Operational Flood Emergency Management Plan

Cumberland Cluster (SSD-43065987)

Prepared for SINSW c/o Roberts Co (NSW) / 17 July 2025

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1.0 Introduction

Taylor Thomson Whitting (NSW) Pty. Limited has been engaged by SINSW c/o Roberts Co (NSW) to prepare an Operational Flood Emergency Management Plan to address the consolidated consent requirements (item D.39) as replicated below from the Department of Planning and Environment (DPE) for the proposed development at 59-73 Felton Road and 183 Pennant Hills Rd, Carlingford NSW 2118 (The Site): SSDA-4365987. A table showing with references to the relative sections of this FEMP that address each part of the consent condition D.39 has been included in Appendix C.

The proposed development involves upgrades to Carlingford West Public School (CWPS) and Cumberland High School (CHS), collectively referred to as the Cumberland Cluster. The existing Cumberland Cluster is affected by mainstream overland flow across the central corridor of the site. The flash flooding from the upstream urban catchment flows from east to west across the central corridor during flood events from the 5% Annual Exceedance Probability (AEP) up to the Probable Maximum Flood (PMF). This FEMP addresses the flood emergency response and actions required for the schools associated with this flooding.

The proposed school upgrade works allow for the provision of several flood mitigation measures that ensure there is no unacceptable increases in flood impact to upstream to surrounding properties. The proposed development provides an acceptable risk to the vulnerable and other school occupants during flood events and results in an improved flood risk compared to those currently experienced by the existing schools.

Further details of the flood impact, risk and mitigation measures for the development are detailed in the TTW Flood Impact Assessment report (*Rev 12, September 2023*), which has been approved under the SSDA. A summary of the assessment with explanations and reasons for approval are detailed in the DPE Assessment Report, *State Significant Development Assessment Report (SSD-43065987), November 2023.*

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'D39. Prior the commencement of operation of each relevant stage, the Applicant must prepare an Operational Flood Emergency Management Plan prepared by a suitably qualified and experienced person(s) and in consultation with NSW State Emergency Service noting the limitations described in the NSW Floodplain Development Manual Appendix N, section N7, to the satisfaction of the Planning Secretary. The Operational Flood Emergency Management Plan must include, but is not limited to the following:

a) incorporates and complies with all advice provided by NSW State Emergency Service at condition D39;

(b) addresses the provisions of the Floodplain Risk Management Guidelines (EHG);

(c) the flood emergency management protocols for the operational phase of the development;

(d) a simplified description of flood behaviour, including potential flood levels and associated frequencies within the site and within the adjoining road system and other public land expected to be used by students and visitors;

(e) details strategies such as early or pre-emptive school closure, and other management requirements where relevant and where consistent with SES advice noting that school closure is to be prioritised over shelter in place;

(f) provides clear emergency management triggers and responses, including rainfall and water level, that require closure of the site;

(g) detail the communication strategy, including to staff, parents, students and the community, of site closure before commencement of the school day and during emergency events;

(h) details of potential flood warning time and flood notification;

(i) details of drills, frequency and record management of the drills;

(j) details of shelter-in-place locations, capacity of buildings for shelter-in-place and flood free routes to each shelter-in-place location from main points of the site;

(k) a map showing the flood-free pedestrian route from each building, structure and active areas of the site to a shelter-in-place location;

(l) details of any gauges or warning infrastructure that are to be provided to assist with flood management, including frequency of maintenance, and how these will be monitored;

(m) identifies clear roles and responsibilities for emergency flood management within the school;

(n) flood warning signs around the site to identify areas with Category H3 hazard and higher, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment and are within the overland flow path;

(o) Shelter-in-place locations that:
- *(i) are nominated by a Chartered Professional engineer;*
- *(ii) are prepared in consultation with NSW State Emergency Services;*
- *(iii) incorporates and complies with all advice provided by NSW State Emergency Service at condition D39(o)(ii);*
- *(iv) are no lower than the 1% Annual Exceedance Probability flood plus 500mm of freeboard;*
- *(v) are above the Probable Maximum Flood;*
- *(vi) are able to withstand flood and debris forces of the Probable Maximum Flood; and*
- *(vii) provide a minimum floor space of 3 sqm per person, including students and staff;*

(p) recognise that the NSW SES is the lead combat agency for floods and state that any flood response directive issued by the SES must be followed;

(q) provide clear messaging and communication protocols to, including but not limited to staff, parents and students and adjoining residential sites;
- *(i) includes clear requirements that the Plan be regularly reviewed; and*

(r) include details of awareness training for employees, contractors, visitors, students and caregivers and induction of new staff members.

Extract of SSDA Consolidated Consent: Condition D39

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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)
- Blacktown City Flood Emergency Sub Plan (2023)
- Considering Flooding in Land Use Planning Guideline DPE 2021
- Department of Planning and Environment (2021) Considering Flooding in Land Use Planning Guideline;
- Department of Planning and Environment (2023) – Flood Risk Management Guide LU01
- NSW Department of Planning and Environment Assessment Report SSD-43065987 (Nov 2023)
- NSW Department of Planning and Environment (2023) Flood Risk Management Manual
- NSW Department of Planning and Environment (2025) Shelter-in-place guideline for flash flooding
- NSW Planning Portal Spatial Viewer
- TTW Flood Impact Assessment Report - Cumberland High School and Carlingford West Public School, Rev 12 (Sep 2023)

1.2 Existing Site

The site, located in Carlingford, is surrounded by low-density residential areas, and bounded by Hilar Avenue to the north, Felton Road, Blenheim Road and Dunmore Ave to the east, Pennant Hills Road to the south, and Felton Road to the west, as shown in Figure 1. The site falls within Parramatta Council LGA and zoned as R2 (Low Density Residential) based on Parramatta Local Environmental Plan 2021.

Carlingford West Public School (CWPS) has primary pedestrian and bicycle access on Felton Road East and West, with a secondary pedestrian access on Hilar Avenue. Pedestrians can also access the school from the south through Cumberland High School (CHS) via Pennant Hills Road, Dunmore Avenue, and Blenheim Road. The main CHS pedestrian and bicycle access are Pennant Hills Road and Dunmore Avenue, with a secondary access located at Felton Road East and West and Hilar Avenue. The two schools are separated by playing grounds in the centre with each school operating independently.

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Figure 1 - Site Location and Surrounding Area

The site is located at 59-73 Felton Road and 183 Pennant Hills Road, Carlingford and is legally described as follows.

SCHOOL	LOT AND DP	LOT AREA
CWPS	Lot 1 DP 235625	0.4698ha
	Lot 2 DP 235625	2.363ha
	Lot 5 DP 235625	0.3958ha
CHS	Lot 3 DP 235625 (part CWPS)	4.736ha
	Lot 4 DP 235625	1.421ha

The total site area is about 9.39ha (CWPS-3.2286ha, CHS-6.157) with the highest level at 94.30mAHD at the south-eastern boundary of the site, falling to 77.00 AHD towards the mid-northwest of the site. The site buildings and layout are shown in more detail in Figure 2.

