

# **Flood Emergency Response Plan**

## **1 King Street, Concord West**

**Prepared for Billbergia / 6 September 2024**

221118

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Rev	Date	Prepared By	Approved By	Remarks
1	06/09/2024	LC	JM	DRAFT

## 1.0 Introduction

TTW have been engaged by Billbergia to prepare a Flood Emergency Response Plan (FERP), to be implemented during the operation of the proposed development at 1 King Street, Concord West. The site is subject to overland flooding during significant rainfall events and a response plan is required to address the management of site users during flood events.

The purpose of this FERP is to summarise the flood risks within 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.

### 1.1 Reference Documents

The FERP has been prepared with reference to the following:

- Australian Institute of Disaster Resilience (AIDR) Guideline 7-3: Flood Hazard (2017);
- City of Canada Bay Council Development Control Plan (DCP), 2023;
- City of Canada Bay Local Environmental Plan, 2013;
- FloodSafe guidelines and the relative FloodSafe Tool Kits;
- NSW Department of Planning and Environment (2023) Draft Shelter-in-place Guideline – Preamble (<https://pp.planningportal.nsw.gov.au/draftplans/under-consideration/shelter-place-guideline>);
- 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, Housing and Infrastructure – Planning Circular PS 24-001, Update on addressing flood risk in planning decisions, 1st March 2024;
- NSW State Emergency Service (SES) Guidelines; and
- TTW (2024) Flood Impact and Risk Assessment Report for 1 King Street, Concord West, dated 6 September 2024.

### 1.2 Proposed Site

The site is located at 1 King Street, Concord West, NSW 2137, approximately 15 km west of the Sydney CBD, in the City of Canada Bay Local Government Area (LGA). The site is legally defined as Lot 101, DP791908, with a total area of 3.14 hectares. Figure 1 presents the site location, bounded by George Street to the west, the T9 Northern railway line and Concord West station to the east, commercial/residential buildings to the south, and residential properties to the north.

There are two vehicular access points to the site via George Street in the southwest, and an additional access point via King Street in the northeast. The site is currently occupied by a vacant 1-2 storey building, 2-storey carpark, external parking and landscaping. To the north of the lot is the Only About Children Concord childcare centre, consisting of a 1-storey building and external parking.

The development proposal comprises 10 new buildings, ranging from 4-12 storeys. The proposal features activated retail frontages within a station precinct concentrated in proximity to Concord West Train Station, an urban village consisting of town house style frontages and residential amenity, and a parkland living precinct which abuts its central green connector. The current ground floor concept plan is presented in Figure 2. Retail activity (shown in blue) will be concentrated within the northeast of the site, adjacent to the Concord West Train Station, functioning as a community area and transport precinct. This area will feature considerable ground level activation and anchor retailers. The site's residential dwellings (depicted in yellow) are concentrated toward the south and west.



Figure 1: Site Location (Source: Nearmap imagery taken December 2023)

