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# FLOOD RISK ASSESSMENT REPORT

# PLANNING PROPOSAL

# PROPOSED RESIDENTIAL DEVELOPMENT

## 776 & 792-794 Botany Road & 33 Henry Kendall Crescent, Mascot, NSW

**Revision 02**

**March 2024**

**Our Job No. 240257**

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**Project verification**

| | |
|---|---|
| Project Title | Proposed Residential Development |
| Document Title | 240257 Flood Risk Assessment Report |
| Project Number | 240257 |
| Description | Flood Risk Assessment Report. PP |
| Client contact | Patrick Ko – Homes NSW |

| | Name | |
|---|---|---|
| Prepared By | Frank Hongshen Zhou | |
| Checked by | Nicholas Wetzlar | |
| Issued by | Nicholas Wetzlar | |
| File Name | 240257 Flood Risk Assessment Report | |

Document History

| Date | Revision | Purpose | Recipients | Format | Checked |
|---|---|---|---|---|---|
| 12.03.2024 | 1.0 | Issued for PP | Patrick Ko – Homes NSW | PDF | N.W |
| 18.03.2024 | 2.0 | Issued for PP | Patrick Ko – Homes NSW | PDF | N.W |
| | | | | | |

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## Table on Contents

## 1. Introduction

Henry & Hymas has been engaged by Homes NSW to prepare this Flood Risk Assessment Report (This Report) to supplement the Planning Proposal for the proposed residential development at 776 & 792-794 Botany Road & 33 Henry Kendall Crescent, Mascot.

The aim of This Report is to provide a preliminary assessment of the site and its compatibility with the local flood plain. The report seeks to assess the Planning Proposal's compliance with governing flood controls and best industry practice, while providing preliminary advice in regard to the likely potential impacts the development will have on existing local flood behaviour. The Report aims to address the following items:

- Nature of flooding in the locality: Present a summary on the nature of flooding in the region and current flood information including flood depth, extent and hazard.
- Provide commentary on building levels for the Planning Proposal including Finished Floor Levels (FFLs) and basement entrance levels.
- Provide commentary on the likely changes on existing flood behaviour and flow regime resulting from the proposed development and the necessity for flood mitigation measures (if required).
- Advise any further flooding investigations and reporting requirements.
- Provide commentary on the proposed development compliance with the flooding related controls as documented in Bayside Council's Development Control Plan (DCP) 2022 as well as NSW Department of Planning and Environment's Flood Risk Management Manual 2023.
- Flood risk assessment – to assess the risks associated with the Planning Proposal.
- Provide recommendations on all precautions to minimise risk to personal safety of occupants and the risk of property damage for the development to address the flood impacts on the site.
- Provide recommendation of potential flood emergency response in the event of a flood.

## 2. Existing site and context

The existing site is located in the Sydney metropolitan suburb of Mascot. It is bounded by Botany Road to the east, Coward Street to the south, Henry Kendall Crescent to the west and existing residential dwellings to the north. It is also within 800m of Mascot Train Station to the west.

The subject site comprises 25 social housing dwellings owned by NSW Land and Housing Corporation (LACHC) within five two storey brick buildings including three walkup apartment buildings and two town house style buildings. The site also contains the Mascot Ambulance Station being a two storey brick building fronting Botany Road to the north of the social housing.

The social housing is legally described as Lots A, B, C, D and E of DP 36472 known as 792-794 Botany Road and 33-37 Henry Kendall Crescent, Mascot. The Mascot Ambulance Station is described as Lot 1 in DP 36486 and known as 776 Botany Road.

The surrounding context is comprised of a primarily low density residential character, with scattered pockets of mixed-use and commercial activity in its immediate surroundings. Mascot Town Centre and the Botany Road Local Centre are two consolidated areas of retail and commercial offerings located to the west and south of the site respectively.

The subject site is located within the Bayside Council LGA. The locality sketch of the site is shown in Figure 1 below.