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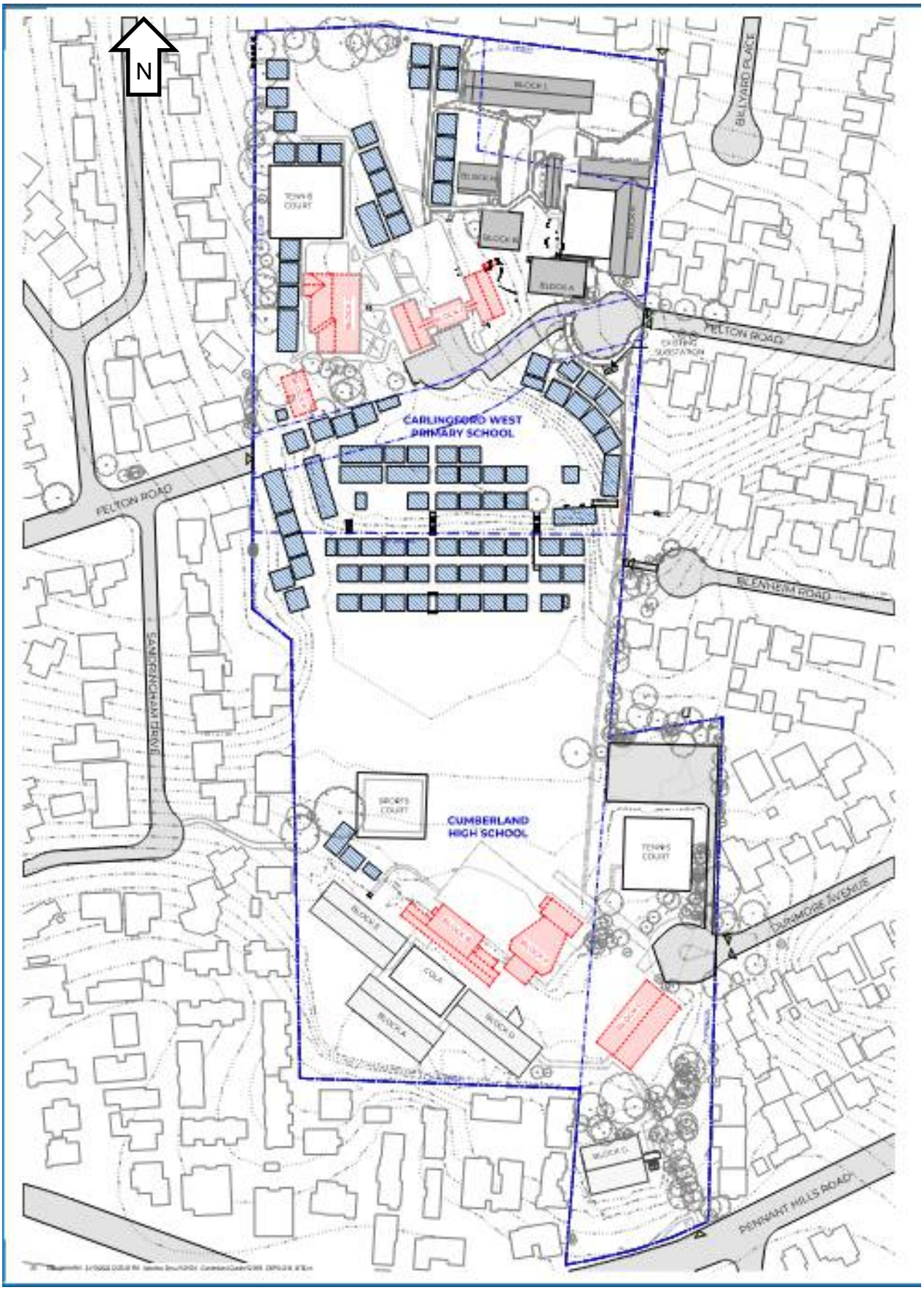

Figure 2 – Woods Bagot SSDA site plan existing CC-WB-DA-10-00-05

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1.3 Proposed Development

The proposed development includes upgrades to CWPS and CHS, collectively known as the Cumberland Cluster. Figure 3 show the existing scenario and the proposed development of the site.

Figure 3– Existing and Proposed Development

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1.3.1 Proposed CWPS

The proposed upgrade to CWPS will include the construction of four new buildings in the northwest portion of the site known as buildings W, X, Y and Z to cater for approximately 1,610 students, refer to section 1.3.3 for a description of the development staging. These new buildings range from one to three storeys which includes general learning spaces, library, amenities, staff rooms and combined canteen, out of school hours care (OSHC), gym, hall, construction of a new kiss and ride off Felton Road West, waste loading area, On-Site Detention (OSD) tank and staff carpark. Refer to Figure 4 below for the location of the proposed new buildings.

Figure 4– Carlingford West Public School Proposed Development Site Plan

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1.3.2 Proposed CHS

The proposed upgrade at CHS will include the construction of three new buildings located in the southeast portion of the site know as buildings X, Y and Z to cater for approximately 2,040 students, refer to section 1.3.3 for a description of the development staging. These new buildings range from one to five storeys which includes general and specialists learning spaces, library, administration, staff and student amenities, and combined lecture theatre, movement space, canteen, stage, and gym/hall. A new one-way bus link road and waste loading area from Dunmore Avenue to Pennant Hills Road are also proposed in the works. Refer to Figure 5 for the location of the proposed new buildings.

Associated civil works and landscape works are proposed across both school sites including tree removal and planting and new play areas as well as public domain upgrades by widening nearby footpaths.

Figure 5– Cumberland High School Proposed Development Site Plan

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1.4 Operational Staging and Final End State

Carlingford West Public School (CWPS) Buildings W and X will become operational ahead of the remaining new buildings within the broader development, which includes CWPS Buildings Y and Z and Carlingford High School (CHS) Buildings Y and Z. This early operational staging has been implemented to support school operations and does not result in any physical changes to the approved development.

The early activation of CWPS Buildings W and X is expected to have minimal impact on the site and the surrounding environment. Notwithstanding the staged operational approach, this Flood Emergency Management Plan reflects the final end state of the development and applies to the operation and management once all new buildings are fully operational.

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2.0 Flood Behaviour

Following completion of the Cumberland Cluster development, the site will be prone to the post-development flood conditions and behaviour as detailed in the approved TTW in the Flood Impact Assessment (FIA) September 2023.

The Approved FIA included a flood hazard assessment 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 6, 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.

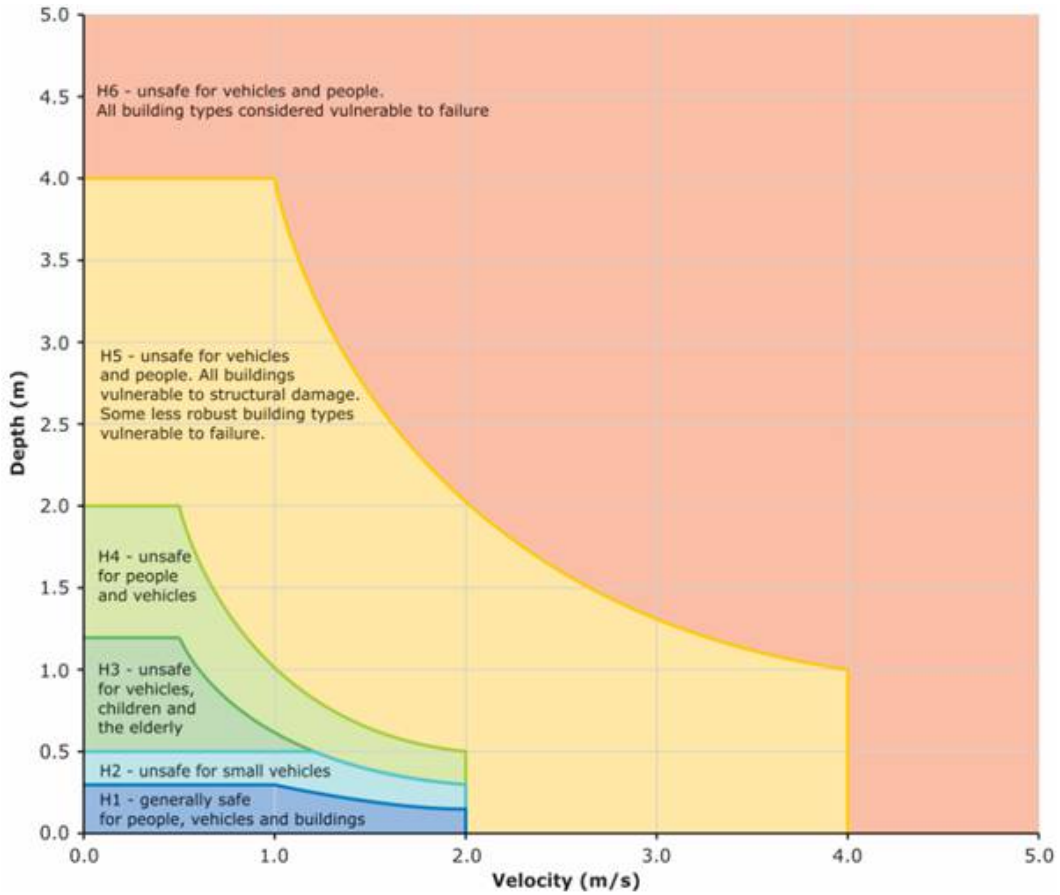

Figure 6: Flood hazard vulnerability curve (Flood Risk Management Guide FB03 - Flood Hazard, NSW DPE, 2022)

Table 1: 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

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2.1 Post-Development Flood Behaviour

The TTW FIA shows that there is an existing major overland flow path that runs through the central corridor of site flowing from the east to west through the playing fields. This overland flow path continues northwest towards Hunts Creek. Minor stormwater runoff from the CWPS flows from the northeast to southwest following the natural fall of the land, whilst the runoff from CHS flows from south to north. This report addresses the emergency response to flooding associated with the major overland flow corridor.

