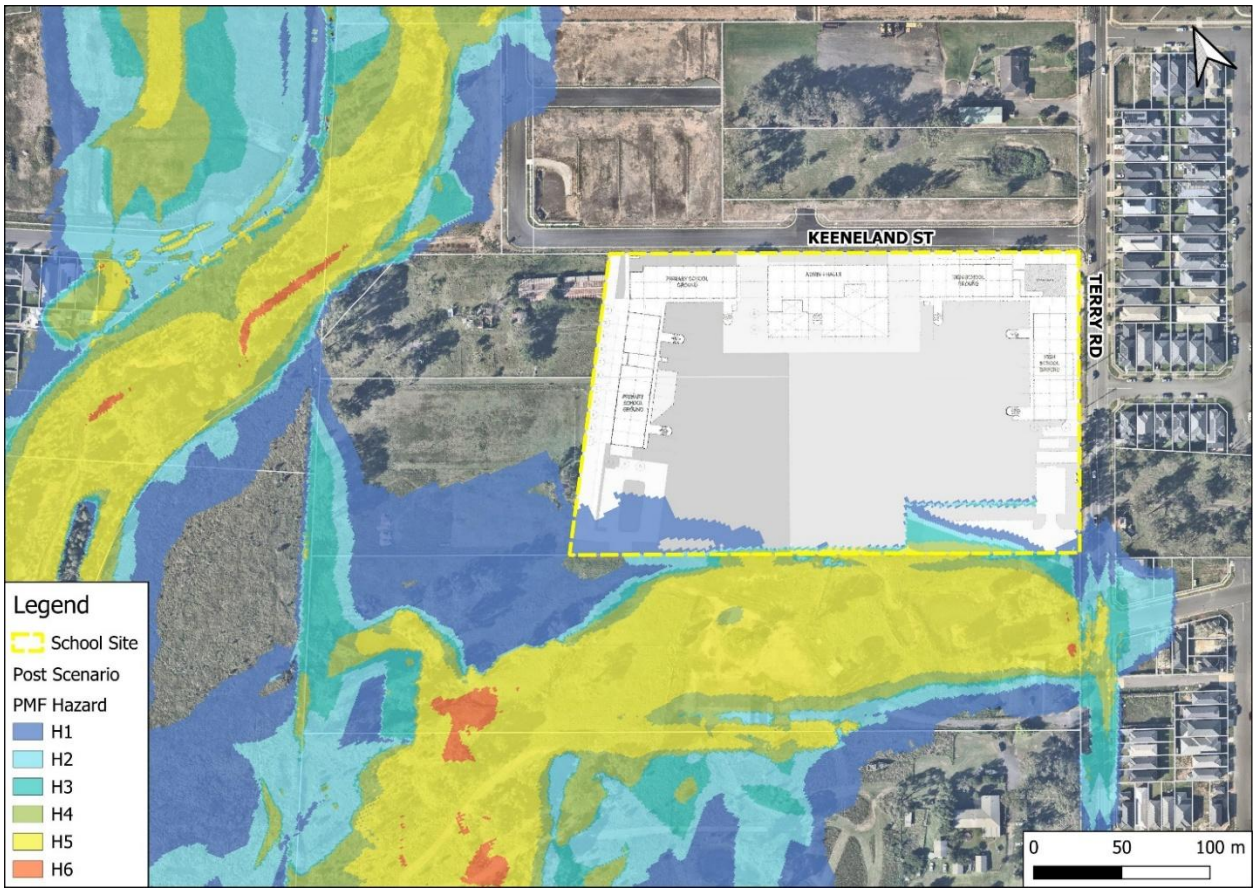

Figure 7: Peak flood hazards (PMF event) – Post-Development Scenario

2.2 Inundation and Recession Times

Table 4 presents a summary of the inundation and recession times for a range of PMF storm durations, including the critical duration (15-minutes). Longer durations, including a 6-hour storm event, have been assessed in order to consider the possibility of longer isolation periods.

For the purpose of this assessment, the recession time is regarded as the time taken for roads to return to a trafficable, low hazard (H1) state.

The short critical duration for the catchment indicates that roads are unlikely to be isolated for an extended period of time. The route that is deemed the first to return to a low hazard, trafficable state is north on Terry Road.

Analysis indicates that across the range of PMF durations assessed, the maximum time the school is isolated for is less than one hour, in the critical duration (15 min) event. Figure 8 shows the flood hazard categorisation within the entire model during the critical PMF storm event.

Table 4: Time to inundation and recession at the site in PMF storm events

PMF Storm Duration	Time to Inundation (minutes)	Recession Time
15 minutes (Critical duration)	< 10 minutes until flows reach a H3 hazard level along Terry Road to the southeast of the site. While travel north on Terry Road is mostly uninhibited (refer Figure 8), there are flood hazards up to H3 within the kerb and gutter system which extends further into the southbound less than 10 minutes after the onset of the storm. While this is not shown to impact the northbound lane, there is a sag point at this location, and it is possible floodwaters may encroach on the northbound lane.	Egress is possible about 1 hour after the onset of the storm by travelling north on Terry Road, with the road mostly cleared of floodwaters. All routes have returned to a trafficable condition 1 hour 30 minutes after the onset of the storm, with travel south via Terry Road returning to H1 hazard. Isolation time of approximately 50 minutes.
90 minutes	< 10 minutes until flows at No. 48 Terry Road impact the entire lot at mostly H2 hazard (though this reaches H5 to the southwest). Routes out of the site are not cut off at any point during the storm event.	The site is not isolated at any point in this storm event.
6 hrs (Long duration)	< 30 minutes until flows at No. 48 Terry Road impact the entire lot, though this remains at H1 the entire duration of the storm event. Routes out of the site are not cut off at any point during the storm event.	The site is not isolated at any point in this storm event.