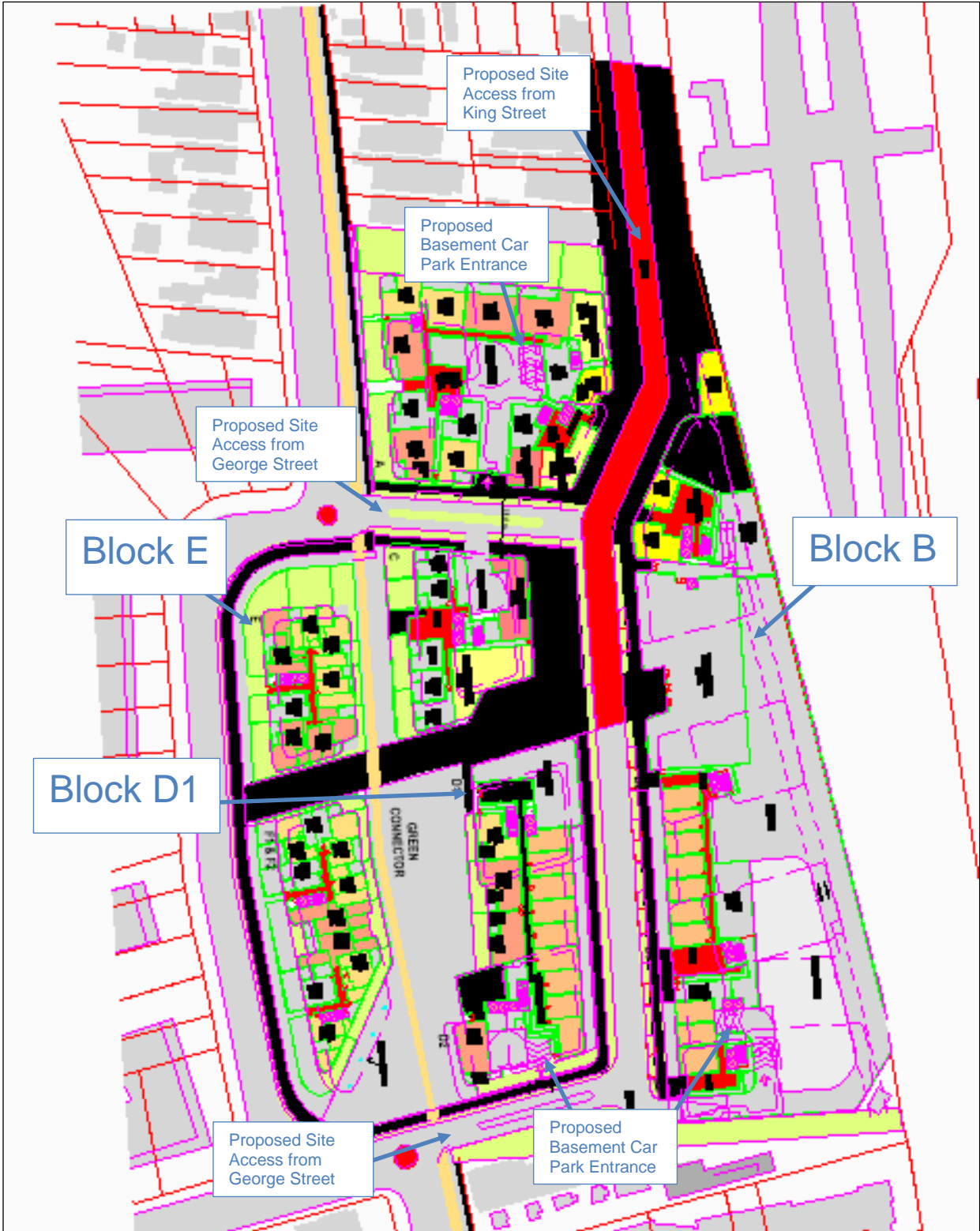


Figure 2: Ground floor architecture plan (Source: GroupGSA, dated March 2024)



## 2.0 Flood Behaviour

TTW obtained the City of Canada Bay Council TUFLOW model from the Powells Creek Flood Study and updated the model to include new site survey and design information for the proposed development. The flood behaviour and flood impact associated with the development is described in detail in the Flood Impact and Risk Assessment Report prepared by TTW (dated 6 September 2024) and submitted with this FERP.

For the 1% AEP (Annual Exceedance Probability) event, the 60-minute duration storm was adopted as the critical storm duration, consistent with the Powells Creek Flood Study. For the Probable Maximum Flood (PMF), a range of storm durations from the 15-minute storm up to the 360-minute storm were run. Although the 30-minute storm is critical for the site, this FERP includes an analysis of longer duration events to determine the maximum potential impact time for the site.

### 2.1 Post-Development Flood Depths and Levels

Model outputs indicate that the sag point on George Street, west of the site, is affected by overland flooding in events as frequent as the 18% AEP (5-year Average Recurrence Interval (ARI)) event. However, flooding at this sag point does not overtop onto the site until the 5% AEP (20-year ARI) event, with the site minimally affected by flooding until the 0.2% AEP event, when floodwaters reach the proposed Block E, a residential block to the west of the site.

The peak flood depths and levels at the site in post-development conditions in the 1% AEP and PMF events are depicted in Figure 3 and Figure 4, respectively. The proposed buildings are unaffected by overland flows in the 1% AEP event. However, flood inundation is estimated over small area near the subject site boundary fronting George Street, near the sag of this road. Flood depths in excess of 750mm are estimated at the lowest point of the site in the 1% AEP event, but the site grading directs these flows away from the proposed buildings. Flood depths in excess of 1.3m are estimated at the sag of George Street to the west in the 1% AEP event. The results show that flooding on Queen Street (i.e. to the east of the railway lines) will not overtop the railway lines and impact the site in the 1% AEP event.

In the critical 30-minute PMF storm event, flooding from Queen Street overtops the railway lines and reaches the site, primarily impacting internal roads and landscaping area. Depths are generally estimated to be less than 500mm, with the exception of the site's western perimeter, adjacent to the George Street sag, where flood depths in excess of 1.5m are estimated, alongside the site's eastern property boundary where flood depths as high as 600mm are estimated.

