

Flood Risk Assessment

80 O'Sullivan Road, Leumeah

Prepared for Equity Development Management / 11 December 2023

211844 CFAA

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1.0 Introduction

Taylor Thomson Whitting Pty. Ltd (TTW) has been engaged by Equity Development Management to prepare a Flood Assessment for the proposed Development at 80 O'Sullivan Road, Leumeah in NSW. The purpose of this report is to support the Planning Proposal for the site which has received Gateway Determination (PP-2023-1943). Prior to public exhibition the Gateway Determination requires the planning proposal to be updated to include further flood analysis as follows:

Include further flood analysis in relation to the Probable Maximum Flood showing pre and post development scenario to determine risk and potential impact (this is to enable consideration of issues such as flood duration, velocity and safe evacuation and how these can be mitigated, prior to any final decision being made post exhibition).

This report addresses the additional flooding requirements, along with a summary of the flood planning requirements for the development.

1.1 Site

The proposed development site is located at 80 O'Sullivan Road, Leumeah and falls within the Campbelltown Local Government Area (LGA). The development site is bounded to the north and west by O'Sullivan Road, south by Pembroke Road, and north and east by commercial developments, on grade parking, and vacant zoning. Site zoning falls under Category B2-Local Centre. The existing site is shown in figure 1.

Two buildings are associated with the site, the Leumeah Hotel and the Liquor Stax Leumeah Bottle Shop. The total area of site covers an area of approximately 8000 sq.m. The development site currently consists of impermeable hard paving, roofing, and road surfacing with minimal soft landscaping or permeable areas.



Figure 1. - Site Location

1.2 Proposed Development

The Planning Proposal includes a concept proposal of a mixed used development consisting of two residential towers extending above retail and hotel areas at ground floor, with associated basement parking and external landscaping. The concept proposal will be part of a wider precinct masterplan as shown in figures 2 and 3 respectively.



Figure 2. – Proposed Concept Ground Floor Layout



Figure 3. – Site Development Within Wider Precinct Plan (Indicative)

1.3 Reference Documents

- Campbelltown City Council Development Control Plan (DCP) 2015
- Campbelltown Local Environmental Plan (LEP) 2015
- Campbelltown Engineering Design for Development 2009.
- Bow Bowing Bunbury Curran Creek Strategic Floodplain Risk Management Study and Plan.
- Flood modelling results from Bow Bowing Bunbury Curran Creek Flood Study
- Floodplain Development Manual, NSW Government 2005.
- Gateway Determination for Planning Proposal PP-2023-1943

2.0 Existing Flooding

2.1 Existing Flood Information

The development site is located within the Smiths Creek catchment which is part of the wider Bow Bowing Creek catchment. Smiths Creek is located approximately 100m to the north east of the site and Bow Bowing Creek is Creek located approximately 180m to the north west of the site. Figure 2 shows the site location within the wider catchment area. Campbelltown City Council have completed the Bow Bowing Bunbury Curran Creek Strategic Floodplain Risk Management Study and Plan (Molino Stewart, 2019). Truncated flood results from this study have been provided to TTW for the site location and are the basis for the flood analysis within this report.

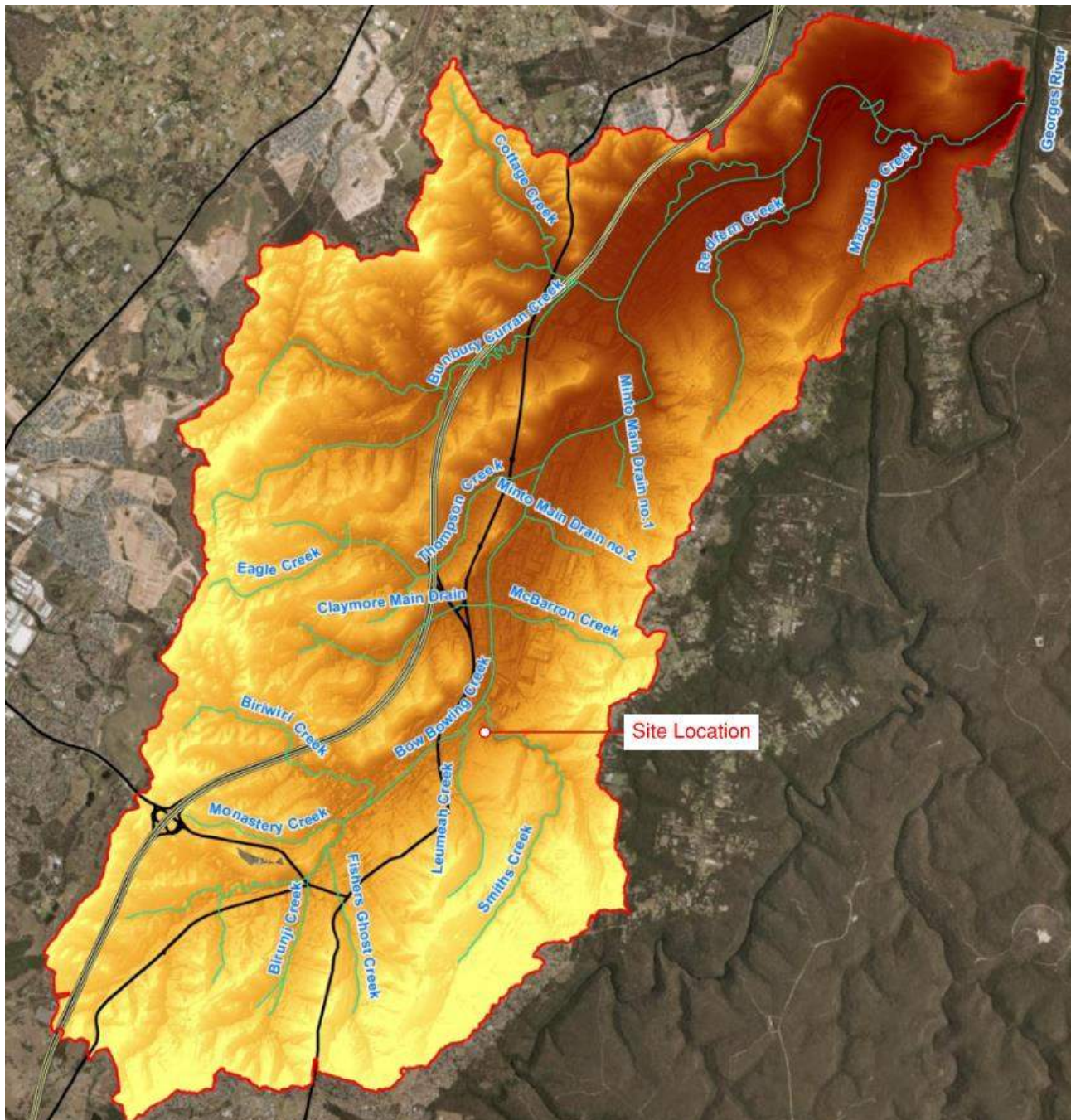


Figure 4. - Site Location In Relation to Catchment and Creeks

2.2 Existing Flood Behaviour

The requirements for the Gateway Determination refer to further Analysis of the Probable Maximum Flood (PMF). This is included in the report, however additional analysis of the 1% AEP flood has also been included to give a wider context of the flood behaviour and flood planning constraints that would need to be addressed during any future Development Application process.

The site is subject to flooding from both the 1% AEP and the PMF events. Flooding is primarily associated with the eastern boundary of site, with only hard paving and the on-grade carpark currently impacted during storm events below the 1%AEP. The existing Council flood results for 1% AEP and PMF flood depths and level are shown in figures 5 and 6 respectively. The flood modelling shows that the site is a flood affected by overland flow from Smiths Creek when the culvert capacity under Pembroke Road is exceeded. The 1% AEP overland flow runs north from Pembroke Road through the existing access road and car park east of the hotel.

The 1% AEP flood extent is generally constrained to the external parking area to the east of hotel and with generally shallow depths of less than 150mm (below kerb height). The 1% AEP Flood Level to the east of the hotel is approximately 54.70m

The PMF shows a much greater extent of flooding across the site and wider area that inundates the existing hotel area with significant depths greater than 3m. The PMF level at the existing hotel is approximately 57.90m.

The existing hotel has a ground floor level of approximately 55.00m and is above the 1% AEP but becomes inundated with approximately 2.70m in the PMF. The existing bottle shop remains flood free and has a ground floor level of approximately 58.30m which is above both the 1% AEP and PMF flood level. Refer to Table 1 for a summary of the existing flood levels and depths.

Flooding within O'Sullivan Road and Pembroke Road, away from the culvert crossing, are generally contained within the road reserve around the development frontage with flood depths typically below 150mm in the 1% AEP (below top of kerb height) and below 200mm in the PMF.

