

Flood Emergency Response Plan

The Ponds High School

Prepared for NSW Department of Education / 17 September 2025

241650

Contents

1.0	Introduction	4
1.1	Proposed Activity	4
1.2	Guidance Documents	4
1.3	Site Description	5
2.0	Flood Behaviour	7
2.1	Post-Development Flood Behaviour	8
2.1.1	1% AEP Event.....	8
2.1.2	PMF Event	10
2.2	Inundation and Recession Times	11
3.0	Flood Response Strategy	14
3.1	Preferred Strategy	14
3.1.1	Pre-Emptive Closure	14
3.1.2	Shelter-in-Place.....	14
3.2	Secondary Emergency.....	18
4.0	Flood Warnings and Notifications.....	19
4.1	Bureau of Meteorology.....	19
4.2	NSW SES Australian Warning System	19
4.3	Triggers	20
4.4	Emergency Signals.....	20
5.0	Flood Response Team	21
5.1	Staff Responsibilities	21
5.2	Key Contact Details	21
6.0	Preparation for Flood Response	22
6.1	Education and Signage.....	22
6.2	Flood Drills	22
6.3	Flood Emergency Kit	22
7.0	Flood Response Actions	23
8.0	Limitations and Revision of the Flood Emergency Response Plan.....	24
9.0	Mitigation Measures and Recommendations	24
	Evaluation of Environmental Impacts	24

Rev	Date	Prepared By	Approved By	Remarks
1	1 August 25	RC/MK	EC	Draft for comment
2	17 September 25	RC	MK	Final

1.0 Introduction

This Flood Emergency Response Plan (FERP) has been prepared by TTW (NSW) Pty Ltd on behalf of the NSW Department of Education (The Department) to inform a Review of Environment Factors (REF) for upgrades to The Ponds High School (the activity) located at 180 Riverbank Drive, The Ponds (the site).

The Ponds High School, located in northwest Sydney is a coeducational comprehensive high school that opened in 2015.

1.1 Proposed Activity

The proposed activity would provide for upgrades to the existing school, including the following:

- Construction of two new permanent school buildings Building E and F, of three and four storeys, respectively. The buildings comprise classrooms/teaching spaces and amenities.
- Reconfiguration of external areas, including demolition of hardstand and landscaped spaces, construction of fencing, new natural and synthetic turf playing fields, and relocation of cricket nets and outdoor shelters, with ancillary landscaping works including tree removal and planting.
- Removal of demountable buildings following completion of new permanent learning spaces.
- Expansion and reconfiguration of car parking areas to improve circulation, access, and capacity, with ancillary works.
- Upgrades to site infrastructure, including stormwater management, the existing substation, and ancillary works.
- The proposed activity does not seek to increase staff or student numbers at the high school.

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as “development permitted without consent” on land carried out by or on behalf of a public authority (i.e. The Department) under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Clause 3.37 of the T&I SEPP.

The REF describes the activity, documents the examination and consideration of all matters affecting, or are likely to affect, the environment, and details safeguards to be implemented to mitigate impacts.

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the Addendum guidelines for schools. The purpose of this report 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.

The Department is the proponent and the determining authority for the project under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

1.2 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);
- Blacktown City Council (BCC) Development Control Plan (DCP), 2015;
- Blacktown City Council (BCC) Engineering Guide for Development (EGD), 2005;
- Blacktown City Council (BCC) Water Sensitive Urban Design (WSUD) Developer Handbook MUSIC Modelling and Design Guide, 2020;
- Blacktown City Council (BCC) and NSW State Emergency Services (SES) Blacktown City 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;
- Department of Planning, Housing and Infrastructure – Planning Circular PS 24-001, Update on addressing flood risk in planning decisions, 1st March 2024;
- NSW Department of Planning and Environment (2025) Shelter-in-place guideline for flash flooding (<https://pp.planningportal.nsw.gov.au/draftplans/made-and-finalised/shelter-place-guideline-flash-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 \(nsw.gov.au\)](https://spatialcollaborationportal.nsw.gov.au)).

1.3 Site Description

The site is identified in Figure 1 and the activity is shown in Figure 2.

The site is located in the suburb of The Ponds in the Blacktown City Council (BCC) local government area (LGA), approximately 2.25km east of Schofields Station. The site is bounded by low density residential development to the east, west, and south, and Little Trolley Park to the north.

The site is legally described as Lot 11 in Deposited Plan 1200915 and is zoned R2 Low Density Residential in the *Alex Avenue and Riverstone Precinct Plan 2010*, which forms Appendix 7 to *State Environmental Planning Policy (Precincts—Central River City) 2021*. The proposed alterations and additions are situated within this Lot, which has an area of approximately 8.62 hectares. The site forms part of a larger school lot containing both Riverbank Public School and The Ponds High School.

The main vehicular and pedestrian access to the site is via Riverbank Drive. Vehicular access is also available on Wentworth Street along the eastern side of the site. The site lot is bounded by regional stormwater treatment system to the north, Wentworth Street to the east, Riverbank Drive to the south and Hambledon Road to the west.