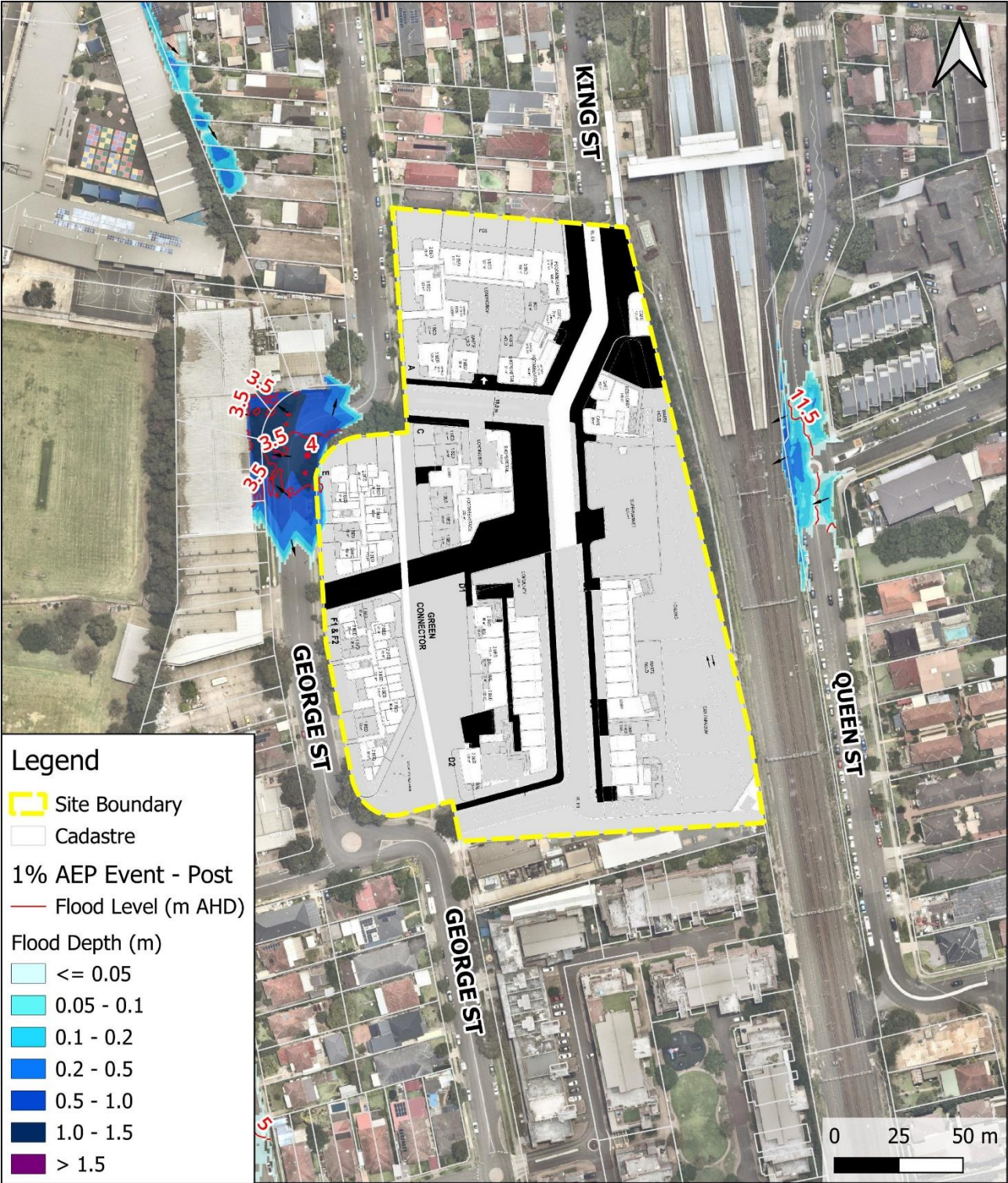


Figure 3: Flood levels and depths (1% AEP event) – Post Development Conditions



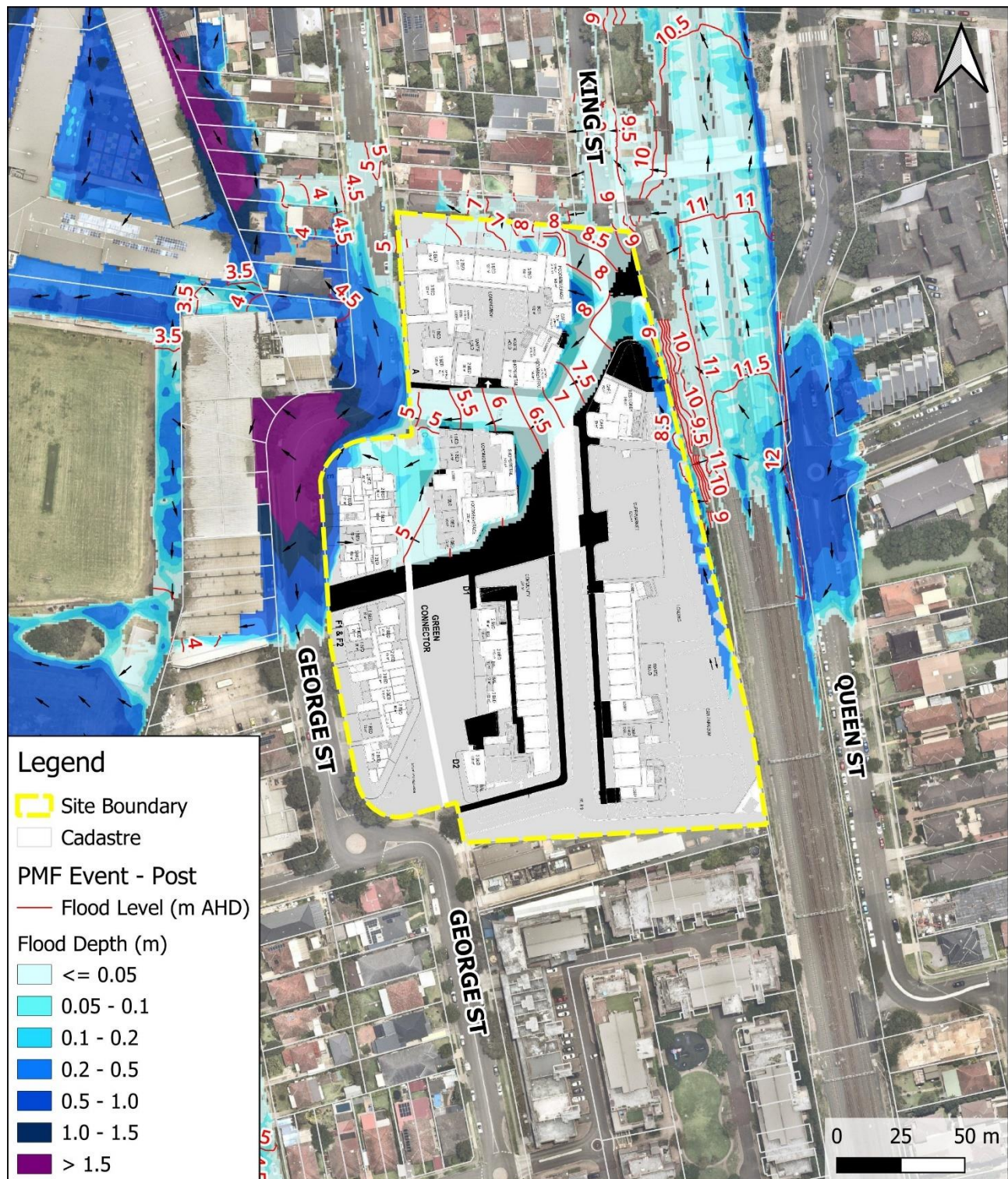


Figure 4: Flood levels and depths (PMF event) – Post Development Conditions

## 2.2 Post-Development Flood Hazard

A hazard assessment was 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 5, 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).