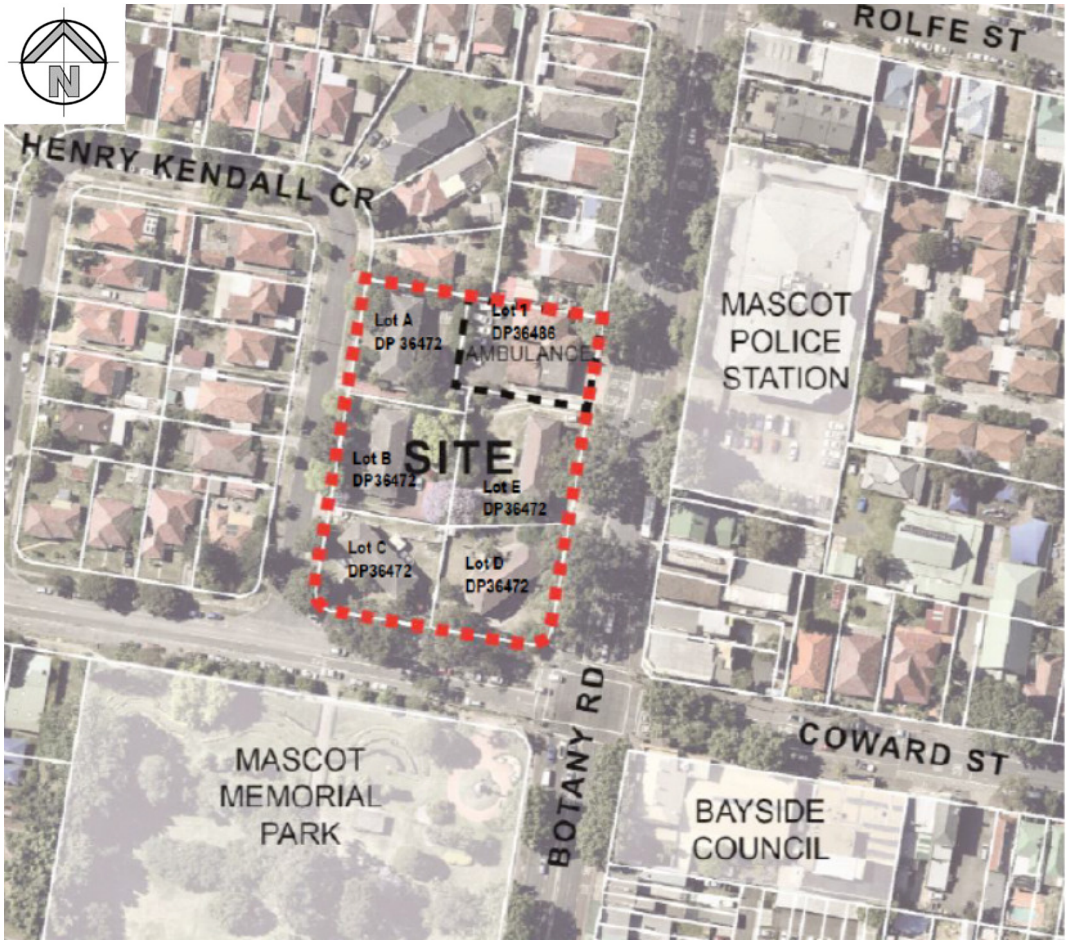


Figure 1 - Locality Sketch

## 3. The Proposed Development

The proposal seeks to amend the Bayside Local Environmental Plan (LEP) to rezone the site from E1 Local Centre to R4 High Density Residential.

A preliminary Urban Design Study has been prepared by SJB which details potential architectural/ building layouts associated with the Planning Proposal. The proposed development includes construction of three blocks of multi-storey residential buildings with associated landscaped areas, pedestrian footpaths, vehicle crossing and basement car parks. The proposal seeks demolition of the existing residential buildings as well as the building of Mascot Ambulance Station.