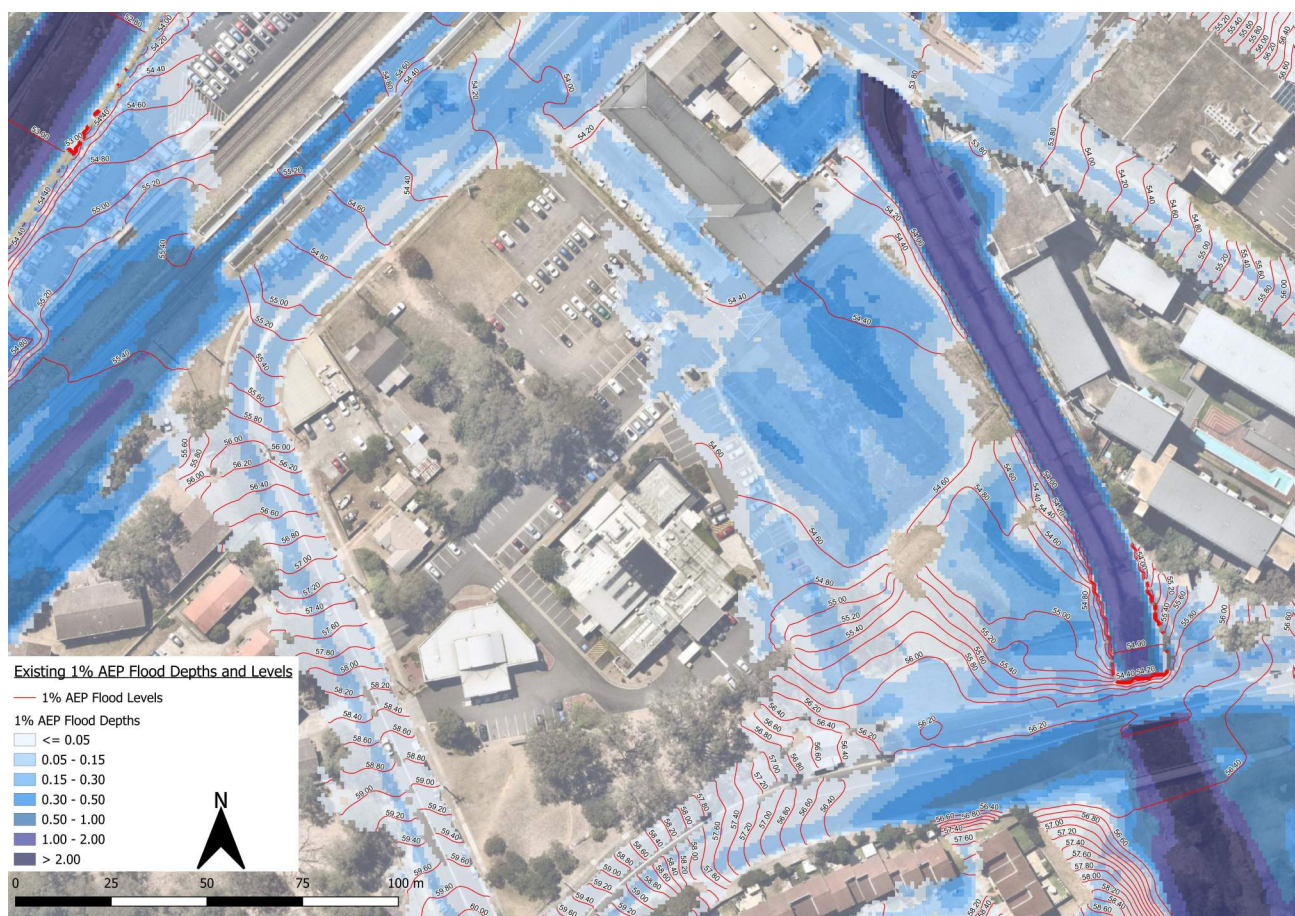


Figure 5. - Existing 1% AEP Flood Depths and Levels

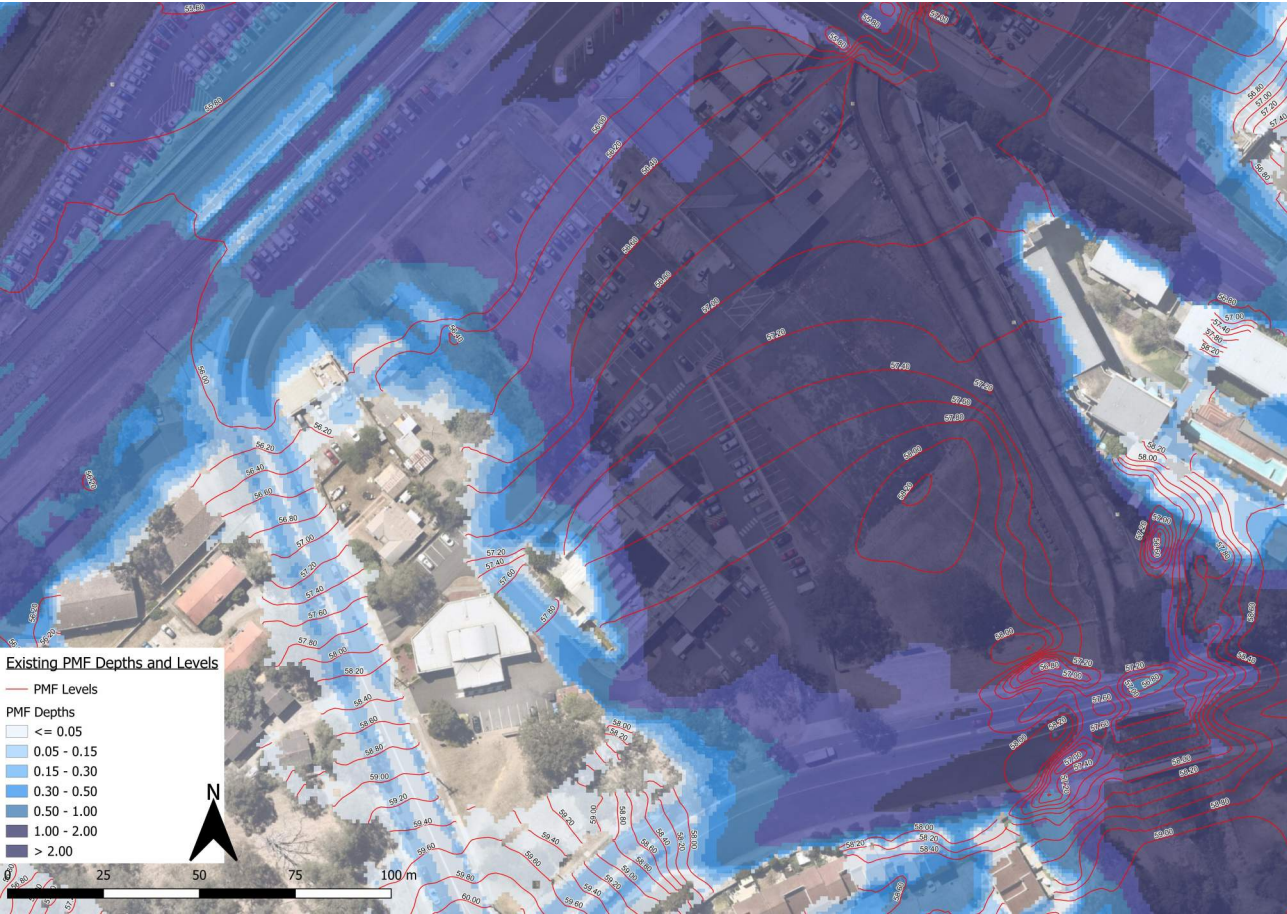


Figure 6. - Existing PMF Flood Depths and Levels

	Existing Hotel	Existing Bottle Shop
Floor Level	55.00m	58.30m
1% AEP Flood Level	54.70m	No Flooding
1% AEP Flood Depth	<150mm	No Flooding
Probable Maximum Flood Level	57.90m	57.80m
Probable Maximum Flood Depth	2.70m	0.25m

Table 1. Summary of Existing Flood Levels and Depths

3.0 Post Development Flooding

Given the level of the development design at Concept Stage there is limited design information regarding proposed site grading and levels, building threshold, levels proposed stormwater, and external landscaping. A detailed flood impact and risk assessment will be completed during the Development Application process, when there is a sufficient level of design detail available and will be in accordance with the 2023 NSW Flood Risk Management Manual and Guidelines.

However, flood risk analysis has been completed for the post development scenario based on the current concept development layout and potential impacts on the existing flood behaviour.

3.1 Post Development 1% AEP Flood Risk

An overlay of the concept site plan shows that the new tower ground floor extents are generally located outside the 1% AEP extent, except for a small area along the eastern edge of the east tower, refer to figure 7. This minor localised area of flooding is shallow depth (less than 100mm), is unlikely to have any significant impact on the overall flood behaviour and should be easily managed through the site levels and grading.

The 1% AEP flood hazard is low across the site with Hazard Category H1 which is safe for people and vehicles in accordance with the flood hazard vulnerability curves , refer to figures 8 and 9.