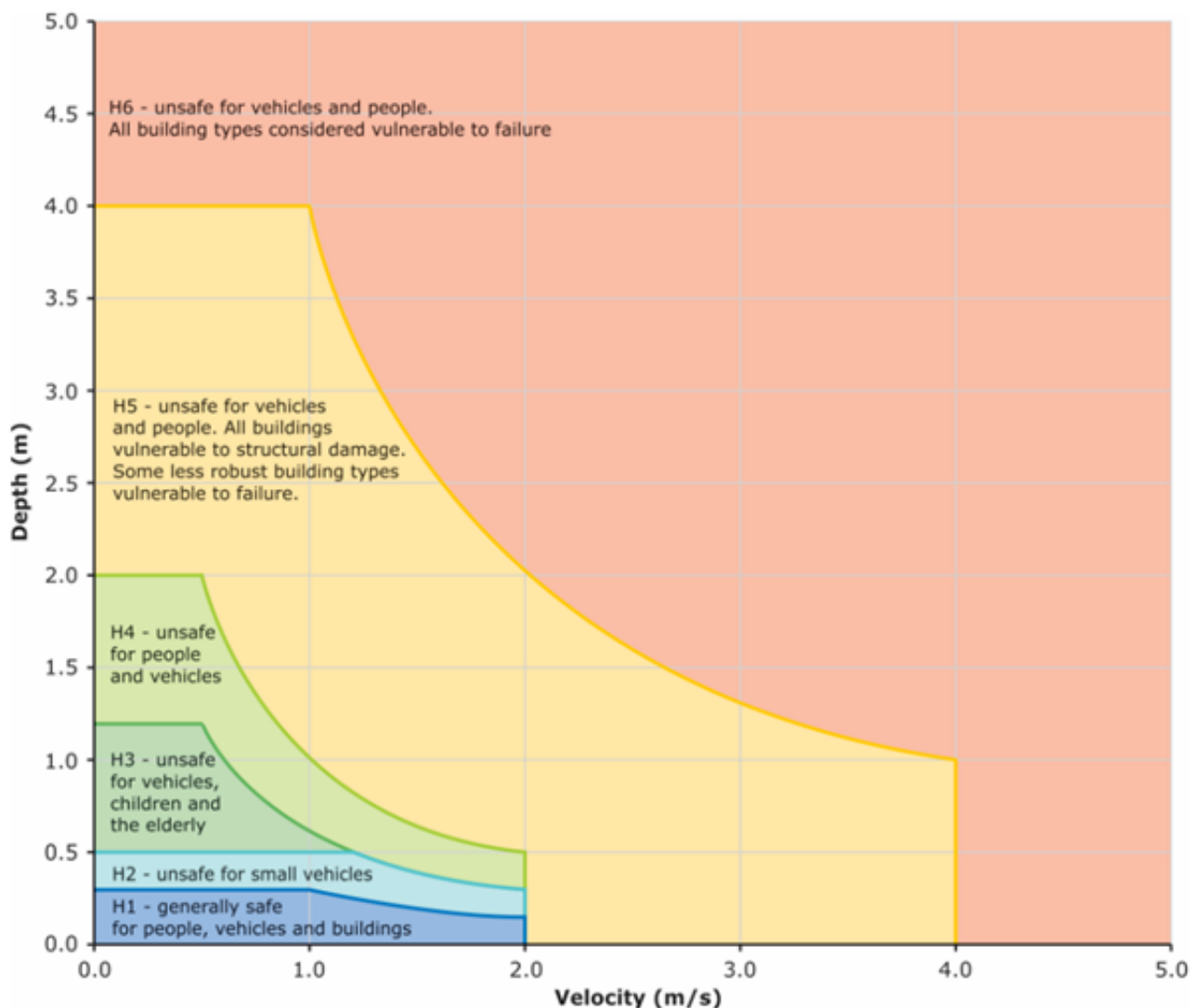


Figure 5: Flood hazard vulnerability curve (Source: Flood Risk Management Guide FB03 - Flood Hazard, NSW Department of Planning and Environment, 2022)

Figure 6 and Figure 7 present the flood hazard categorisation around the site in post-development conditions in the 1% AEP and PMF events, respectively. In both the 1% AEP event and the PMF event, the sag area of George Street to the west is estimated to experience flood hazard of H3 or higher, making this section of the George Street unsafe for vehicles and people.

In the PMF, the north of the site of the site is impacted by low hazard flows (H1), particularly the internal areas. However, the western perimeter of Block E and the eastern perimeter of Block B (which includes the proposed supermarket) is affected by flows with a flood hazard level of H3.