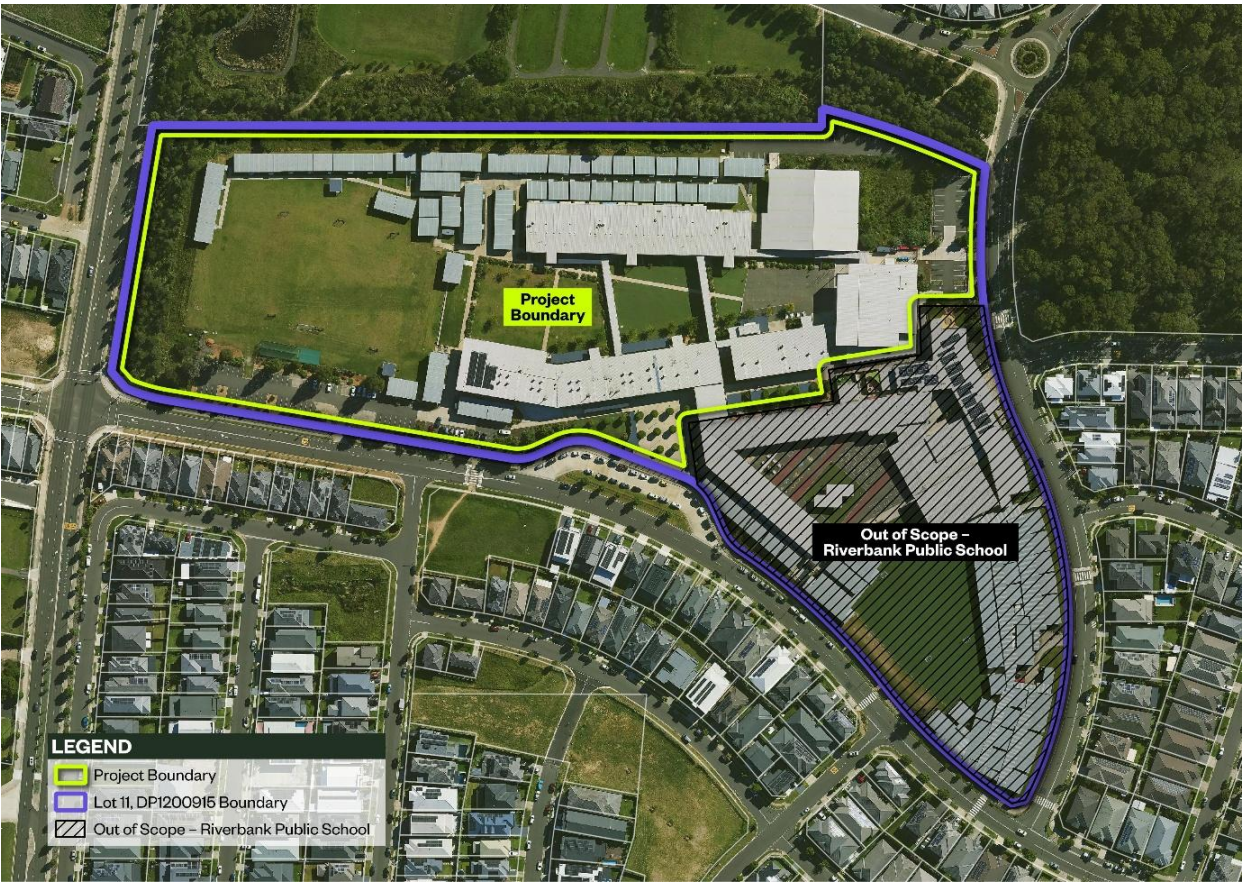


Figure 1: Site location plan (Source: Mecone)