The flood mitigation works enable the proposed buildings, at their proposed design levels, to be above the 100-year (1% AEP) flood level with a 500mm freeboard and also above the PMF level of the mainstream overland flow. The FIA confirms that there is more that 500mm freeboard available for the proposed buildings to the mainstream flooding (TTW, Sep 2023). The Flood Levels and proposed building floor levels are summarised in the following table. All existing buildings are also located outside the mainstream overland flow path and are above the PMF and 1% AEP plus 500mm level.

Table 2 – Comparison of Mainstream 1% AEP and PMF Flood Levels (with 500 mm Freeboard) with Building Floor Levels

Proposed Building	Mainstream 1% AEP	Mainstream 1% AEP +500	Mainstream 1% AEP+CC	Mainstream 1% AEP+CC+500	Mainstream PMF	Floor Level
X (CWPS)	81.36	81.86	81.44	81.94	81.95	86.00
Y (CWPS)	81.36	81.86	81.44	81.94	81.95	86.00
Z (CWPS)	81.36	81.86	81.44	81.94	81.95	86.00
W (CWPS)	81.36	81.86	81.44	81.94	81.95	86.00
Y (CHS)	81.36	81.86	81.44	81.94	82.00	83.75
Z (CHS)	81.36	81.86	81.44	81.94	82.00	83.70

The major overland flood corridor is generally contained within the sports fields however the northern portion of the existing staff car park to the east of the CHS building Y is also flood affected in the 5% AEP event and above.

Flood hazard is up to H3 ‘Unsafe for vehicles, children and the elderly’ in the 5% and 1% AEP across the overland flow path and increase to flood hazard H5 ‘Unsafe for people and vehicles. All buildings vulnerable to structural damage’ In the PMF.

Flood depths within the corridor are up to 1.0m in the 5% and 1% AEP and increase up to 1.5m in the PMF

The post development flood maps are shown as follows:

- 5% AEP Flood Hazard: figure 7
- 5% AEP Flood Depths and Levels: figure 8
- 1% AEP Flood Hazard: figure 9
- 1% AEP Flood Depths and Levels: figure 10
- PMF Hazard: figure 11
- PMF Depths and Levels: figure 12

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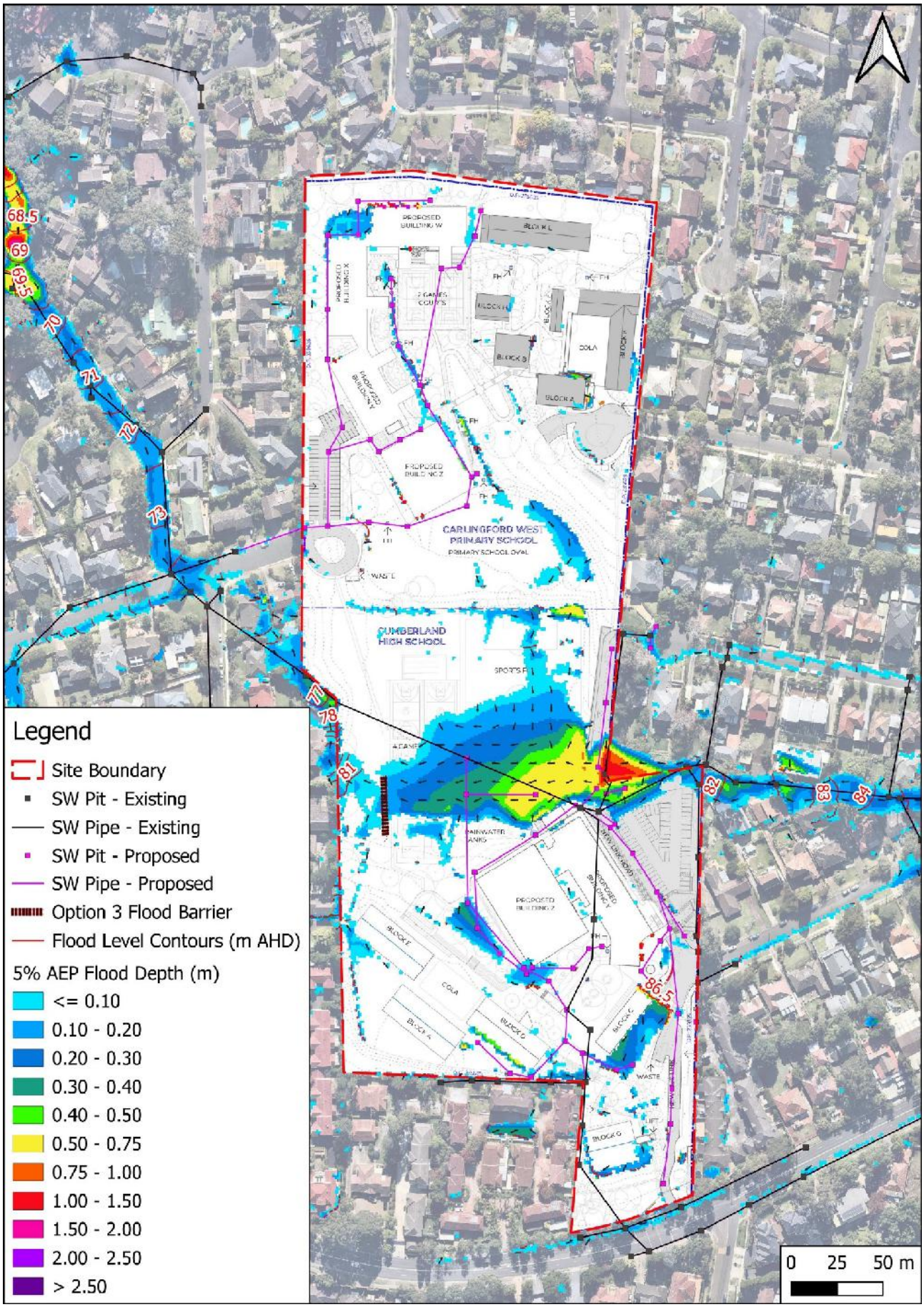