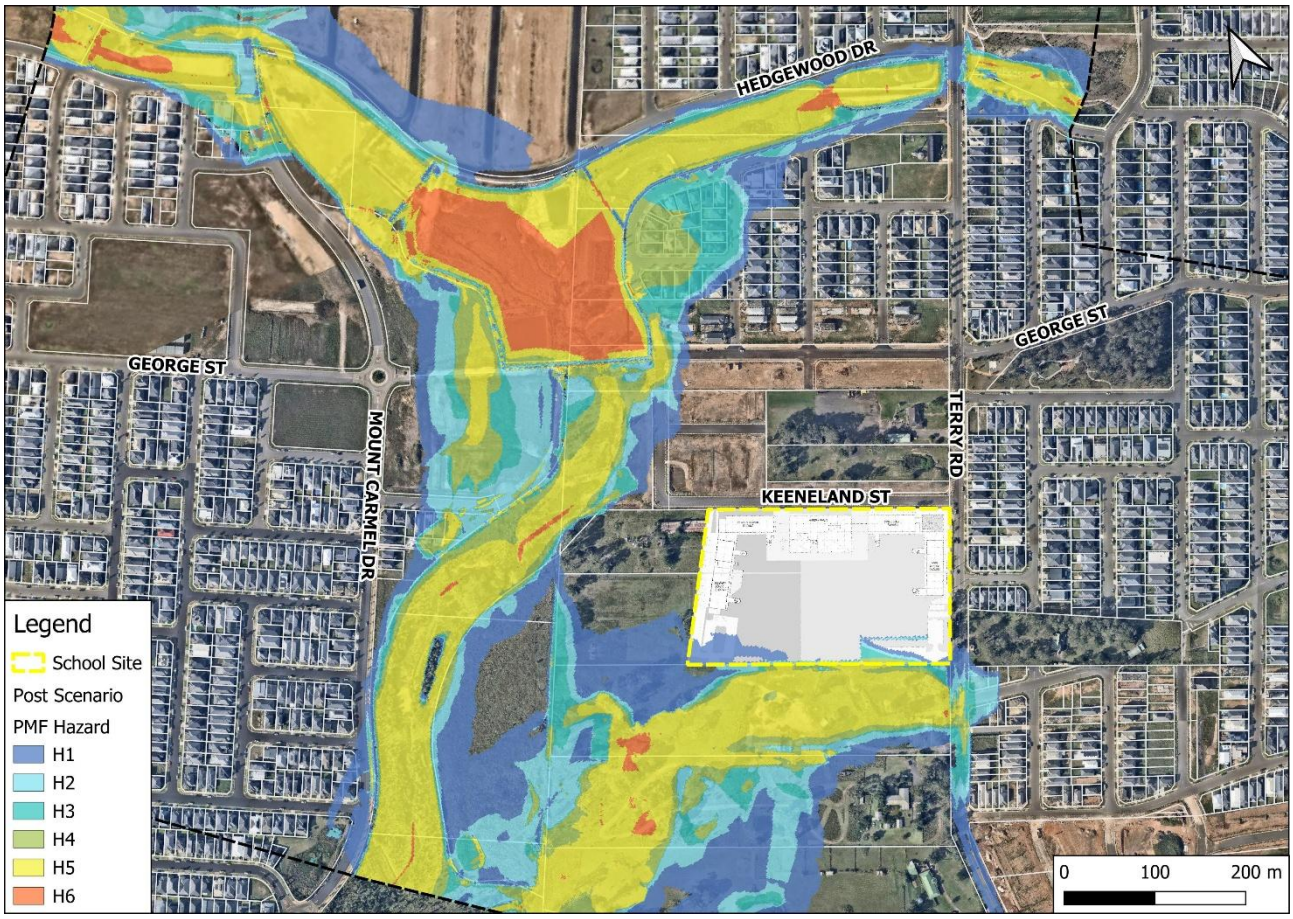

Figure 8: Peak flood hazard categorisation for the site and its surrounding area during the critical PMF storm event.

2.3 Feedback from NSW SES

A letter was provided to NSW SES on 12 May 2025 detailing the existing flood behaviour at the site, alongside the proposed flood emergency response strategy. NSW SES's full response is attached in Appendix B.

In their response, NSW SES noted that they have responded to multiple flood related requests along Terry Road, including water over the road both to the north and south of the site, indicating that the site may be at a greater risk from flooding than indicated in existing flood studies.

It should be emphasised that road hazard analysis contained within this FERP is based on modelling results. In reality during a flood event, the flood affectation on individual roads may vary from what is described in this FERP. As described in more detail in Section 4.0, flood warnings and the Hazards Near Me app should also be monitored by site users to keep informed on which routes can be taken following a flood event.

2.4 Hawkesbury-Nepean River Valley Flooding

The Hawkesbury-Nepean Valley has the most significant flood risk exposure in NSW. The Reconstruction Authority (RA) recently completed the 2024 Hawkesbury-Nepean River Flood Study, which is considered the most up-to-date and reliable source of flood information for the Hawkesbury-Nepean River. A new 2-dimensional hydraulic model (TUFLOW) covering an area of more than 1,500km^2 was developed, which provides detailed flood information for the 190-km length of river, including backwater flooding up the South and Eastern creeks.

Box Hill is located within the South Creek sub catchment of the wider Hawkesbury-Nepean Valley. An interactive map of the Hawkesbury-Nepean Valley flood extent was produced based on the findings of this study and is available on the NSW SES website. Mapping indicates that, even in the Probable Maximum Flood event, the Gables site is not impacted by mainstream flooding or backwash from the Hawkesbury-Nepean

Valley. The site is therefore outside of the Hawkesbury-Nepean floodplain.

However, as indicated in Figure 9, major roads can become flooded, leading to transport disruptions and potential isolation from certain areas within the catchment. Terry Road is impacted approximately 1km south of the site, with depths up to 4m depth.

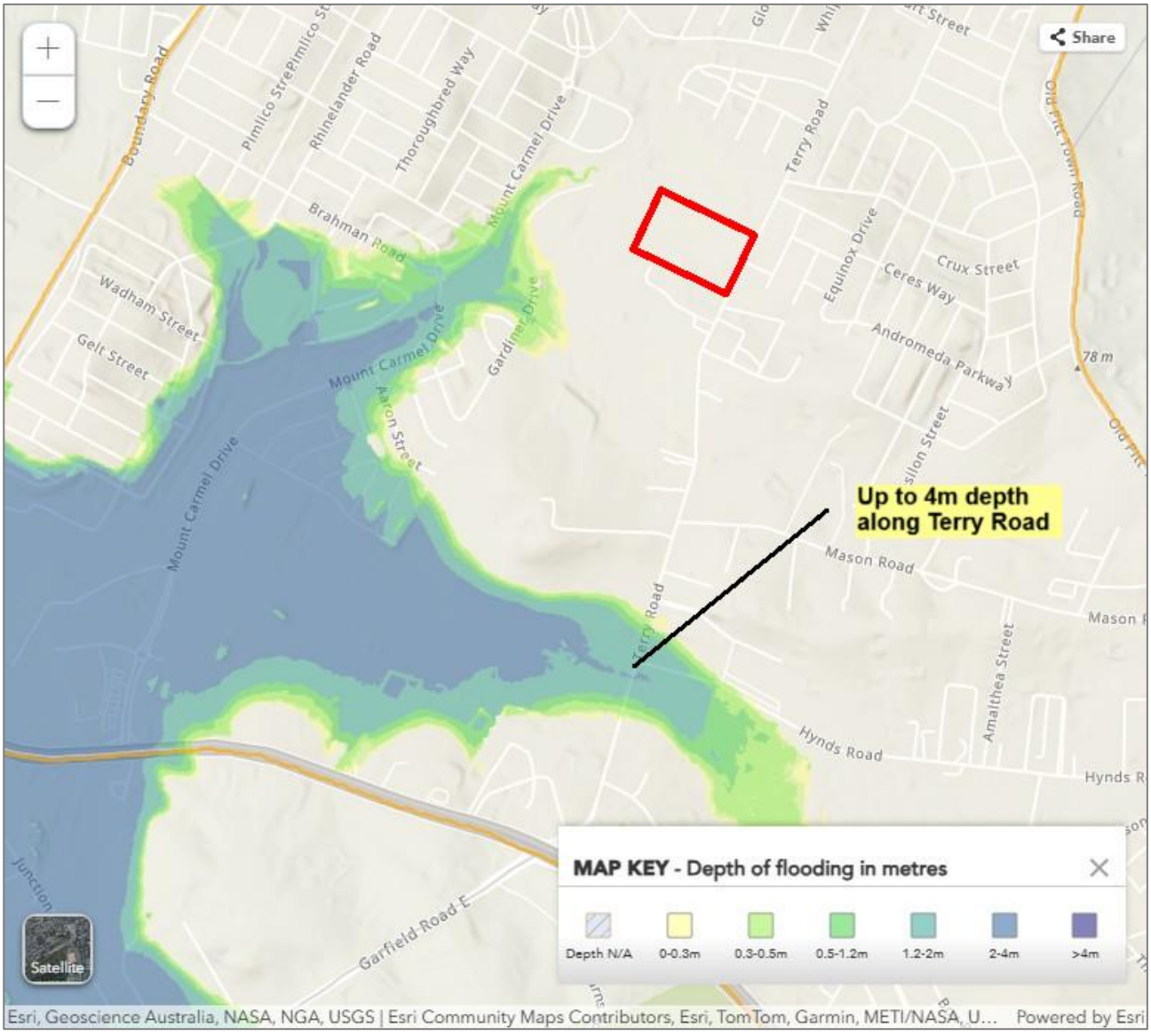

Figure 9: Hawkesbury-Nepean Valley flood extent in the 'biggest flood possible' i.e. the PMF event (Source: NSW SES, 2024).