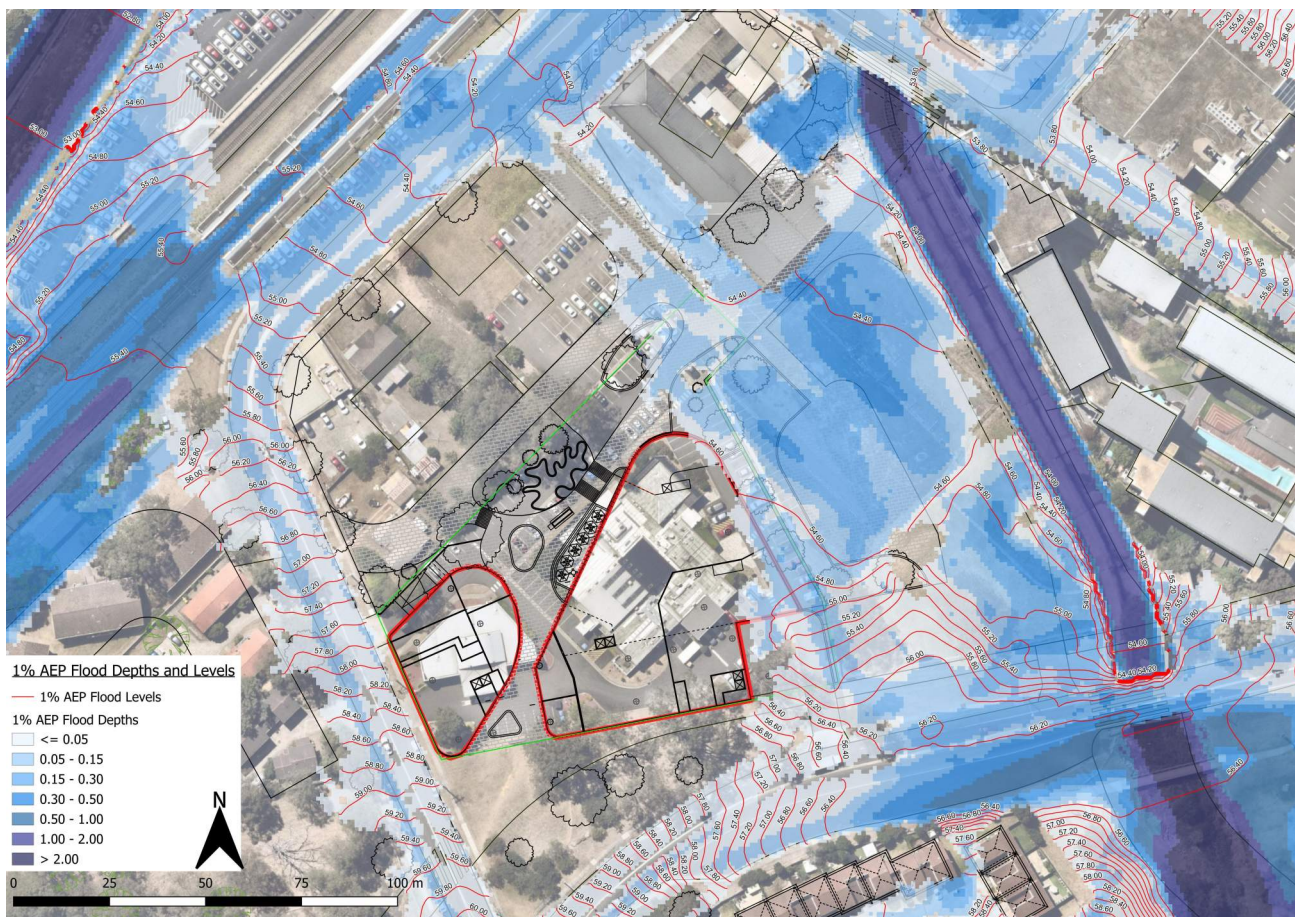


Figure 7. - Post Development Overlay on 1% AEP Flood Depths and Levels

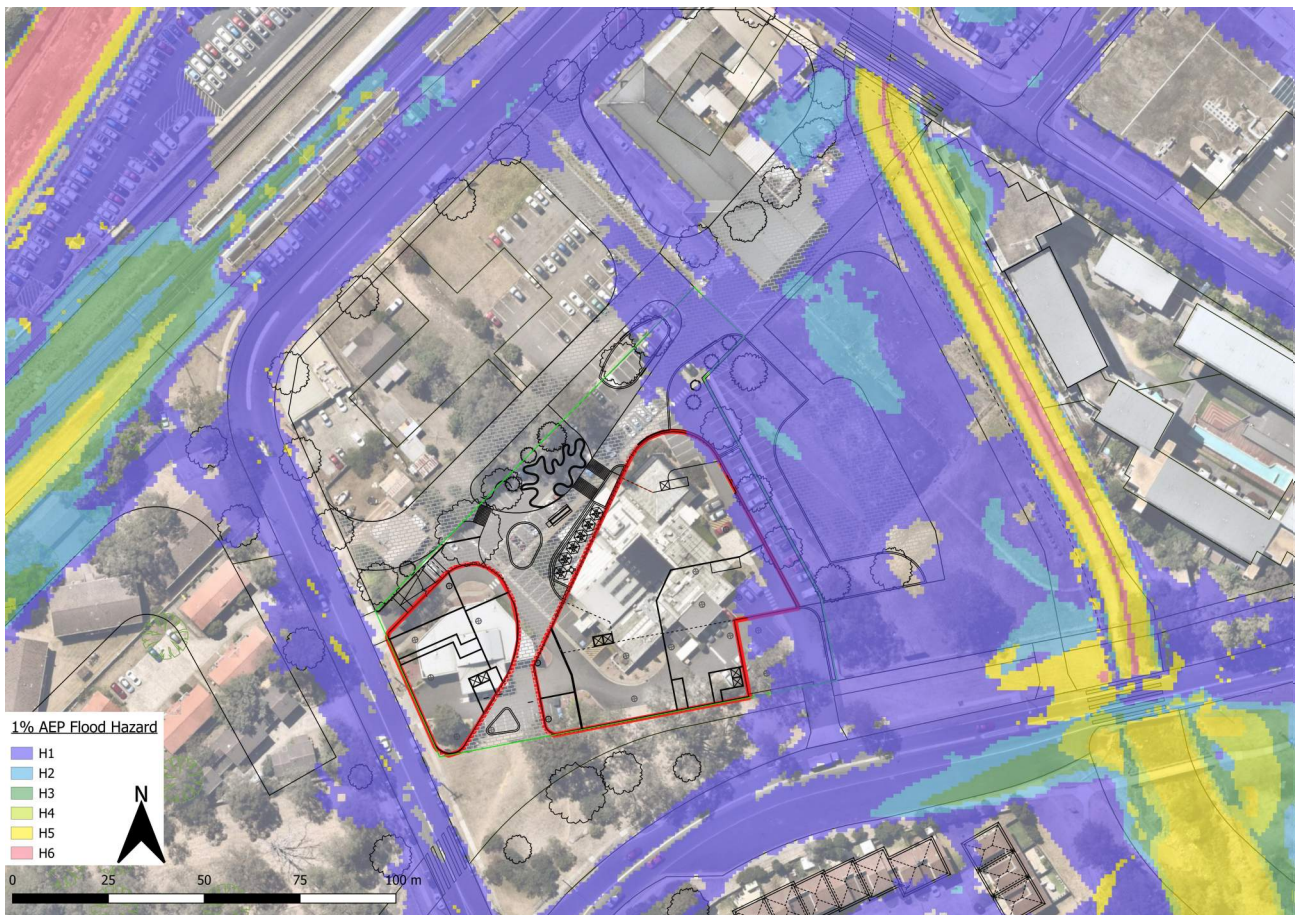


Figure 8. - Post Development Overlay on 1% AEP Flood Hazard

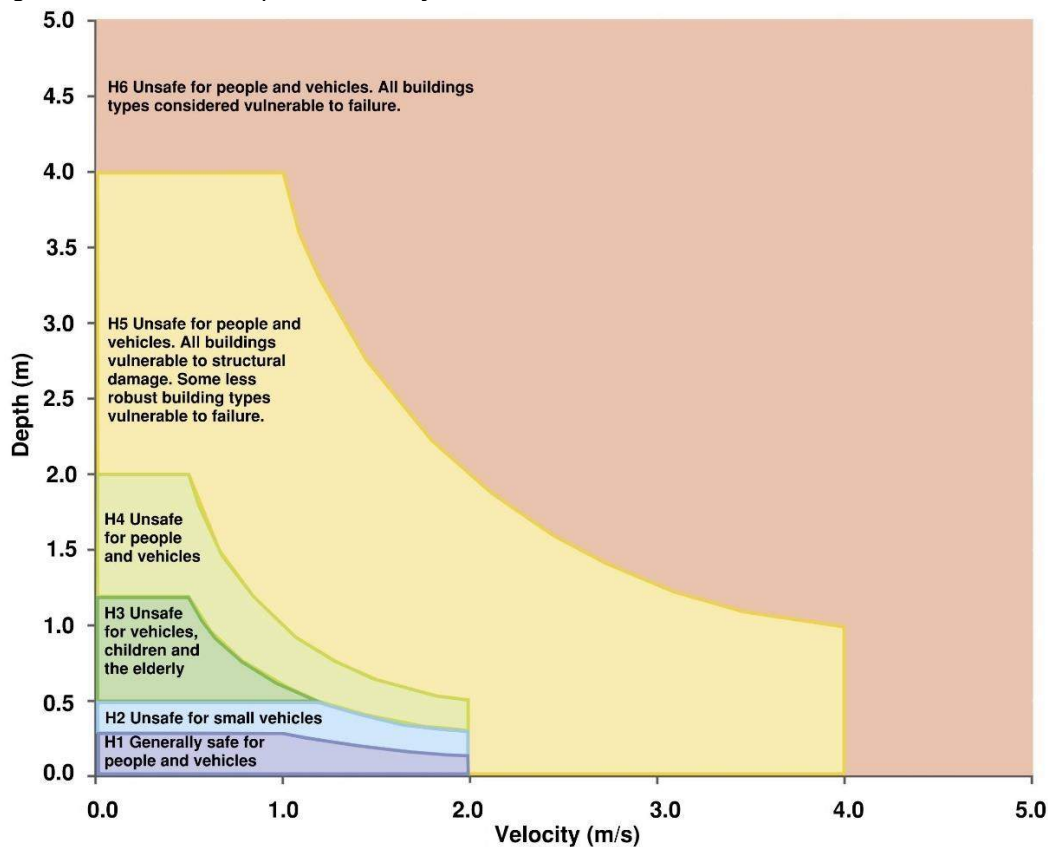


Figure 9. - Flood Hazard Vulnerability Curves - Australian Institute for Disaster Resilience, Guideline 7.

