Flood Impact and Risk Assessment

SummitCare Penrith

Prepared for The Trustee for Peter Wohl Family Trust & The Trustee for Wohlren Family Trust c/o Centurion Project Management

9 September 2024

211227

TTW (NSW) Pty Ltd (ACN 113 578 377)
as trustee for the TTW NSW Trust
(ABN 59 514 956 558) I Consulting Engineers
Level 6, 73 Miller Street, North Sydney NSW 2050

Your Partner in Engineering

Contents

Rev	Date	Prepared By	Approved By	Remarks
1	12/06/2024	LC	EC	Draft
2	09/09/2024	LC	EC	Final

Glossary and Abbreviations

Annual Exceedance Probability	AEP	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage
Australian Height Datum	AHD	A common national surface level datum often used as a referenced level for ground, flood and flood levels, approximately corresponding to mean sea level.
Average Recurrence Interval	ARI	The long-term average number of years between the occurrence of a flood equal to or larger in size than the selected event. ARI is the historical way of describing a flood event. AEP is generally the preferred terminology.
Bureau of Meteorology	BoM	An executive agency of the Australian Government responsible for providing weather services to Australia and surrounding areas.
Development Control Plan	DCP	A Development Control Plan is a document prepared by the Council which provides detailed guidelines which assist a person proposing to undertake a development. A DCP must be consistent with the provisions and objectives of a Local Environmental Plan (LEP).
Finished Floor Level	FFL	The level, or height, at which the floor of a building or structure (including alterations and additions) is proposed to be built.
Flood hazard		A source of potential harm or a situation with a potential to cause loss of life, injury and economic loss due to flooding. Flood hazard is defined as a function of the relationship between flood depth and velocity.
Flood Planning Level	FPL	The combination of the flood level from the defined flood event and freeboard selected for flood risk management purposes.
Freeboard		A factor of safety typically used in relation to the setting of floor levels or levee crest levels. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action, localised hydraulic behaviour etc.
Local Environmental Plan	LEP	LEPs provide a framework that guides planning decisions for local government areas through zoning and development controls. Zoning determines how land can be used (for example, for housing, industry, or recreation).
New South Wales State Emergency Service	NSW SES	The NSW SES is an agency of the Government of New South Wales, is an emergency and rescue service dedicated to assisting the community in times of natural and man-made disasters.
Probable Maximum Flood	PMF	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain.
Representative Concentration Pathways	RCP	RCPs make predictions of how concentrations of greenhouse gases in the atmosphere will change in future as a result of human activities. The four RCPs range from very high (RCP8.5) through to very low (RCP2.6) future concentrations.
Severe Weather Warning		The Bureau of Meteorology issues Severe Weather Warnings whenever severe weather is occurring in an area or is expected to develop or move into an area. Severe Weather Warnings are issued for: • Sustained winds of gale force (63 km/h) or more

- Wind gusts of 90 km/h or more (100 km/h or more in Tasmania)
- Very heavy rain that may lead to flash flooding
- Widespread blizzards in Alpine areas
- Very large waves and high tides expected to cause unusually damaging or dangerous conditions on the coast

1.0 Introduction

TTW has been engaged by the Trustee for Peter Wohl Family Trust & The Trustee for Wohlren Family Trust c/o Centurion Project Management to provide a flood impact assessment for a proposed development at SummitCare Penrith, an aged care facility located at 366 Jamison Road, Jamisontown, NSW 2750. This report outlines the existing constraints of flooding at the site, alongside an assessment into the likely impacts of the proposed development in post-development conditions.

This Flood Impact and Risk Assessment report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the SummitCare Seniors Housing project in Penrith (SSD-68603709) dated 21 March 2024. Specifically, this report has been prepared to respond to the SEARs requirement outlined in Table 1.

Table 1: SEARS Reference 15

Ref.	Description	Section Ref.
15	▪ Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Flood Risk Management Manual.	Section 2.3 Section 4.4
	▪ Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01.	Section 4.2 Section 4.3 Section 4.5
	▪ Detail design solutions and operational procedures to mitigate flood risk where required.	Section 5.1

1.1 Reference Documents

This report has been prepared with reference to the following documents and guidelines:

- Australian Institute of Disaster Resilience (AIDR) Guideline 7-3: Flood Hazard (2017)
- Department of Planning and Environment (2021) Considering Flooding in Land Use Planning Guideline
- Department of Planning and Environment (2023) Flood Impact and Risk Assessment – Flood Risk Management Guide LU01
- FloodSafe guidelines and the relative FloodSafe Tool Kits
- NSW Department of Planning and Environment (2023) Flood Risk Management Manual (https://www.environment.nsw.gov.au/topics/water/floodplains/floodplain-manual\)
- NSW Maps Viewer (Spatial Collaboration Portal - Map Viewers (nsw.gov.au))
- NSW Planning Portal Spatial Viewer (https://www.planningportal.nsw.gov.au/spatialviewer/)
- NSW State Emergency Service (SES) Guidelines
- Penrith City Council (2010) Penrith Local Environmental Plan 2010, Available at: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2010-0540
- Penrith City Council (2018) Nepean River Flood Study, Available at: https://flooddata.ses.nsw.gov.au/related-dataset/nepean-river-flood-study-reporr
- Penrith City Council (2019) Peach Tree and Lower Surveyors Creeks Flood Study, Final Report, Volume 1, 2 and 3. Available at: https://flooddata.ses.nsw.gov.au/dataset/peach-tree-and-lower-surveyors-creek-flood-study-report
- Penrith City Council (2019) Penrith Development Control Plan 2014, Volume 1, Part C3 – Water Management. Available at: https://www.penrithcity.nsw.gov.au/building-development/planning-zoning/planning-controls/development-control-plans

1.2 Development Proposal

SummitCare Penrith is an existing aged care facility with a current capacity of 95 beds. It has been proposed that the site be upgraded to increase capacity, including an extension of the existing buildings to upgrade the site to a complex community home comprised of four buildings. The redevelopment of the site will provide additional beds, facilitating further growth.

Several concept design options for the site have been reviewed and tested. The current architectural concept site plan and concept 3D image is shown in Figure 1 and Figure 2, respectively. It should be noted that these are subject to change.

Figure 1: Proposed ground floor plan for the site (Source: Jackson Teece drawing number DA-110, dated 15 May 2024)

Figure 2: 3D concept design for the site (Source: Jackson Teece, dated 31 January 2024)

2.0 Existing Site

2.1 Location

SummitCare Penrith is situated 366 Jamison Road, Jamistown, NSW 2750, approximately 2km south of Penrith CBD, within the City of Penrith Local Government Area (LGA). The site is located within Lot 10 DP804382, with a total area of approximately 1.1 hectares.

The site is situated in a largely residential area, bordered by Jamison Road to the north, Harris Street to the west, McNaughton Street to the east, and residential properties to the south. The site is currently occupied by various community home buildings, external recreation areas and landscaping. The buildings onsite are currently concentrated to the north of the site boundary, while the southern portion of the Lot is undeveloped, open land. The northern portion of the Lot is zoned as R3 Medium Density Residential under the City of Penrith Local Environmental Plan (LEP) 2010, while the south of the Lot is zoned R2 Low Density Residential.

Although the community home sits on land above the lower floodplain of the Nepean River, the site is situated in close proximity to Peach Tree Creek, approximately 330m west of the site. Alongside mainstream flooding from this creek and its tributaries, the site is potentially subject to overland flooding and flash flooding from the local upstream stormwater catchment.

Figure 3: SummitCare Penrith site location and surrounding area (Source: Nearmap imagery taken 30th March 2024)

2.2 Topography

The ground surface within the site is typically quite flat, varying from a low of 26.5m AHD at the northwest corner of the site to a high of 27.7m AHD in the northeast. This is depicted in the 1-metre resolution Digital Elevation Model (DEM) of the site in Figure 4. The eastern portion of the site slopes towards a sag point on McNaughton Street, whilst the west of the site slopes towards the Peach Tree Creek in the northwest.

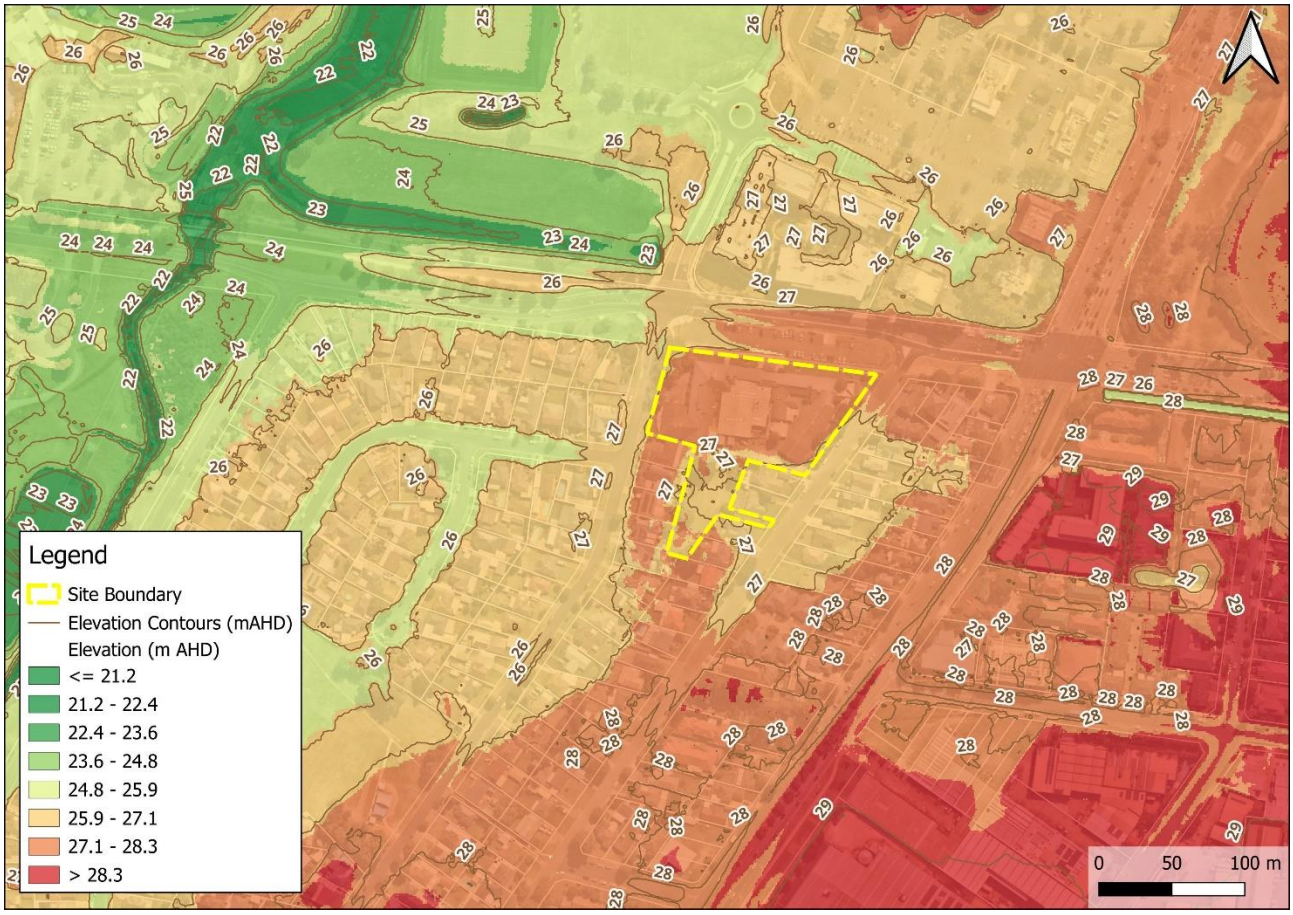


Figure 4: Topography of the site and surrounding area (Source: 1-metre DEM obtained from Elevation Information Systems (ELVIS), dated July 2019).

2.3 Catchment Description

The site is situated within the Peach Tree and Lower Surveyors Creek catchment, which is highly urbanised and includes a combination of residential, commercial and industrial areas with limited areas of open space. Figure 5 presents the site location in relation to nearby watercourses. The site is approximately 150m west of the Racecourse Channel, 330m east of Peach Tree Creek, 700m south of the Showground Channel and 1km east of the Nepean River. As shown in Figure 5, Peach Tree Creek drains into the Nepean River, and it also forms the western boundary of the Peach Tree and Lower Surveyors Creeks catchment. Consequently, flooding within the Nepean River can have a substantial impact on flood behaviour across the western sections of the catchment.

The Nepean River Flood Study (2018) was prepared by Advisian on behalf of Penrith City Council to define existing design flood behaviour along the Nepean River. Model results indicate a backwater effect along Peach Tree Creek to Jamison Road. In the 1% AEP flood, floodwaters overtop the Nepean River banks and discharge into Peach Tree Creek. Figure 6 presents the flood characteristics in the region, with Jamison Road affected by initial backwater flooding, and further inundation when the levee is overtopped. The site itself is unaffected. However, it should be noted that this study focuses on mainstream flooding along the Nepean River only, and does not include an assessment of flooding from the Peach Tree and Surveyors Creek catchment. The site is consequently vulnerable to mainstream flooding from water overtopping the banks of the Peach Tree Creek, alongside inundation from the adjoining Nepean River.

In addition, there is also potential for the capacity of the stormwater system to be exceeded, leading to local overland flooding over the site. This was assessed in the Peach Tree and Lower Surveyor Creek Flood Study (City of Penrith, 2019). Figure 7 presents the capacity of the stormwater system surrounding the site, with two pipes east of the site (along McNaughton Street) failing in 50% Annual Exceedance Probability events or worse.