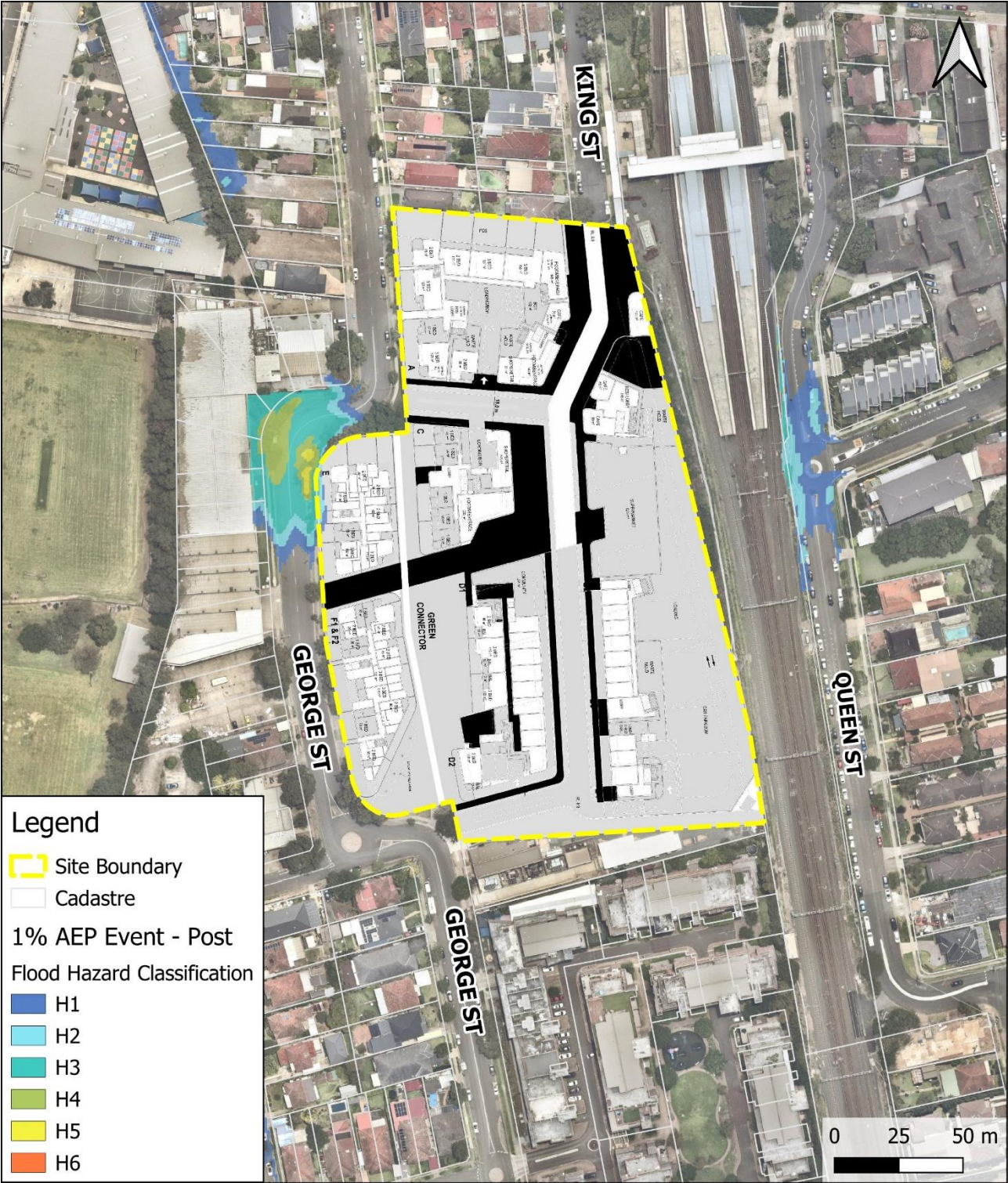


Figure 6: Flood hazards (1% AEP event) – Post Development Conditions



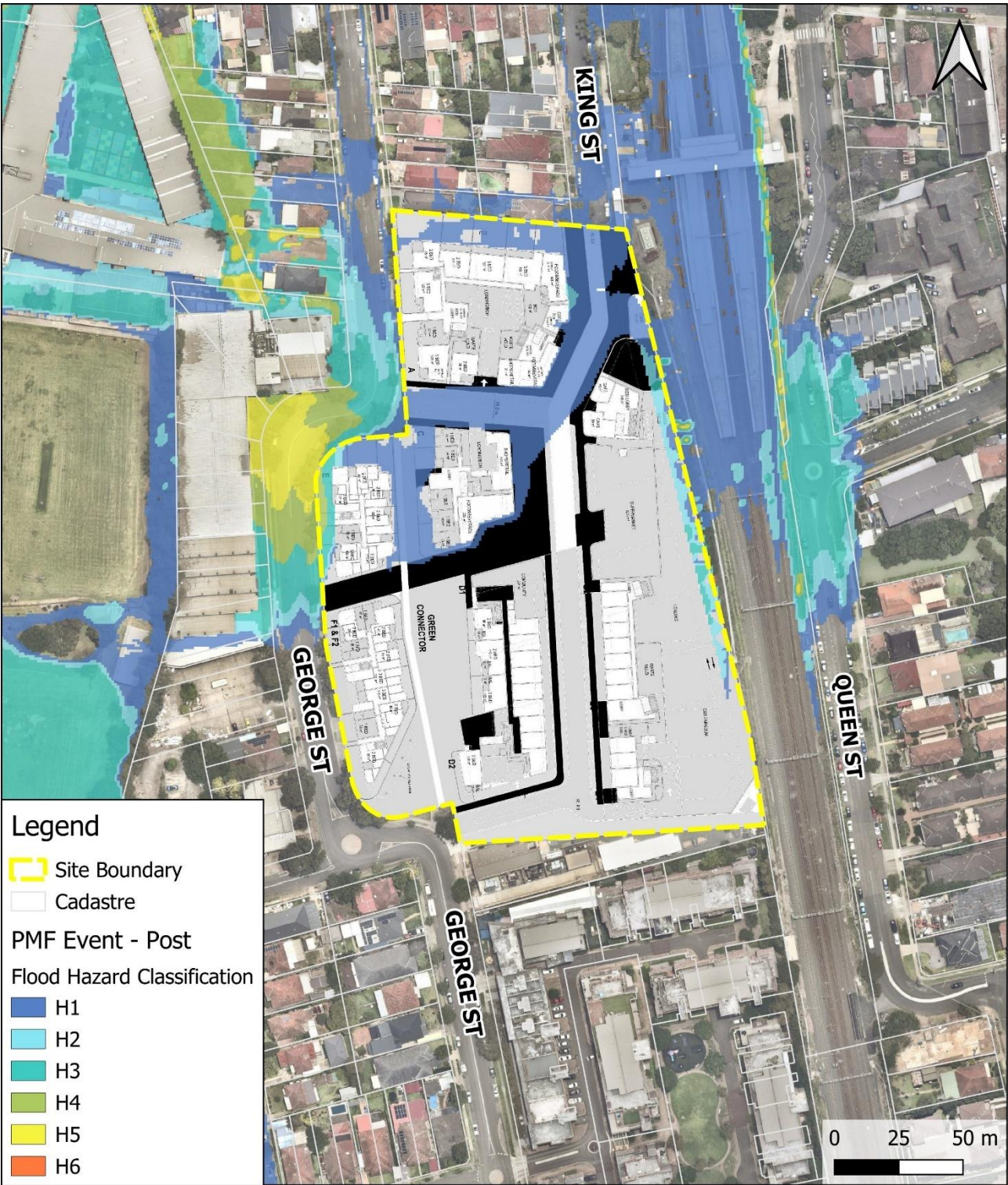


Figure 7: Flood hazards (PMF event) – Post Development Conditions

2.3 Inundation and Recession Times

Table 1 presents a summary of the inundation and recession times for a range of different storm events and durations. For the purpose of this assessment, the recession time is regarded as the time taken for the sag point on George Street to return to a trafficable, low hazard state.