3.2 Post Development PMF Risk

The requirements for the Gateway Determination refer to further Analysis of the Probable Maximum Flood (PMF). Overlays of the concept site plan with the PMF levels and depths, velocity and hazard are included in figures 10, 11 and 12.

The PMF depths are very significant to the east of the site and are approximately 2.7m deep at the location of the east tower. Flood Velocities are generally low, less than 0.5m/s and the flood velocity is not the main source of flood hazard. The PMF Hazard is also very significant due to the very significant flood depths at H5 - *Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.* The proposed building structure and façade within the PMF extent would need to be designed for the expected flood velocities, depths, hydraulic pressure and potential impact from debris.

Due to the high flood hazard and risk associate with the PMF, there would be a requirement for a Flood Emergency Management Plan required during the Development Application process.

The initial concept plan has an indicative ground floor level of approximately RL 58.34m which is above the PMF level of 57.90m. The basement driveway ramp is located to the west of the site off O'Sullivan Road. Here, the flood depth is less than 100mm and should not overtop the road kerb. Therefore, the basement ramp will remain flood free in the PMF. However, to protect the basement flooding any other openings to the basement would also need to be located above the PMF level including any basement lifts, stairs, or ventilation. This will need to be considered during the later design development stages.

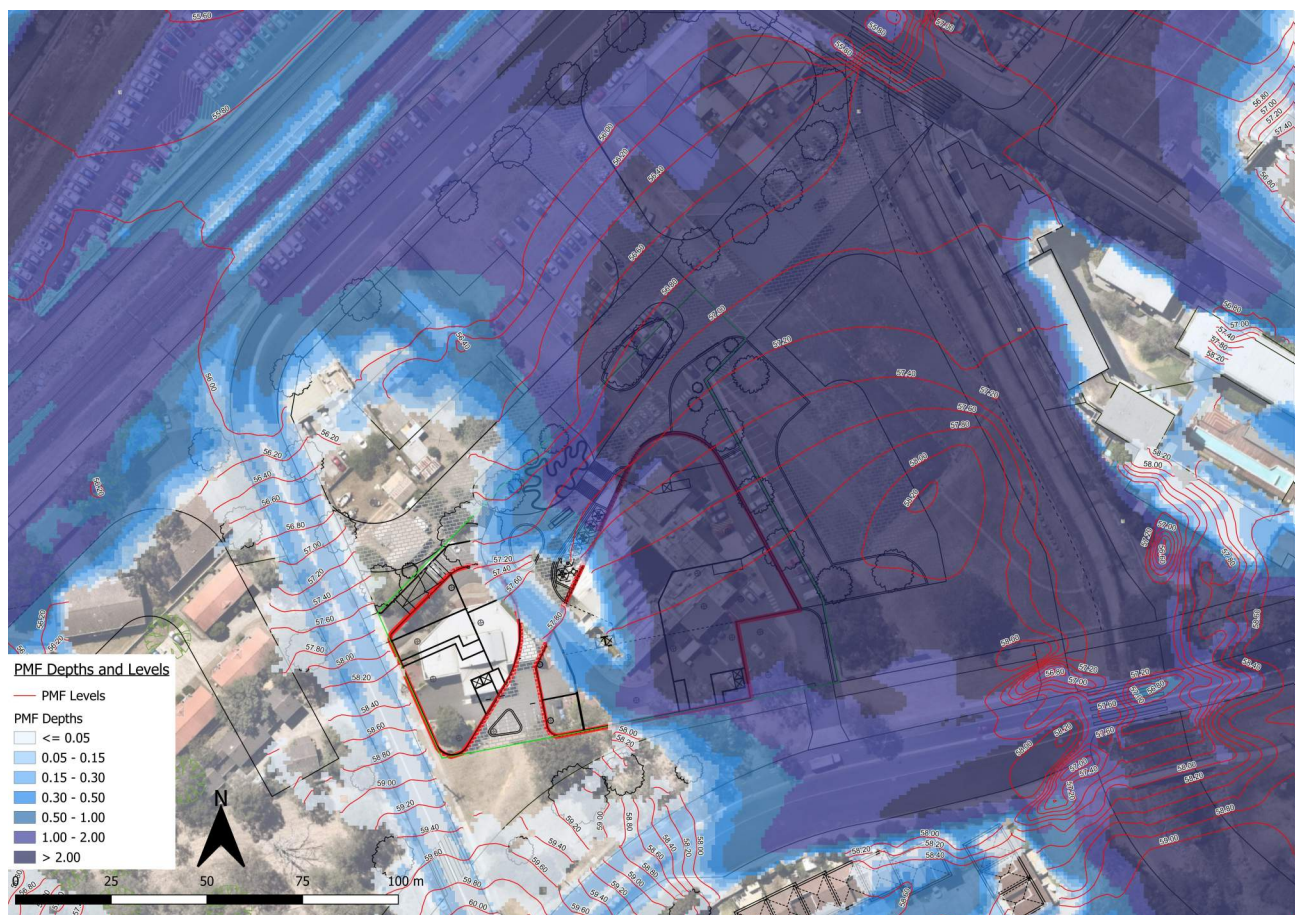


Figure 10. - Post Development Overlay on PMF Flood Depths and Levels

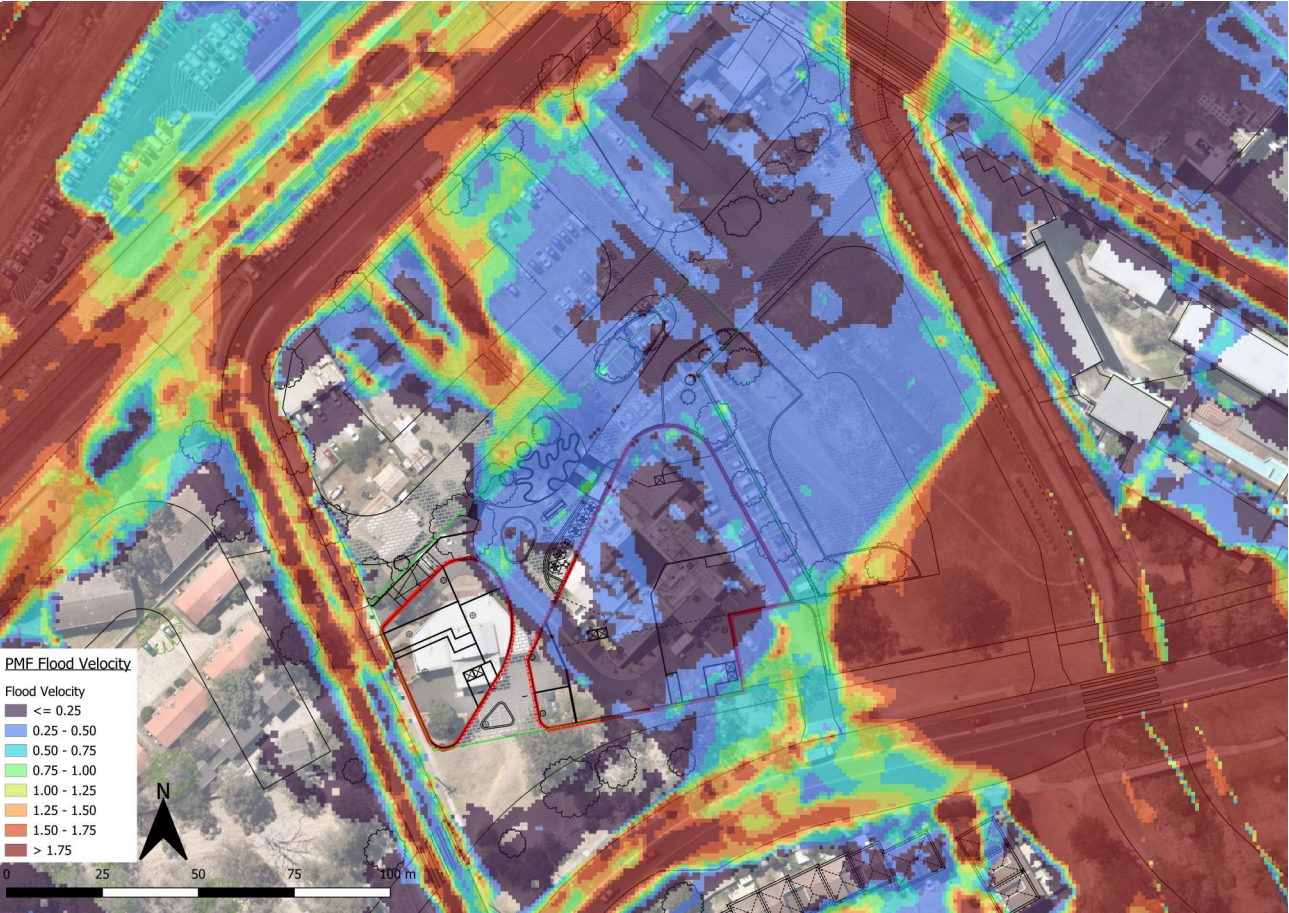


Figure 11. - Post Development Overlay on PMF Velocity

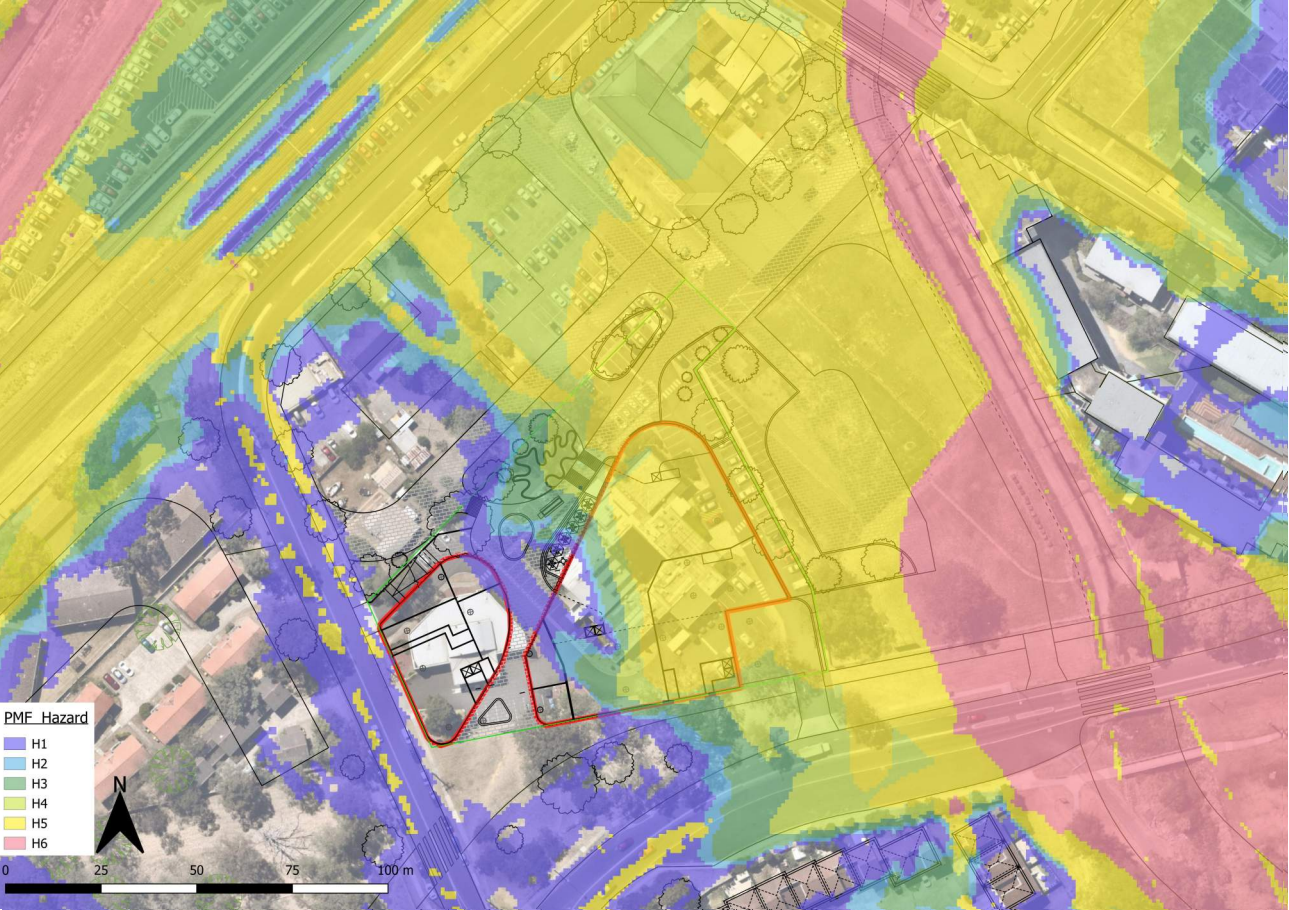