Pedestrian access to the proposed buildings can be achieved via the footpaths around the buildings connecting to the footpath infrastructure in the adjacent road reserves. Vehicular access to the proposed basement can be achieved via the proposed vehicular crossing near the north-eastern corner of the site off Botany Road.

The concept Architectural site plan for the proposed development is provided in Figure 2 below. A full-size copy of the Architectural site plan is included in Appendix A.


*Figure 2 – Concept Architectural Site Plan, SJB Architects 2021*

## 4. Flood Information

### Background Information – Flooding

The Subject Site is identified as a flood affected property as identified by the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd dated 2019. As such as Flood Advice Letter was sought from Bayside Council to provide detailed information regarding relevant flood controls as well as information regarding the flooding itself, flood level, extent, depth, and hazard.

The Flood Advice Letter from Bayside Council dated 6th of March 2024 (Appendix B) indicates that the development subject site is not affected by the 1% AEP (Annual Exceedance Probability) flood, but it is affected by the Probable Maximum Flood (PMF). A copy of the letter is included in Appendix B of this report. Flood level, extent, depth, and hazard mapping contained within Council Flood Advice letter is presented below. The information provided in the Flood Advice letter is specific to the Subject site and the immediate surrounding area. Key flood mapping from the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd is included in Appendix C and provides flood mapping for the surrounding floodplain.

**Flood Depth, Level and Extent Mapping**

Figure 3 below shows Flood Extent and depth mapping in the 1% AEP flood event (Generally accepted as equal to the 1 in 100 Year ARI [Average Recurrence Interval]). Figure 3 shows the surrounding road reserves and minor portions of the subject site are affected during the critical case 1% AEP flood event. Flood levels around the development differ, but generally range from Reduced Level (RL) 8.20m Australian Hight Datum (AHD) in the northwest corner of the site, RL8.65m AHD on the northeast corner of the site, RL8.41m AHD in the southeast corner of the site and RL8.02m AHD in the southwest corner of the site. A detailed assessment of 1% AEP flood levels around the subject site is available in Appendix B of this report. It should be noted that the flood levels presented above allow for climate change and include increase in rainfall intensity of 20% (year 2100) and sea level rise of 0.9m (year 2100).

1% AEP Flood depth within the subject site boundary is generally limited to 0.0-0.15m in depth. It should be noted a flow depth less than 150mm is generally considered not significant.

Figure 4 below shows Flood Extent and depth mapping in the PMF event. Figure 4 shows the surrounding road reserves and a large portion of the subject site are affected during the critical case PMF event. Flood levels different around the development but generally range from RL8.25m AHD in the northwest corner of the site, RL8.75m AHD on the northeast corner of the site, RL8.52m AHD in the southeast corner of the site and RL8.17m AHD in the southwest corner of the site. A detailed assessment of PMF levels around the subject site is available in Appendix B of this report.

PMF Flood depth within the subject site boundary is generally limited to 0.0-0.30m in depth.