Based on the flood study results, NSW SES published the flood evacuation routes that should be taken in the event of a major flood event in the Hawkesbury-Nepean Valley. These routes are shown in Figure 10, with the recommended evacuate route for the site via Old Pitt Town Road to the north, onto Annagrove Road to the southeast before joining the Old Northern Road.

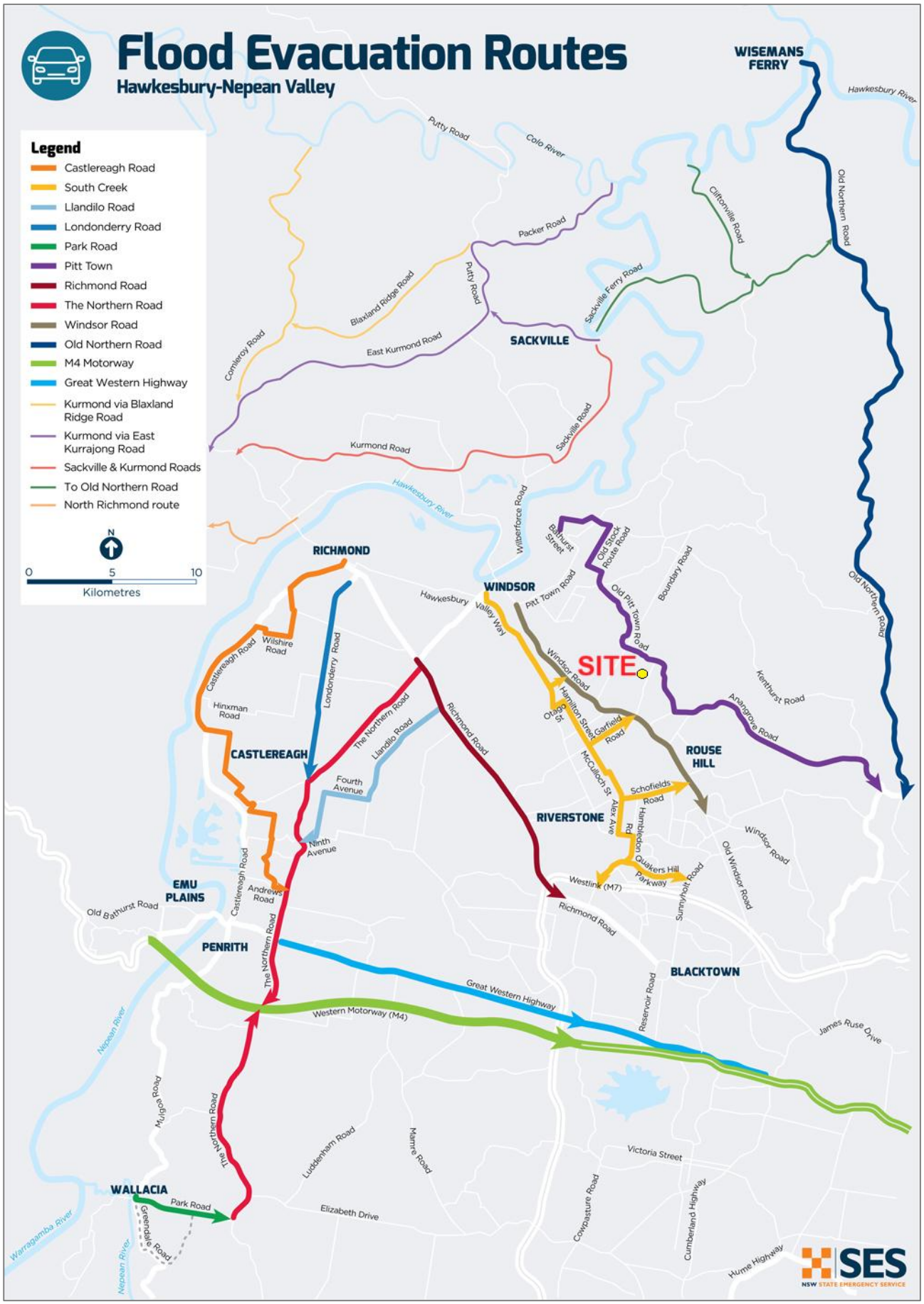

Figure 10: Flood evacuation routes for Hawkesbury-Nepean Valley (Source: NSW SES, 2024).

3.0 Flood Response Strategy

3.1 Hawkesbury Nepean River Valley Flood Event

Though the site itself is located outside of the Hawkesbury-Nepean PMF extent, roads may be cut off for extended periods of time. Section 5.8.5 of The Hills Shire Council Local Flood Emergency Sub Plan highlights pre-emptive evacuation as a potential flood emergency strategy in The Hills.

Pre-emptive closure of the school is the preferred flood emergency strategy for the school site if there is notification of a Hawkesbury-Nepean River Valley flood event.

In the event of Hawkesbury-Nepean River Valley flooding, there will be sufficient flood warnings and notifications to allow for pre-emptive closure of the site. During the operational phase, the school should be closed in advance of the flood event so children can be safe at home and parents do not have to drive through roads that could become hazardous. An SMS must be sent to staff and parents at the earliest opportunity (once the flood warning is issued by BOM) to ensure no site users enter dangerous road conditions.

3.2 Flash Flooding

3.2.1 Pre-Emptive Closure

Section 1.6.2 of The Hills Shire Local Flood Emergency Sub Plan states that evacuation is the primary response strategy for people impacted by flooding. Section 5.8.5 similarly highlights pre-emptive evacuation as a potential flood emergency strategy in The Hills. Pre-emptive closure of the school is the preferred flood emergency strategy for the school site if advanced warning is received outside of school hours, or where a severe event is forecast several hours in advance.

Although flash flood events are characterised by minimal warning times, there may be advanced notice of the extreme rainfall experienced in a 1% AEP–PMF event. During the operational phase, where there is enough warning prior to school opening hours, the school should be closed in advance of the flood event so children can be safe at home and parents do not have to drive though roads that could become hazardous.

In this strategy, The Hills Flood Emergency Sub Plan states that School administration offices (Department of Education) will coordinate the evacuation of schools in consultation with the NSW SES and Welfare Services, if not already closed.

An SMS must be sent to staff and parents at the earliest opportunity (once the severe weather warning is issued by BOM) to ensure no site users enter dangerous road conditions. Any expected visitors of the site should also be informed via SMS if there is a risk of flooding in order to minimise the risk of people entering flood water.

3.2.2 Shelter-in-Place

While there is often advanced warning time of extreme rainfall events such as those endured in a 1% AEP-PMF event, this cannot be relied upon. Flash flood events are usually characterised by minimal warning times, and pre-emptive closure of the school may not be able to be accomplished.

Shelter-in-place (SIP) guidance published by the NSW Department of Planning, Housing and Infrastructure (DPHI) in January 2025 provides considerations that can inform whether SIP is an appropriate response strategy in a flash flood environment, alongside design considerations that should be met. Table 5 outlines the varying factors that must be considered when proposing SIP, and how this site meets the recommendations.