Figure 12. - Post Development Overlay on PMF Hazard

At Smiths Creek, downstream of Pembroke road, the flood event that produces the maximum flood level is the 60 minute duration storm, however the 90 minute and 120 minute duration storms provide similar peak flood levels albeit slightly lower. The flood levels over time for different events for the PMF are shown in figure 13 below.

At this location the top of bank for Smiths Creek is approximately 54.30m. The PMF event is relatively short duration 'flash flooding', which is typical for urban catchments of this size in NSW. Flood levels rise above top of bank after 15-30 minutes from the start of the storm, and peak around 45 minutes to 60 minutes. Flood water levels recede back to the top of bank level again after 2 to 2.5 hours.

Due to the lack of flood warning time available and rapid onset of flood waters during the PMF evacuation of the site may not be suitable. Also as the ground floor level and residential dwellings above level 1 are all above the PMF level, a shelter in place strategy could be adopted for the site. This strategy may also be suitable due to the relatively short duration for flood waters to recede.

Emergency egress and access to the site during the PMF is available from the main entrance car park from O'Sullivan Road. There is only minor flooding in the roadway with shallow depths typically less than 150-200mm and generally low flood hazard.

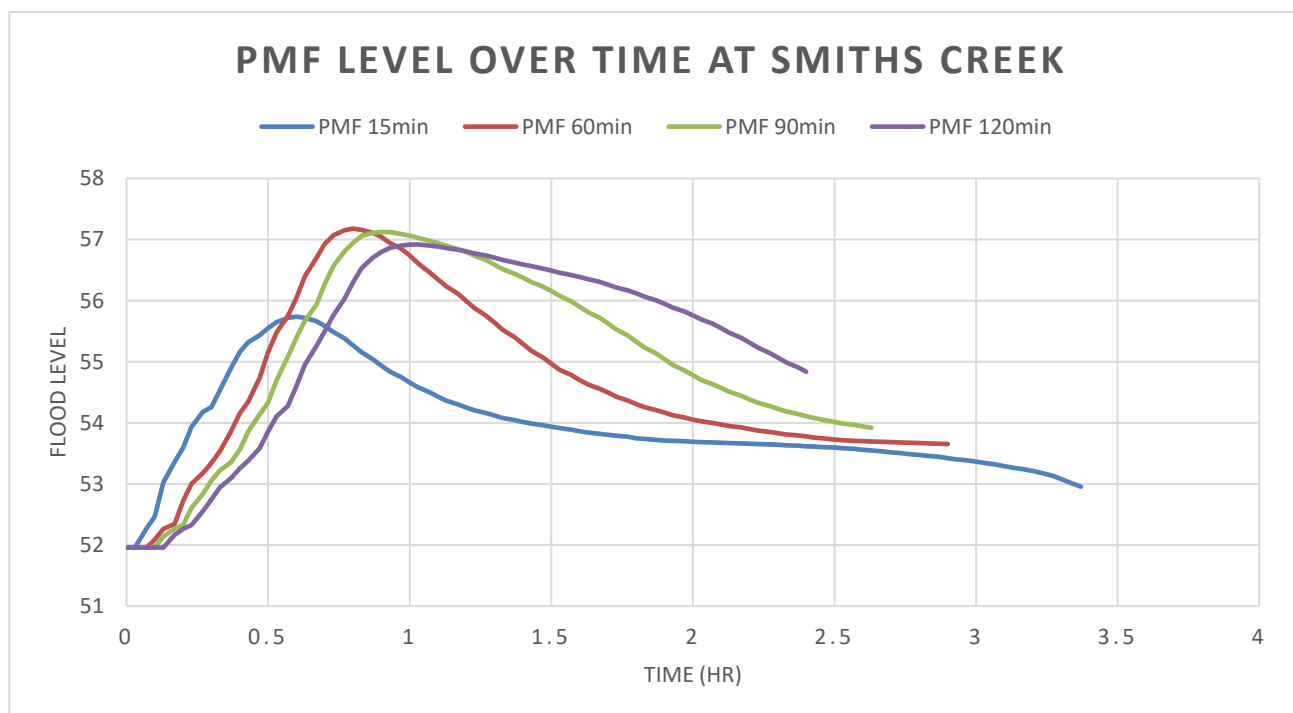


Figure 13. - Post Development Overlay on PMF Hazard

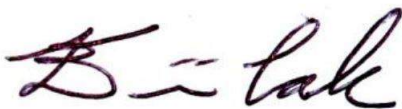
4.0 Flood Planning Requirements

In accordance with the Campbelltown City Council LGA, Flood Planning Levels to be adopted during the development of site are to be at the 100-year flood level, or the 1% AEP plus freeboard as outlined under Section 4.5- Fill and Flood Levels of the Campbelltown Engineering Design for Development 2009.