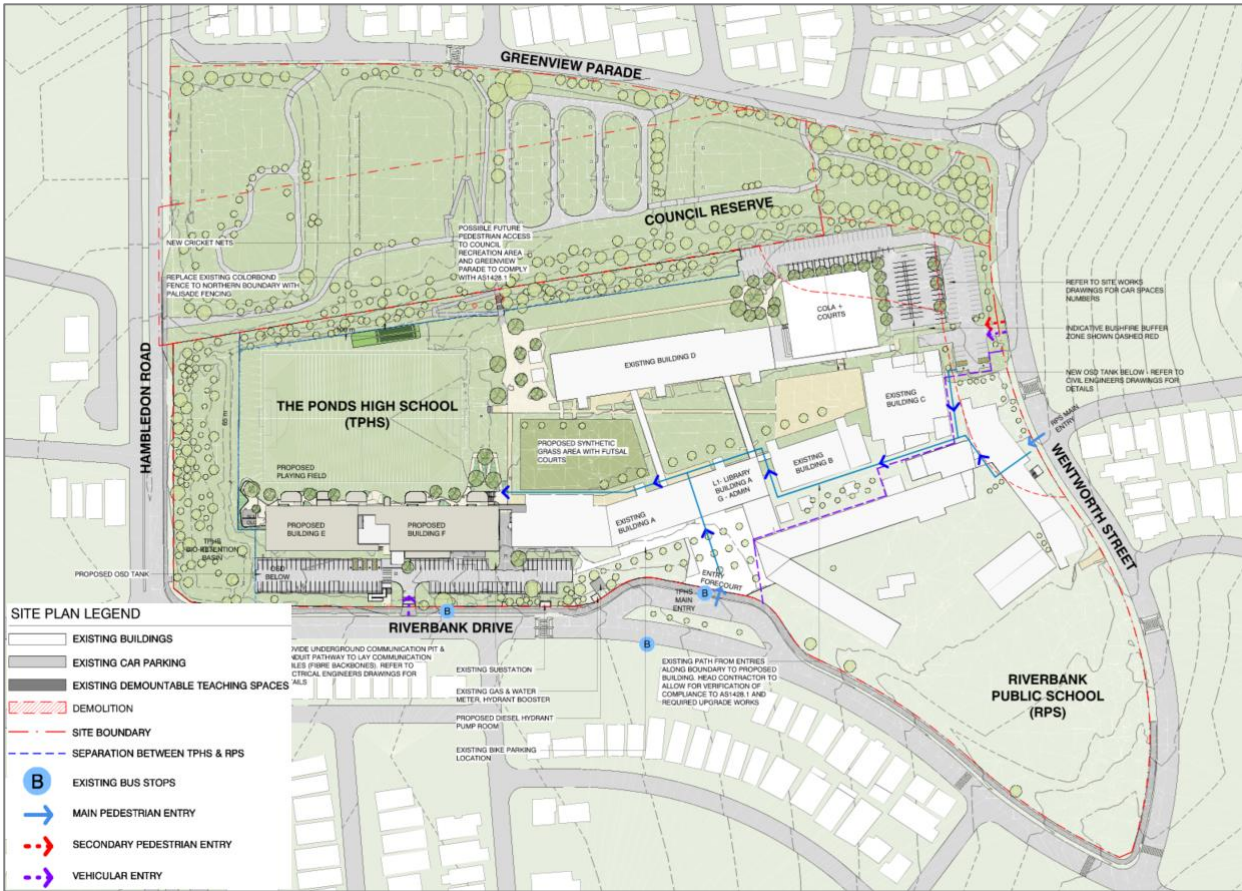


Figure 2: The Ponds High School (Proposed) - indicative only, subject to detailed design (Source: DJRD)

2.0 Flood Behaviour

To assess flood behaviour at the site, a new 1D-2D hydraulic model has been developed by TTW which assesses overland flow in the 50%, 10%, 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 17 September 2025) and submitted together with this FERP. Refer to this report for detailed discussion on modelling carried out for the development.

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 1 outlines the threshold limits for each hazard category.

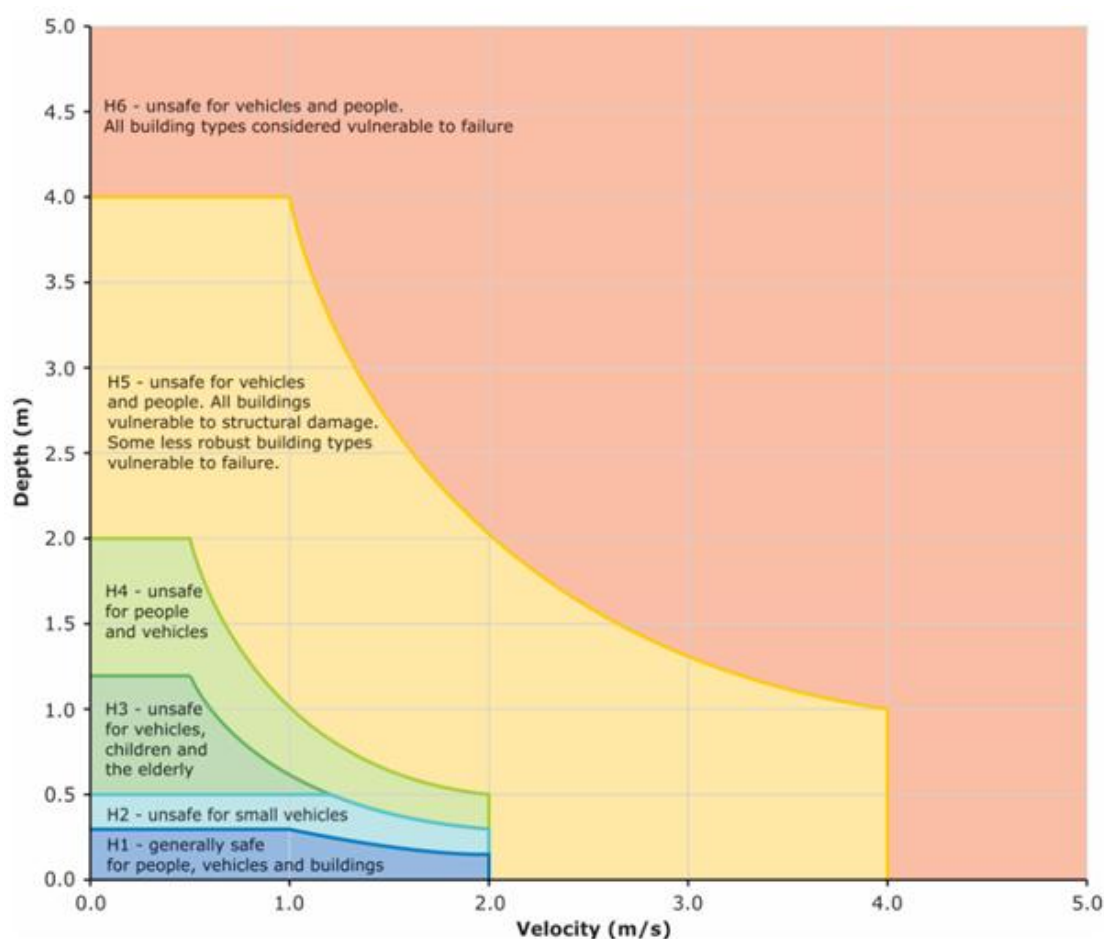


Figure 3: Flood hazard vulnerability curve (Source: Flood Risk Management Guide FB03 - Flood Hazard, NSW Department of Planning and Environment, 2022)

Table 1: Hazard vulnerability threshold limits

Hazard	Description	Classification Limit (m ² /s)	Limiting still water depth (D) (m)	Limiting velocity (V) (m/s)
H1	Generally safe for people, vehicles and buildings	$D \times V \leq 0.3$	0.3	2.0
H2	Unsafe for small vehicles	$D \times V \leq 0.6$	0.5	2.0

H3	Unsafe for vehicles, children and the elderly	$D \times V \leq 0.6$	1.2	2.0
H4	Unsafe for people and vehicles	$D \times V \leq 1.0$	2.0	2.0
H5	Unsafe for people and vehicles. All buildings vulnerable to structural damage.	$D \times V \leq 4.0$	4.0	4.0
H6	Unsafe for people and vehicles. All building types considered vulnerable to failure.	$D \times V > 4.0$	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 report submitted alongside this FERP, and summarised for the 1% AEP and PMF events below.