Table 5: Department of Planning, Housing and Infrastructure SIP Guidelines

SIP Guideline	Response
Initial assessment	
1. Does shelter in place align with existing emergency management strategies for the area, as determined through the flood risk management process and by the NSW SES?	Pre-emptive closure of the site is recommended when there is notification of a Hawkesbury-Nepean flood event, as this impacts main access roads surrounding the site (though not the site itself), which is consistent with the flood response strategy for the Hawkesbury-Nepean River Valley. While the western area adjacent to the site is within a riparian zone, the main flood mechanism impacting the immediate area and access roads around the site is flash flooding via overland flow. Pre-emptive closure of the site is recommended when there is advanced warning of a major storm event, which is consistent with the flood response strategy discussed in The Hills Local Flood Emergency Sub Plan (Section 5.8.5 of the sub plan). However, flash flood events are characterised by minimal warning times and therefore there may not be sufficient warning time to achieve evacuation at the site, as discussed below.
2. Has evacuation off-site (the primary emergency management strategy) been investigated and determined to be unachievable?	With less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site (refer Table 4), there is little warning time to implement evacuation off-site. As evident in Figure 8, there is no way in or out of the site that does not go through flood waters during the critical duration PMF event. NSW SES state that evacuation of a site must not require people to drive or walk through flood water. It is therefore recommended that the school is prepared for a shelter-in-place strategy.
3. Does the development include medical centres, emergency service and community facilities, and sensitive and hazardous land uses, some of which may not be suitable for shelter in place?	While a school is deemed a sensitive activity under the provisions of The Hills Shire Council DCP, the proposed buildings are protected to the PMF level. It is deemed more hazardous to attempt to evacuate the site once a severe storm event has already commenced, as this would involve moving vulnerable site users from a safe environment into roads of high to medium hazard.
4. Shelter in place for greenfield development is not supported	N/A
5. Whether there is existing government developed flood warning systems that give advanced detailed forecasts of flash flooding to allow sufficient time to evacuate to the proposed refuge locations[2] [2] Flash flood warning systems are not failsafe and should not be the only mechanism to get people to shelter in place.	There is less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads. Flood warning systems and flood forecasting is discussed in more detail in Section 4.0. While there are flood warnings issued by the Bureau of Meteorology and the Australian Warning System, the flash nature of flooding at the site (and the inherently limited warning time associated with this type of flooding) limits the capacity of NSW SES to issue flood notifications and action statements with sufficient lead time. It is important to note that the warnings

	outlined in Section 4.0 may not be available or occur with advanced warning.
6. Can the community effectively be informed of the risks associated with the emergency management strategy?	Section 6.0 of this FERP outlines the importance of education and signage in informing site users the flood risks present on site and the flood protocols and procedures involved in the SIP strategy.
Following satisfaction of the above, the following must be assessed:	
7. Detailed assessment of evacuation off-site (the primary emergency management strategy) to determine that evacuation off-site is not achievable	With less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site (refer Table 4), there is little warning time to implement evacuation off-site. While travel north on Terry Road is mostly uninhibited (refer Figure 8), there are flood hazards up to H3 within the kerb and gutter system which extends further into the southbound less than 10 minutes after the onset of the storm. While this is not shown to impact the northbound lane, there is a sag point at this location, and it is possible floodwaters may encroach on the northbound lane. NSW SES state that evacuation of a site must not require people to drive or walk through flood water. It is therefore recommended that the school is prepared for a shelter-in-place strategy.
8. The flood behaviour at the site, with consideration of climate change and assessment of the potential maximum duration of isolation up to and including the PMF to identify that: a) flash flooding is the only flood risk present at the site, whether it be from overland flooding, local creek or riverine flooding, and b) the flooding occurs within less than 6 hours from the commencement of causative rain and the duration of shelter in place due to isolation by floodwaters is less than 12 hours from the commencement of rainfall, and c) the development is not subject to high hazard flooding (e.g. floodways, high hazard H5 or H6 areas) or surrounding roadways are not subject to high hazard flooding.[3] [3] Flood Risk Management Guideline FB03 Flood Hazard, DCCEEW, 2023.	a) While the site is adjacent to a riparian zone, the area surrounding the site is impacted by flash flooding derived from rainfall runoff. The site is not impacted by mainstream flooding derived from the adjacent watercourse. b) There is less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site. The duration of isolation is short due to the flash nature of flooding in the area, with the school only cutoff from access roads for approximately 50 minutes in the critical PMF event (Section 2.2). c) The site itself is not subject to high hazard flooding, as indicated in Figure 8, or the roads immediately adjacent to the site. However, there is H5 hazard evident along Terry Road to the southeast of the site. It is deemed more hazardous to attempt to evacuate the site once a severe storm event has already commenced, as this would involve moving vulnerable site users from safe refuge into roads of high to medium hazard.
9. How shelter in place will be: a) used as part of the site's emergency management response, including actions before, during and after sheltering in place, and	a) Section 7.0 of this FERP outlines how SIP will be implemented at the site, including actions before, during and after.

b) communicated to occupants and visitors of the building and how this communication will be maintained for the life of the development.	b) Section 6.0 outlines how this will be communicated with the site users and how this will be maintained.
10. An understanding of the secondary risks and how the proponent proposes they will be managed is outlined in the FIRA. Secondary risks include medical emergencies, building fire, health and wellbeing. a) Table 12 of EM01 should be used to consider whether the risks could be effectively managed.	a) Secondary emergencies are considered in Section 3.3. b) Table 12 of the EM01 notes that for primary and secondary schools, a key consideration for SIP is as follows: '*Where possible, primary and secondary school classrooms should be located above the PMF level. However, at a minimum there should be access to adequate space above the PMF within a day hospital and school building for school students, staff and visitors where the facility is not intended to be evacuated outside the floodplain*.' The proposed buildings are set above the PMF, and therefore there is adequate space above this level, making all proposed buildings safe for refuge. Table 12 of the EM01 also notes "*Consider developing a PA system to communicate directions and safety messages to the population in the lead-up to and during a flood to assist in improving the safety of the community*." A PA system has been recommended in Section 4.4 of this FERP.
Design criteria for consideration	
i. the floor level of the shelter in place part of the development be above the PMF, and	All proposed buildings are set above the PMF level and will not experience above-floor inundation. As a result, all buildings are safe to shelter in from the ground floor and upwards.
ii. structural soundness for conditions in a PMF event, considering flood and debris forces, be verified by a suitably qualified structural engineer, and	This is also a provision in The Hills Shire Council DCP (Part C Section 6) 'All structures to have flood compatible building components below FPL4 (PMF)'; and 'Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including FPL4 (PMF). An engineer's report may be required.' This has been noted in Section 8.0 of the FIRA prepared by TTW. However, all proposed buildings are outside of the PMF extent.
iii. area and access to the area does not rely on access to electricity, is self-directing, and have clearly marked internal access for all people on site, including consideration of access for potential occupants and/or visitors	As a school site, access and clearly marked internal access will be achieved.
iv. protection from weather and appropriate heating and cooling	As a school site this will be achieved.
v. access to personal hygiene facilities such as a toilet	As a school site this will be achieved.
vi. a minimum floor space of 2 m² per person	Overall, the site will provide refuge space well over 2sqm per person, based on minimum square footage per classroom. This is coupled with various communal spaces across the site for additional refuge, including the hall, library and canteen areas.

vii.	items for self-sufficiency that are stored, maintained and are regularly updated in an accessible location above the PMF, including sufficient drinking water and food for occupants, fire extinguishers, radios and torches with spare batteries, and a first aid kit with an automated external defibrillator (AED)	As a school site this will be achieved. Refer Section 6.3 for this recommendation.
viii.	centralised communal shelters may be considered but must be freely accessible internally at all times and externally accessible during events	As a school site this won't be required. In addition to flood-free classrooms, there will also be existing communal spaces available to refuge, including the hall, the general learning spaces, library, canteen areas, etc. (refer Figure 1).
ix.	access is provided to onsite systems that generate power of the shelter in place location during and after the event for a full range of flood events up to the PMF	Two substations are proposed – one along the north of the site close to Keeneland Street, and another north of the high school vehicular access. Access to both substations is retained up to (and including) the PMF event.
x.	detail how these requirements will be maintained and enforced for the life of the development.	Flood Emergency Response Plans are 'living documents' which need to be regularly reviewed once the school is operational to ensure they remain appropriate to address the risk to the site, can be practically implemented, and consider changing information and lessons learnt from any floods since the last review. It is recommended that the FERP is reviewed following staff changes, flood drills as well as flood events to ensure that the details remain relevant.