The Flood Planning Controls associated with the 1% AEP flood event are as follows:

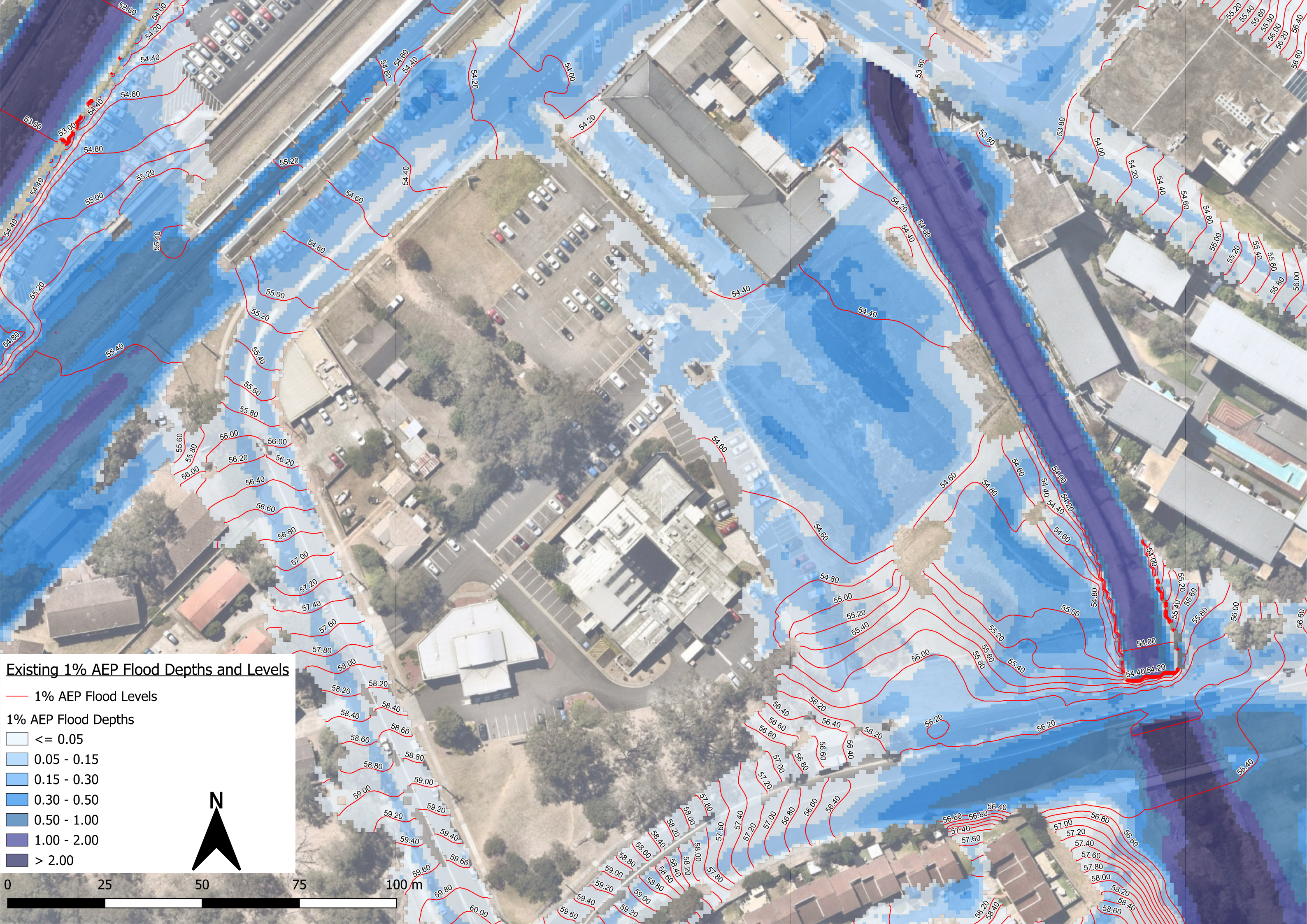
- To avoid the increase of flood hazard or risk from the new development.
 - **The proposed concept is unlikely to have any significant impact on flood risk or hazard in the 1% AEP. However, this will also be managed through site grading and design with a detailed Flood Impact and Risk Assessment completed during the DA process.**
- For Commercial and Industrial developments, the Finished Floor Level is required to be at the 1% AEP flood level plus 500mm freeboard.
 - **The 1% AEP flood level is 54.70m and requires a flood planning level of 55.20m. The proposed concept plan has an indicative ground floor of commercial level of 58.30m which is significantly above the freeboard requirement. A detailed review of building thresholds and compliance with freeboard requirements will be completed during the DA process.**
- A minimum 150mm is required above the finished surrounding ground levels. Council recommends adoption of up to 300mm where overland flow exceeds 150mm.
 - **This can be achieved through the site grading, levels and threshold design during the DA process.**
- For underground car parks, the lip of the driveway entry and exit are to exceed the 1% AEP flood level and demonstration that access points are not affected during the 1% AEP should be provided.
 - **The Basement car park entrance of O'Sullivan Road will be located above the PMF.**