Figure 7– Post Development 5% AEP Flood Depths and Levels

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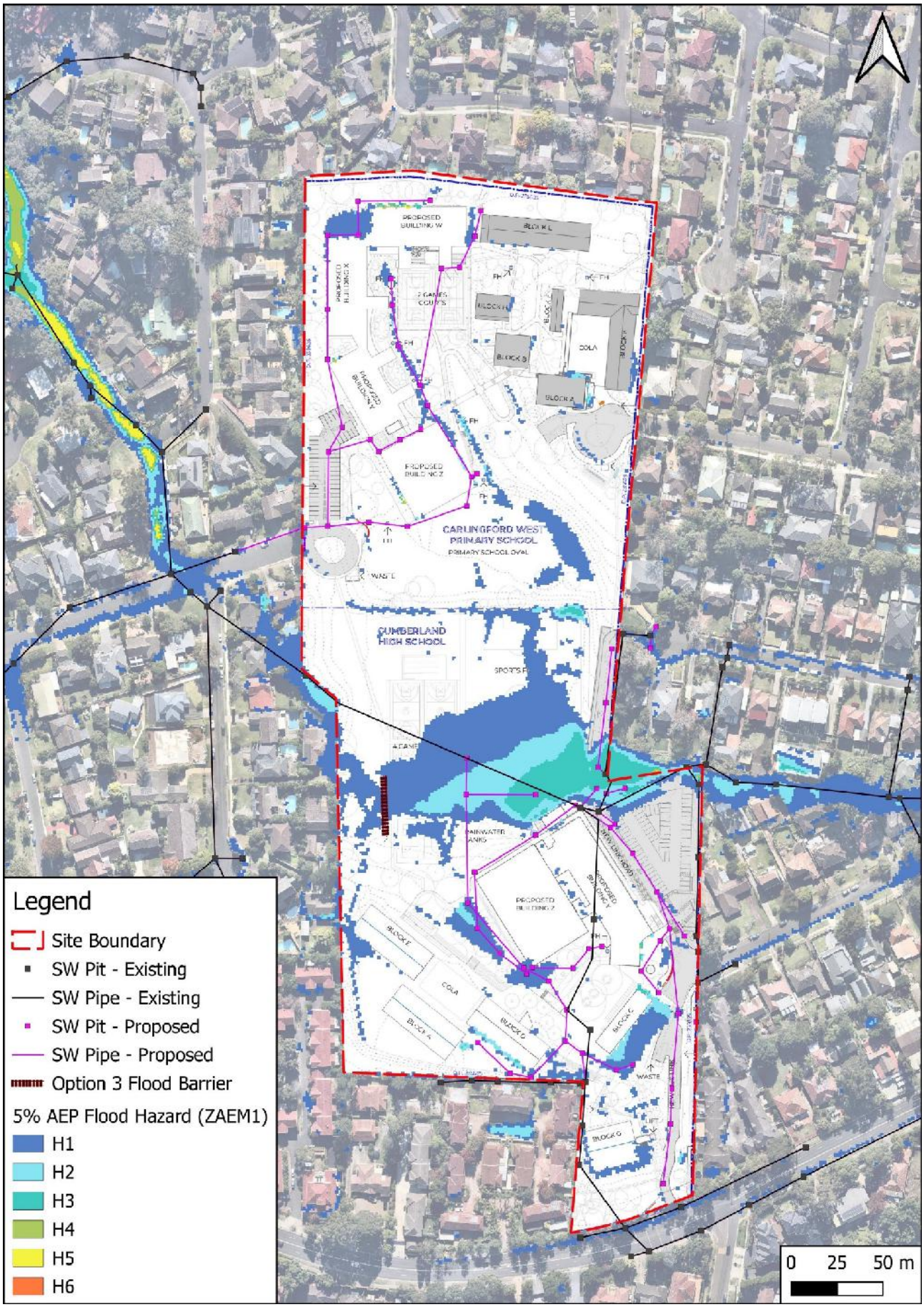

Figure 8– Post Development 5% AEP Flood Hazard

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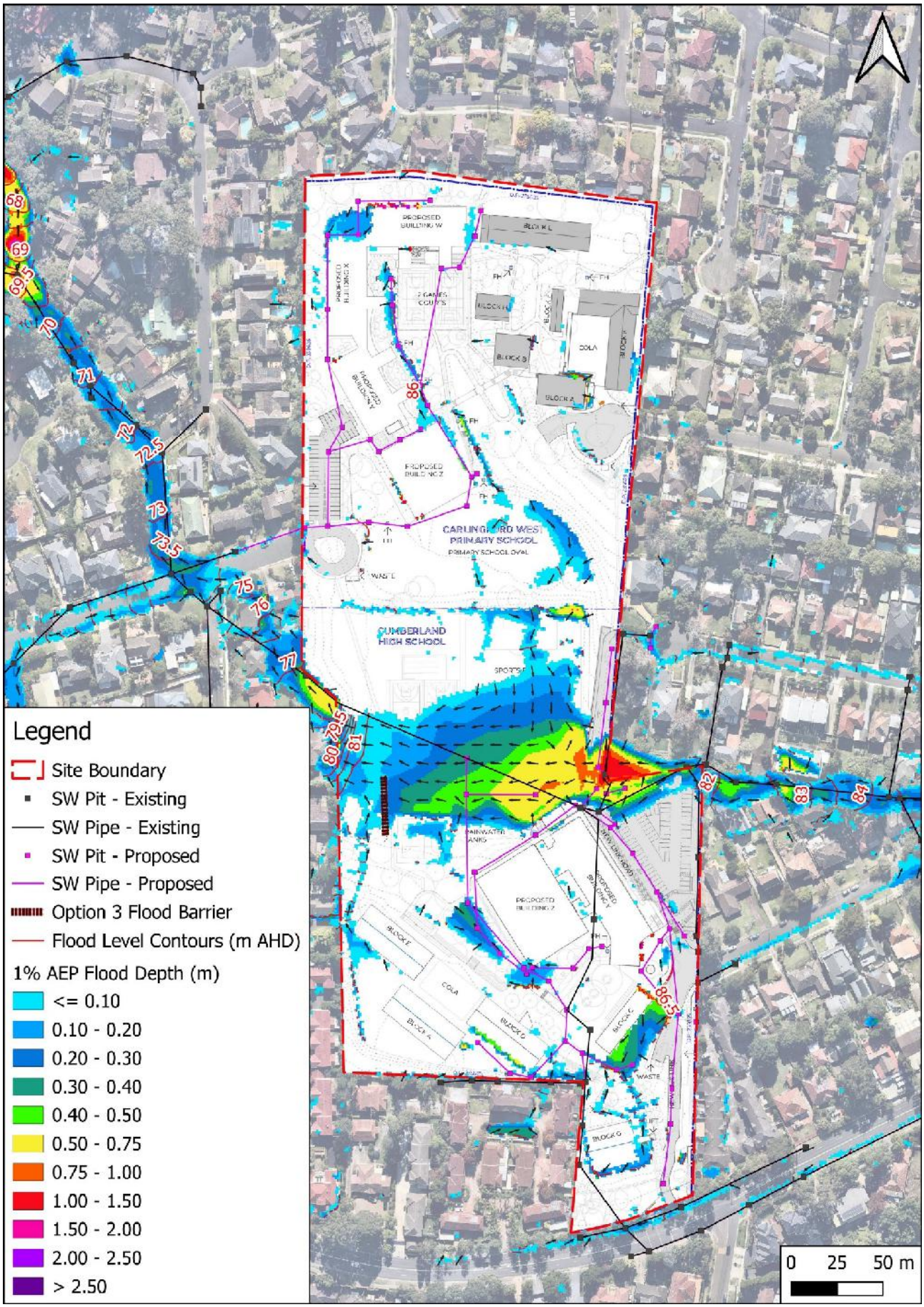