3.3 Secondary Emergency

Although shelter-in-place is the emergency response strategy should a severe flash flood event begin without sufficient warning, any decision to shelter-in-place must be accompanied by alternative plans for evacuation in the event of a secondary emergency (e.g. medical or fire) or if some site users refuse to shelter-in-place.

While they should be advised to stay in place (at least until the magnitude of the flood is clearer), if they insist on leaving or if there is a secondary emergency during a flash flood event, the following route is the first to become trafficable and should be taken:

- Exit site via Keeneland Street
- Travel north on Terry Road
- Travel east onto George St
- Join onto Old Pitt Road, which has been identified as a regional main evacuation route.

4.0 Flood Warnings and Notifications

4.1 Bureau of Meteorology

Severe weather and thunderstorm warnings are issued by the Bureau of Meteorology (BoM). These warnings are continually updated with descriptions of the likely conditions, including predicted extreme rainfall depths. Flood warnings are issued by the BoM when flooding is occurring or is expected to occur in an area. Warnings may include specific predictions of flood depths dependent on real-time rainfall and river level data. These warnings are distributed by BoM to councils, police and the relevant local SES, as well as being available on the BoM website.

- A ***Flood watch*** is issued by the BoM up to four days prior to a flood event. A watch is generally updated daily and may be issued before, during, or after rainfall has occurred.

- ***Flood warnings*** are issued by the BoM when flooding is occurring or expected to occur in a particular area. Warnings may include specific predictions of flood depths dependent on real-time rainfall and river level data. These warnings are distributed to Council, Police, and the relevant local SES, as well as being available on the BoM website, through telephone weather warnings and radio broadcasts.

The above warnings are primarily for mainstream flood events, such as a Hawkesbury Nepean River Valley flood event. Other warnings are also available that should be used for flash flood environments.

- A ***Severe Weather Warning*** is issued by the BoM when severe weather is occurring or expected to develop, that is the direct consequence of a thunderstorm. For broad severe weather such as east coast lows or vigorous cold fronts, Severe Weather Warnings are aimed to be issued 24-36 hours ahead of the expected onset. This warning time may be reduced particularly for more localised severe weather. Once a severe weather warning is issued it is routinely updated every six hours until the threat has passed, but may be updated more frequently for rapidly evolving situations.
- *A **Severe Thunderstorm Warning*** is issued by the BoM whenever there is sufficient meteorological evidence to suggest that severe thunderstorm development is likely, or when a severe thunderstorm has been directly reported or observed. Regional warnings are provided for one or more forecast areas and aim to give 3 hours warning before thunderstorms develop. Detailed thunderstorm warnings are provided for capital cities (including this site) and aim to give 60 minutes warning before severe thunderstorms develop. Warnings are updated routinely every 30-60 minutes until the threat has passed or more frequently if required.

4.2 NSW SES Australian Warning System

NSW SES has recently implemented the Australian Warning System (AWS) which replaces their previous evacuation orders and warnings system. The AWS is a new national approach to information and 'Calls to Actions' for hazards including flooding. The System uses a nationally consistent set of icons, with three warning levels: Advice, Watch and Act, and Emergency Warning. The flood warnings are described in Figure 11.

Figure 11: Australian Warning System - Three Warning Levels

The NSW SES utilises a range of sources to build detailed flood intelligence within local communities, including information from flood studies and historical flood data. As part of the transition to the Australian Warning System, the NSW SES has increased flexibility to tailor warnings at the community level, based on the expected consequences of severe weather events.

The Chief Warden is responsible for monitoring information from the AWS. Impacted communities will continue to receive flood warnings through the NSW SES website, NSW SES social media channels and by listening to local ABC radio stations. The NSW SES has also developed an all-hazards warning platform, Hazard Watch, to provide an additional channel for communities to access important warning information.

Each warning has three components:

1) **Location and hazard**: The location and the type of hazard impacting the community.
2) **Action statement**: For each warning level there are a range of action statements to guide protective action by the community. These statements evolve as the warning levels increase in severity. Statements range from 'prepare now' and 'monitor conditions' at the Advice level, to 'stay indoors' at the Watch and Act level, to 'seek shelter now' in the Emergency Warning level. As the situation changes and the threat is reduced, the level of warning will decrease accordingly.
3) **The warning level**: The severity of the natural hazard event based on the consequence to the community.

In a Hawkesbury-Nepean event, warnings will be available to allow for pre-emptive closure of the site. In a flash flood event, little to no warning time is likely to be available, with Severe Storm Warnings and Severe Thunderstorm Warnings likely to be the only warnings available.

It is also important to acknowledge that neither the NSW SES nor the Bureau of Meteorology can provide special individual flood warning services for each affected property or school. The more specific the warning requirement for individuals and sites becomes, the more difficult it is for the NSW SES to deliver warnings in the short time frames that often apply. School operators must be weather aware and act early on publicly broadcast severe weather and flood warnings.

4.3 Triggers

The flash nature of flooding at the site (and the inherently limited warning time associated with this type of flooding) limits the capacity of NSW SES to issue flood notifications and action statements with sufficient lead time. It is important to note that the warnings outlined above may not be available or occur with advanced warning.

To ensure adequate response time, alternative triggers should be monitored, including severe weather warnings, media updates via local radio stations and social media. While the Chief Warden is responsible for monitoring information from the AWS, NSW SES recommend that all site users (namely, all staff members and wardens) refer to the HazardWatch website and the Hazards Near Me app.

4.4 Emergency Signals

The site should have a Public Announcement (PA) system that can be used by the Chief Warden to inform all staff of the chosen response strategy in the event of a flood emergency. This ensures that staff with key responsibilities in the Plan can begin to fulfil their duties without delay.

The PA system should be used alongside SMS and email updates to staff and students to inform them of any severe weather or flood warnings covering the site.

5.0 Flood Response Team

5.1 Staff Responsibilities

In the event of a severe flood, various staff members will be responsible for specific tasks as detailed in Table 6. Before the site is in operation, these roles must be delegated to specific staff members.

Table 6: Staff Flood Responsibilities

Role	Responsibilities
Chief Warden	- Decide if pre-emptive closure can occur if warnings are received prior to school opening hours or with several hours' notice - Monitor flood warnings and notifications from BoM and AWS - Monitor BOM in the area of the site - Inform staff and students/parents of flood risk - Coordinate flood SIP drills
First Aid Officer	- Coordinate assistance for less able students and pre-school age children, and staff - Prepare a Flood Emergency Kit that includes a portable radio, torch, spare batteries, first aid materials, emergency contact numbers, candles, waterproof matches, waterproof bags and required medications.
Staff	- Check visitor log and student registers so all site users can be accounted for. - Report missing students or site visitors to Chief Warden

5.2 Key Contact Details

In the event of a severe flood, key telephone numbers have been listed in Table 7 below.