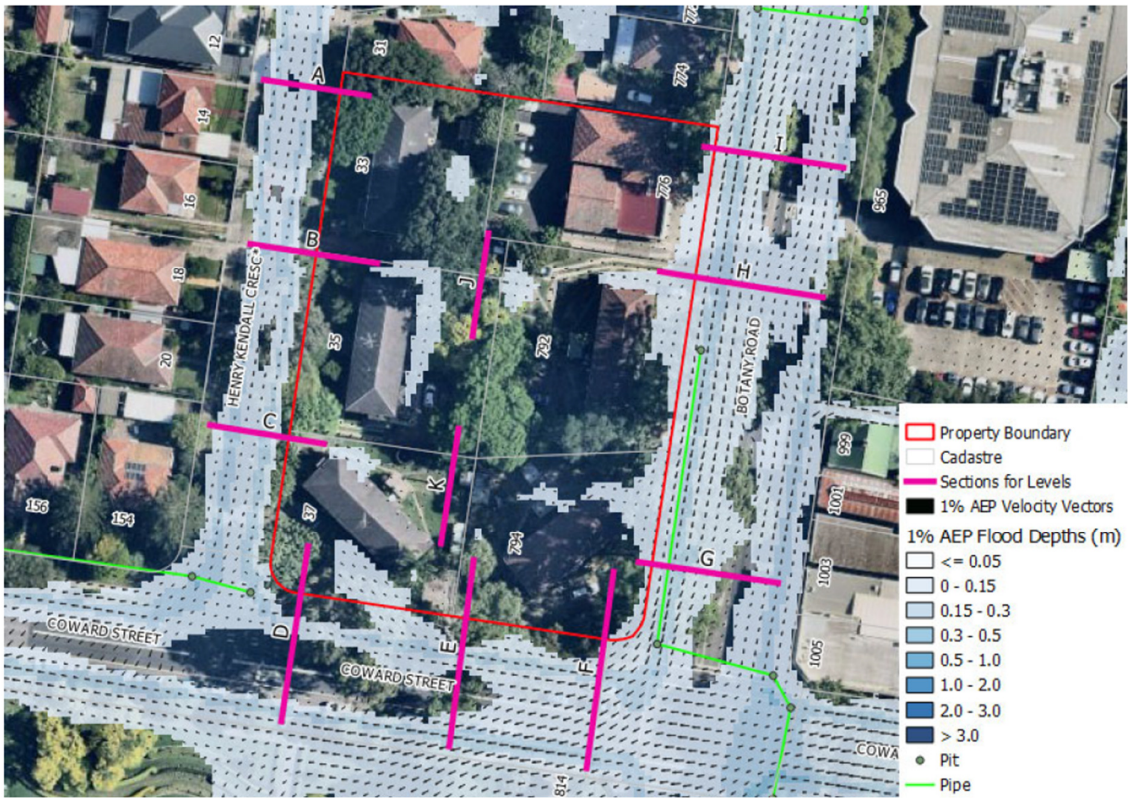



Figure 3 - 1% AEP Flood Extent Map

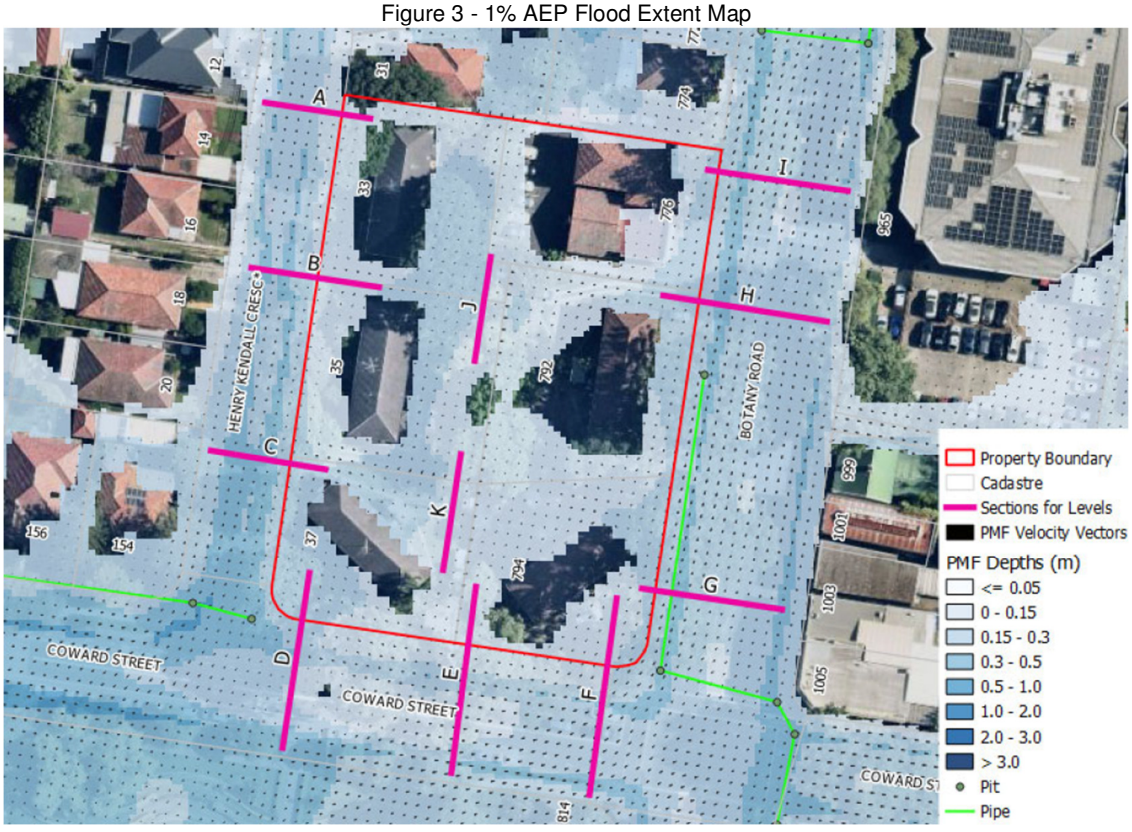



*Figure 4 - PMF Extent Map*

## Flood Hazard

The Flood Hazard Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017) represents the current industry best practice with regards to defining flood hazard. The guideline considers a holistic approach to consider flood hazards to people, vehicles and structures. The flood hazard level is determined on the basis of the predicted flood depth and velocity. This is conveniently done through the analysis of flood model