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APPENDIX A – Flood Maps



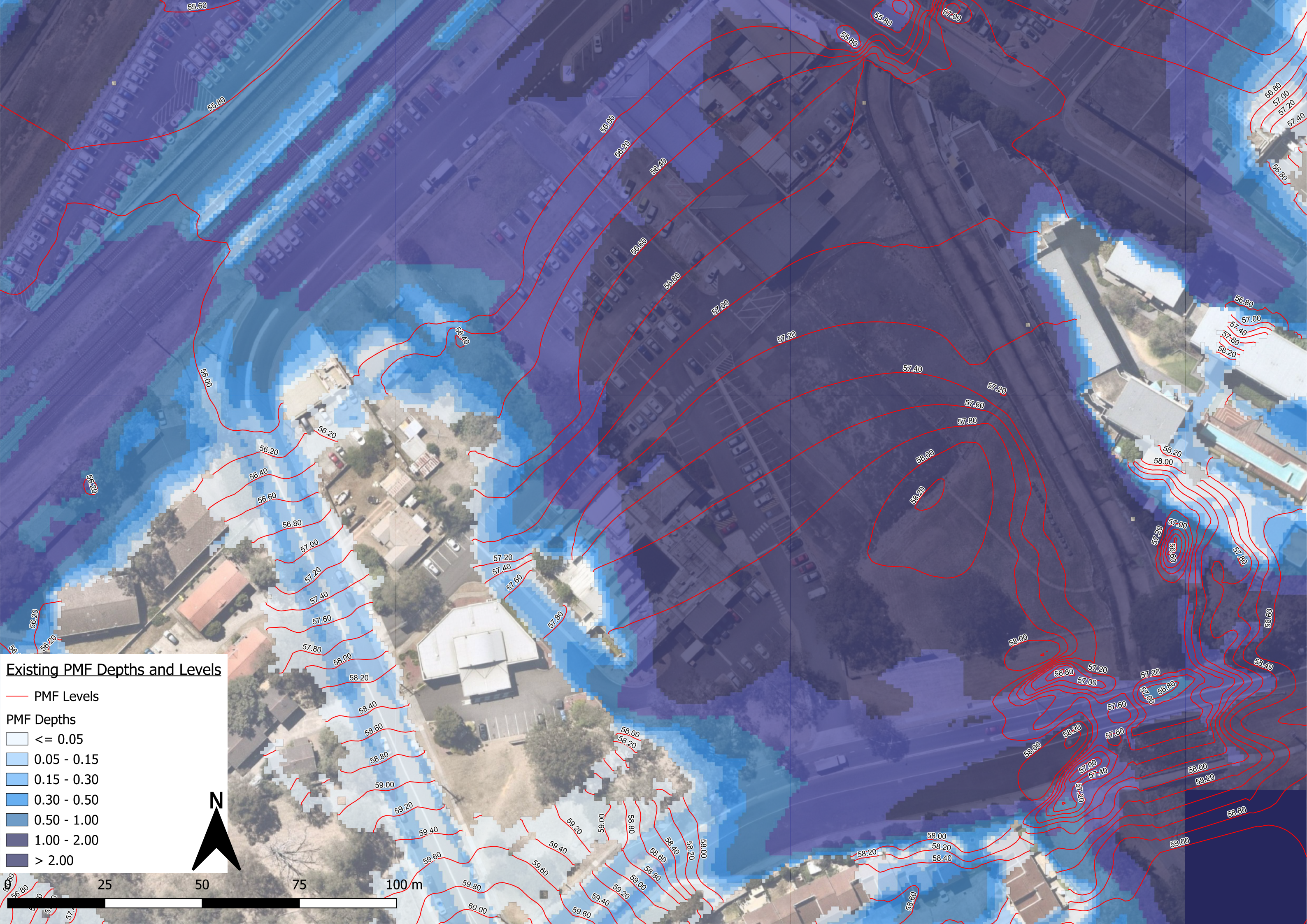
Existing 1% AEP Flood Depths and Levels

— 1% AEP Flood Levels

1% AEP Flood Depths

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- > 2.00





Existing PMF Depths and Levels

— PMF Levels

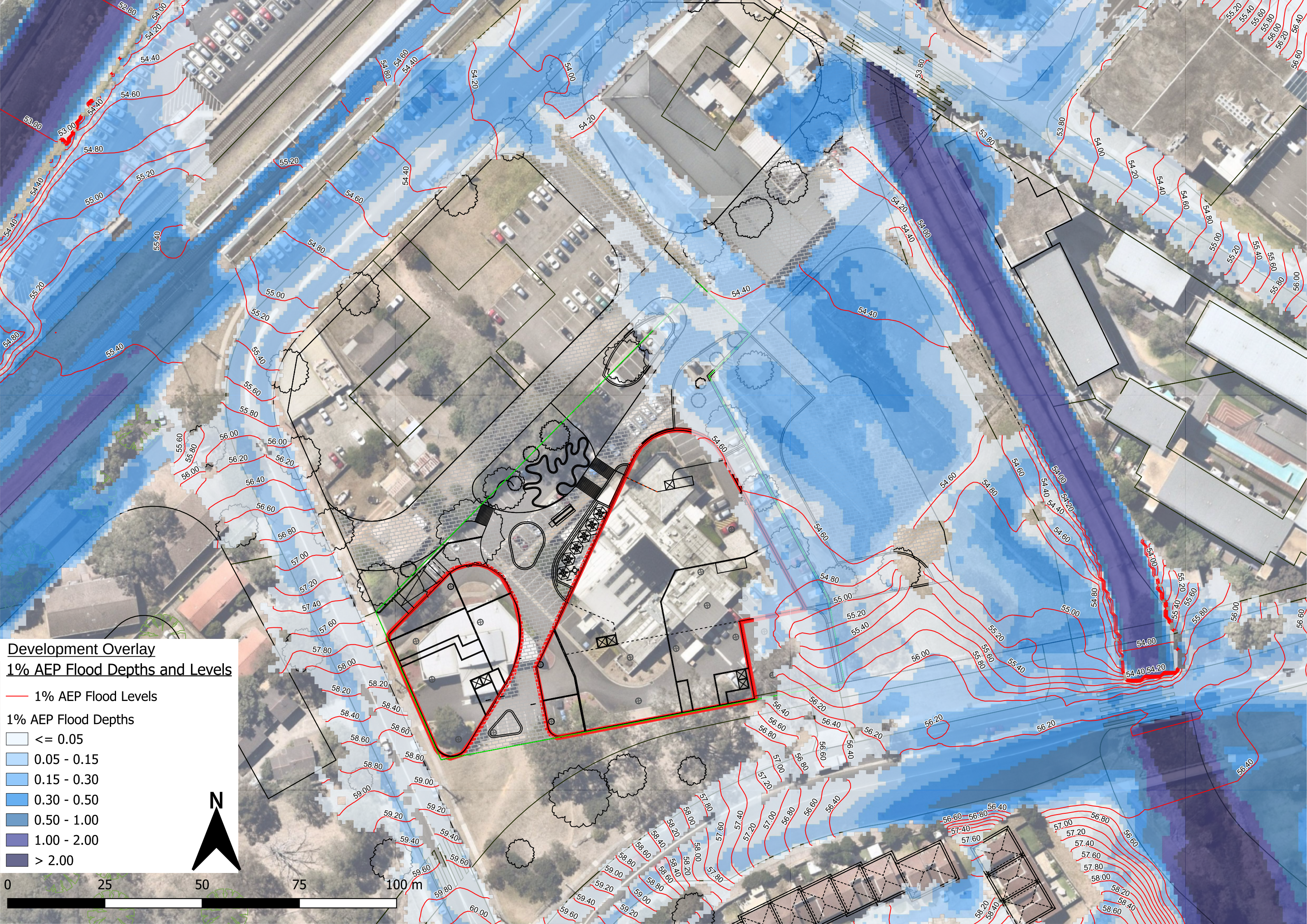
PMF Depths

Lightest Blue	<= 0.05
Light Blue	0.05 - 0.15
Medium Blue	0.15 - 0.30
Dark Blue	0.30 - 0.50
Very Dark Blue	0.50 - 1.00
Dark Purple	1.00 - 2.00
Black	> 2.00

North Arrow

Scale Bar

0 25 50 75 100 m



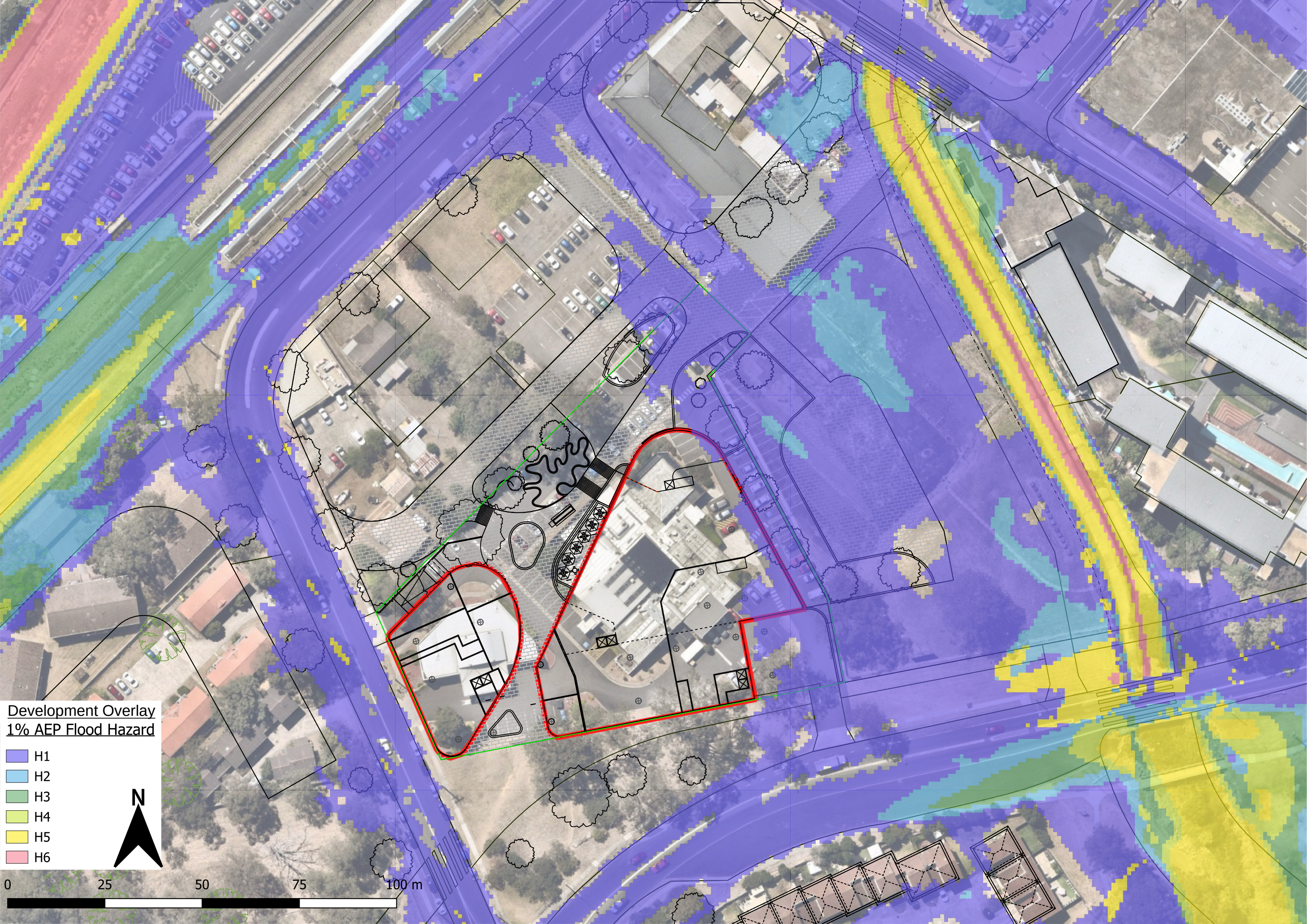
Development Overlay
1% AEP Flood Depths and Levels

— 1% AEP Flood Levels

1% AEP Flood Depths

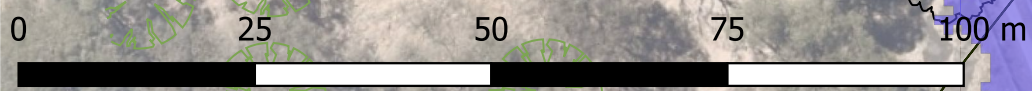
- ≤ 0.05
- 0.05 - 0.15
- 0.15 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- > 2.00