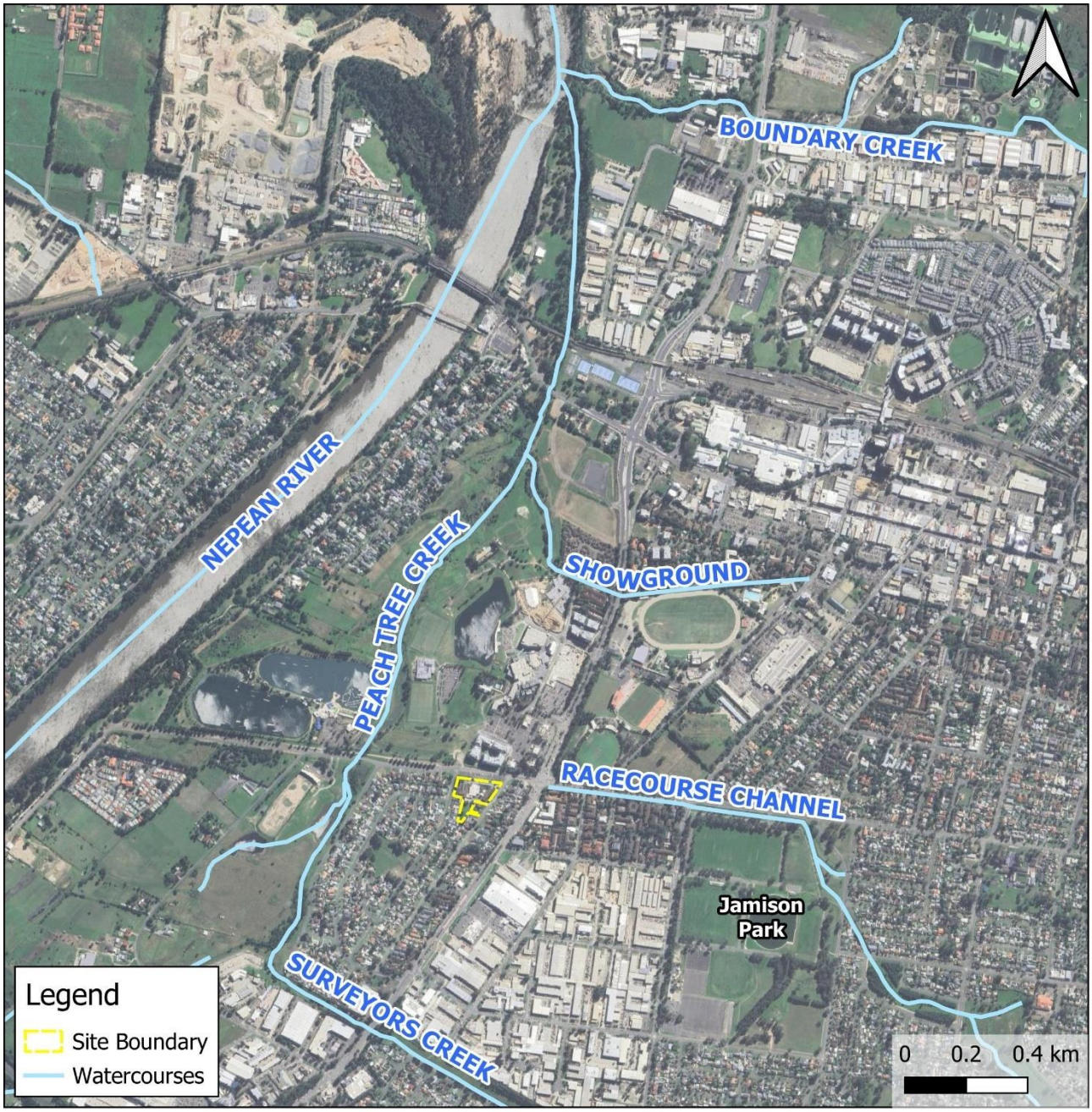


Figure 5: Watercourses in the area surrounding the site (Source: SixMaps)

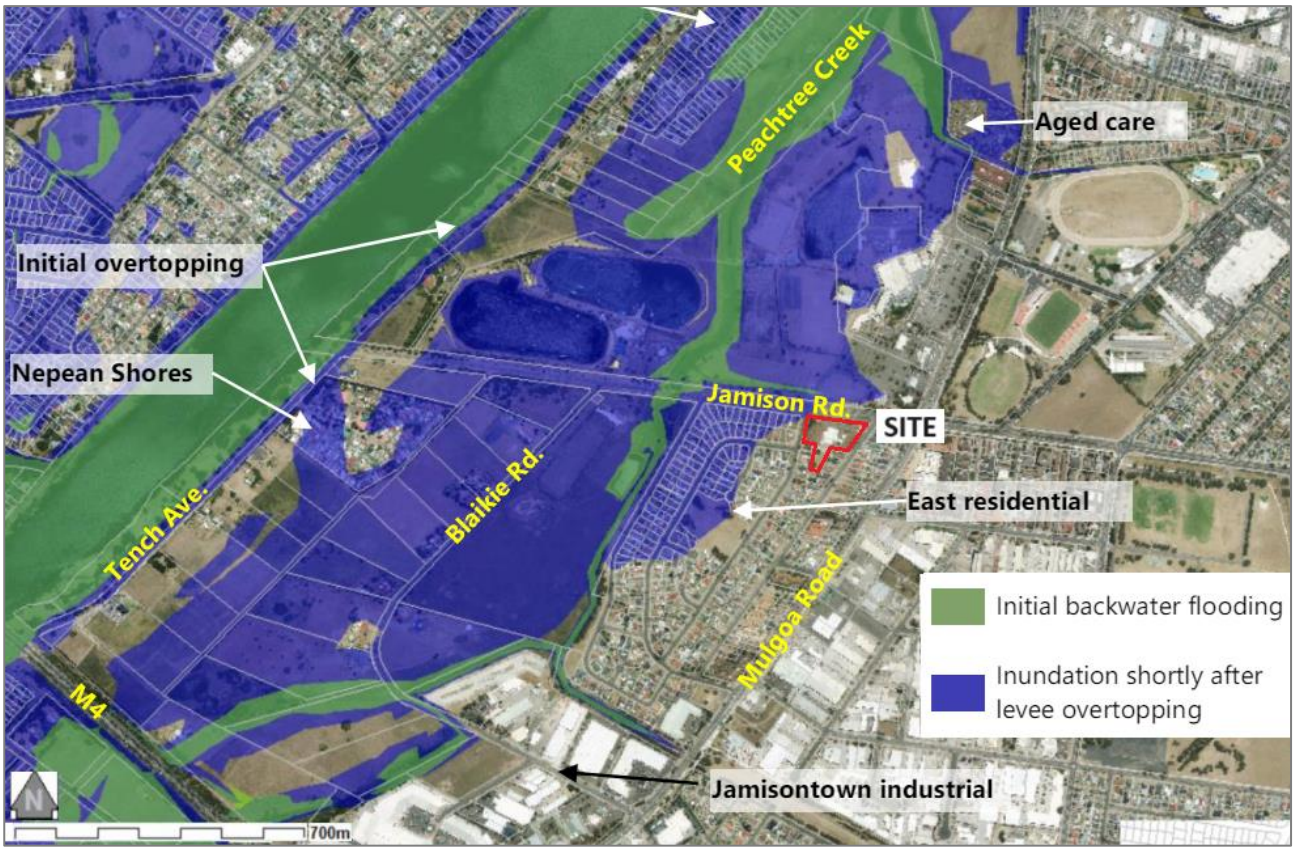


Figure 6: Flood characteristics during a Nepean River flood (Source: Nepean River Flood Study, 2019)

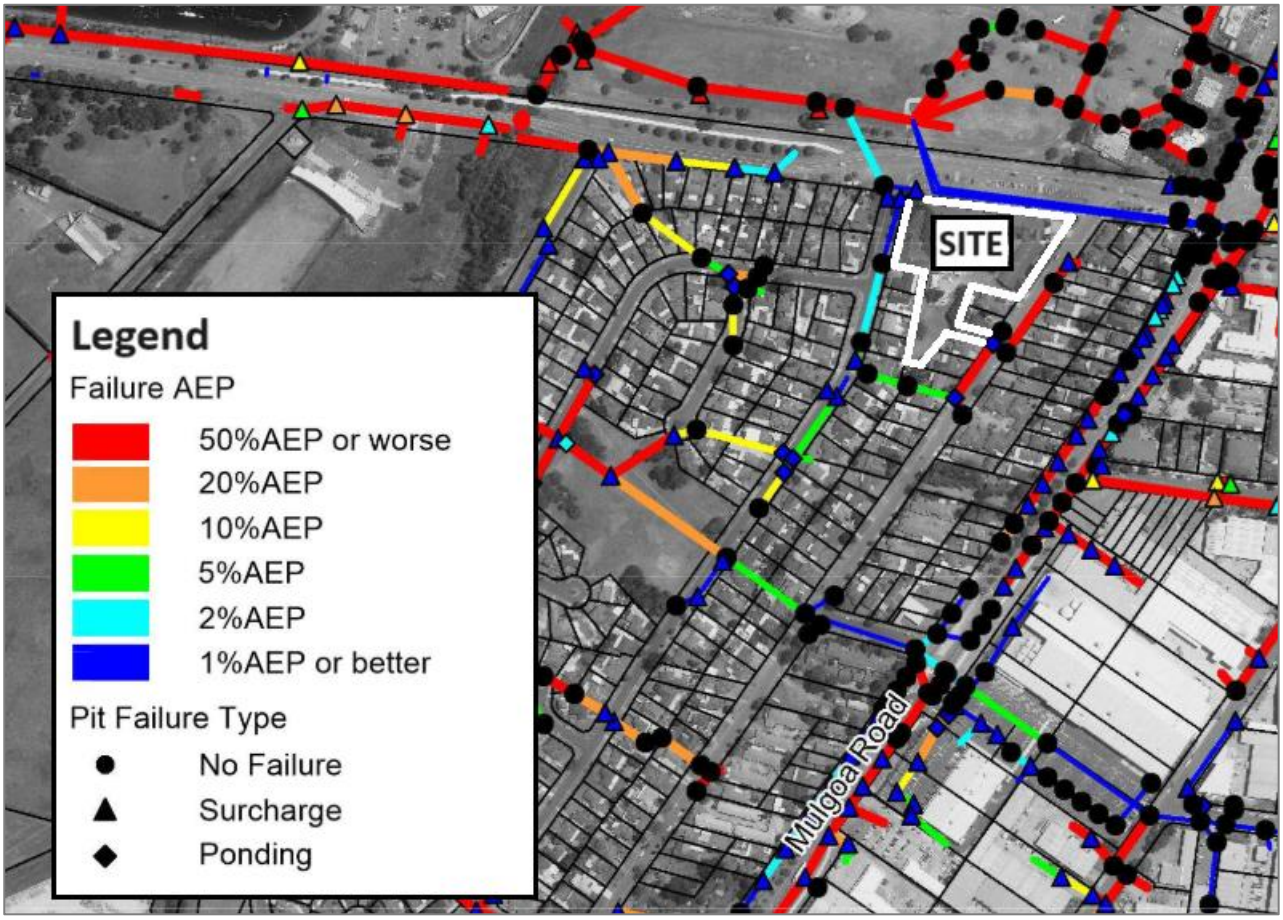


Figure 7: Stormwater capacity surrounding the site. (Source: Peach Tree and Lower Surveyors Creek Flood Study, 2019, Figure 43.2)

3.0 Hydraulic Model

3.1 Peach Tree and Lower Surveyors Creek Flood Study (2019)

Penrith City Council engaged Catchment Simulation Solutions to complete the Peach Tree and Lower Surveyors Creek Flood Study in 2019, which assessed flood behaviour and impacts in the area. The study considered not only mainstream flooding from Peach Tree Creek and its tributaries, but also the impacts of urban stormwater flooding and overland flows.

The Peach Tree and Lower Surveyors Creeks Flood Study covers an area of 1,250 hectares within the Penrith City Council Local Government Area (LGA). The study involved the construction of a hydrologic XP-RAFTS flood model to simulate the transformation of rainfall into runoff. The resulting hydrographs were then fed into a 2D hydraulic model using TUFLOW software to simulate the movement of runoff across the catchment. The TUFLOW model extent is shown in Figure 8.

TTW obtained Penrith City Council's TUFLOW model developed for the Peach Tree and Lower Surveyors Creek Flood Study (2019). For the existing (pre-development) scenario, no changes were made to Council's flood model. Flood modelling was completed for the 10% AEP, 5% AEP, 1% AEP, 0.5% AEP and 0.2% AEP events, alongside the Probable Maximum Flood (PMF). The critical duration for the site (i.e. the storm duration that produces the highest flood levels) was identified as the 120-minute storm for the 1% and 0.5% AEP events, and the 45-minute storm for the PMF.