2.1.1 1% AEP Event

The flood depths and levels in the 1% AEP event for the Post-Development Scenario are presented in Figure 4, with hazard classification depicted in Figure 5.

- Within the TPHS site itself, flood affectation is low in the 1% AEP, with negligible sheet flow at the proposed sports field.
- Flooding within the bio-retention basin reaches around 0.5m, at H3 hazard (unsafe for vehicles, children and the elderly).
- The southwestern car park is free from flooding in the 1% AEP. The northeastern car park is impacted by ponding of floodwaters along the internal driveway to the north (150-160mm depth). However, hazard here is H1 (generally considered trafficable) and the driveway onto Wentworth Street is also H1.
- Wentworth Street to the east of the site is impacted by H2 hazard just south of the Greenview Parade roundabout (unsafe for small vehicles).
- Riverbank Drive is impacted by H3 hazard at the junction of Jerralong Drive and Hambledon Road to the southwest of the site. Hazard reaches H5 in the westbound lane of Riverbank Drive (Unsafe for people and vehicles. All buildings vulnerable to structural damage).



Figure 4: 1% AEP event – flood depths and levels surrounding the site – Post-Development Scenario



Figure 5: 1% AEP event – flood hazard classification surrounding the site – Post-Development Scenario

2.1.2 PMF Event

The flood depths and levels in the PMF event for the Post-Development Scenario are presented in Figure 6, with flow velocity and hazard classification depicted in Figure 7.

- As a result of the re-grading of the sports field, there is split flow with ponding to the north of the sports field and to the south (i.e. north of the proposed Buildings E & F). Depths to the north peak at approximately 230mm, and at around 240mm to the south. Peak flood level northeast of Building F reaches 53.07m AHD, remaining at H1 hazard. This is considered negligible and will be largely managed by stormwater management provisions.
- Flooding within the bio-retention basin reaches around 0.55m, remaining at H3 hazard (as in the 1% AEP).
- The southwestern car park is somewhat impacted in the PMF event at the northwestern corner with sheet flow between 50-80mm, with low H1 hazard. The northeastern car park is impacted by ponding of floodwaters along the internal driveway to the north (250mm depth). However, hazard here remains at H1.
- Wentworth Street to the east of the site is impacted by H5 hazard directly adjacent to the car park driveway entrance (unsafe for small vehicles). Tomah Crescent and Springwood Avenue to the east of Wentworth Street are similarly impacted by H5 hazard.
- Riverbank Drive is impacted by H5 hazard at the southwestern frontage of the site (including at the southwest car park entry) and at the junction of Jerralong Drive and Hambledon Road. Hambledon Road northbound is similarly impacted by H5 hazard, while Jerralong Drive is subject to H4 hazard (Unsafe for people and vehicles).