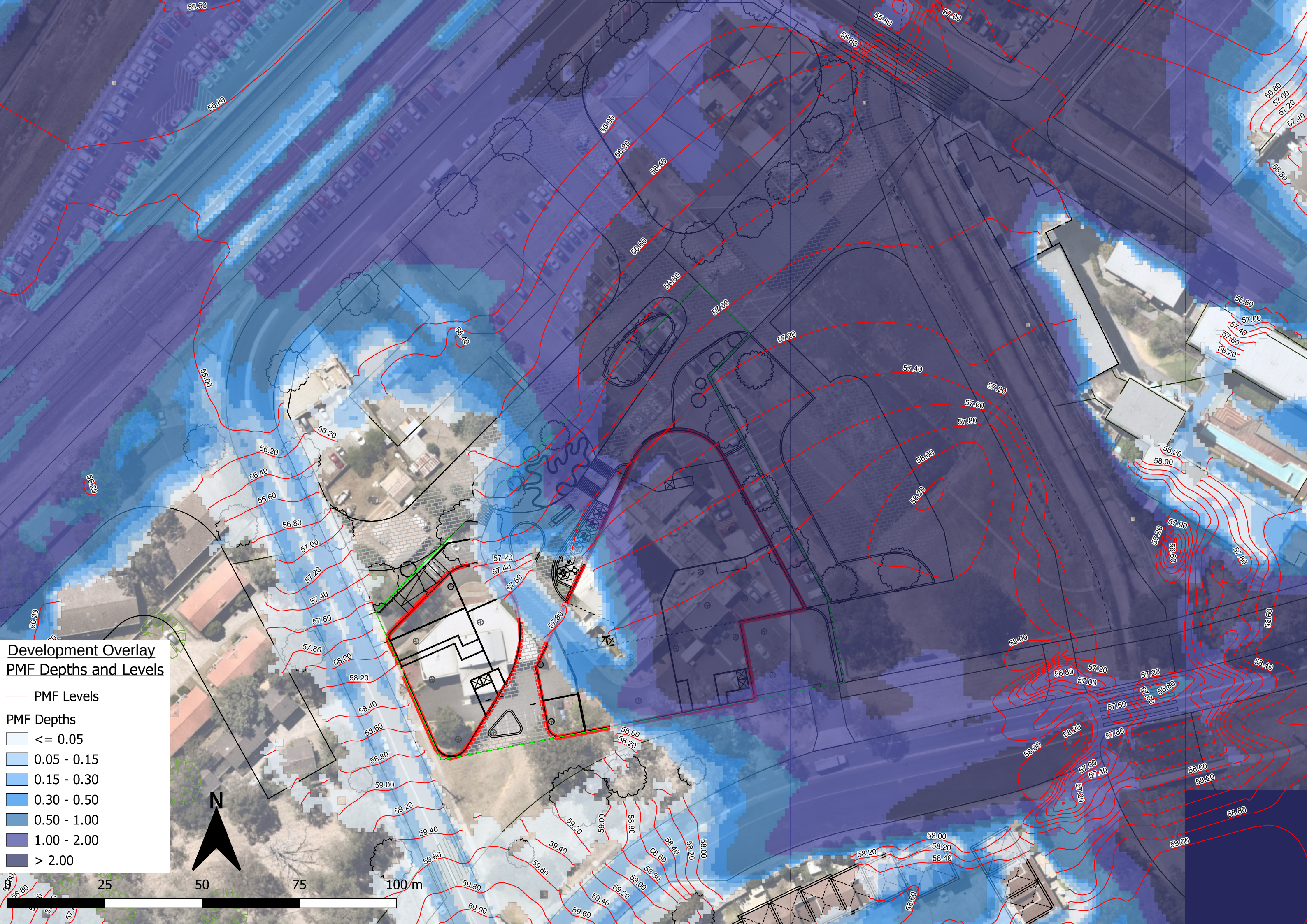




Development Overlay
1% AEP Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6



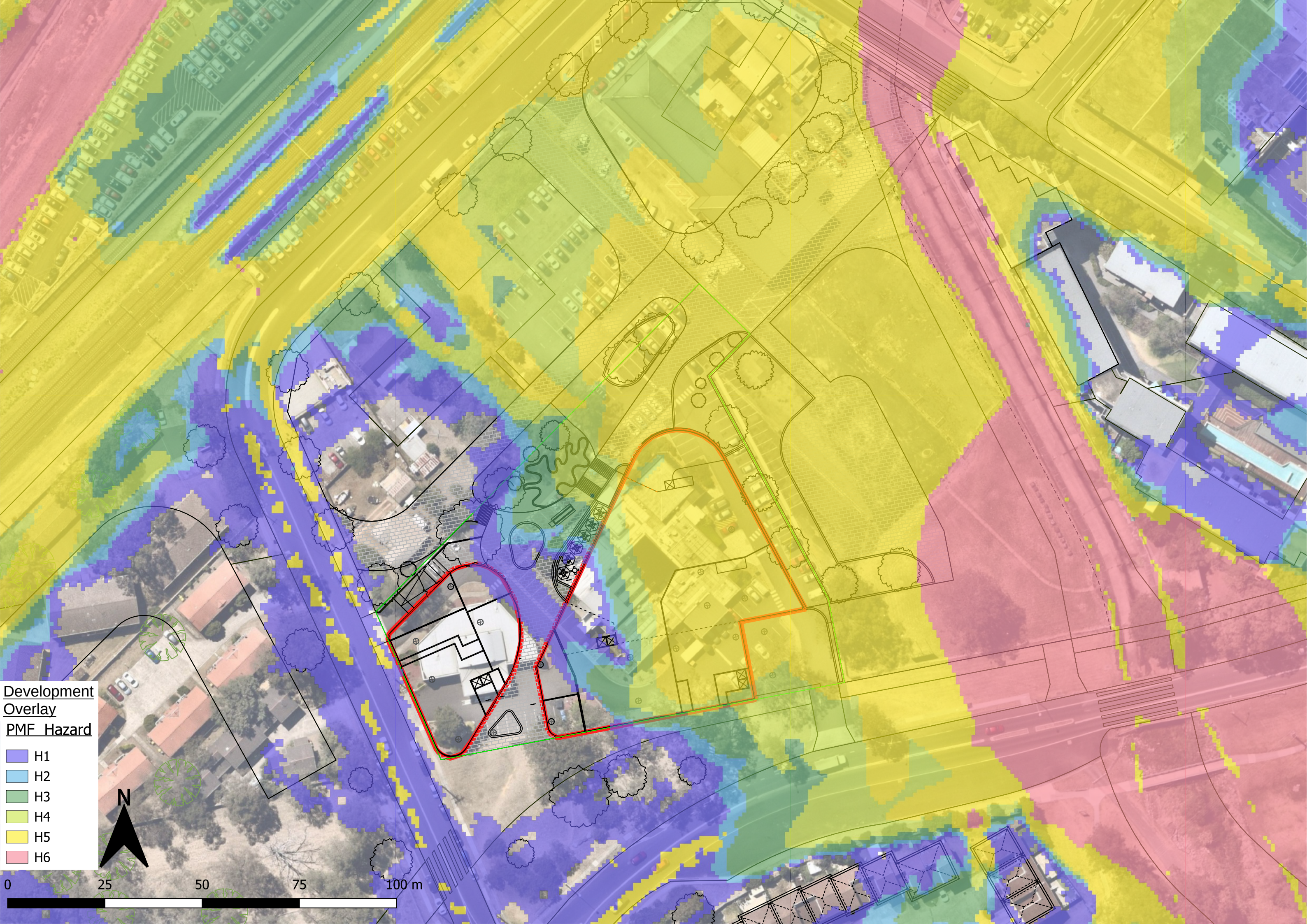


Development Overlay
PMF Depths and Levels

— PMF Levels

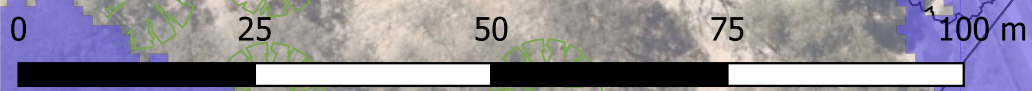
PMF Depths

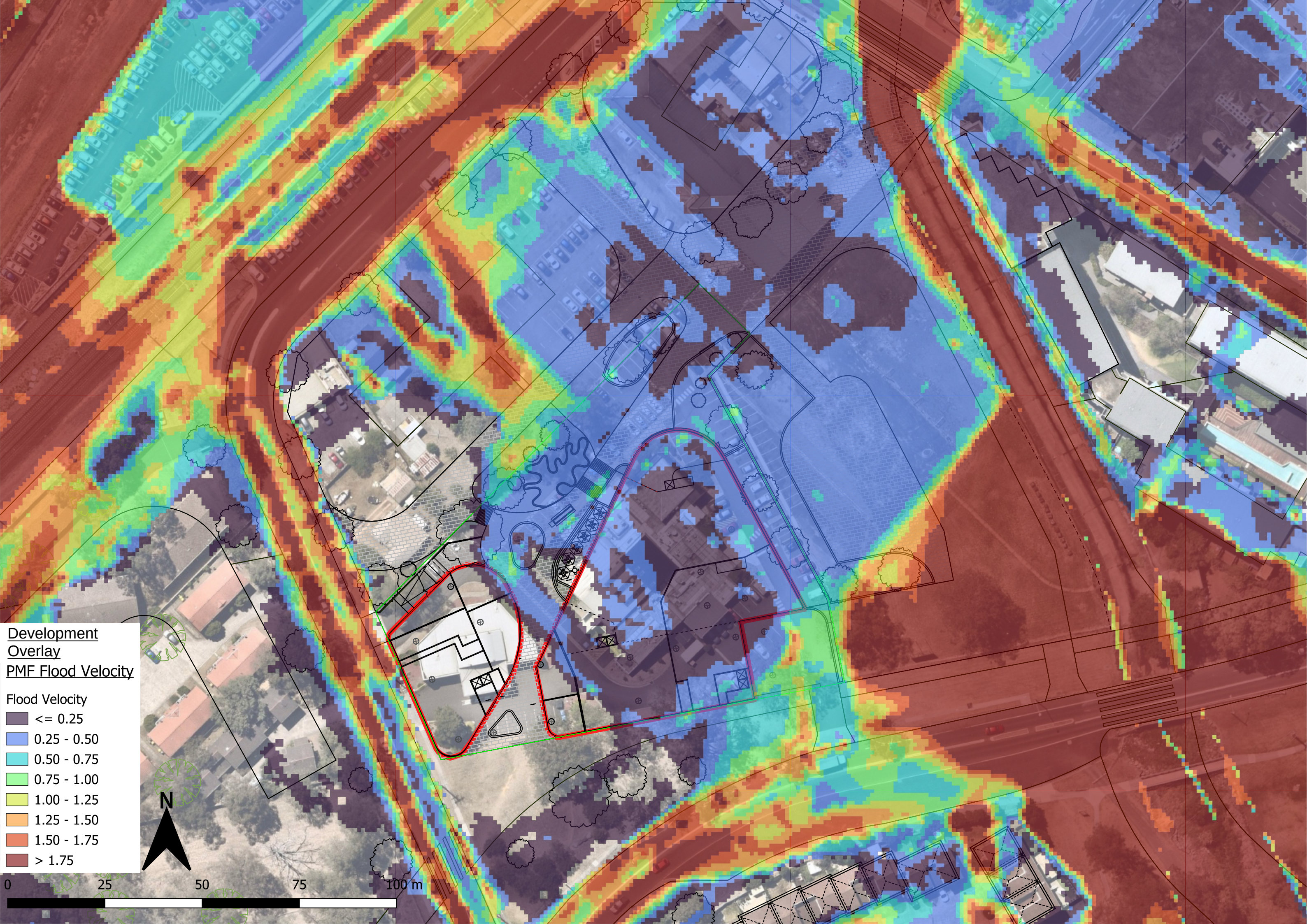
≤ 0.05
0.05 - 0.15
0.15 - 0.30
0.30 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00



Development
Overlay
PMF Hazard

- H1
- H2
- H3
- H4
- H5
- H6





Development
Overlay
PMF Flood Velocity

Flood Velocity

- ≤ 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- > 1.75

N

0 25 50 75 100 m