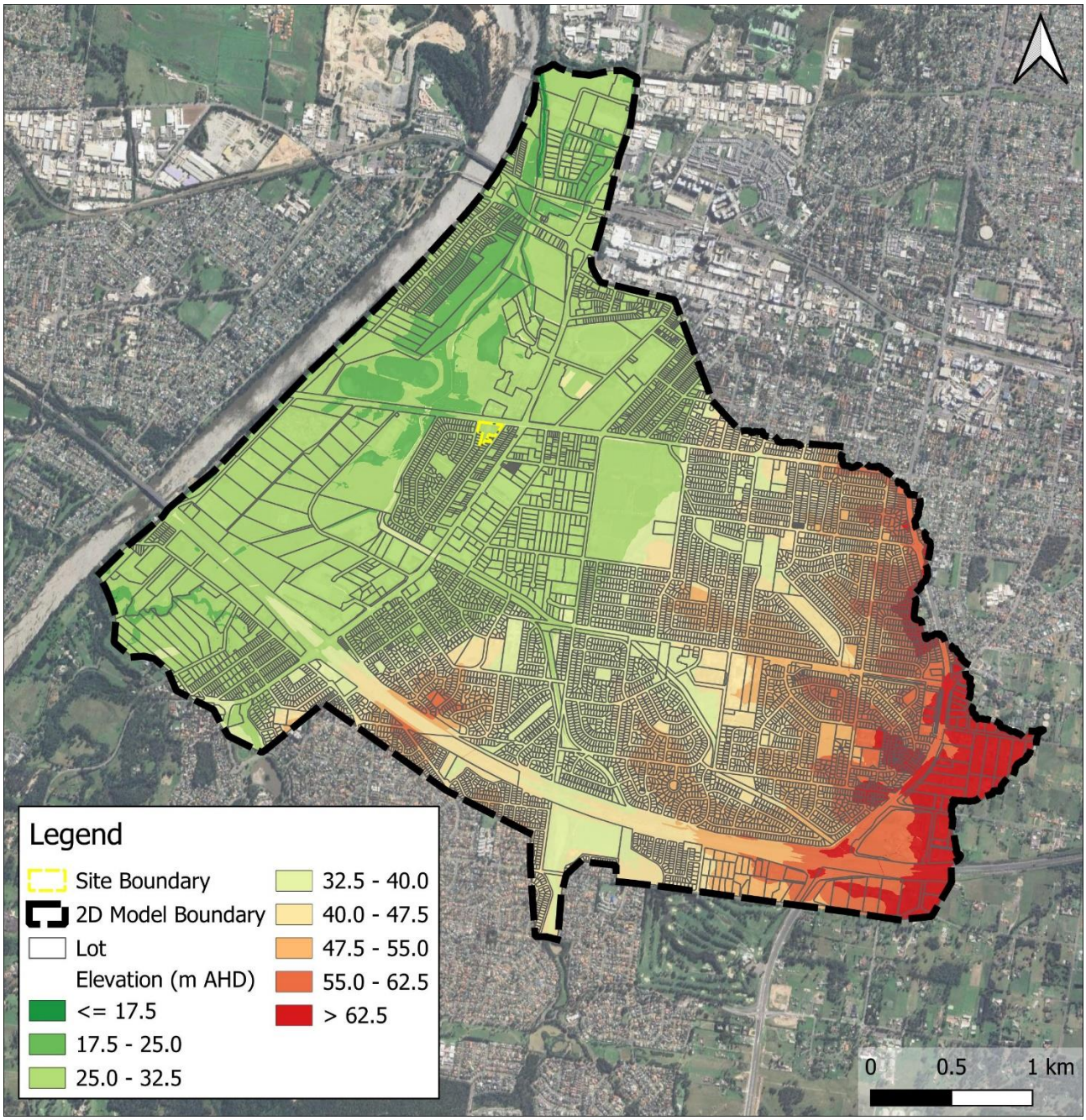


Figure 8: Peach Tree and Lower Surveyors Creek Flood Study model extent in relation to the site

3.2 Flood Hazard Assessment

The relative vulnerability of the community to flood hazard has been assessed by 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 presented in Figure 9, 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 2 outlines the threshold limits for each hazard category.

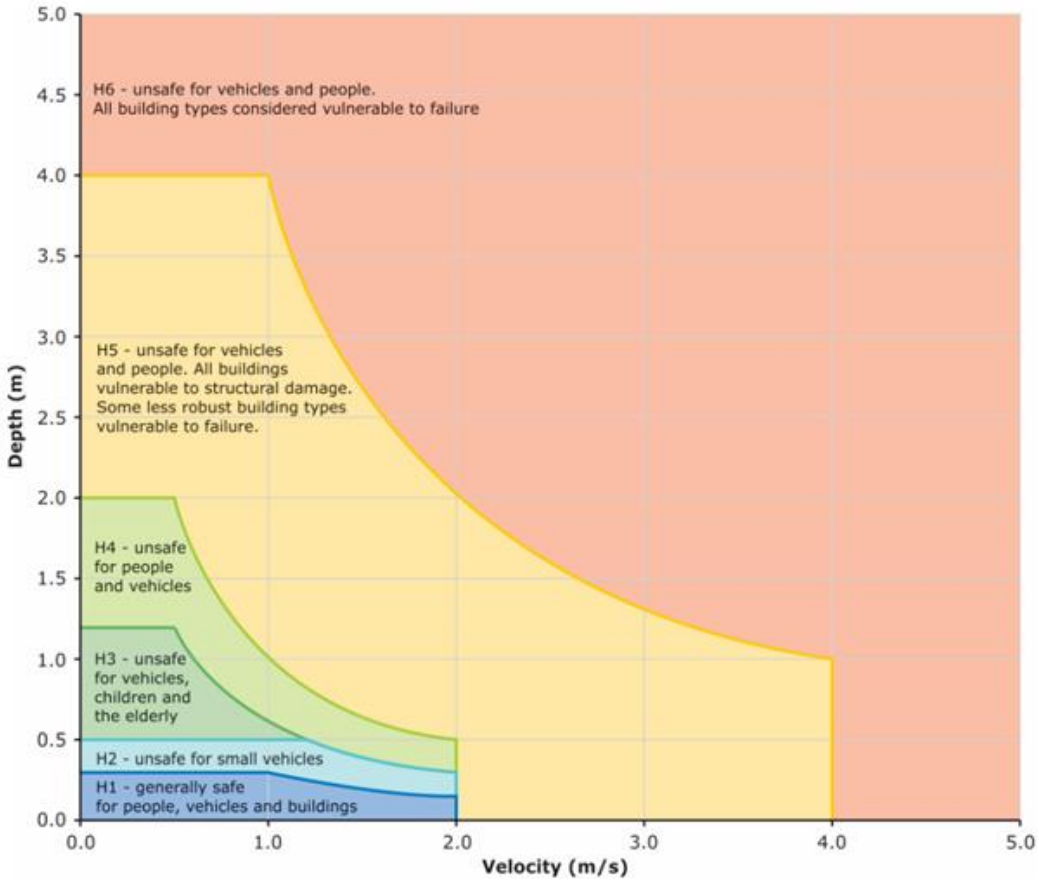


Figure 9: Flood hazard vulnerability curve (Source: Flood Risk Management Guide FB03 - Flood Hazard, NSW Department of Planning and Environment, 2022)

Table 2: Hazard vulnerability threshold limits

Hazard Classification	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	–	–

4.0 Flood Model Results

4.1 Existing Flood Conditions

The peak flood levels, depths, velocities, and hazard categories in the critical duration 1% AEP event for the existing site conditions are shown in Figure 10, Figure 11 and Figure 12, respectively. Figure 13, Figure 14 and Figure 15 illustrate the PMF depths, velocity, and hazard information under existing conditions. Flood depth and level maps for the 10% AEP, 5% AEP, 0.5% AEP and 0.2% AEP events are attached in Appendix A. Table 3 outlines the maximum flood level along McNaughton Street, east of the site, in all modelled design events. The flood level markers in Figure 10 and Figure 13 indicate where these levels were taken from.

Upon review of the model outputs, the following observations have been made:

- The majority of the site is situated outside the 1% AEP flood extent (see Figure 10). McNaughton Street is affected by overland flows in all modelled events, including the 10% AEP event. This is reflective of the limited capacity of the stormwater pipes here, which were found to reach full capacity in events as frequent as the 50% AEP event.
- In the 1% AEP event, depths along McNaughton Street reach a maximum of 780mm within the gutter, while the flood level reaches a maximum of 27.13 m AHD. In the Penrith City Council LEP, the Flood Planning Level (FPL) for the LGA is defined as the 1% AEP flood level plus 0.5 m freeboard. For the site, this equates to a minimum ground floor level of 27.63m AHD. Currently, the existing buildings have a ground floor level of approximately 27.75m-27.80m.
- The site is minimally affected in the 1% AEP event, with the exception of some small areas towards the eastern boundary and the access path onto McNaughton Street. Raised ground levels or new buildings will be avoided here to prevent any adverse flood impact to the adjacent properties.
- In the 1% AEP event, flooding within the site boundary is low hazard (H1-H2 hazard level). Along McNaughton Street, where the existing stormwater system surcharges, flows are categorized as H3 hazard (unsafe for vehicles, children, and the elderly). Similarly, floodwaters along the western portion of Jamison Road reach H4-H5 hazard (unsafe for vehicles and people) where the Peach Tree Creek is conveyed below Jamison Road Bridge. However, egress from the site is possible on low hazard roads heading east on Jamison Road.
- In the PMF event, flood depths reach a maximum of 2.0m along McNaughton Street, with a level of 28.40m AHD. In this event, floodwaters extend much further across the site, with only a small area to the northeast that is unaffected. In terms of hazard levels, the majority of flows at the site are categorised as H3 hazard level. However, flows across the currently undeveloped southern portion of the property reach a H4 hazard level. Access roads are also affected by high hazard flows in the PMF, including Jamison Road (in both directions), Mulgoa Road, Harris Street and McNaughton Street.

Table 3: Flood level along McNaughton St in each design flood event. Flood level marker location shown in Figure 10

Flood Level (m AHD) on McNaughton Street					
10% AEP	**5% AEP**	**1% AEP**	**0.5% AEP**	**0.2% AEP**	**PMF**
26.70	26.77	27.13	27.33	27.43	28.06