Figure 9– Post Development 1% AEP Flood Depths and Levels

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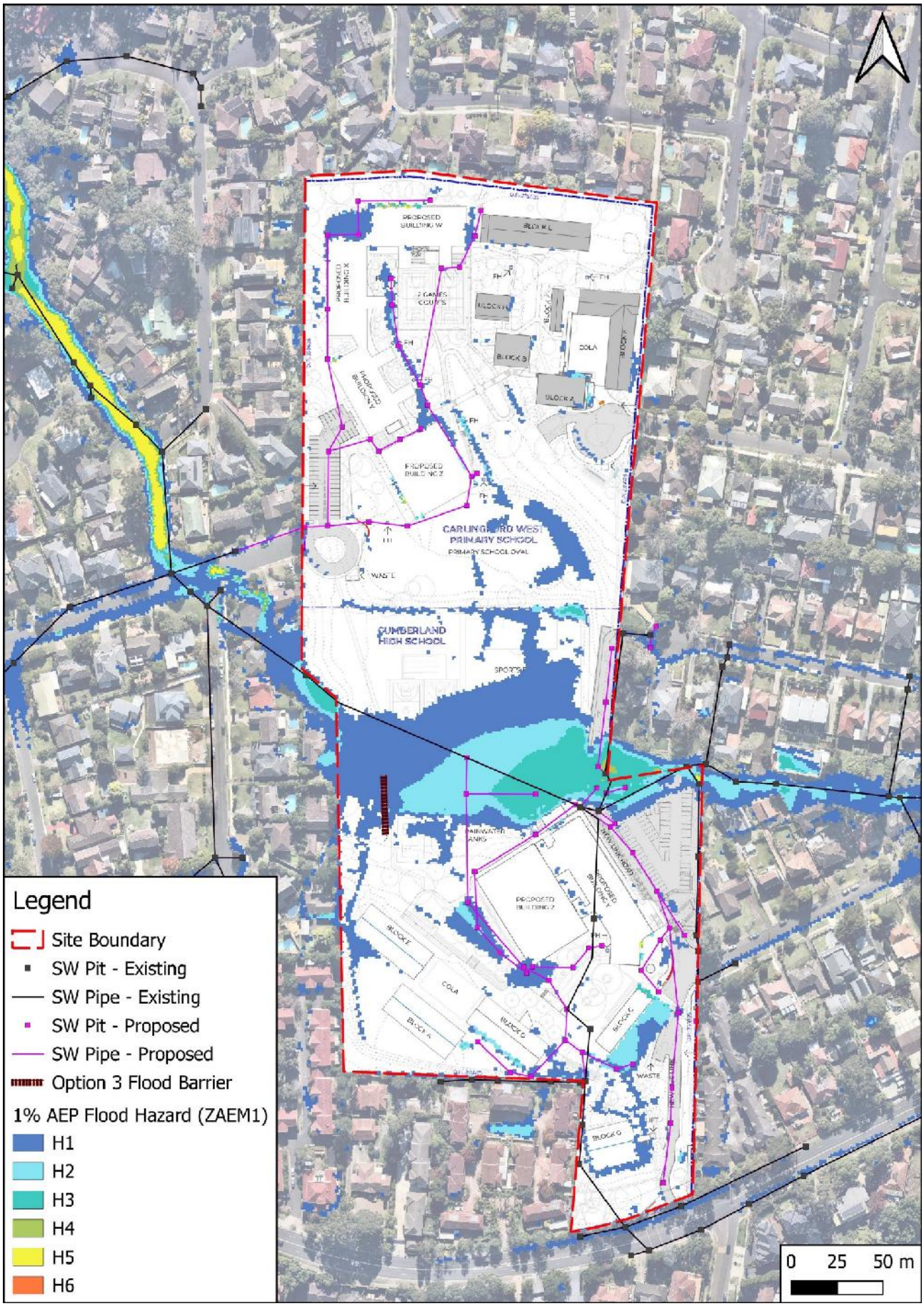

Figure 10 – Post Development 1% AEP Flood Hazard

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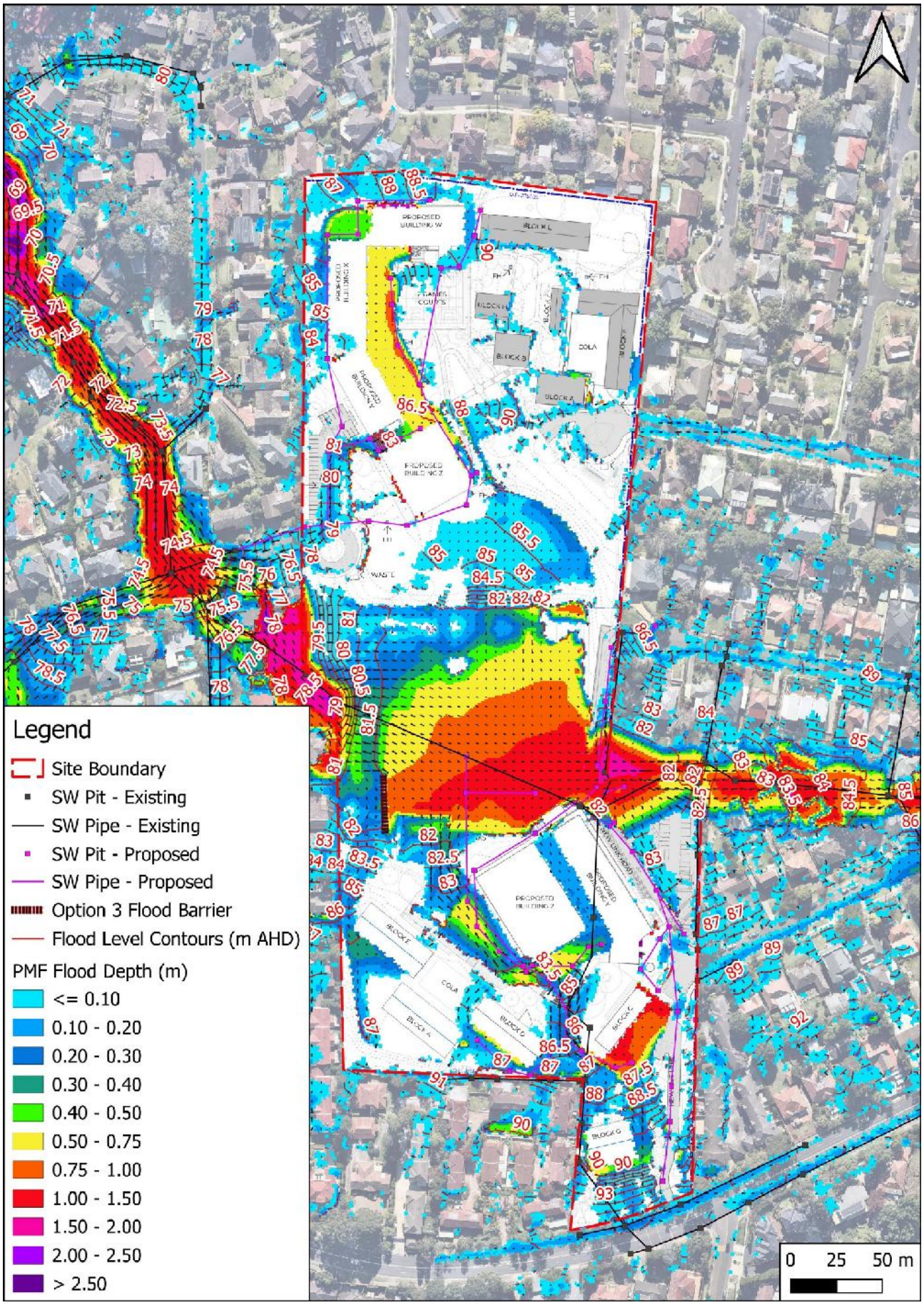

Figure 11– Post Development PMF Flood Depths and Levels

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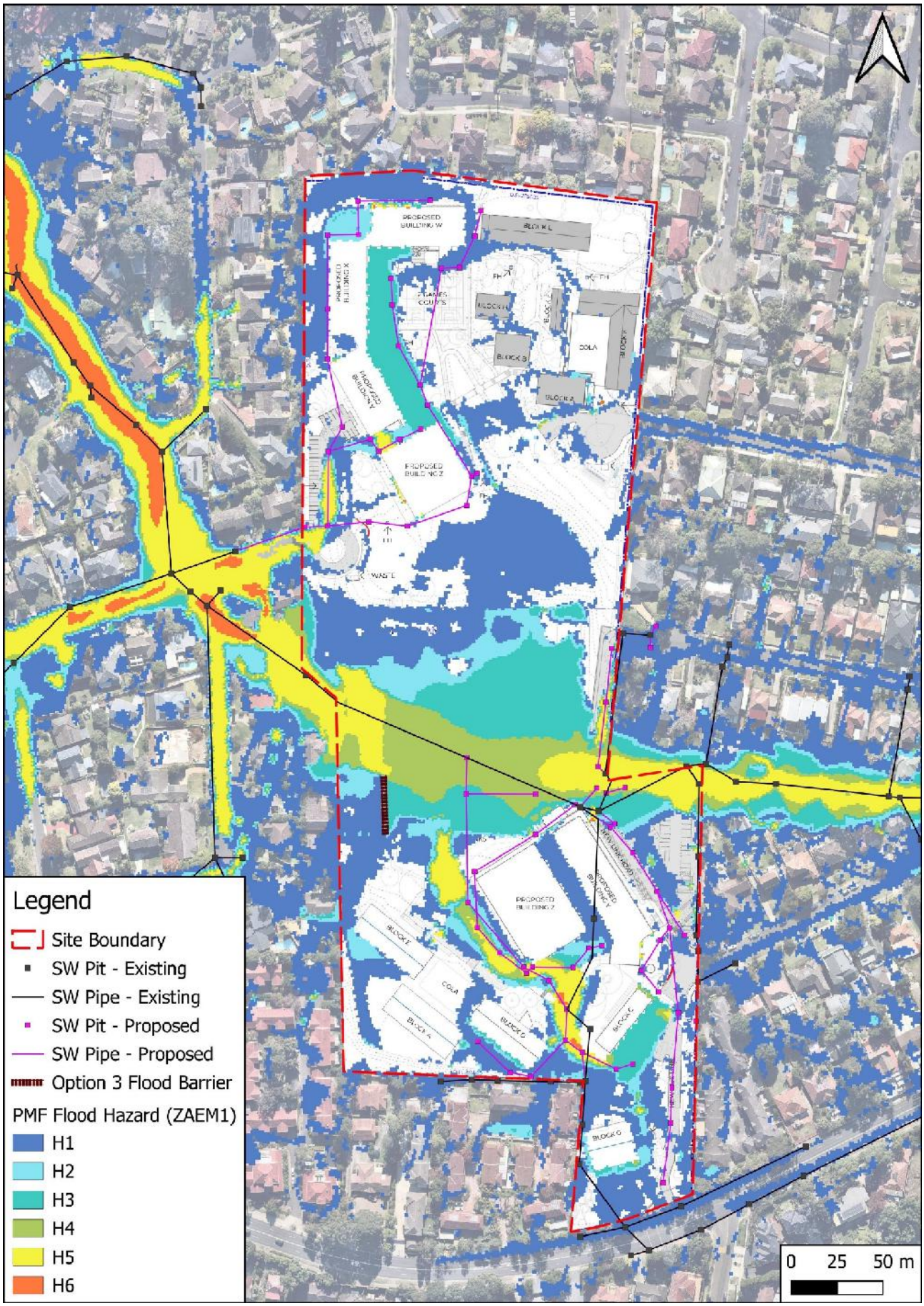