However, it should be noted that in all modelled events, there is a low hazard route into and out of the site via



the site's southern driveway onto George Street, which bypasses the sag point. Whilst King Street is only affected by low hazard flows in the vicinity of the site, it is cut off by flows with a H5 hazard classification approximately 210m north of the site in the 30-minute PMF event. In addition, further onward travel via this road is limited, regardless of hazardous flows, as the road only extends an additional 400m north of the site, with no connections to the east, due to the railway line.

Therefore, if site users must leave the site during a flood (e.g. due to a coincident emergency, or in the unlikely event that NSW SES issue evacuation action statements), it is recommended that the site is evacuated via the southern driveway onto George Street. More detail is provided in Section 3.1.2.

*Table 1: Time to inundation and recession at the site and George St sag point in various storm events*

Event	Storm Duration	Time to Inundation (minutes)	Recession Time
10% AEP	60 minutes	< 50 minutes for flows at the sag point on George Street to reach a H3 hazard level.	George St sag point returns to a trafficable state approximately 90 minutes after the onset of the storm.
1% AEP	60 minutes	< 20 minutes until the sag point on George St becomes too hazardous to drive across;  Flows from the sag point overtop the kerb and intrude upon the western site boundary (adjacent to Block E) after less than 30 minutes. However, flows do not reach the entrance to the block.	George St sag point returns to a trafficable state approximately 1hr 50 minutes after the onset of the storm
PMF	30 minutes  (CRITICAL DURATION)	< 10 minutes until flows reach a H3-H4 hazard level at the sag point on George St (restricting access to the site from the northern George St entry);  < 20 mins for floodwaters to extend into the site. Hazard level at the sag point reaches H5. Flows overtop kerb from George St, reaching H3 hazard immediately west of Block E, which houses a number of residential dwellings on the ground floor. Extension of King St is also affected by low hazard (H1) flows;  For the duration of the critical 30-minute PMF event, the site is accessible via the southern entry point on George Street, which is impacted by flows categorised as H1 hazard.	George St sag point returns to a trafficable state approximately 2hrs after the onset of the storm.
	1 hr	< 10 minutes until flows reach a H3-H4 hazard level at the sag point on George St (restricting access to the site from the northern George St entry);  < 20 minutes for floodwaters to extend into the site from George Street, in the west, extending towards Block E.  < 30 minutes for floodwaters to overtop into the site from railway line in the east, with Block A, B, C and King St affected by low hazard flows (H1-H2 classification).	Flows over the site begin to recede approximately 1hr 30 minutes following the onset of the storm, though the George St sag point is still unsafe 2hrs after the onset of the storm.  It is estimated that the road would return to trafficable conditions approximately 2hrs 40 minutes after the onset of the storm.
	3 hrs	< 20 minutes until flows reach the George St sag point (H1-H2 hazard);	< 4hrs 20 minutes following the onset of the storm, the George St

		<p>&lt; 30 minutes until flows at this sag point overflow onto the west of the site. Sag point flows reach H3-H4 hazard level.</p> <p>&lt; 40 minutes until flows reach the Block E western perimeter.</p>	<p>sag point becomes largely flood free (with the exception of H1-H2 hazard flows in the gutter), with a total inundation time of approximately 4 hrs.</p>
	6 hrs	<p>&lt; 50 minutes until sag point on George St is affected by flows categorised as H3 hazard – no longer trafficable. These flows overtop the kerb and intrude on the site (specifically Block E) in less than 1 hr following the onset of the storm.</p> <p>Flows from the railway line do not overtop onto the site in the 6-hour storm duration PMF event, so the rest of the site (and King St) remain flood-free. The site is accessible for the duration of the event via the southern driveway onto George St.</p>	<p>Flows overtopping onto the site from George St sag point (affecting Block E only) take approx. 5hrs 50 mins to recede, 6hrs 40 minutes following the onset of the storm.</p> <p>However, the sag point does not return to trafficable conditions for a further 20 minutes, 7 hours after the onset of the storm, and 6hrs 10 mins after flows first became hazardous.</p>

## 3.0 Flood Response Strategy

### 3.1.1 Shelter-in-Place

Draft shelter-in-place (SIP) guidance published by the NSW Department of Planning and Environment in 2023 states that SIP is an appropriate emergency management response when the flood warning time and flood duration are both less than six hours. In the critical duration PMF event, there is less than 10 minutes from the onset of the storm until flows at the George Street sag point become hazardous (and less than 20 minutes until they reach Block E). The road returns to a trafficable state after approximately 2-hours. In longer duration events, the George Street sag point is hazardous for a maximum of about 6hrs 10mins, however the overall risk to the site is lower, given that flows do not overtop the railway line, and hence the majority of the site is not flood affected (with the exception of Block E). Although there is available access/egress during the PMF event via George Street to the south, it is important to ensure that the wider community is not burdened by the any further road congestion caused by additional population and traffic associated with the development.

The primary flood management strategy for the site is therefore to shelter-in-place. It should be noted that based on current site plans, all proposed buildings are set above the PMF level and will not experience above-floor inundation. As a result, all buildings are safe to shelter in from the ground floor and upwards. Access to the basement level is to be closed off, with no staff or residents permitted to this level. During the shelter-in-place strategies, all staff and residents are to remain indoors, and residents should shelter within their home. Staff should remain indoors at their place of work, and the Site Manager must ensure that there are no site users outdoors, including within the car park area. The site visitors can be advised to shelter within the community building in Block D1. Based on current site plans, the floor area is 351m<sup>2</sup>, with a capacity to hold 117 people on the ground floor based on the recommendation of 3m<sup>2</sup> per person.

However, although shelter-in-place is the preferred emergency response strategy, any decision to shelter-in-place must be accompanied by alternative plans for evacuation in the event that there is any change in the anticipated impact to the site, or if some site users refuse to shelter-in-place.