Table 7: Key Contact Numbers

IMPORTANT TELEPHONE NUMBERS	
Chief Warden	tba
Deputy Manager	tba
Safety/First Aid Officer	tba
Centre Staff	tba
External Contacts	
Police/Ambulance (for life-threatening emergencies)	000
NSW State Emergency Services (SES)	132 500
Fire & Rescue NSW – Riverstone Fire Station	02 9493 1083
Riverstone Police Station	02 9680 5399
Westmead Hospital	02 8890 5555

6.0 Preparation for Flood Response

6.1 Education and Signage

As part of the preparation for a flood event, all staff and students will be made aware and advised of the flood risks present on site and the flood protocols & procedures via signage. This will form part of the mandatory site inductions that all staff must undertake prior to commencing work. A copy of this FERP which includes emergency response procedures will be made available at communal areas within the site as well as the main office. This FERP must be regularly reviewed by the Chief Warden, or in the event of any staff restructure or other significant change, to ensure it is up to date.

The overland flow through No.48 Terry Road could potentially pose a risk to safety to persons if not managed. Site users need to be made aware that they should not enter this area. This would need to be managed through fences, signage, Chief Warden training, and presentations to both staff, parents, teachers, students and others present at the school.

Similarly, during times of significant events in the creek catchment, site users should not enter the recreational fields to the west. Peak inundation times here take significantly longer due to the larger catchment extents, and the upstream basin detention system, and as such are more manageable. Warnings should be provided via the PA system during periods of potential high creek levels.

6.2 Flood Drills

It is recommended that flood drills be held by staff annually to ensure all staff workers and students are familiar with the sound of the alert and their subsequent flood response actions. It is the responsibility of the Chief Warden to ensure that evacuation drills are organised and that any issues with these drills are attended to, and if necessary, rerun.

These drills are required to test the suitability of the plan, identify gaps and to provide staff the opportunity to put into practice their specific responsibilities. If issues arise, this plan should be reviewed and updated. The Chief Warden will also ensure that all site drills are recorded in an appropriate records book and any non-conformities reported and responded to.

6.3 Flood Emergency Kit

A Flood Emergency Kit should be prepared prior to a flood event taking place and regularly checked to ensure that supplies within the kit are sufficient and in working condition. This check could occur after the evacuation drill takes place to provide a regular schedule. The Kit should include:

- Radio with spare batteries;
- Torch with spare batteries;
- First aid kit and other medicines;
- Candles and waterproof matches;
- Waterproof bags;
- A copy of the Site Emergency Management Plan; and
- Emergency contact numbers.

As noted in the SIP guidance published by the DPE in January 2025, items for self-sufficiency should include sufficient drinking water and food for occupants, fire extinguishers, radios and torches with spare batteries, and a first aid kit with an automated external defibrillator (AED). These must be stored in a waterproof container in an accessible location above the PMF. It is the responsibility of the Chief Warden and First Aid Officer to make sure that this kit is maintained and regularly updated, and is readily available during an emergency.

7.0 Flood Response Actions

The flood response actions are outlined in Table 8.

Table 8: Flood Emergency Response Actions for the site

Flood Emergency Response Plan	
Flood Warning and Notification Procedures	**Evacuation and Refuge Protocols**
1) Weather forecast predicts significant rainfall event in the area or BoM issues a **FLOOD WATCH / Severe Weather Warning** or NSW SES issue a yellow "**ADVICE**" warning 	The following actions must be undertaken by the Chief Warden: 1) Notify all staff, site users and parents of the potential severe weather / flood event via SMS and email and confirm availability of relevant staff to assist with emergency actions if required. 2) Ensure the emergency kit is ready to use. 3) Listen to the local radio station and BOM website for updates on severe weather and thunderstorm forecasts. Monitor updates on social media and NSW SES platform Hazard Watch. 4) Ensure staff are familiar with their responsibilities.
2) Flash flooding is reported in the media / via visual observation or BoM issues a **FLOOD WARNING / Severe Thunderstorm Warning** or NSW SES issue an amber "**WATCH AND ACT**" or red "**EMERGENCY**" warning 	If the flood event is not anticipated to impact the site (either directly or indirectly), the **Chief Warden** is to continue hourly check-ins and postpone high risk activities (e.g. unnecessary deliveries etc.). If a flood event is anticipated to impact the site, the **Chief Warden** must undertake the following actions: • **For life-threatening emergencies phone 000 immediately.** **If outside of operational school hours, or if warning of a Hawkesbury Nepean Valley Flood event is received, or where several hours of notice of a flash flood event has been given:** • Implement pre-emptive closure of school. Send SMS to staff and parents to inform them and advise them of closure. **If during school hours or where warning time is deemed insufficient:** • An alert and warning message should be broadcast over the PA system confirming a significant flood event, notifying all students and staff to begin **shelter-in-place** procedures. • Ensure no one is outdoors. Site users must not enter the area south of the site (48 Terry Rd) or the recreational fields to the west during periods of high creek levels. • Send SMS to parents, advising them of SIP strategy and asking them not to travel to school. • Direct all students and staff to shelter in their classrooms. Unnecessary movement between buildings should be avoided. Staff must check student registers and complete a headcount to ensure all site users are accounted for. • The **Chief Warden** is to follow any action statements provided via the AWS. **<u>NOTE</u>: Avoid driving or walking through floodwaters. These are the main causes of death during flooding.**
3) Visual observation shows flood is receding or the alert has been downgraded by the relevant authorities and flood event has passed 	• The **Chief Warden** is to confirm floodwater has subsided below the ground level and that there is no ponding within the site. • Flooded areas are to remain off limits until ponding has cleared. Site is to be inspected by the **Chief Warden** if required. Once it has been confirmed that the water level has reduced to a suitable level, and if determined safe, the **Chief Warden** may announce that staff and students no longer need to shelter-in-place. • Keep this FERP up to date.

8.0 Limitations and Revision of the Flood Emergency Response Plan

This FERP only addresses the shelter-in-place strategies during extreme flooding events for students and staff within the site itself and is considered a guide only. It does not cover students and staff individual safe travel arrangements to the site or when their safe travel arrangements may be disrupted by flooding and/or road closures. This FERP also cannot account for the behaviour of individuals (e.g. site visitors), such as choosing not to remain isolated in a building above the PMF for an extended flood duration or attempting to enter dangerous areas during a flood.

In addition, this FERP is based on the currently available information for the proposed site, and must be updated following the detailed design stage, prior to the site becoming operational. Flood Emergency Response Plans are 'living documents' which need to be regularly reviewed once the school is operational to ensure they remain appropriate to address the risk to the site, can be practically implemented, and consider changing information and lessons learnt from any floods since the last review.

It is the NSW Department of Education & Communities' responsibility to ensure this FERP is current and updated as necessary to be in line with relevant standards, directorate, legislation, and the Regional's State Emergency Management Plan to ensure the health, safety and welfare of all staff, students and others.

9.0 Mitigation Measures and Recommendations

Aspect	MM ID	MM Name	Mitigation Measure	Timing
Operational Flooding	OPFMM1	Operational Flood Emergency Response Management Plan	Prior to the commencement of operation, the Flood Emergency Response Plan (FERP) is to be incorporated with the Emergency Management Plan and include the following: **a)** Prioritise evacuation by closing the school before the school day if flood events are forecasted and SES advises. **b)** School administration must undertake annual evacuation preparations and an evacuation drill prior to the commencement of the wet season (typically November to April); **c)** School administration to undertake responsibilities as set out in the FERP; and **d)** Ensure that the Flood Warning Notice is maintained and permanently visible.	Prior to the commencement of operations
Operational Flooding	OPFMM2	Regularly review and update FERP	This FERP is based on the currently available information for the proposed site, and must be updated following the detailed design stage, prior to the site becoming operational. During operation, the FERP must be reviewed following staff changes, flood drills and flood events to ensure details remain relevant.	Design, operation