Figure 12 – Post Development PMF Flood Hazard category

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2.2 Flood Inundation Time

Peak flood levels for the 1% AEP and smaller events are produced during the critical 45-minute storm event, whilst peak flood levels for the PMF are produced during the and critical 15-minute storm event. This high intensity short duration flood behaviour is considered flash flooding and there would little to no warning time, following the start of the storm event.

It is expected that flood levels would recede within 60 -120 minutes after the start of the storm, however, there still may be areas of deep ponding in trapped low points that may require flood waters to be pumped out or to naturally drain away through stormwater infrastructure as the wider flood levels recede.

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3.0 Flood Emergency Plan - Preparedness

3.1 Preferred Strategy

3.1.1 Pre-Emptive Closure

Previous consultation with NSW SES and DPE (refer to SSD Assessment report) confirms that due to the flash flooding nature at the site, and lack of warning time available, evacuation during a flood event would not be safe or feasible.

Instead, the pre-emptive closure of the school, before the start of the school day is the preferred strategy for a major flood event. 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 will 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.

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 will also be informed via SMS if there is a risk of flooding, in order to minimise the risk of people entering flood water. In the event of closure, additional communication will also be sent by email and social media and will include distribution to the adjoining residential properties.

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 accomplished.

If pre-emptive closure cannot be accomplished prior to the school opening, then the last resort is to implement shelter in place (SIP)

3.1.2 Shelter-in-Place

Shelter-in-place (SIP) guidance published by the NSW DPE in January 2025 provides considerations that can inform whether SIP is an appropriate response strategy in a flash flood environment, alongside design considerations to be assessed. 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 central corridor of the site is flash flooding via overland flow. Pre-emptive closure of the site is will take place when there is advanced warning of a major storm event, which is consistent with the flood response strategy discussed in the Blacktown City Local Flood Plan (Section 5.8.5). However, flash flood events are characterised by minimal warning times and therefore there it would not be safe 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 15 minutes from the onset of the critical PMF storm until inundation of the adjoining roads of the proposed school site (refer section 2.2), there is little warning time to implement evacuation off-site.

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	Previous investigation of evacuation off-site during the SSD approval process was completed and advice from SES, DPE and EHG was that SIP would be preferred over evacuation off-site.
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 proposed and existing buildings are protected above the PMF level and provide suitable facilities and space for SIP
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 15 minutes from the onset of the critical PMF storm until inundation of the site. Storm warning systems and forecasting is discussed in more detail in Section 4.0. While there are storm and severe weather warnings issued by the Bureau of Meteorology and the Australian Warning System, the flash flooding at the site (and the inherently limited warning time associated with this type of flooding) may limit 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 6.1 of this FEMP 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	As there is less than 15 minutes from the onset of the critical PMF storm until inundation of the site, there is little warning time to implement evacuation off-site. Previous detailed investigation of evacuation routes off-site during the SSD approval process was completed and advice from SES, DPE and EHG was that SIP would be preferred to evacuation off-site. .
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	Consideration of climate change has been made in the approved Flood Impact and Risk Assessment (FIRA) Flood levels and hazard associated with climate change is significantly less than the PMF event. The PMF event provides a more conservative flood level/hazard than that of the 1% AEP with climate change. a) The site is impacted by flash flooding derived from local overland flooding. b) There is less than 15 minutes from the onset of the critical PMF storm until inundation of the school site. The duration of isolation is short 60-120 minutes. c) While the overland flow corridor across the school sites is subject to high flood hazard (up to H5 in the PMF event), all

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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.	proposed and existing school buildings are set above the PMF and 1% AEP+500mm mainstream flooding. Low hazard access is available from Felton Road (CWPS) and Dunmore Avenue (CHS) to the east and Pennant Hills Road (CHS) to the south.
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 FEMP 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. 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 0 with suitable low hazard access routes from Felton Road, Dunmore Avenue and Pennant hills Road. 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 ground floor levels of the proposed and existing buildings across the site are above the PMF and provide suitable and adequate space for the school students staff and visitors., refer to Appendix A for the internal space assessment. 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 will be installed as per Section 4.4 of this FEMP.
Design criteria for consideration	
i. the floor level of the shelter in place part of the development be above the PMF, and	All ground floor levels of existing and proposed buildings are set above the PMF and 1% AEP+500mm mainstream flood levels.
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 Appendix C of the Engineering Design Guide for Development: "*Where the site is exposed to flood flows in a 1% AEP event, a certificate stating that the building is capable of withstanding the predicted flood waters, impact loads from debris and buoyancy without structure damage must be submitted by a qualified structural engineer*". This has been noted in the approved FIRA prepared by TTW and will be considered as part of the structural engineering design.

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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 including existing and proposed buildings will provide refuge space well over 3sqm per person, based on minimum square footage per classroom, refer to Appendix A.
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 included within the wider School Emergency Response. 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, however all existing and proposed buildings are above the PMF and 1% AEP+500mm mainstream flooding.
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	There are no substations or power generation systems located within the mainstream PMF extent
x.	detail how these requirements will be maintained and enforced for the life of the development.	Flood Emergency Management 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. This FEMP will be reviewed following staff changes, flood drills as well as flood events to ensure that the details remain relevant.

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3.2 Secondary Emergency

Although pre-emptive closure is the primary emergency response strategy, if a severe flash flood event occurs without sufficient warning, any decision to shelter-in-place must be accompanied by suitable plans for emergency access in the event of a secondary emergency (e.g. medical or fire).

Low flood hazard vehicular access (H1 - suitable for all) is available for all flood events including the PMF by the following external roads:

- Felton Road (CWPS) to the East
- Dunmore Avenue (CHS) to the east
- Pennant Hills Road (CHS) to the south

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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 severe rainfall. Flood warnings are issued by the BoM when flooding is occurring or is expected to occur in an area however this is for mainstream flooding and would not cover the flash flooding at this site. These warnings are distributed by BoM to government, emergency services and the community, including local SES, and are 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 a 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 storms and flooding. The system uses a nationally consistent set of icons, with three warning levels: Advice, Watch and Act, and Emergency Warning. The storm warnings are described in Figure 13.

Figure 13: 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. 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.

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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 thunderstorm warnings.

4.3 Triggers

The nature of flash flooding at the site (and the inherently limited warning time) 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 must be monitored including BOM Severe Weather and Thunderstorm Warnings, media updates via local radio stations and social media. While the Chief Warden is responsible for monitoring information from the BOM website and 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.