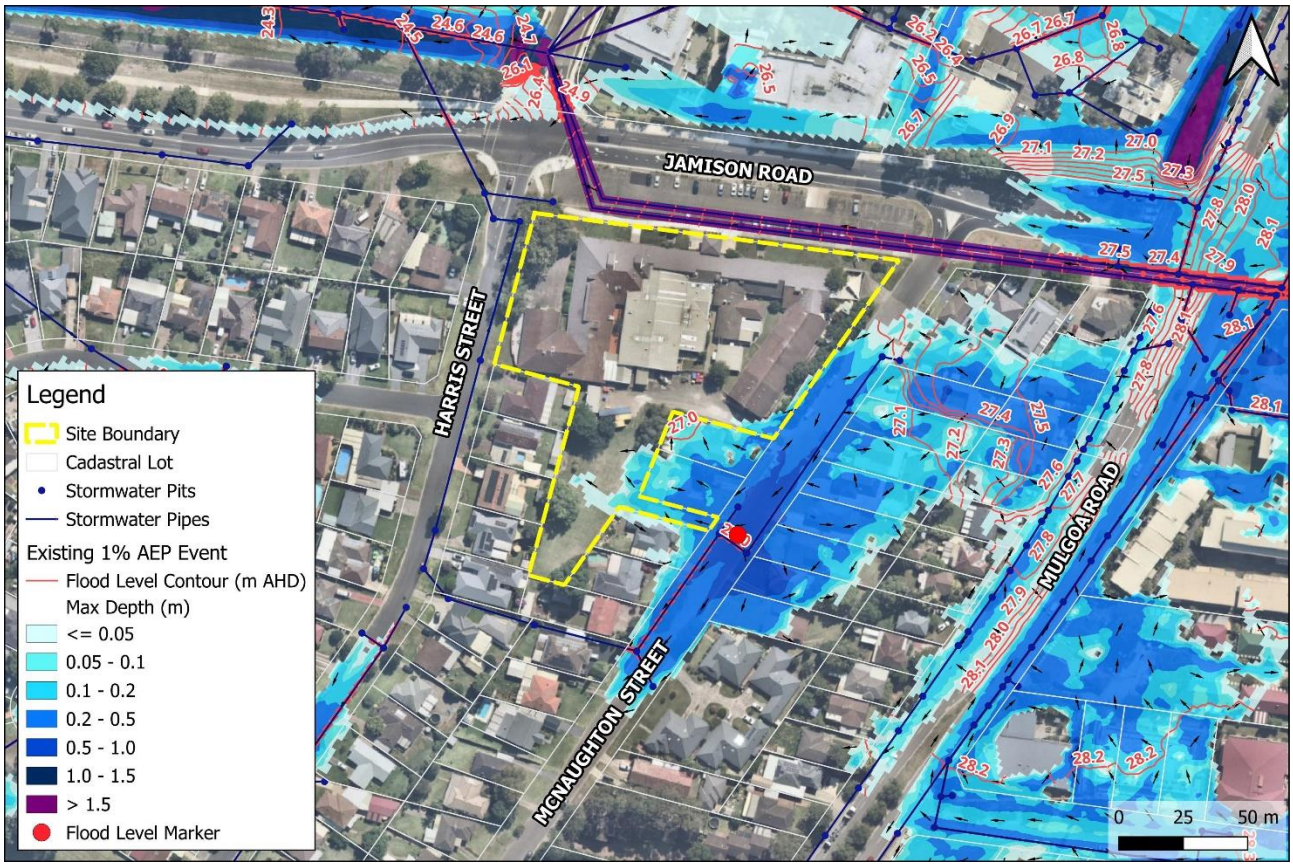


Figure 10: 1% AEP flood depths and levels at the site under existing conditions

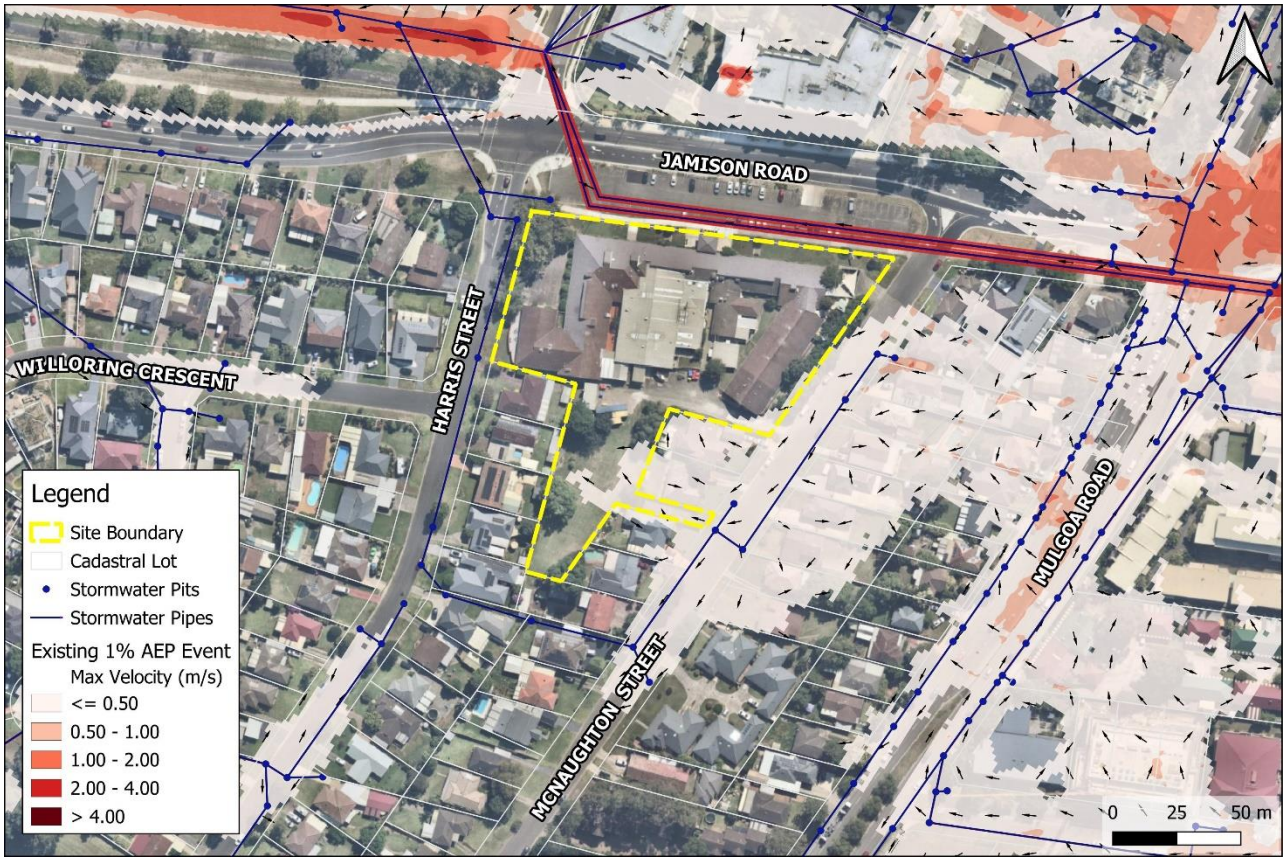


Figure 11: 1% AEP flood velocities at the site under existing conditions

Figure 12: 1% AEP flood hazard levels at the site under existing conditions

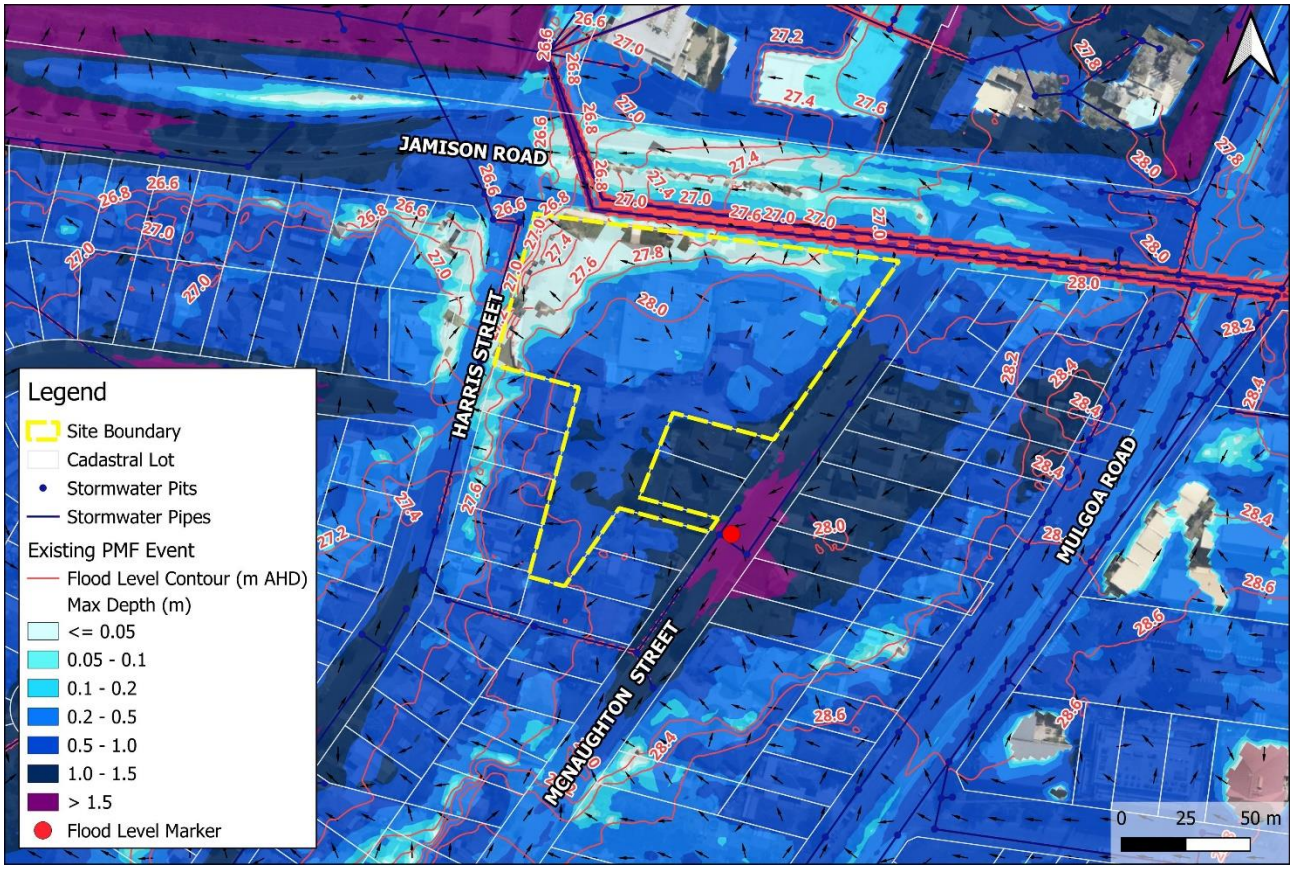


Figure 13: PMF depths and levels at the site under existing conditions

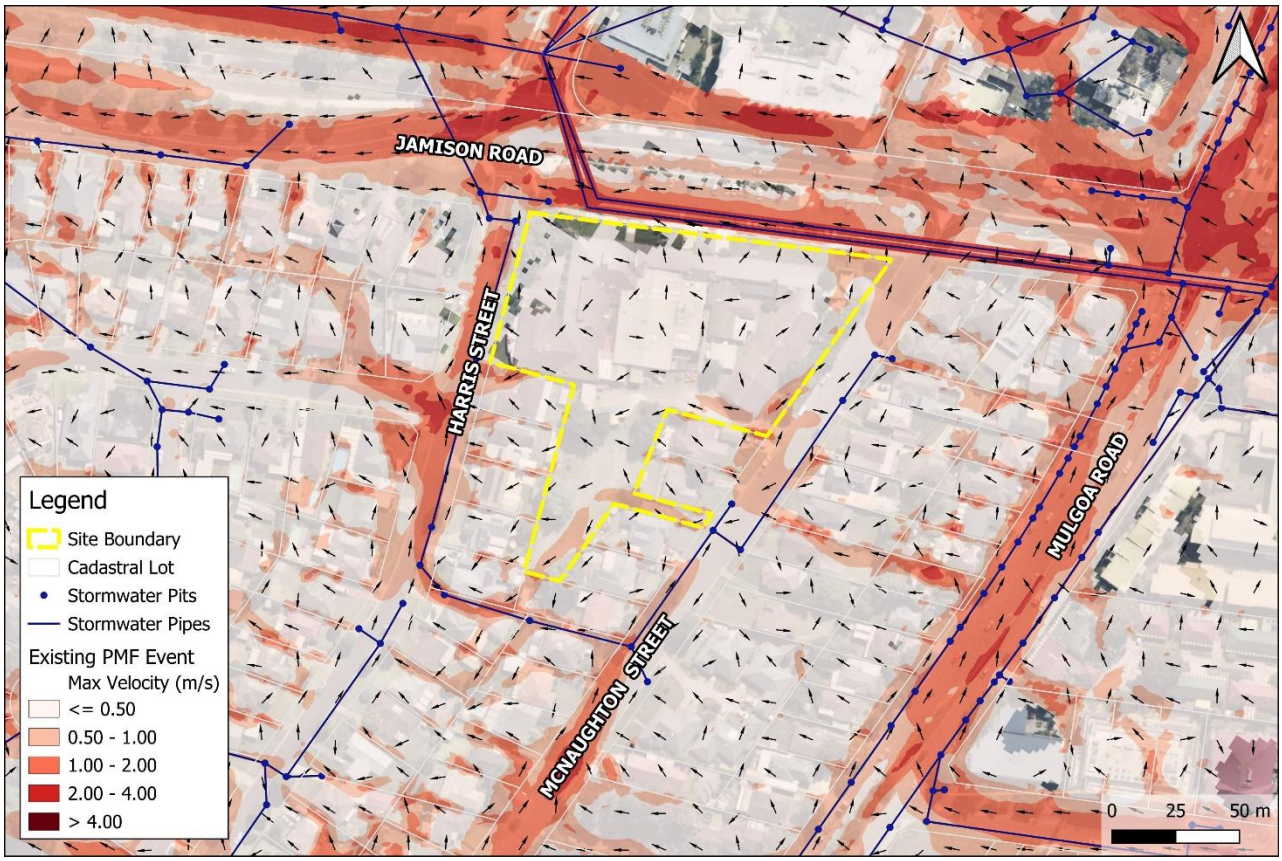


Figure 14: PMF velocities at the site under existing conditions

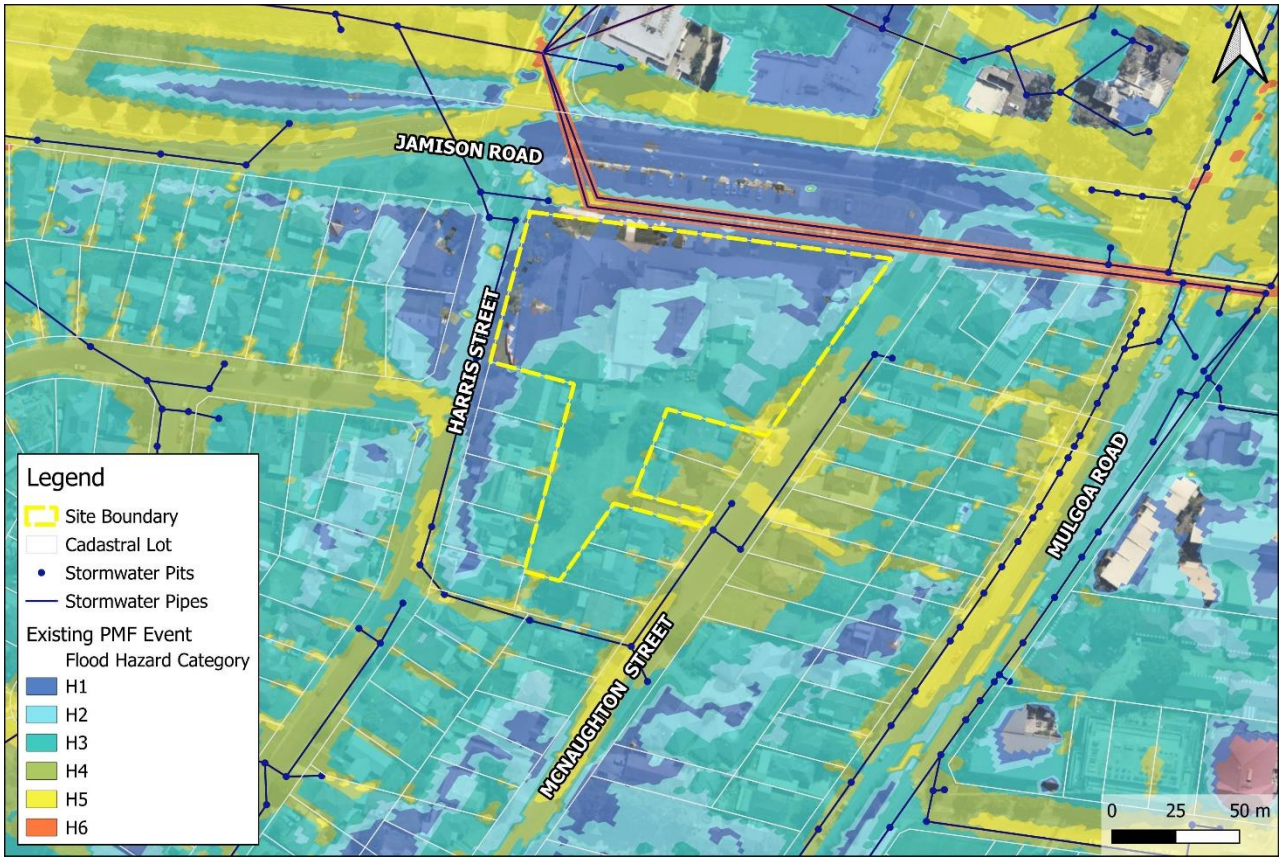


Figure 15: PMF hazard levels at the site under existing conditions

4.2 Post-Development Flood Conditions

To allow for flood assessment of the site in post development conditions, the existing flood model has been modified to include the proposed buildings. The proposed building footprints were based on the latest architecture plans of the site obtained from Jackson Teece, dated 15 May 2024.

The peak flood levels, depths, velocities, and hazard categories in the critical duration 1% AEP event for the post-development site conditions are shown in Figure 19, Figure 20 and Figure 21, respectively. The peak depths, velocity, and hazard information in the PMF event under post-development conditions are presented in Figure 19, Figure 20 and Figure 21. Results for the 0.5% AEP event are attached in Appendix B. As the proposed development does not have any impact on flood levels in the 1% AEP event (see Section 4.3 for further discussion), it was not deemed necessary to run the lower magnitude, higher frequency events in the post-development scenario.

In the 1% AEP event, the flood level on McNaughton Street (marked in Figure 16) is 27.04m AHD, with no change from the existing scenario. In the PMF, the flood level is 28.02m AHD, compared with 28.06m AHD in the existing scenario. The proposed development ultimately has a negligible impact on overall flood behaviour. Section 4.3 provides a more detailed assessment of the impact of the proposed development on 1% AEP flood levels.