Operational Flooding	OPFMM3	Delegate staff responsibilities	To ensure all staff are aware of their specific roles and associated flood response actions.	Prior to commence of operation
Operational Flooding	OPFMM4	Education and signage	As part of the preparation for a flood event, all staff and students must be made aware and advised of the flood risks present on site and the flood protocols & procedures via signage. This will enhance preparedness for a flood event.	Prior to commence of operation
Operational Flooding	OPFMM5	Fencing and signage	Fencing and signage should be installed to advise all site users to stay away from the southern and western boundaries of the site during a storm event.	Prior to commence of operation
Operational Flooding	OPFMM6	Flood drills	It is recommended that flood drills be held by staff annually to ensure all staff workers and students are familiar with the sound of the alert and their subsequent flood response actions.	During operation
Operational Flooding	OPFMM7	Flood emergency kit	A Flood Emergency Kit should be prepared prior to a flood event taking place and regularly checked to ensure that supplies within the kit are sufficient and in working condition.	Prior to commence of operation, during operation

Prepared by
TTW (NSW) PTY LTD

RACHEL CALDWELL
Civil Flood Modeller

Reviewed & Authorised By
TTW (NSW) PTY LTD

EIRIAN CRABBE
Associate Director (Flood)

Appendix A

Consultation with Council

FW: 211317 - Box Hill/Box Hill Industrial Precinct - Flood Levels and H&H Models

Reply | Reply All | Forward

AH

Anisul Huq <ahuq@thehills.nsw.gov.au>
To Jamie Marshall; Bala Kilaparty
Cc Philip McAteer; Stephen Brain; Eric Ruiz

Sun 6/08/2023 7:48 PM

General\All Employees (unrestricted)

This sender ahuq@thehills.nsw.gov.au is from outside your organization.

Flood Information Plan_Box Hill Growth Centre Precinct.pdf
5 MB

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jamie,

Please find attached the flood information plan for the subject area under the ultimate-developed catchment condition.

The flood information presented in the plan is derived from the TUFLOW models developed as part of the Box Hill Industrial Precinct - Water Cycle Management Strategy. These models were initially prepared by J. Wyndham Prince, Consulting Civil Infrastructure Engineers, and later updated by Cardno Engineering Services. Currently, this is the most reliable information available to the Council.

Where future development of the site is being considered, and the site is Flood Controlled Land, reference should be made to Council's Flood Controlled Land Development Control Plan (DCP). A copy of the DCP is available on Council's website.

Feel free to contact me at 98430464 if you have any questions regarding the provided information.

Regards,

Anisul Huq
Senior Floodplain Systems Engineer
9843 0464 | ahuq@thehills.nsw.gov.au
Administration Centre, 3 Columbia Court Norwest NSW 2153
PO Box 7064, NORWEST NSW 2153
www.thehills.nsw.gov.au

Appendix B

Consultation with NSW SES

From: Rachel Caldwell <rachel.caldwell@ttw.com.au>
Sent: Monday, 12 May 2025 2:55 PM
To: NSW SES Risk Reduction <rra@ses.nsw.gov.au>
Cc: Grace Carpp <grace.carpp@ttw.com.au>
Subject: NSW SES Consultation on Box Hill PS HS FERP

EXTERNAL EMAIL: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good afternoon,

TTW are preparing a Flood Emergency Response Plan (FERP) to accompany a Review of Environmental Factors (REF) for the proposed Box Hill PS & HS, located at 50-52 Terry Road, Box Hill.

Given the sensitivity of the subject site as an educational establishment, I would greatly appreciate if you could review our proposed emergency strategy (overview attached) and respond with your feedback.
Note that we are still producing the FERP, and so this letter provides an overview of our assessment and justification for the proposed strategy, based on modelling of the existing flood behaviour.

Please let me know if you have any queries.

Many thanks,
Rachel

TTW

Rachel Caldwell | Civil Flood Modeller
+61 2 9439 7288 | | rachel.caldwell@ttw.com.au
TTW Engineers | Sydney
Read our latest news here

Rachel Caldwell

From: NSW SES Risk Reduction <rra@ses.nsw.gov.au>
Sent: Monday, 2 June 2025 4:53 PM
To: Rachel Caldwell
Cc: Grace Carpp; NSW SES Risk Reduction; Helen Slater
Subject: Response RE: ACK ID 3107 RE: NSW SES Consultation on Box Hill PS HS FERP
Attachments: 20250602 NSW SES ID 3107 Response FERP Box Hill Primary & High Schools.pdf

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon Rachel,

Thank you for providing NSW SES the opportunity to review the proposed Box Hill Primary and High Schools.

Please find NSW SES response attached for consideration.

Kind regards.
Daniela

Daniela Mitreski
Program Support Officer | Emergency Risk Assessment Branch | Emergency Management Directorate
NSW State Emergency Service – State Headquarters
E rra@ses.nsw.gov.au

93-99 Burelli Street Wollongong, NSW 2500
PO Box 6126 Wollongong, NSW 2500
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OUR MISSION: SAVING LIVES AND CREATING SAFER COMMUNITIES.

OUR VISION: A TRUSTED VOLUNTEER-BASED EMERGENCY SERVICE, WORKING TOGETHER TO DELIVER EXCELLENCE IN COMMUNITY PREPAREDNESS AND EMERGENCY RESPONSE.

FOR EMERGENCY HELP IN FLOODS, STORMS AND TSUNAMI CALL THE NSW SES ON 132 500

The NSW SES acknowledges the traditional custodians of the lands on which we walk, work and live. We recognise their continuing connection to land, waters and culture and pay respect to Elders, past and present.

Our Ref: ID 3107
Your Ref: 231099 CFAA

2 June 2025

Rachel Caldwell
TTW Pty Ltd
Level 6, 73 Miller Street
North Sydney NSW 2060

Via email

email: rachel.caldwell@ttw.com.au
CC: helen.slater@ses.nsw.gov.au

Dear Rachel,

Flood Emergency Response Plan for Box Hill Primary & High Schools

Thank you for the opportunity to provide comment on the Flood Emergency Response Plan (FERP) for the proposed development at Box Hill Primary & High Schools, 50-52 Terry Road, Box Hill.

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami in NSW. This role includes, planning for, responding to and coordinating the initial recovery from floods. As such, the NSW SES has an interest in the public safety aspects of the development of flood prone land, particularly the potential for changes to land use to either exacerbate existing flood risk or create new flood risk for communities in NSW.

It is the preference of NSW SES that all schools follow the application of sound land use planning and flood risk management in accordance with the relevant directions under the *Environmental Planning and Assessment Act 1979*, the Flood Prone Land Policy, the Flood Risk Management Manual 2023 (the Manual) and supporting guidelines.

The NSW SES has reviewed the proposed FERP and the flood risk information (e.g. The Hills Shire Local Flood Plan, Hawkesbury-Nepean Flood Study 2024 etc.) available to the NSW SES, noting the proposed development is at risk of local overland flooding along the site boundary in a 1% Annual Exceedance Probability (AEP) events and the adjacent roads may be cut by floodwaters. During the Probable Maximum Flood (PMF) event, flooding may "*reach a H5 hazard along Terry Road to the southeast of the site less than 10 minutes after the onset of*

the storm".[1] Terry Road, south of the site is also cut by regional flooding during a Hawkesbury-Nepean PMF Flood, reaching depths of up to 4 meters.[2]

As detailed in the Support for Emergency Management Planning, the NSW SES is opposed to the imposition of development consent conditions requiring private flood evacuation plans rather than the application of sound land use planning and flood risk management. **The NSW SES also does not have statutory authority to endorse or approve flood emergency response plans**, however, provides the following advice based on the principles outlined in the Guidelines as detailed in Attachment A.