Additional flood depth gauges will be located within the staff carpark to the east of CHS building Y and within the playing field near the eastern boundary within the main overland flow corridor. This can be used as a visual trigger where flood depths reach 300mm relocation to the SIP is required if pre-emptive closure of the school cannot be made.

4.4 Emergency Signals

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

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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.

Note that SES is the lead combat agency for floods and any flood response directive issued by the SES must be followed.

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 weather warnings and notifications from BoM and AWS - Monitor BOM lidar and weather in the area of the site - Inform staff and students/parents of flood risk - Monitor flood triggers and following responses - Coordinate flood SIP drills and review and update this OFEMP if needed
First Aid Officer	- Coordinate assistance for less able students and pre-school age children, and staff - Ensure specific flood related items are included as part of the wider school emergency kit such as 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, using the DoE and adopted school protocol and procedures. - 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

IMPORTANT TELEPHONE NUMBERS	
CWPS	
Chief Warden	[redacted]02 9871 7187
Deputy Warden	[redacted]02 9871 7187
Safety/First Aid Officer	[redacted]02 9871 7187
Centre Staff	02 9871 7187
CHS	
Chief Warden	[redacted]02 9871 7187
Deputy Warden	[redacted]02 9871 7718
Safety/First Aid Officer	[redacted]02 9871 7718
Centre Staff	02 9871 7187
External Contacts	
Police/Ambulance (for life-threatening emergencies)	000
NSW State Emergency Services (SES)	132 500
Fire & Rescue NSW – St. Andrews Fire Station	02 9493 1092
Eagle Vale Police Station	02 9820 0899
Campbelltown Hospital	02 4634 3000

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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 educated on the flood risks present on site and the flood protocols, procedures and signage. All staff, visitors and contractors on site will be made aware of the flood risk, including their management responsibilities. This will form part of the mandatory site specific WHS inductions that must be undertaken prior to commencing work or visting the school site. A copy of this FEMP which includes emergency response procedures will be made available at communal areas within the site as well as the main office. This FEMP must be regularly reviewed (as part of the flood drills) by the Chief Warden, or in the event of any staff restructure or other significant change, to ensure it is up to date.

Flood signage, similar to that shown in Figure 14 below, must be installed within the mainstream overland flow path across the sports fields that identify areas with Category H3 hazard and higher, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment, refer to Appendix B

In addition, depth gauges which will also indicate the 5% AEP, 1% AEP and PMF levels will be installed in the sports field at the eastern boundary and the staff car park where high flow and hazard is predicted. This will allow for visual warnings and trigger for shelter in place protocol to be given and will also provide long term education of the potential of flooding at the site to users of the site.

Given the short response time of the significant storms it is proposed that shelter in place protocol take place when the flood gauge depth reaches 0.30m, which would be marked onto the gauge. The gauges will be monitored frequently (half hourly) when storm warnings are in place for the wider region.

The flood gauges and signage must be inspected as part of the twice annual flood drills and the Chief Warden is to ensure any maintenance works are completed and logged.

Figure 14 – Flood Signage and Gauges

6.2 Flood Drills

Flood drills are to be held by staff regularly to ensure all staff, workers and students are familiar with the sound

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of the alert and their subsequent flood response actions (shelter in place). This will be covered under the overall Emergency Management plan where schools are required to have 2 emergency drills per year. It is the responsibility of the Chief Warden to ensure that flood 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 must be reviewed and updated. The Chief Warden will also ensure that all flood drills and OFEMP reviews are recorded in an appropriate records book and any non-conformities reported and responded to.

6.3 Flood Emergency Kit

An overall emergency kit will be prepared by the schools as part of the wider Emergency Response. This must be prepared prior to occupation and regularly checked to ensure that supplies within the kit are sufficient and in working condition. This check is to be made after evacuation drill takes place to provide a regular schedule. The emergency kit must include the following items for a flood emergency:

- 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 must include sufficient drinking water and food for occupants, fire extinguishers, radios and torches with spare batteries, and a first aid kit with consideration of 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 to make sure that this kit is maintained and regularly updated and is readily available during an emergency.

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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	
SES is the lead combat agency for floods and any flood response directive issued by the SES must be followed.	
Emergency Trigger	**Emergency Response**
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 potential severe weather 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.
Local flash flooding is reported nearby or Visual observation of flood depth gauge exceeding 300mm on site or BoM issues a **Severe Thunderstorm Warning** or NSW SES issue an amber "**WATCH AND ACT**" or red "**ACT NOW**" warning 	If the severe weather event or thunderstorm 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. use of sports fields). If a thunderstorm is anticipated to impact the site, the **Chief Warden** must undertake the following actions: • **For life-threatening emergencies phone 000 immediately.** **If several hours of notice has been given and before the start of a school day:** • 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 will be broadcast over the PA system confirming a significant storm event, notifying all students and staff to begin **shelter-in-place** procedures. • Ensure no one is outdoors - **especially within the playing fields along the main overland flow corridor, within the staff car park and through** • 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 is to 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.**
Visual observation shows flooding is receding or the alert has been downgraded by the relevant authorities and any storm event that occurred has passed. 	• The **Chief Warden** is to confirm floodwater has subsided 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.

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8.0 Limitations and Revision of the Flood Emergency Management Plan

This FEMP only addresses the shelter-in-place strategy for students and staff within the site, during severe storm events that would lead to flooding, 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 FEMP also cannot account for the behaviour of individuals (e.g. site visitors), such as choosing not to remain isolated in a building on a floor above the PMF for an extended flood duration or attempting to enter dangerous areas during a flood.

Flood Emergency Management Plans are 'living documents' which need to be regularly reviewed (twice annually as part of the flood drills) 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.

Prepared by

TTW (NSW) PTY LTD

EIRIAN CRABBE
Associate Director

Approved by

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TIM MOORE
NSW Civil Manager

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Appendix A

Shelter In Place – Combined Existing and Proposed Capacity Assessment

CWPS	Students = 1610, Staff = 90, Visitors <100, Total = 1800		
Existing buildings		**New buildings**	
Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	1481 m²	Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	7113 m²
Shelter in place area requirement per person	3 m²	Shelter in place area requirement per person	3 m²
Total capacity to shelter	**494**	**Total capacity to shelter**	**2371**
CHS (Stage 1)	Students = 1500, Staff = 111, Visitors <200, Total = 1811		
Existing buildings		**New buildings**	
Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	3937 m²	Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	6620 m²
Shelter in place area requirement per person	3 m²	Shelter in place area requirement per person	3 m²
Total capacity to shelter	**1312**	**Total capacity to shelter**	**2207**
CHS (Stage 1+2)	Students = 2040, Staff = 148, Visitors <200, Total = 2388		
Existing buildings		**New buildings**	
Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	3059 m²	Total habitable internal area (excl, ancillary space e.g. storage, toilet etc)	9470 m²
Shelter in place area requirement per person	3 m²	Shelter in place area requirement per person	3 m²
Total capacity to shelter	**1020**	**Total capacity to shelter**	**3157**