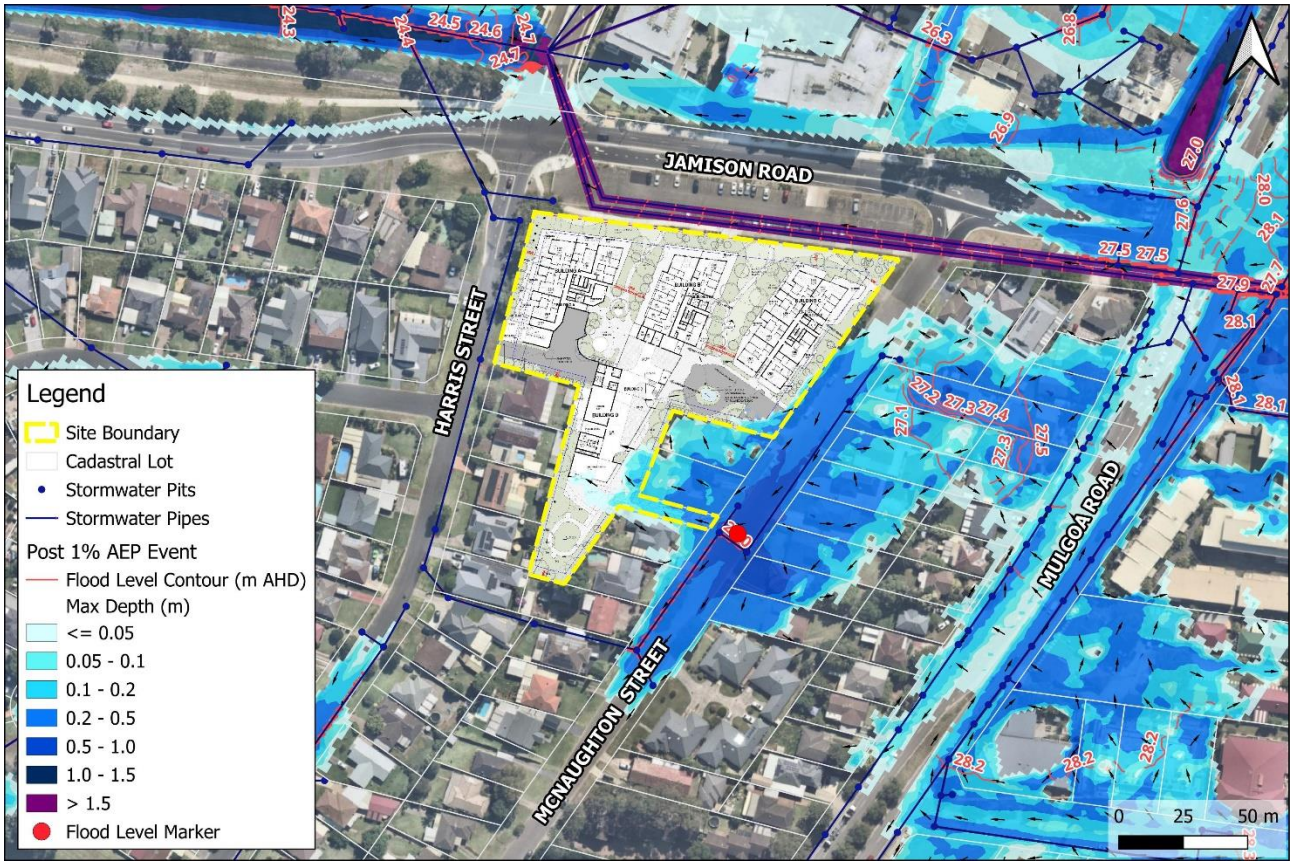


Figure 16: 1% AEP flood depths and levels at the site under post-development conditions

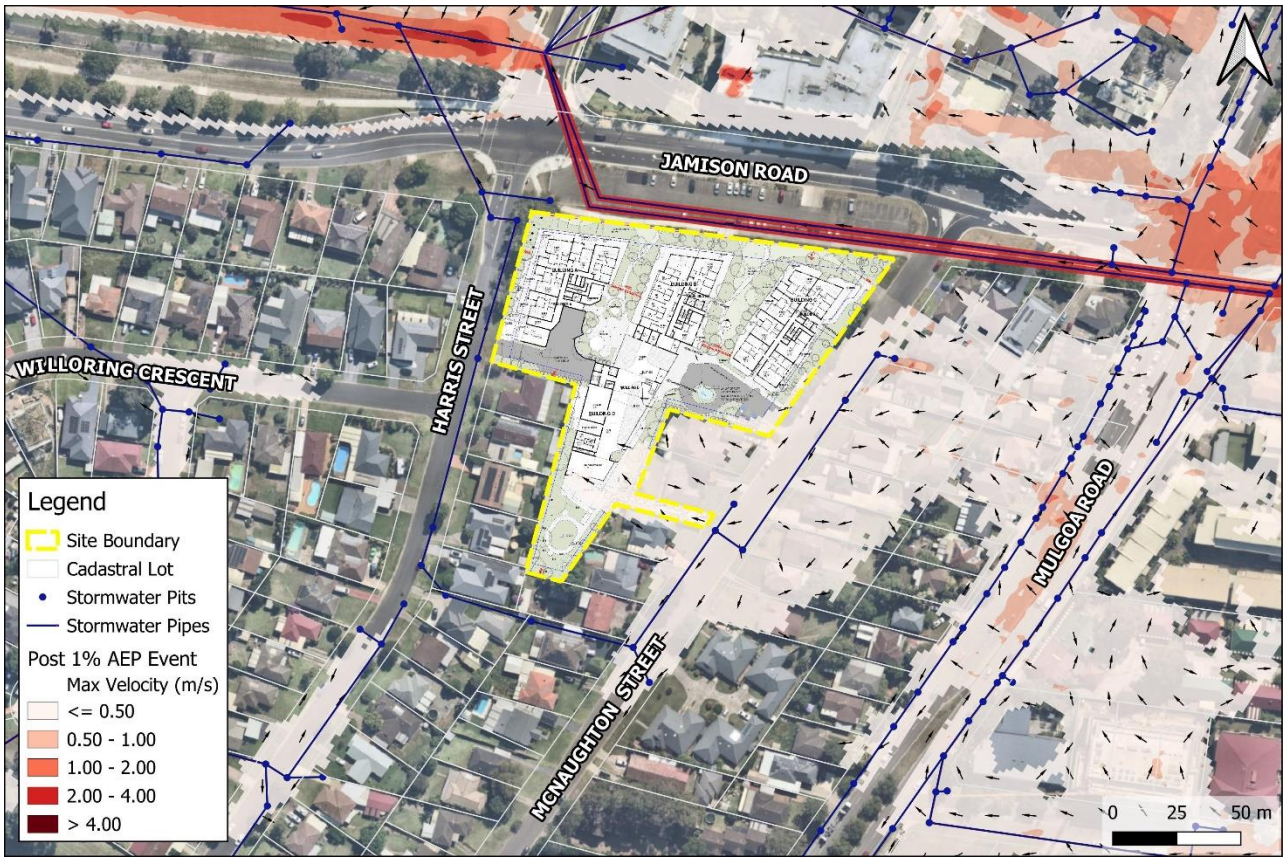


Figure 17: 1% AEP flood velocities at the site under post-development conditions

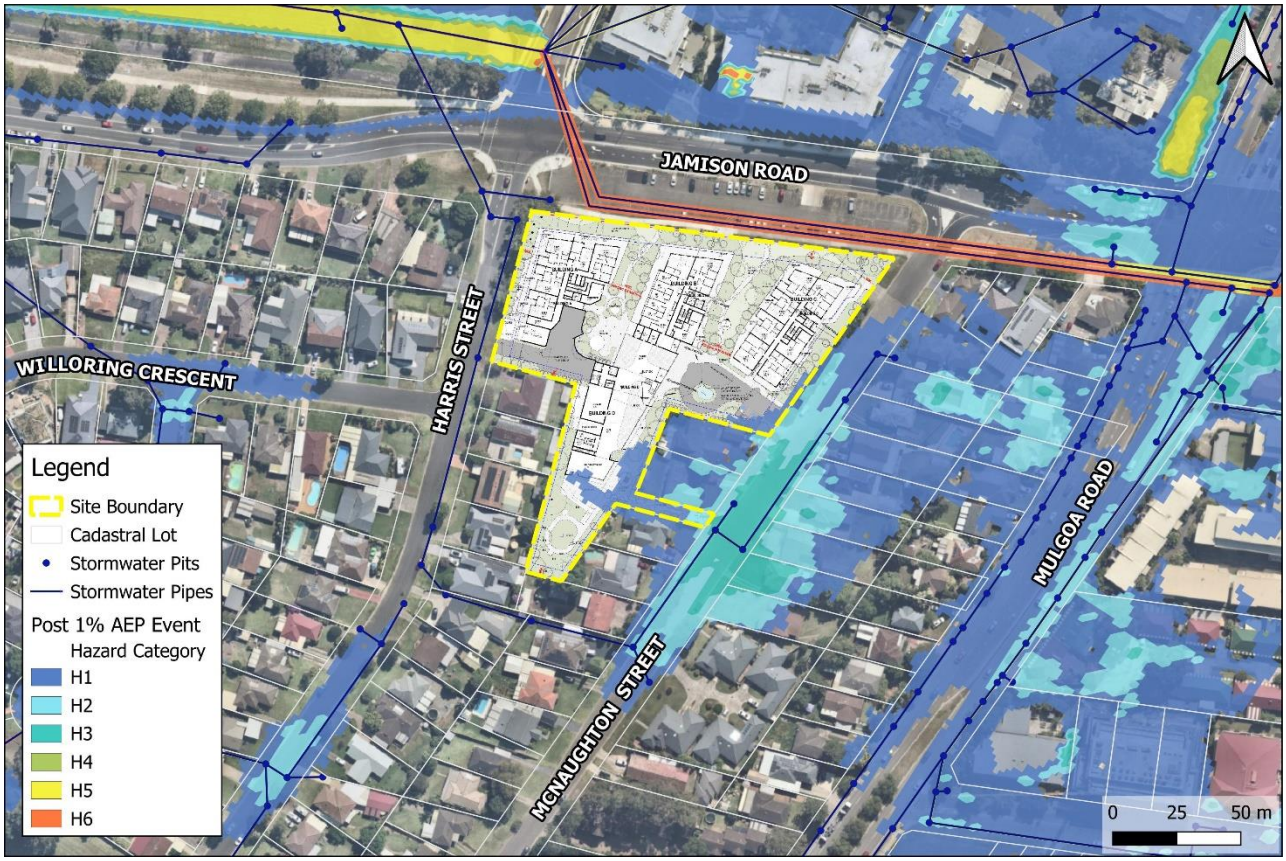


Figure 18: 1% AEP flood hazard levels at the site under post-development conditions

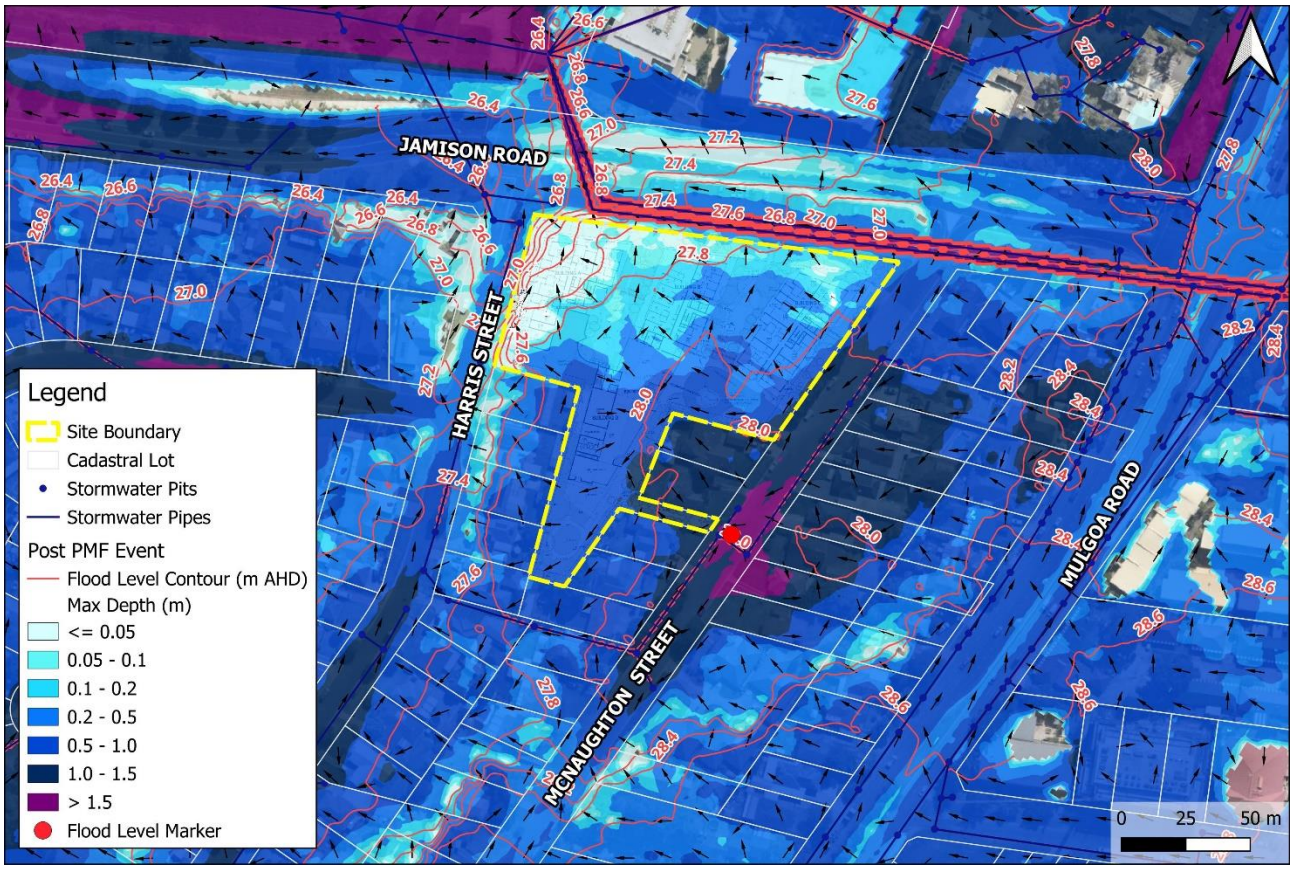


Figure 19: PMF flood depths and levels at the site under post-development conditions