In summary, we recommend:

- **Implementing** early triggers in the Flood Emergency Response Plan (FERP), such as monitoring Severe Weather Warnings and Flood Warnings and consider closing the school ahead of the start of the school day, particularly considering the flash flooding risk in the area. A strategy of isolation or sheltering in buildings surrounded by flood water are not equivalent, in risk management terms, to evacuation.
- **Pursuing**, if relevant, site design and stormwater management that reduces the impact of flooding and minimises any risk to the community. Any improvements that can be made to reduce flood risk will benefit the community.
- **Exercising** flood emergency plans regularly, similar to building fire evacuation drills. The NSW SES also recommends updating the FERP at regular intervals and whenever additional flood information is available or highlighted during the drills or flood events. The frequency of exercising and updating emergency plans should be detailed within the FERP itself.
- **Considering** the impact of climate change on the flood risk, and incorporating that into any updated FERPs.

Further useful information can be found here:

- NSW SES website
- Emergency Business Continuity Plan
- The Department of Climate Change, Energy, the Environment and Water website

Please feel free to contact Kate Dawes via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

[1] TTW, 2025, Flood Emergency Response Plan, Time to Inundation and Recession Times, Page 6
[2] NSW Reconstruction Authority, 2024, Hawkesbury-Nepean River Flood Study, Map-EXT12-PMF-05 Flood Extents, Depths and Contours, Probably Maximum Flood, Map Book Volume A2, Page 93

Yours sincerely,

Elspeth O'Shannessy
Manager, Emergency Risk Assessment
NSW State Emergency Service

ATTACHMENT A: Principles Outlined in the Support for Emergency Management Planning Guideline[3]

Principle 1 Any proposed Emergency Management strategy should be compatible with any existing community Emergency Management strategy.

Any proposed Emergency Management strategy for an area should be compatible with the evacuation strategies identified in the NSW State Flood Plan[4] and The Hills Shire Flood Emergency Sub Plan, where evacuation is the preferred emergency management strategy for people impacted by flooding.[5]

The Flood Risk Management Manual 2023 notes flood risk management plans are 'living documents' which need to be regularly reviewed to ensure they remain appropriate to address the flood risk to the community, can be practically implemented and consider changing information and lessons learnt from any floods since the last review.

Principle 2 Decisions should be informed by understanding the full range of risks to the community.

Decisions relating to future development should be risk-based and ensure Emergency Management risks to the community of the full range of floods are effectively understood and managed.

Further, risk assessment should consider the full range of flooding, including events up to the Probable Maximum Flood (PMF) and not focus only on the 1% AEP flood. This is reflected in the NSW Flood Risk Management Manual 2023. It is noted the proposed development is at risk of local overland flooding along the site boundary in a 1% Annual Exceedance Probability (AEP) events and the adjacent roads may be cut by floodwaters. During the Probable Maximum Flood (PMF) event, flooding may "*reach a H5 hazard along Terry Road to the southeast of the site less than 10 minutes after the onset of the storm*".[6] Terry Road, south of the site is also cut by regional flooding during a Hawkesbury-Nepean PMF Flood, reaching depths of up to 4 meters.[7] These levels of depth and hazard are unsafe for all people and vehicles.

We would like to emphasise that the NSW SES has responded to multiple flood related requests along Terry Road, including water over the road to both the north and south of the

[3] NSW Government. 2023. Principles Outlined in the Support for Emergency Management Planning Guideline
[4] NSW Government. 2024. NSW State Flood Plan. Section 5.1.7, page 34
[5] NSW SES, The Hills Shire Flood Emergency Sub Plan, Endorsed May 2023, Section 5.8
[6] TTW, 2025, Flood Emergency Response Plan, Time to Inundation and Recession Times, Page 6
[7] NSW Reconstruction Authority, 2024, Hawkesbury-Nepean River Flood Study, Map-EXT12-PMF-05 Flood Extents, Depths and Contours, Probably Maximum Flood, Map Book Volume A2, Page 93

site. This suggests the site may be at greater risk from flooding than indicated by the existing flood studies, with access/egress available only through smaller local streets.

Principle 3 Development of the floodplain does not impact on the ability of the existing community to safely and effectively respond to a flood.

The ability of the existing community to effectively respond (including self-evacuating) within the available timeframe on available infrastructure is to be maintained. It is not to be impacted on by the cumulative impact of new development.

Risk assessment should have regard to flood warning and evacuation demand on existing and future access/egress routes. Consideration should also be given to the impacts of localised flooding on evacuation routes. Evacuation must not require people to drive or walk through flood water.

The local and regional road network is also prone to local and riverine flooding and would require caregivers to ensure they have adequate time to collect the children prior to the roads becoming flooded. As this age group of students are largely unable to self-evacuate, the evacuation time would require additional travel time required for caregivers to reach the building prior to access becoming affected and proceed to safety. Evacuation must not require people to drive or walk through flood water. Therefore, ideally the school would be closed prior to the impact of flooding, as proposed by the FERP[8].

Development strategies relying on an assumption that mass rescue may be possible where evacuation either fails or is not implemented are not acceptable to the NSW SES.

Principle 4 Decisions on development within the floodplain does not increase risk to life from flooding.

Managing risks requires careful consideration of development type, likely users, and their ability respond to minimise their risks. This includes consideration of:

- Isolation – There is no known safe period of isolation in a flood, the longer the period of isolation the greater the risk to occupants who are isolated. Sheltering in buildings where entrances and exits may become flooded in the larger floods may result in isolating the children potentially without food or water for several hours or more depending on the weather system/s.
- Secondary risks – This includes fire and medical emergencies that can impact on the safety of people isolated by floodwater. The potential risk to occupants needs to be considered and managed in decision-making.
- Consideration of human behaviour – The behaviour of individuals such as choosing not to remain isolated from their family or social network in a building on a floor above the PMF for an extended flood duration or attempting to return to a building during

[8] TTW, 2025, Flood Emergency Response Plan, Preferred Emergency Response Strategy, Page 6

a flood, needs to be considered. It is unrealistic to assume parents or caregivers will not attend the school to pick up children in circumstances of flooding.

Principle 5 Risks faced by the itinerant population need to be managed.

Any Emergency Management strategy needs to consider people visiting the area or using a development.

Principle 6 Recognise the need for effective flood warning and associated limitations.

An effective flood warning strategy with clear and concise messaging understood by the community is key to providing the community an opportunity to respond to a flood threat in an appropriate and timely manner.

NSW SES utilises the Australian Warning System which is a nationally consistent, three-tiered approach to issue clear warnings and lead people to take action ahead of severe weather events. The three warning tiers consist of Advice, Watch and Act and Emergency Warning. These warnings can be viewed on the SES website and the HazardWatch website and app.

While warnings from the Australian Warning System will apply to regional Hawkesbury-Nepean flood events which may impact local streets during a PMF event, overland flooding affecting the school may occur with little to no warning. Severe Weather Warnings and Severe Thunderstorm Warnings from the Bureau of Meteorology are the only warnings currently available for these events.

Principle 7 Ongoing community awareness of flooding is critical to assist effective emergency response.

The flood risk at the site and actions taken to reduce risk to life should be communicated to all site users (includes increasing risk awareness, community connections, preparedness actions, appropriate signage and emergency drills) during and after the construction phase. However, it is important to note that the NSW SES is opposed to the imposition of development consent conditions requiring private flood evacuation plans rather than the application of sound land use planning and flood risk management.

Development in a floodplain will increase the need for NSW SES to undertake continuous community awareness, preparedness, and response requirements. Users of the proposed development should be made aware of their flood risk, the Hazards Near Me app (a tool to receive flood warnings as part of the Australian Warning System) and the NSW SES website which contains comprehensive information for the general community about what to do before, during and after floods as well as in-language resources and HazardWatch (NSW SES interactive information and warnings site).