results. A high flood depth will cause a hazardous situation while a low depth may only cause an inconvenience. High flood velocities are dangerous and may cause structural damage while low velocities generally have no major threat. The Flood hazard is expressed as the product of flood velocity and depth or Flood Velocity x Depth product. The hazard vulnerability curves are provided in the chart below, refer Figure 5. The definitions of each have also been tabulated below, Refer Table 1.

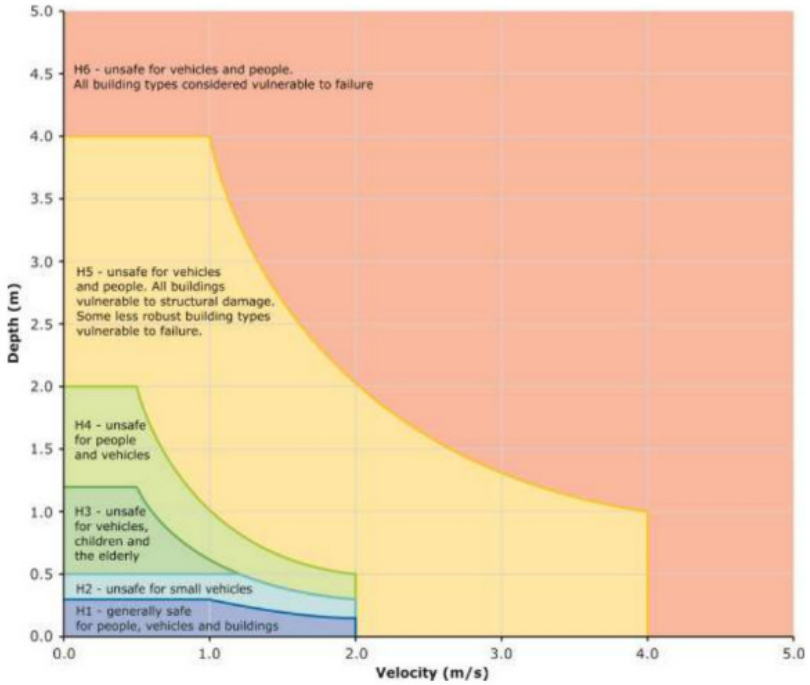



Figure 5: Flood Hazard Vulnerability Curves (AIDR, 2017)