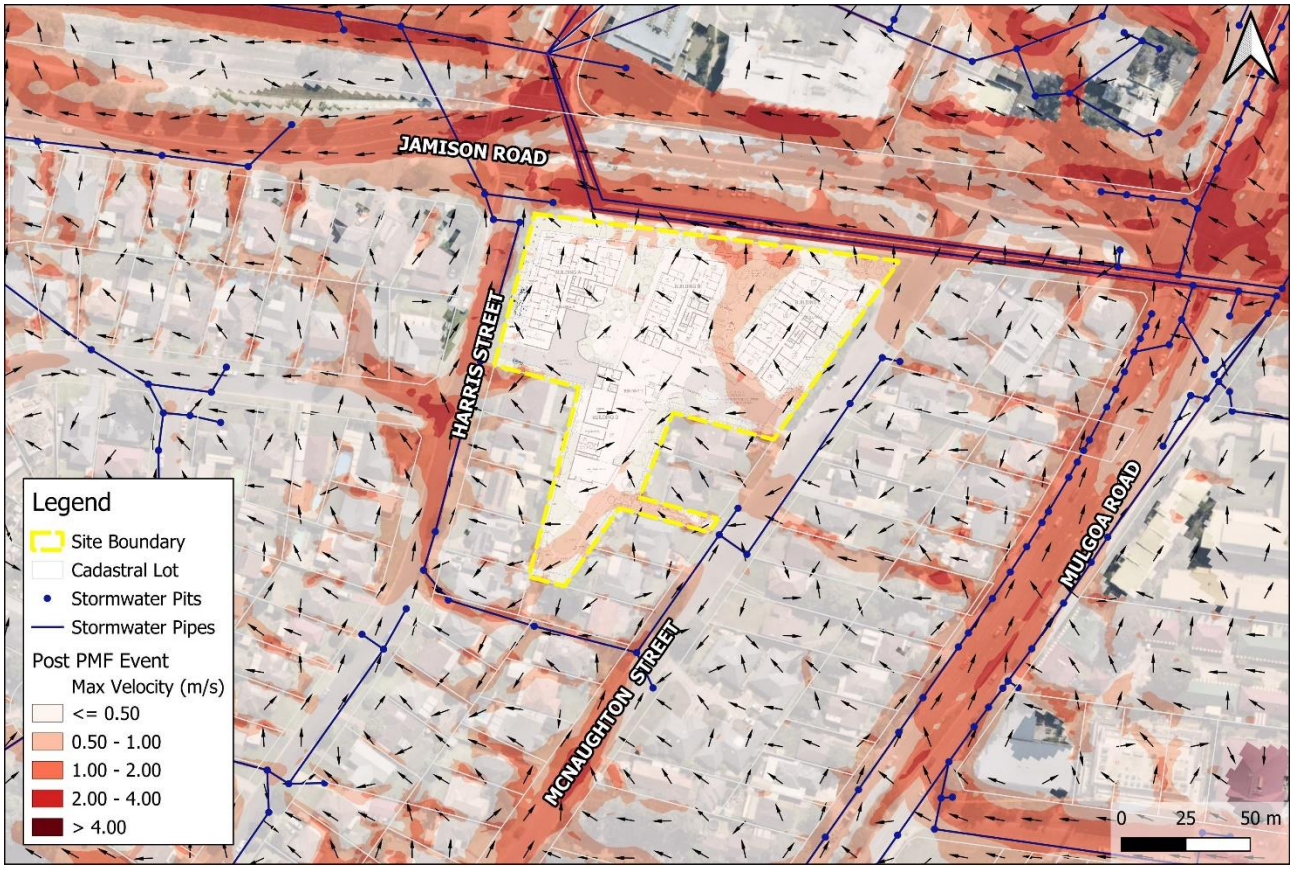


Figure 20: PMF flood velocities at the site under post-development conditions

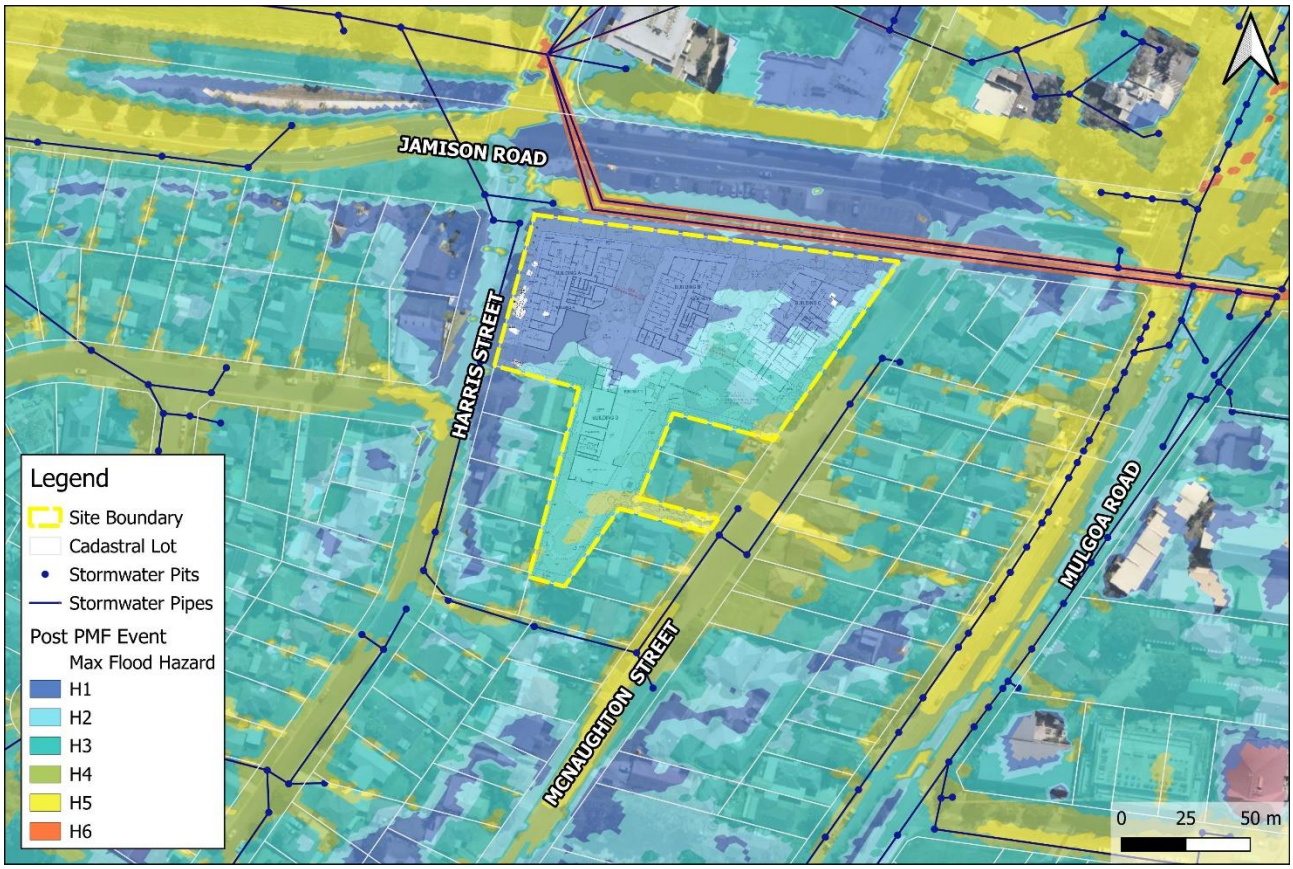


Figure 21: PMF flood hazard levels at the site under post-development conditions

4.3 Offsite Impacts

A flood impact assessment has been carried out to ensure the proposed development would not result in either an unacceptable flood level increase or worsening of the flood conditions over the neighbouring properties in the 1% AEP flood event. This impact assessment incorporated unfiltered results (i.e. considering all wet cells, and not only those affected by depths exceeding 0.1m). The flood level impact map for the proposed development in the 1% AEP event is shown in Figure 22.

The flood impact assessment confirms that the change to flood levels as a result of the proposed development is negligible and limited to a maximum increase of 0.007m north of Jamison Road.

Figure 22: Difference in 1% AEP flood level – existing vs post-development scenario (impact of proposed development)

4.4 Climate Change

Council's Peach Tree and Lower Surveyors Creek Flood Study provides an assessment of the potential impact that climate change may have on the current flood risk across the study area, based on the interim climate change factors published in Australian Rainfall and Runoff (Geoscience Australia, 2016). The flood study assessed the impact of a 9.1% increase in rainfall as the best estimate of likely rainfall intensity increases by 2090 under RCP4.5, and a 18.6% increase under RCP8.5. These increases were applied to current 1% AEP rainfall. Model outputs demonstrated a 100mm increase in flood level at McNaughton Street under RCP4.5, and a 200mm increase under RCP8.5.

Based on the 1% AEP event model results, this would equate to a level of 27.24m AHD (27.04m AHD + 200mm), which is equivalent to the 0.5% AEP flood level of 27.29m AHD (see Table 4, Section 4.5). With a proposed FFL between 27.70–27.80m AHD, the proposed buildings are therefore set above the climate change scenarios flood level, and above the 0.5% AEP event, with no adverse impact outside the development site.

4.5 Summary of Findings

The flood levels at two points across the site in the 1% AEP, 0.5% AEP and PMF events are summarised in Table 4. Point A is located at the driveway onto Harris Street, which leads into the basement car park, while Point B is adjacent to the driveway access onto McNaughton Street. Refer to Figure 23 for specific point locations. As shown in the Table, the development has minimal impact on flood levels at both locations, in all modelled scenarios.

Table 4: Summary of flood levels at two locations around the site

Point	Existing Flood Level (m AHD)			Post-Development Flood Level (m AHD)		
	1% AEP	0.5%	PMF	1% AEP	0.5% AEP	PMF
A	N/A	N/A	26.98	N/A	N/A	26.95
B	27.044	27.289	28.03	27.044	27.293	28.00

Figure 23: Locations where flood level information has been extracted (see Table 4)

5.0 Flood Planning Requirements

5.1 Penrith LEP – Flood Planning Levels

In the Penrith City Council LEP, the Flood Planning Level (FPL) for the LGA is defined as the 1% AEP flood level plus 0.5 m freeboard. For the site, this equates to a minimum ground floor level of approximately 27.55m AHD. Building A of the proposed development has a Finished Floor Level (FFL) of 27.70m AHD, while Buildings B and C have an FFL of 27.80m AHD. The proposed development is therefore safely located 150–250mm above the FPL.

Due to the higher risk to life associated with basement flooding, the basement should be protected to the PMF where possible. The driveway crest at the basement will be set to the PMF level on Harris Street (27.25m AHD).

5.2 Penrith Development Control Plan

The current Development Control Plan (DCP) in place covering Jamistown was published in 2014. The Penrith City Council DCP provides additional planning and design guidelines to support the aims and objectives of the LEP. Section C3.5 of the DCP (Water Management, Flood Planning) of Penrith DCP provides controls for development on flood prone land and applies to all land subject to the flood planning provisions of the LEP.

5.2.1 C1 – Submission Requirements

As per Control 1 in the Penrith City Council DCP (2014), for developments on land fully or partially flood affected, the applicant must adhere to the controls outlined in Table 5.

Table 5: Submission requirements that developments on flood affected land must adhere to

Flood Control	Compliance Assessment
The development will not increase the flood hazard or risk to other properties	As demonstrated in the 1% AEP hazard mapping (existing scenario shown in Figure 12, post-development scenario in Figure 18), there is no increase in flood hazard within or surrounding the site as a result of the proposed development. In addition, the flood level afflux mapping in Section 4.3, further confirms that the development has no offsite impacts in the 1% AEP event.
The structure of the proposed building works shall be adequate to deal with flooding situations	This control is to be incorporated into the final design phases.
The proposed building materials are suitable	This control is to be incorporated into the final design phases.
The buildings are sited in the optimum position to avoid flood waters and allow safe flood access for evacuation	In the 1% AEP event, the eastern boundary of the site is partially flood affected by flows exceeding 0.1m depth. Based on the current architecture plans by Jackson Teece, the proposed buildings are not positioned in this area, and hence are situated in the optimum position to avoid these floodwaters.
The proposed redevelopment will not expose any resident to unacceptable levels of risk or any property to unreasonable damage	As demonstrated in the offsite impact assessment in Section 4.3, the development has negligible impacts on neighbouring properties, and will not increase risk to any residents.
Development must be compliant with any existing buildings with the Standard - Construction of Buildings in Flood Hazard Area and the accompanying handbook developed by the Australian Building Codes Board (2012).	Based on the currently available information at this stage, development is compliant with the recommendations set out in these handbooks.

5.2.2 C2 – Flood Hazard Classification

As per Control 2 of the DCP, Council will not grant consent to new developments in floodways or high hazard areas. The DCP defines high hazard as occurring when there is possible danger to life and limb; evacuation by trucks is difficult; there is potential for structural damage; and social disruption and financial losses could be high. As depicted in the hydraulic categorisation map for the 1% AEP event under existing site conditions in Figure 24, the development is not situated in a floodway, and hence is compliant with this flood control.