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Appendix B

Flood Hazard Signage, SIP Routes and Secondary Emergency Access points

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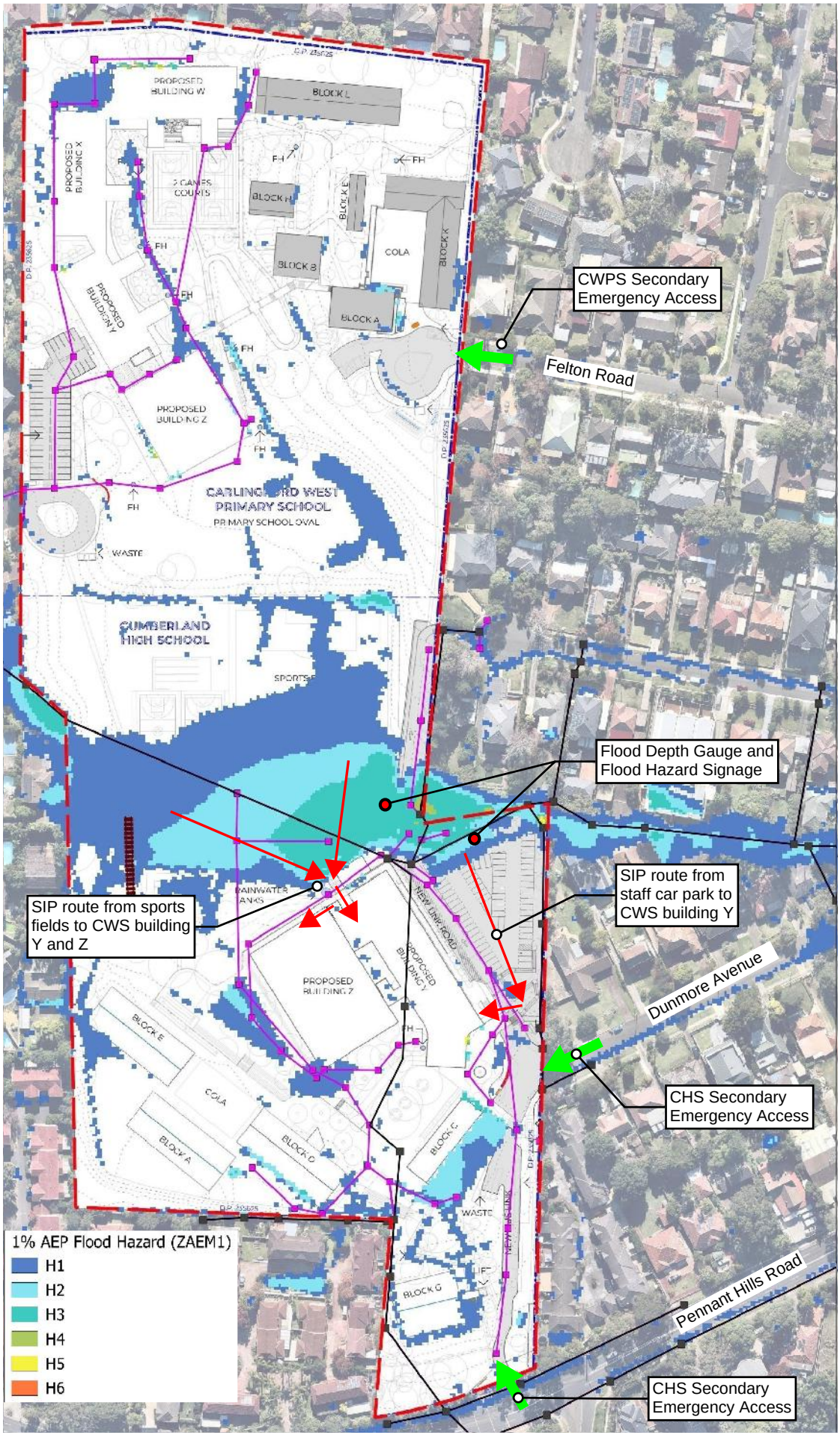

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Appendix C

Condition D39 Document Reference Table

Point	Requirement	Document Reference
D39	Prior to the commencement of operation of each relevant stage, the Applicant must prepare an Operational Flood Emergency Management Plan prepared by a suitably qualified and experienced person(s) and in consultation with NSW State Emergency Service noting the limitations described in the NSW Floodplain Development Manual Appendix N, section N7, to the satisfaction of the Planning Secretary. The Operational Flood Emergency Management Plan must include, but is not limited to the following:	This Operational Flood Emergency Management Plan (OFEMP), Cumberland Cluster (SSD-43065987), prepared by TTW Pty Ltd, Issue 3 dated 17 July 2025 SES Response Letter, dated 17 June 2025 SINSW Covering Letter, dated 30 June 2025
(a)	incorporates and complies with all advice provided by NSW State Emergency Service at condition D39;	SES Response Letter, dated 17 June 2025 SINSW Covering Letter, dated 30 June 2025 This OFEMP incorporate SES specific requested changes at Section 4.2, 4.3, 6.1, 6.2 and 7 .0
(b)	addresses the provisions of the Floodplain Risk Management Guidelines (EHG);	This OFEMP SSD Approved Flood Impact Assessment Report, revision 12, prepared by TTW Pty Ltd dated 26 September 2023 The approved FIRA and this OFEMP is based on the provisions and requirements of the Floodplain Management Guidelines and incorporates the following core principles. Understand and managing the flood behaviour and flood risk: FIRA Sections 3-10 OFEMP Section 2.0 Removing, reducing and mitigating flood Risk: FIRA Sections 5.4-5.8 OFEMP Section 2.1 Integrating flood planning requirements and land use-planning: FIRA Section 5 and 6 Consideration and assessment of Climate Change resilience. FIRA Section 8 and 9 Greater resilience and management of floods for extreme flood events: FIRA Sections 5, 8 and 9 OFEMP Section 2-7 Community awareness, engagement, education and preparation for flooding: OFEMP Section 6
(c)	the flood emergency management protocols for operational phase of the development	This OFEMP: Section 3 and 7
(d)	a simplified description of flood behaviour, including potential flood levels and associated frequencies within the site and within the adjoining	This OFEMP: Section 2

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Point	Requirement	Document Reference
	road system and other public land expected to be used by students and visitors;	
(e)	details strategies such as early or pre-emptive school closure, and other management requirements where relevant and where consistent with SES advice noting that school closure is to be prioritised over shelter in place;	This OFEMP: Section 3
(f)	provides clear emergency management triggers and responses, including rainfall and water level, that require closure of the site;	This OFEMP: Section 7: Table 6
(g)	detail the communication strategy, including to staff, parents, students and the community, of site closure before commencement of the school day and during emergency events;	This OFEMP: Section 3.1.1
(h)	details of potential flood warning time and flood notification;	This OFEMP: Section 4
(i)	details of drills, frequency and record management of the drills;	This OFEMP: Section 6.2
(j)	details of shelter-in-place locations, capacity of buildings for shelter-in-place and flood free routes to each shelter-in-place location from main points of the site;	This OFEMP: Section 3.1.2, Appendix A, Appendix B
(k)	a map showing the flood-free pedestrian route from each building, structure and active areas of the site to a shelter-in-place location;	This OFEMP: Appendix B
(l)	details of any gauges or warning infrastructure that are to be provided to assist with flood management, including frequency of maintenance, and how these will be monitored;	This OFEMP: Section 4.3
(m)	identifies clear roles and responsibilities for emergency flood management within the school;	This OFEMP: Section 5 Table 4
(n)	flood warning signs around the site to identify areas with Category H3 hazard and higher, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment and are within the overland flow path;	This OFEMP Section 6.1

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Point	Requirement	Document Reference
(o)	Shelter-in-place locations that: (i) are nominated by a Chartered Professional engineer; (ii) are prepared in consultation with NSW State Emergency Services; (iii) incorporates and complies with all advice provided by NSW State Emergency Service at condition D39(o)(ii); (iv) are no lower than the 1% Annual Exceedance Probability flood plus 500mm of freeboard; (v) are above the Probable Maximum Flood; (vi) are able to withstand flood and debris forces of the Probable Maximum Flood; and (vii) provide a minimum floor space of 3 sqm per person, including students and staff;	SES Response Letter, dated 17 June 2025 SINSW Covering Letter, dated 30 June 2025 This OFEMP i) OFEMP Reviewed and Approved by Tim Moore CPEng ii)+iii) OFEMP has been updated to incorporate SES specific requested changes at Section 4.2, 4.3, 6.1, 6.2 and 7 .0 iv) Section 3.1.2 Table 3 v) Section 3.1.2 Table 3 vi) Section 3.1.2 Table 3 vi) Section 3.1.2 Table 3, Appendix A
(p)	recognises that the SES is the lead combat agency for floods and state that any flood response directive issued by the SES must be followed; and	This OFEMP Section 5.1 Section 7.0
(q)	provide clear messaging and communication protocols to, including but not limited to staff, parents and students and adjoining residential sites;	This OFEMP Section 3.1.1 Section 6.1
	(i) includes clear requirements that the Plan be regularly reviewed; and	This OFEMP Section 6.1
(r)	include details of awareness training for employees, contractors, visitors, students and caregivers and induction of new staff members.	This OFEMP Section 6.1 Section 6.2

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