### 3.1.2 Self-Evacuation

Self-evacuation should only be considered if the proximity, scope or anticipated duration of the flood emergency poses an immediate threat to resident and staff safety, or in the unlikely event that NSW SES issue evacuation action statements that cover the site. In addition, it must be acknowledged that some site users will refuse to comply with shelter-in-place orders. While they should be advised to stay in place (at least until the magnitude of the flood is clearer), if they insist on leaving, the recommended self-evacuation route is presented in Figure 8, shown against the critical 30-minute duration PMF storm event.

Specifically, the route involves:

- Egress from the site from the carpark via the southern driveway onto George Street;
- Continuing south for approximately 120m on George Street and taking the second exit at the roundabout, heading straight down George Street;
- Continue south on George Street for another 640m, before turning left onto Pomeroy Street at the junction;
- Further onward travel via Beronga Street.

This route can also be used in the event that emergency personnel require access to the site due to a coincident event, including a medical emergency or a fire during a flood event.



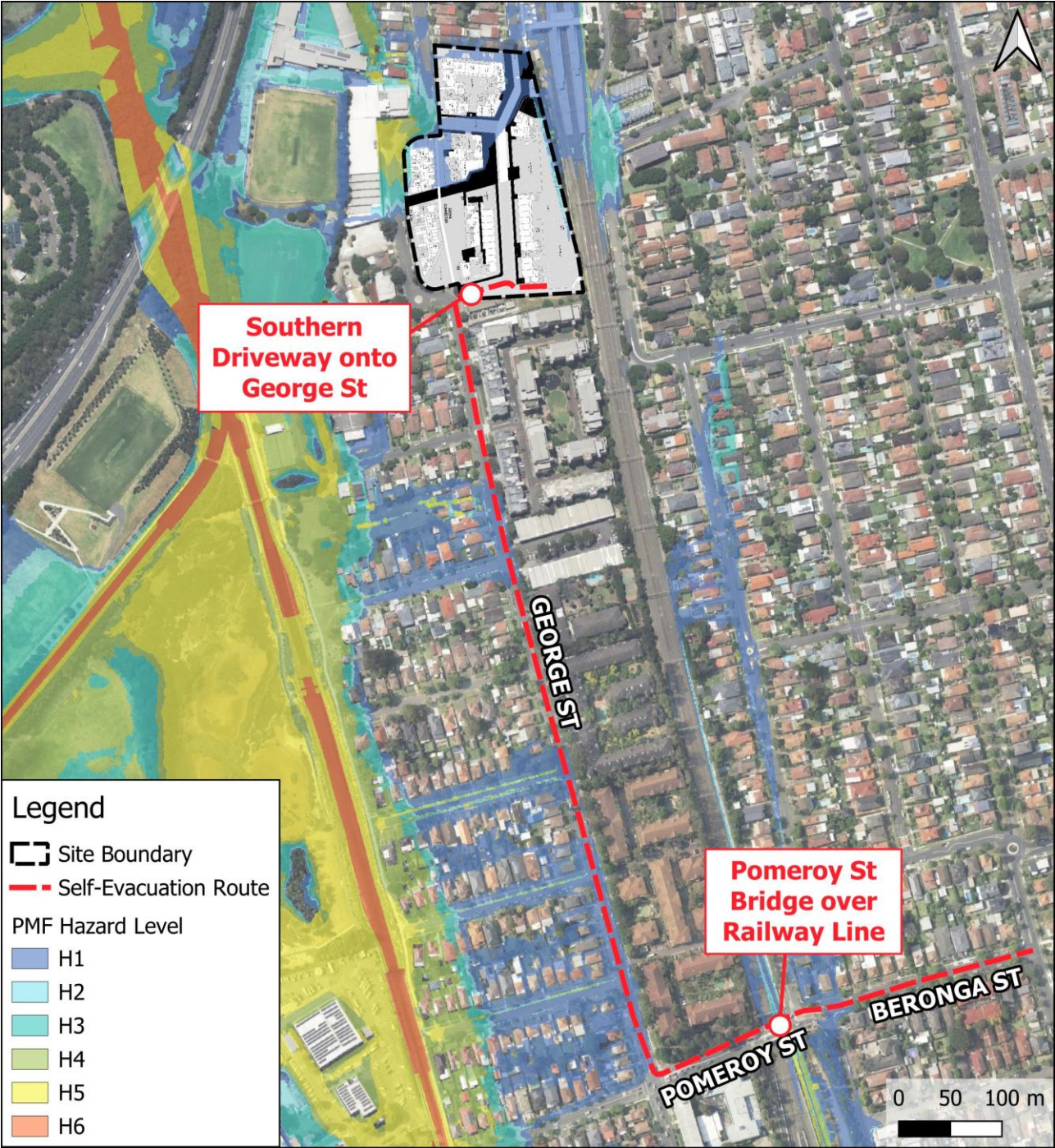


Figure 8: Recommended self-evacuation route from the site

## 4.0 Flood Warnings and Notifications

### 4.1 Bureau of Meteorology

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

- A **Flood watch** is issued by the BoM up to four days prior to a flood event. A watch is generally updated daily and may be issued before, during, or after rainfall has occurred.
- **Flood warnings** are issued by the BoM when flooding is occurring or expected to occur in a particular area. Warnings may include specific predictions of flood depths dependent on real-time rainfall and river level data. These warnings are distributed to Council, Police, and the relevant local SES, as well as being available on the BoM website, through telephone weather warnings and radio broadcasts.

### 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 Site Manager 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 'stay informed' at the Advice level, to 'prepare to evacuate' at the Watch and Act level, to 'evacuate 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.

### 4.3 Triggers

However, 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.

To ensure adequate response time, alternative triggers should be monitored, including severe weather warnings, media updates via local radio stations and social media. The Site Manager is responsible for monitoring these flood triggers.