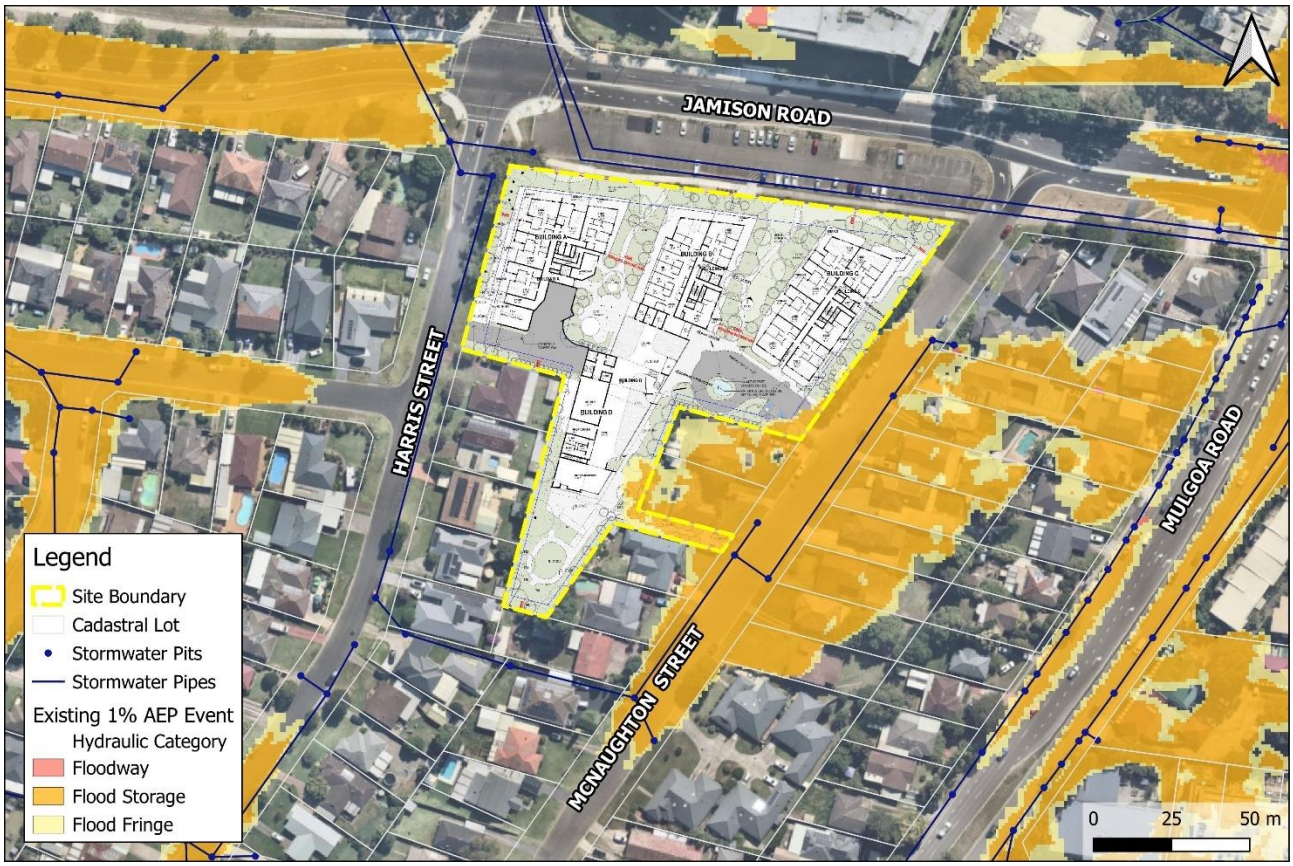


Figure 24: 1% AEP event - hydraulic categorisation - existing conditions

5.2.3 C11 – Residential Accommodation

According to Control 11 of Penrith DCP, Council will generally not support an application for any land use which may attract large numbers of people (including schools, function centres, hostels, etc.) on land below the FPL and on land that cannot be safely and effectively evacuated during a 1% AEP flood event.

As aforementioned, the FPL (1% AEP level + 0.5m freeboard) at the site is approximately 27.55m AHD. According to current architecture plans by Jackson Teece, the ground floor FFL for all buildings is set at 27.70m AHD or 27.80m AHD, 150-250mm above the FPL.

In terms of site access in the 1% AEP event, Jamison Road is rising access and provides a suitable, trafficable evacuation route. Nepean Hospital can be accessed from this road, although it is situated outside of the study area. Figure 25 presents the hazard categorisation of flows across the surrounding region in this event, alongside a preliminary evacuation route, should this be required. Access onto Jamison Road is available from both vehicular access points. Although Parker Street and Derby Street are situated outside the study area, review of additional hazard mapping from the Penrith CBD Detailed Overland Flow Flood Study (depicted in Figure 26) demonstrates that both roads are low hazard and trafficable.

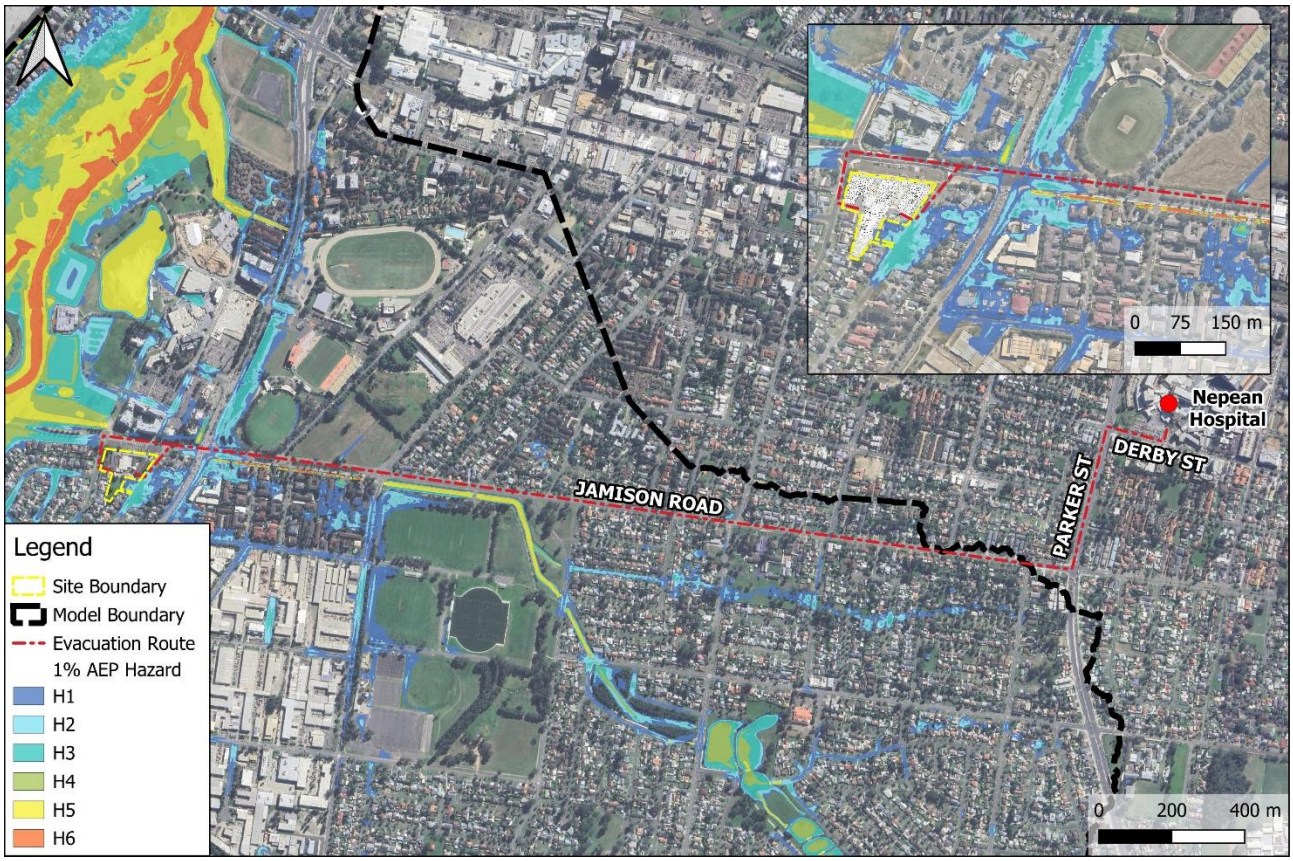


Figure 25: Preliminary evacuation route towards Nepean Hospital in 1% AEP event

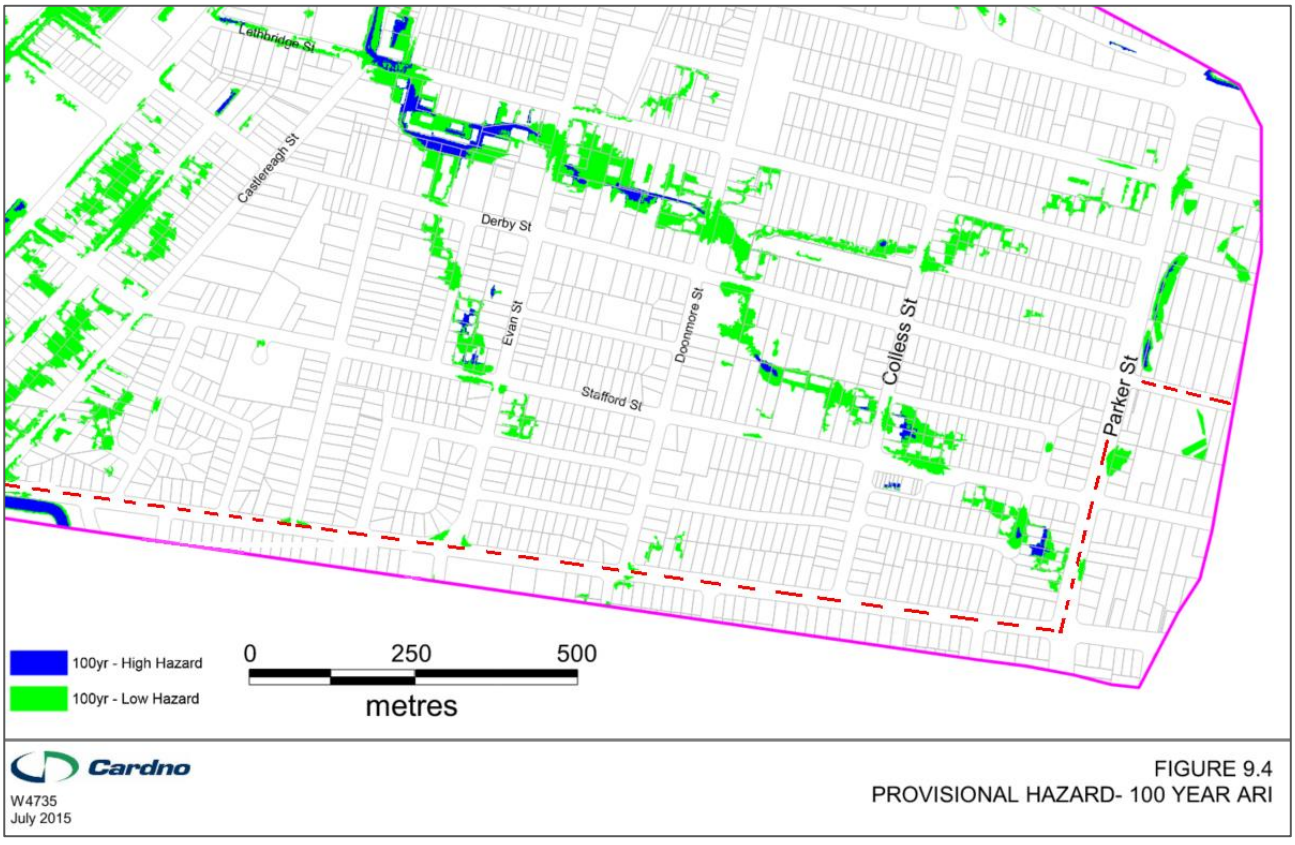


Figure 26: Hazard categorisation of Parker St and Derby Street (Source: Penrith CBD Overland Flow Flood Study, 2015)

5.2.4 C13 – Overland Flow Flooding

According to Control 13 of the DCP, consideration must be given to the impact on any overland flow path. Generally, Council will not support development obstructing overland flow paths. Development is required to demonstrate that any overland flow is maintained for the 1% AEP event.

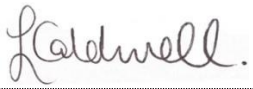
As shown in the depth maps for the site in the 1% AEP event in both existing and post-development conditions (Figure 10 and Figure 16, respectively), the site is largely unaffected by flows over 0.1m depth, and there are no overland flow paths across the site in this event. The development therefore has no impact on overland flow paths in this event. This is further demonstrated in the flood impact mapping in Figure 22.

6.0 Conclusion

TTW updated Council's Peach Tree and Lower Surveyors Creek Flood Model to investigate the impact of the proposed development of SummitCare Penrith and assess the suitability of the site for further development. Modelling concluded that:

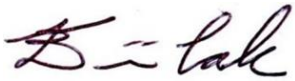
- The proposed development has no significant impact on flood behaviour or flood hazard in the 1% AEP event, with a maximum increase in flood level of 7mm.
- The Flood Planning Level for the site (1% AEP + 0.5m AHD) is approximately 27.55m AHD. The proposed development is located 150–250mm above this.
- The potential impact of climate change has been considered, with a 18.6% increase in rainfall intensity equating to a 200mm increase in flood levels at the site. This would result in a level of 27.24m AHD, which is below the 0.5% AEP flood level and lower than the minimum Finished Floor Level of 27.70–27.80m AHD for the proposed development.
- Additional protection is provided for the basement driveway with a crest above PMF level on Harris Street (27.25m AHD) to prevent sudden inundation in PMF event.
- The development is compliant with the flood controls set out in the Penrith City Council DCP (2014).