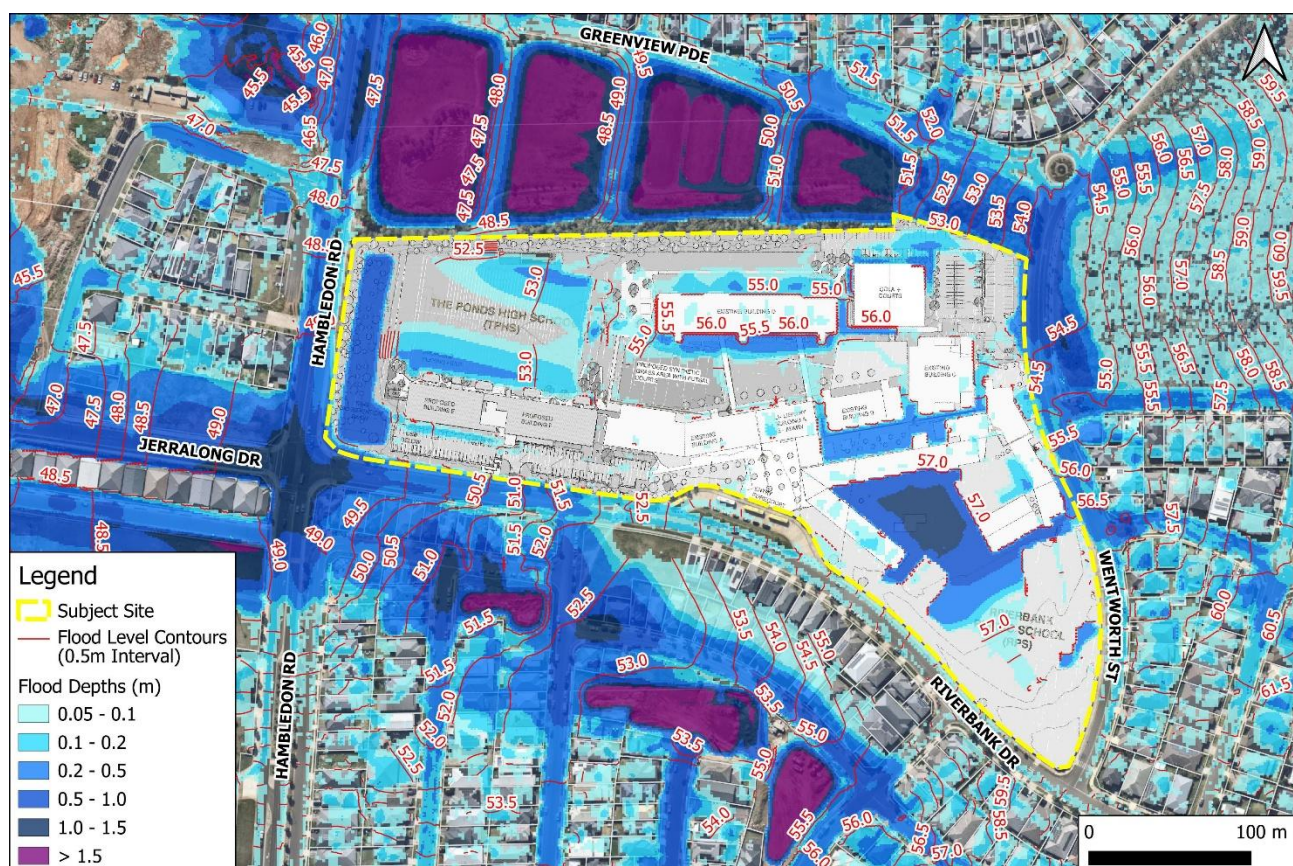


Figure 6: PMF event – flood depths and levels surrounding the site – Post-Development Scenario

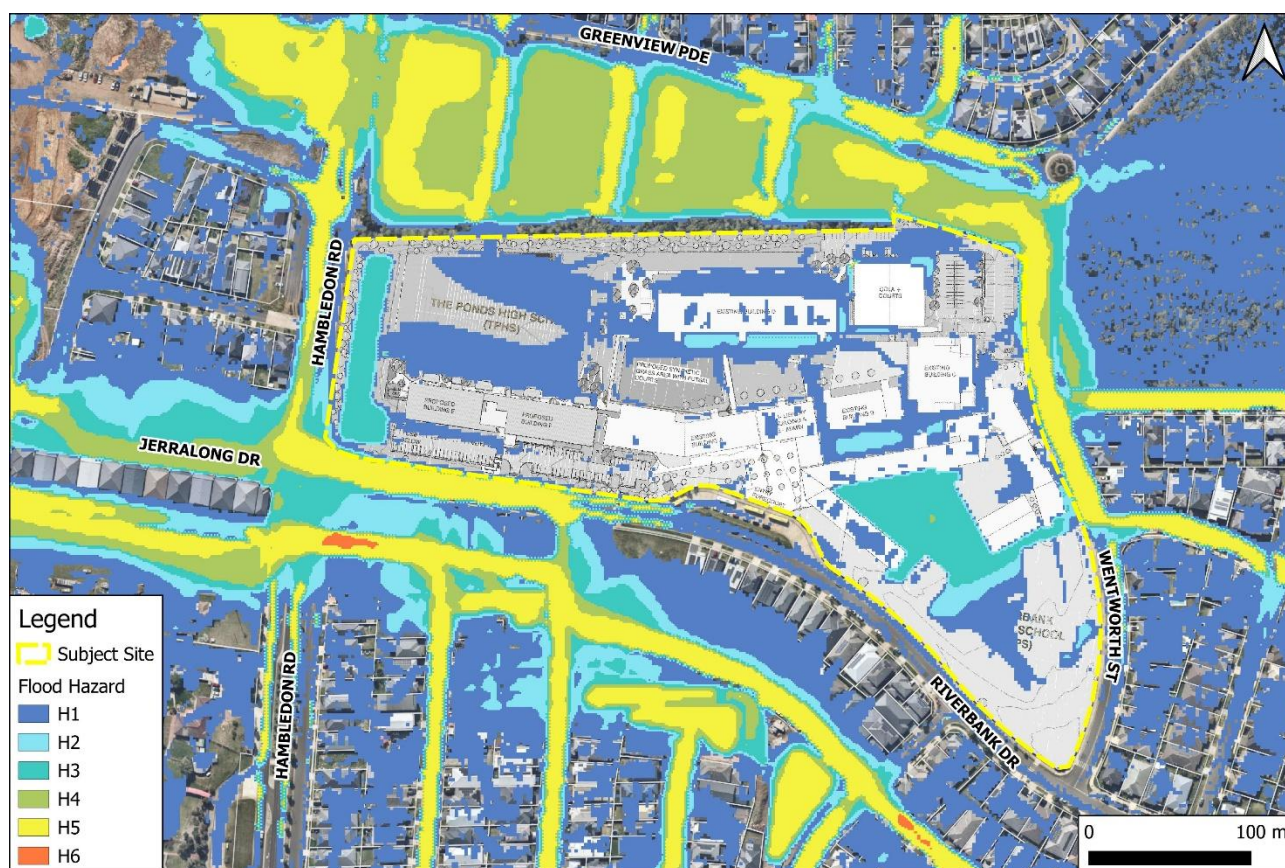


Figure 7: PMF event – flood hazard classification surrounding the site – Post-Development Scenario

2.2 Inundation and Recession Times

Table 2 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.

Due to the rainfall-on-grid modelling methodology, the surrounding roads will always be flood affected in the PMF event, though it is important to consider the flood hazard and whether roads are trafficable. 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.

Table 2: 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 H5 hazard level at Wentworth Street to the northeast of the site, including at the northeastern car park entry. < 10 minutes until flows reach H5 hazard along Riverbank Drive at the southwest of the site, close to the Jerralong Drive and Hambledon Road junction. This also impacted Riverbank Drive directly adjacent to the driveway entry to the southwestern car park.	Egress is possible about 40 minutes after the onset of the storm by travelling north on Wentworth St, with only residual H1 flows remaining. Isolation time of approximately 30-40 minutes. Note that 40 minutes after the onset of the storm, the junction of Hambledon, Riverbank and Jerralong are still impacted by ponding of H3 hazard.