### 4.4 Emergency Signals

The site should have a Public Announcement (PA) system that can be used by the Site Manager 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 residents 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 2. Before the site is in operation, these roles must be delegated to specific staff members.

Table 2: Staff Flood Responsibilities

Role	Responsibilities
Site Manager	<ul style="list-style-type: none"><li>- Inform staff of flood risk</li><li>- Coordinate flood evacuation drills</li><li>- Decide if pre-emptive relocation is required prior to warnings from NSW SES</li><li>- Liaise with NSW SES</li><li>- Delegate emergency response actions if necessary – e.g. to designated “Block Wardens” who are responsible for a specific block.</li></ul>
First Aid Officer	<ul style="list-style-type: none"><li>- Coordinate assistance for less able residents and staff</li><li>- 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.</li></ul>

### 5.2 Key Contact Details

In the event of a severe flood, key telephone numbers have been listed in Table 3 below.

Table 3: Key Contact Numbers

<b><u>IMPORTANT TELEPHONE NUMBERS</u></b>	
Site Manager	tba
Deputy Manager	tba
Safety/First Aid Officer	tba
Centre Staff	tba
<b><u>External Contacts</u></b>	
Police/Ambulance	000
NSW State Emergency Services (SES)	132 500
Fire & Rescue NSW – Concord	02 9493 1016
Burwood Police Station	02 9745 8499
Concord Repatriation Hospital	02 97675000

## 6.0 Preparation for Flood Response

### 6.1 Education

As part of the preparation for a flood event, all staff and residents 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 will be made available to all new staff, managers and residents. Completion of site induction and safety training for existing and new staff is the responsibility of the Site Manager.

Depth markers can also be implemented along the western wall of Block E, and the eastern wall of Block B, to demonstrate the estimated 1% AEP and PMF depths, ensuring that site users are aware of the potential risks of flooding at the site.

### 6.2 Signage

It is important that the site has adequate signage for flood warning, similar to those in Figure 10. Flood warning signs should be positioned around the site to identify areas affected by Category H3 hazard and higher in the critical PMF event, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment.

A copy of a detailed FERP which includes emergency response procedures will be made available at communal areas within the site as well as the main office.



Figure 10: Signage and Gauges

### 6.3 Flood Drills

It is recommended that flood drills be held by staff annually to ensure all staff workers are familiar with the sound of the alert and their subsequent flood response actions. It is the responsibility of the Site Manager 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 Site Manager will also ensure that all site drills are recorded in an appropriate records book and any non-conformities reported and responded to.

## 6.4 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.




This Emergency Kit should be stored in a waterproof container, and it is the responsibility of the Site Manager to make sure that this kit is maintained and available during an emergency.



## 7.0 Flood Response Actions

The flood response actions are outlined in Table 4.

Table 4: Flood Emergency Response Actions for the site

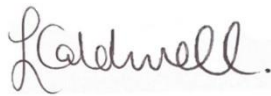
Flood Emergency Response Plan	
Flood Warning and Notification Procedures	Evacuation and Refuge Protocols
<p>1) BoM issues a <b>FLOOD WATCH</b> or NSW SES issue a yellow “<b>ADVICE</b>” warning</p> 	<p>The following actions must be undertaken by the Site Manager:</p> <ol style="list-style-type: none"><li>1) Notify all staff and residents of the flood watch via SMS and email and confirm availability of relevant staff to assist with emergency actions if required.</li><li>2) Ensure the emergency kit is ready to use.</li><li>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.</li><li>4) Ensure staff are familiar with their responsibilities.</li></ol>
<p>2) BoM issues a <b>FLOOD WARNING</b> or NSW SES issue an amber “<b>WATCH AND ACT</b>” or red “<b>ACT NOW</b>” warning</p> 	<p>If the flood event is not anticipated to impact the site (either directly or indirectly), the <b>Site Manager</b> is to continue hourly check-ins and postpone high risk activities (e.g. unnecessary deliveries etc.).</p> <p>If flood event is anticipated to impact the site, the <b>Site Manager</b> must undertake the following actions:</p> <ul style="list-style-type: none"><li>• <b>For life-threatening emergencies phone 000 immediately.</b></li><li>• An alert and warning message should be broadcast over the PA system confirming a significant flood event, notifying all residents and staff to begin <b>shelter-in-place</b> procedures.</li><li>• Ensure no one is in the basement. Once cleared, close off all access to the basement.</li><li>• Lock all entrances along the western perimeter of Block E. Ensure the area is cordoned off and signage is in place to advise all site users of the flood risk and ensure the door is not opened until the floodwaters have receded.</li><li>• Direct all residents to stay in their homes, all retail/café staff to stay inside, and ensure site visitors remain indoors. Anyone outdoors or in the car park should be informed of the flood risk and advised to shelter-in-place in the community building in Block D1.</li><li>• Any site users who do not wish to stay should be informed that they are leaving at their own risk and should use the low hazard route presented in Section 3.1.2.</li><li>• The <b>Site Manager</b> is to follow any action statements provided via the AWS.</li></ul> <p><b>NOTE:</b> Avoid driving or walking through floodwaters. These are the main causes of death during flooding.</p>
<p>3) The alert has been rescinded or downgraded by the relevant authorities and any flood event that occurred has passed.</p> 	<ul style="list-style-type: none"><li>• The <b>Site Manager</b> is to confirm floodwater has subsided below the ground level and that there is no ponding within the site.</li><li>• Flooded areas are to remain off limits until ponding has cleared. Site is to be inspected by the <b>Site Manager</b> if required. Once it has been confirmed that the water level has reduced to a suitable level, and if determined safe, the <b>Site Manager</b> may announce that staff and residents no longer need to shelter-in-place.</li></ul>

## 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 residents and staff within the site itself and is considered a guide only. It does not cover residents and staff individual safe travel arrangements to the site or when their safe travel arrangements may be disrupted by flooding and/or road closures.

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.

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