Prepared by
TTW (NSW) PTY LTD



LAURA CALDWELL
Civil Flood Modeller

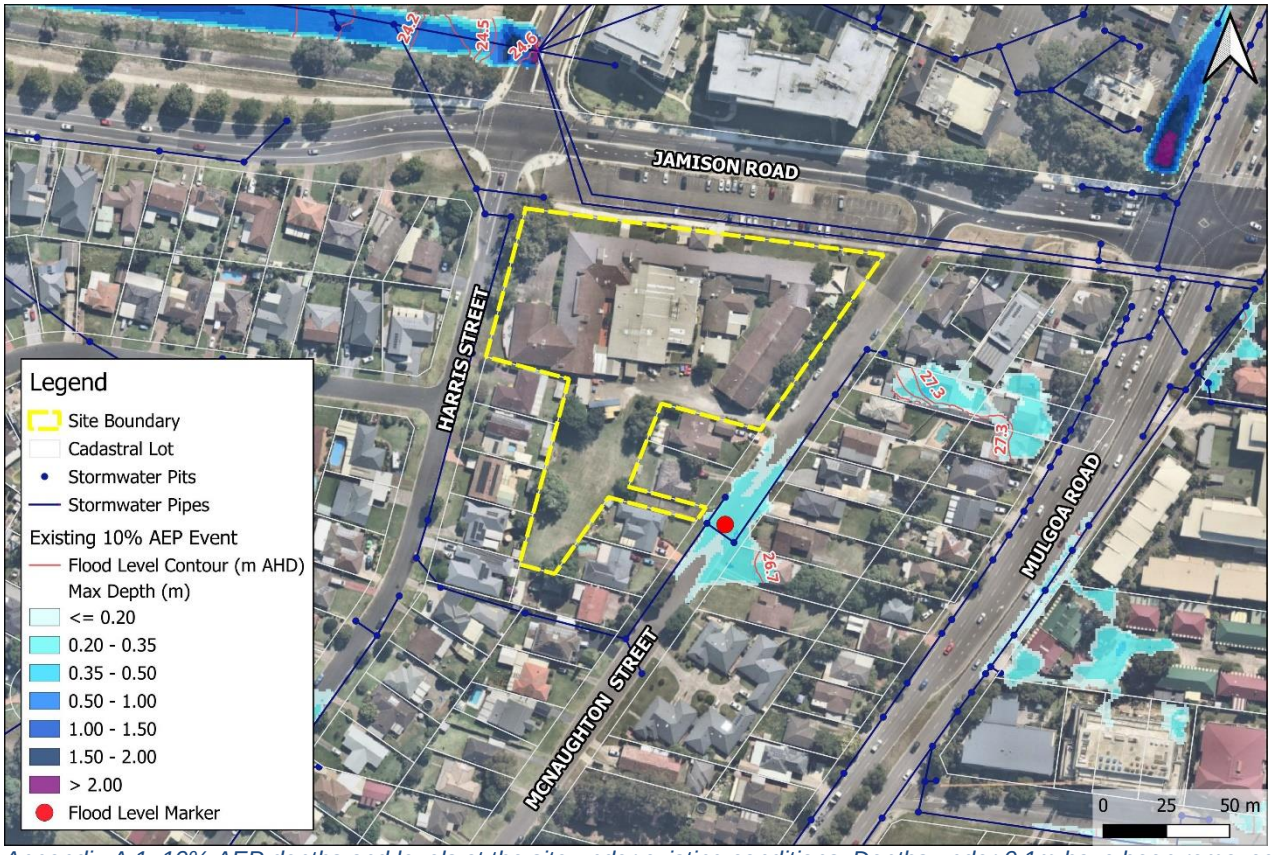
Authorised By
TTW (NSW) PTY LTD



EIRIAN CRABBE
Associate Director

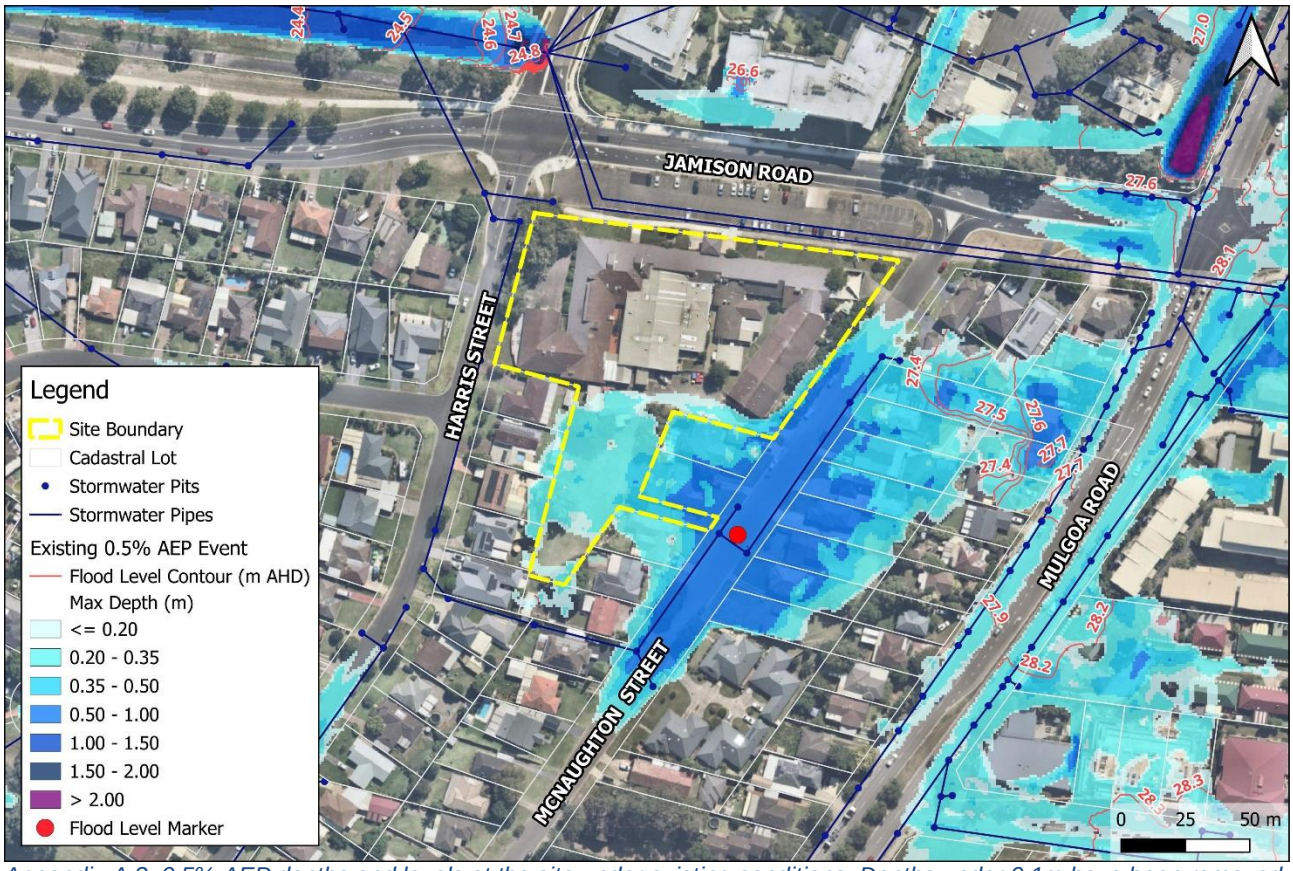
Appendix A

Existing Scenario Additional Events

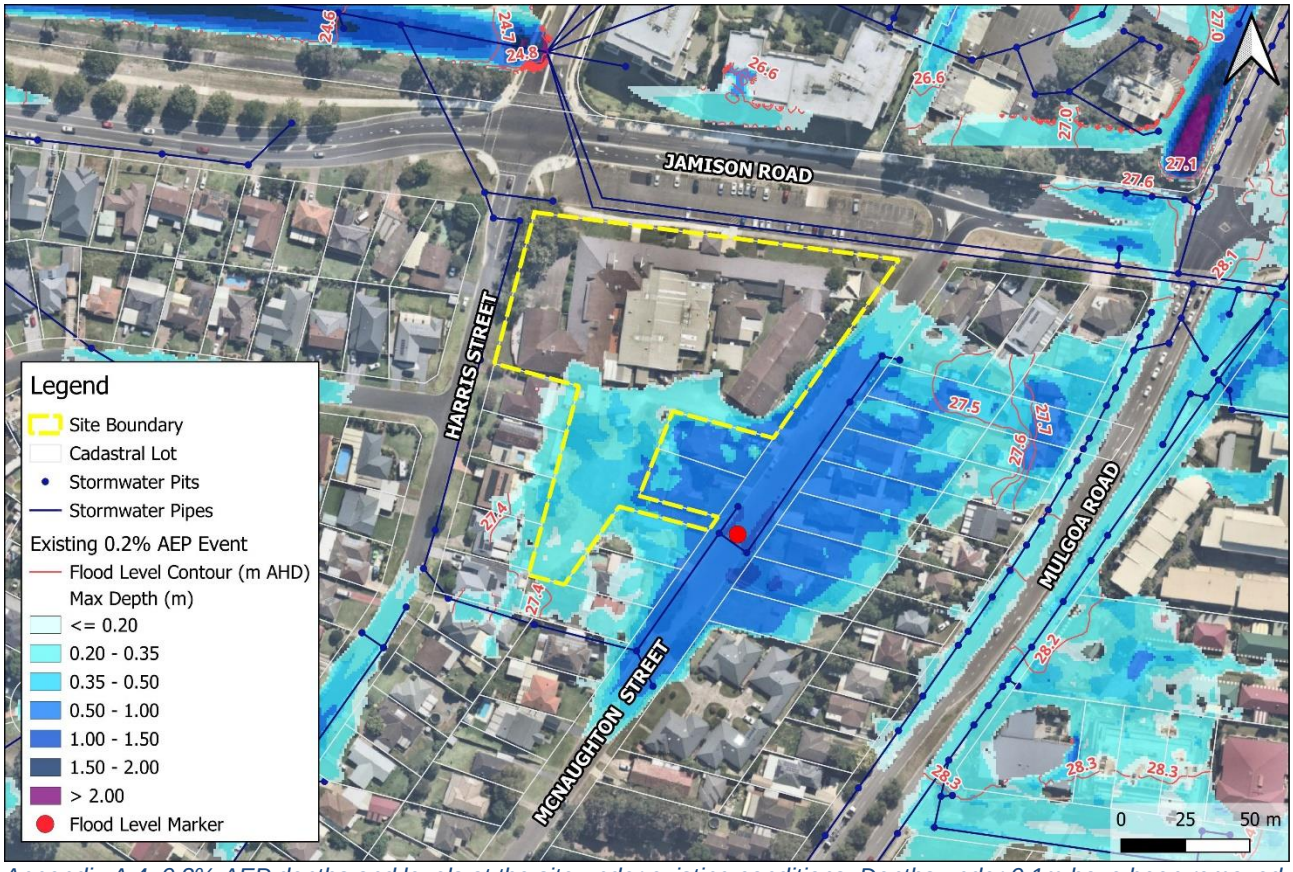


Appendix A 1: 10% AEP depths and levels at the site under existing conditions. Depths under 0.1m have been removed.

Appendix A 2: 5% AEP depths and levels at the site under existing conditions. Depths under 0.1m have been removed.



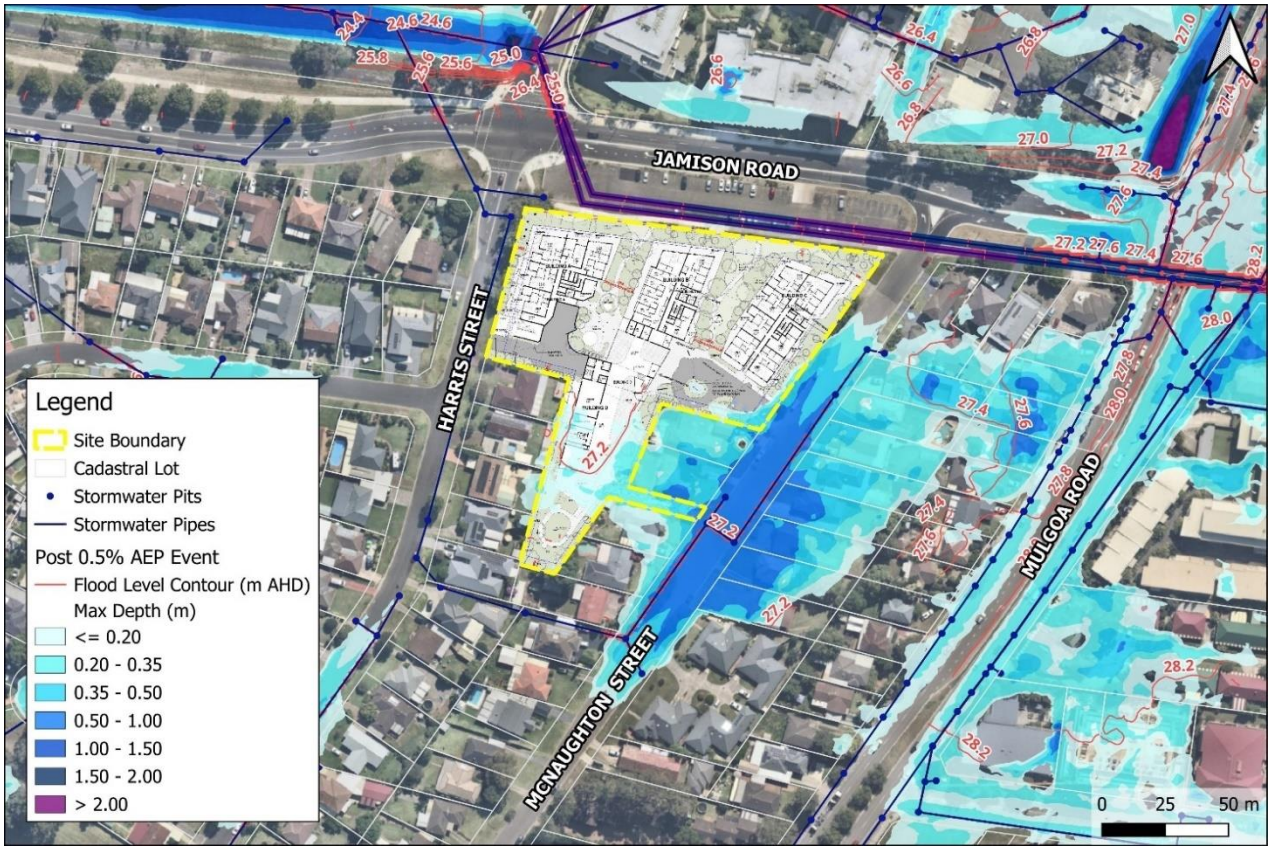
Appendix A 3: 0.5% AEP depths and levels at the site under existing conditions. Depths under 0.1m have been removed.



Appendix A 4: 0.2% AEP depths and levels at the site under existing conditions. Depths under 0.1m have been removed.

Appendix B

Post-Development Scenario Additional Events



Appendix B 1: 0.5% AEP depths and levels at the site under post-development conditions. Depths under 0.1m have been removed.