	The entry forecourt and main drop-off area is impacted by low H1 hazard, but the main vehicular access and egress points are cut off less than 10 minutes after the onset of the storm.	Jerralong Drive is trafficable approximately 2 hours 30 minutes after the onset of the storm. Residual flooding remains in the northbound lane of Hambledon Road, adjacent to the regional basins.
90 minutes	< 10 minutes until flows reach H2-H4 hazard level at Wentworth Street to the northeast of the site, including at the northeastern car park entry. There are also isolated instances of H5 along road gutters. < 10 minutes until flows reach H5 hazard along Riverbank Drive at the southwest of the site, directly adjacent to the driveway entry to the southwestern car park. In this storm duration, flood hazard peaks approximately 40 minutes after the onset of the storm, with H5 hazard along Wentworth, Hambledon and Riverbank. The entry forecourt and main drop-off area is impacted by low H1 hazard, but the main vehicular access and egress points are cut off less than 10 minutes after the onset of the storm.	Egress is possible about 1 hour 50 minutes after the onset of the storm by travelling north on Wentworth St, with only residual H1 flows remaining. Isolation time of approximately 1 hour 30-40 minutes. Note that at this time, the junction of Hambledon, Riverbank and Jerralong are still impacted by ponding of H3 hazard. Jerralong Drive is trafficable approximately 4 hours after the onset of the storm. Residual flooding remains in the northbound lane of Hambledon Road, adjacent to the regional basins.
6 hrs (Long duration)	< 20 minutes until flows at the junction of Hambledon, Riverbank and Jerralong reach H2 hazard. Despite this, access and egress from the site is still possible via onward travel east on Riverbank, or via Wentworth St. < 40 minutes until flows reach H2 hazard level at Wentworth Street to the northeast of the site, including at the northeastern car park entry. < 40 minutes until flows reach H5 hazard along Riverbank Drive at the southwest of the site, directly adjacent to the driveway entry to the southwestern car park, including isolated instances of H5 hazard. In this storm duration, flood hazard peaks approximately 2 hours after the onset of the storm, with H5 hazard along Riverbank Drive (to the southwest of the site), H3 along Hambledon Road, and H2 along Wentworth (with isolated instances of H5 along the gutter in the southbound lane). The entry forecourt and main drop-off area is impacted by low H1 hazard, but the main vehicular access and egress points are cut off less than 40 minutes after the onset of the storm.	Egress is possible about 4 hours 50 minutes after the onset of the storm by travelling east on Riverbank Drive via the southwestern car park. Egress is possible about 5 hours after the onset of the storm by travelling south on Wentworth St. Isolation time of approximately 4 hours 30 minutes.

The short critical duration for the catchment indicates that roads are unlikely to be isolated for an extended period of time.

In all events, the entry forecourt and main drop-off area is only impacted by low H1 hazard, alongside the eastern portion of Riverbank Drive. However, the main vehicular access and egress points at the southwest and northeast of the site are cut off. The route that is deemed the first to return to a low hazard, trafficable state is by travelling north on Wentworth St, with only residual H1 flows remaining. Analysis indicates that across the range of PMF durations assessed, the maximum time the school is isolated for is approximately 4 hours 30 minutes.

Figure 8 shows the flood hazard categorisation within the entire model during the critical PMF storm event. This indicates that there is no way in or out of the site's vehicular access points in the critical PMF event that does not go through high or medium hazard waters, though floodwaters quickly recede.

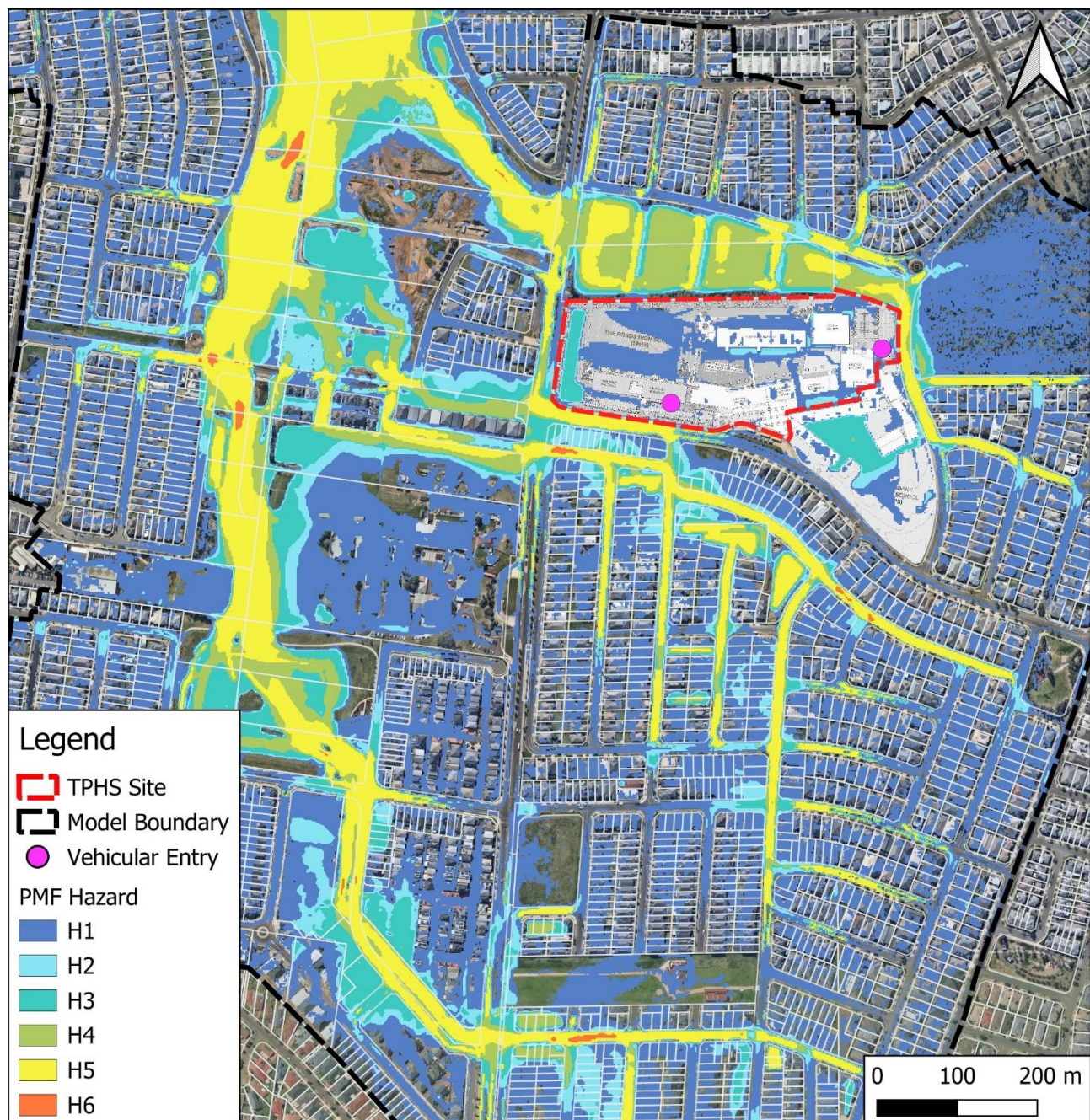


Figure 8: Peak flood hazard categorisation for the site and its surrounding area during the critical PMF storm event.

3.0 Flood Response Strategy

3.1 Preferred Strategy

3.1.1 Pre-Emptive Closure

Section 1.6.2 of the Blacktown City 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 Blacktown. 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 weather forecast notice of the extreme rainfall experienced in a 1% AEP–PMF event. During the operational phase, where there is enough severe weather 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 through roads that could become hazardous.

In this strategy, the Blacktown 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.

3.1.2 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. Severe weather events may lead to flash flooding with little to no warning time, and pre-emptive closure of the school cannot be accomplished, as was acknowledged by SES during consultation.

Shelter-in-place (SIP) guidance published by the NSW Department of Planning and Environment (DPE) 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 3 outlines the varying factors that must be considered when proposing SIP, and how this site meets the recommendations.

Table 3: Department of Planning and Environment 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?	The main flood mechanism impacting the immediate area 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 Campbelltown Local Flood Emergency Sub Plan (Section 5.8.4 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 of the proposed school site (refer Table 2), 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's vehicular access points that does not go through high or medium hazard 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 the proposed site is deemed a sensitive activity as an educational establishment, the new 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	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.
² Flash flood warning systems are not failsafe and should not be the only mechanism to get people to shelter in place.	
6. Can the community effectively be informed of the risks associated with the emergency management strategy?	Section 6.1 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 2), 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 high or medium hazard 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.
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	As outlined in the new ARR2019 Climate Change Considerations chapter (i.e. Book 1 Chapter 6), the effects of climate change that has occurred since the development of the current set of rainfall IFDs (Intensity-Frequency-Duration data) should be considered and accounted for in the assessment of present time flooding conditions (i.e. the year of 2025 at the time of assessment). For this assessment, all rainfall intensities

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.	adopted have been upscaled to the year 2025 based on the Shared Socioeconomic Pathway (SSP) 2-4.5 Scenario, which represents the intermediate Greenhouse Gas Emissions Scenario. This is detailed in the Flood Impact and Risk Assessment submitted alongside this report. a) The site is impacted by flash flooding derived from rainfall runoff. The site is not impacted by mainstream flooding. 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 30-40 minutes in the critical PMF event (Section 2.2). In all tested PMF events, flooding occurred within less than 5 hours from the commencement of the storm. In the long-duration (6-hour) event, the site was isolated for a maximum of 4 hours 30 minutes, and the isolation period is less than 12 hours from the commencement of rainfall. c) While the site itself is not subject to high hazard flooding, as indicated in Figure 7, the adjacent Hambledon Road to the west, Riverbank Drive to the south and Wentworth Street to the east are subject to H5 flooding in the PMF event. 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 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 b) communicated to occupants and visitors of the building and how this communication will be maintained for the life of the development.	a) Section 7.0 of this FERP outlines how SIP will be implemented at the site, including actions before, during and after. b) Section 6.0 outlines how this will be communicated the site users and how this will be maintained.
10. a) 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. b) Table 12 of EM01 should be used to consider whether the risks could be effectively managed.	a) Secondary emergencies are considered in Section 3.2. b) Table 12 of the EM01 notes that for primary and secondary schools, a key consideration for SIP is as follows: <i>'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.'</i> With a proposed FFL of 53.1m AHD, the proposed Buildings E & F are set above both the PMF level (peak ponding level of 53.06m AHD) and the PMF CC2090 scenario, which peaks at 53.08m AHD. The proposed buildings are therefore located above the PMF. With the CC2090 scenario equating to a 40% increase in rainfall intensities, this indicates that the site is resilient against climate change, even when applied to the Probable Maximum Flood.

	Table 12 of the EM01 also notes “ <i>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.</i> ” 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	With a proposed FFL of 53.1m AHD, the proposed Buildings E & F are set above both the PMF level (peak ponding level of 53.06m AHD) and the PMF CC2090 scenario, which peaks at 53.08m AHD. The proposed buildings are therefore safe for refuge across all floors.
ii. structural soundness for conditions in a PMF event, considering flood and debris forces, be verified by a suitably qualified structural engineer, and	The proposed buildings are outside of the PMF extent and therefore confirmation of structural soundness is not required.
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 m ² per person	Overall, the site will provide refuge space well over 2sqm per person, based on minimum square footage per classroom. Based on the Schedule of Accommodation provided by DJRD, Building E has a total gross floor area (GFA) of 4,069m², while Building F has a total GFA of 5,138m², with both buildings totalling 9,207m². Even when applying a 60% reduction to account for furniture, toilets and storage facilities, this leaves a ‘usable’ floor area of 3,683m² to shelter within, with the proposed buildings having capacity to shelter over 1,800 people.
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.

iii.	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. The proposed buildings are set above the PMF, with general learning spaces, learning commons, and multipurpose rooms available for shelter.
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	The substation is located to the southeast of the southwestern car park. Access to the substation 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.

With less than 10 minutes from the onset of the critical PMF storm until inundation of the adjoining roads for the proposed school site, it is recommended that the school is prepared for a shelter-in-place strategy.

As evident in Figure 8, there is no way in or out of the site that does not go through high or medium hazard 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. The duration of isolation is short due to the flashy nature of flooding in the area, with the school only cut off from access roads for approximately 30-40 minutes in the critical PMF event (Section 2.2), though this increases to up to 4 hours 30 minutes hours in the longer duration 6-hour PMF event. It should also be noted that all proposed buildings are to be set above the PMF level and will not experience above-floor inundation. As a result, all proposed buildings are safe to shelter in from the ground floor and upwards.

During the shelter-in-place strategy, all staff and students are to remain indoors. The Chief Warden must ensure that there are no site users outdoors, including within the car park area.

3.2 Secondary Emergency

Although shelter-in-place is the preferred emergency response strategy should a severe 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, Riverbank Drive at the main drop-off and pick-up area remains at H1 for the entire duration of the PMF event, and onward travel east along Riverbank Drive is trafficable. If exiting the site via the vehicular entrances, the first route to become trafficable is travel north on Wentworth St from the northeastern car park, with only residual H1 flows remaining 40 minutes after the critical PMF event. Egress via the southwestern vehicular entrance is still inhibited by ponding of H3 hazard at the junction of Hambledon, Riverbank and Jerralong, and so this route should be avoided.

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 **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 9.



Figure 9: 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.

As the site is affected by flash flooding, 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 flashy 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 also 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 4. Before the site is in operation, these roles must be delegated to specific staff members.

Table 4: 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 radar and weather in the area of the site - Inform staff and students/parents of flood risk - Coordinate flood SIP drills
Safety/First Aid Officer	- Coordinate assistance for less able students 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 5 below.

Table 5: Key Contact Numbers

<u>IMPORTANT TELEPHONE NUMBERS</u>	
Chief Warden	tba
Deputy Manager	tba
Safety/First Aid Officer	tba
Centre Staff	tba
<u>External Contacts</u>	
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
Blacktown Hospital	02 9881 8000

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. All staff on site will be made aware of the flood risk (including their management responsibilities) via briefing and 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 (including after a flood event experienced by the school), or in the event of any staff restructure or other significant change, to ensure it is up to date.

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 flood level. It is the responsibility of the Safety/First Aid Officer to make sure that this kit is maintained and regularly updated, and is readily available during an emergency event.

7.0 Flood Response Actions

The flood response actions are outlined in Table 6.

Table 6: 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 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 severe weather warning 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 for updates on forecasted flood heights and timings. Monitor updates on social media and NSW SES platform Hazard Watch. 4) Ensure staff are familiar with their responsibilities. If a significant storm is forecast with advanced warning (>6 hrs), the Chief Warden should pre-emptively close the school. Notify parents and staff via SMS and email
2) Flash flooding is reported in the media / via visual observation or BoM issues a 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 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 where several hours of notice is 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 (particularly at the bio-retention basin). Once everyone is indoors, access outside should be closed off with temporary signage advising site users of the flood risk. • Send SMS to parents, advising them of SIP strategy & asking 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. NOTE: 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 any flood event that occurred 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.

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 for an extended flood duration or attempting to enter dangerous areas during a flood event.

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

Mitigation measures identified as necessary are outlined below.

Mitigation Number	Aspect/Section	Mitigation Measures	Reason for Mitigation Measure
1	Design, operation	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.
2	Prior to commence of operation	Delegate staff responsibilities.	To ensure all staff are aware of their specific roles and associated flood response actions.
3	Prior to commence of operation	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.
4	During operation	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.
5	Prior to commence of operation	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.

Evaluation of Environmental Impacts

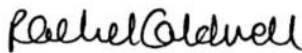
The Flood Impact and Risk Assessment (TTW, August 2025) submitted alongside this report assesses the impact of the activity associated with flooding. The offsite flood impact assessment found that given the loss

of storage associated with the filling of the northeastern car park, there is an offsite increase in flood level within the regional basins to the north of the site. However, offsite impacts are only evident within the designated drainage basins, and do not impact adjacent residential properties or the roadways. Similarly, flood hazard within the basin is not significantly changed with the increase and remains in the same hazard category both pre-and post-development.

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed activity, 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 flood risks and impacts can be appropriately mitigated or managed to ensure that there is minimal effect on the locality, community through recommended measures as outlined above.
- The activity is not considered to produce a significant impact.

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