| Hazard Vulnerability Classification | Description |
|---|---|
| H1 | Generally safe for vehicles, people and buildings. |
| H2 | Unsafe for small vehicles. |
| H3 | Unsafe for vehicles, children and the elderly. |
| H4 | Unsafe for vehicles and people. |
| H5 | Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure. |
| H6 | Unsafe for vehicles and people. All building types considered vulnerable to failure. |

Table 1: Vulnerability definitions (AIDR, 2017)

Flood Hazard (as classified under the AIDR, 2017) for the 1% AEP Flood Event is shown below in is provide by Figure 6. From review of Figure 6 It is evident the subject site and immediate surrounding road reserve is classified as H1 – Generally safe for vehicles, people and buildings.

Flood hazard for the PMF Event is shown below in Figure 7. From review of Figure 7 it is evident the subject site is classified as H1. The surrounding road reserve is generally classified as H1 with minor portions of hazard category H2 (Unsafe for small vehicles) located within adjacent kerb lines.

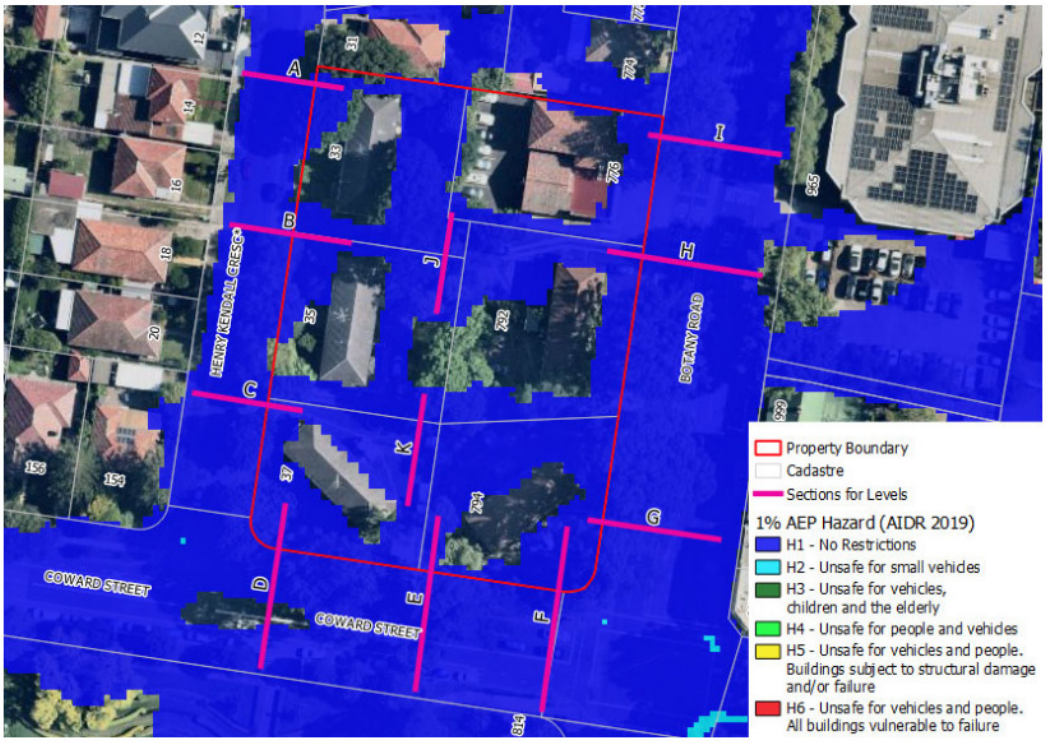



Figure 6 - 1% AEP Flood Hazard Map

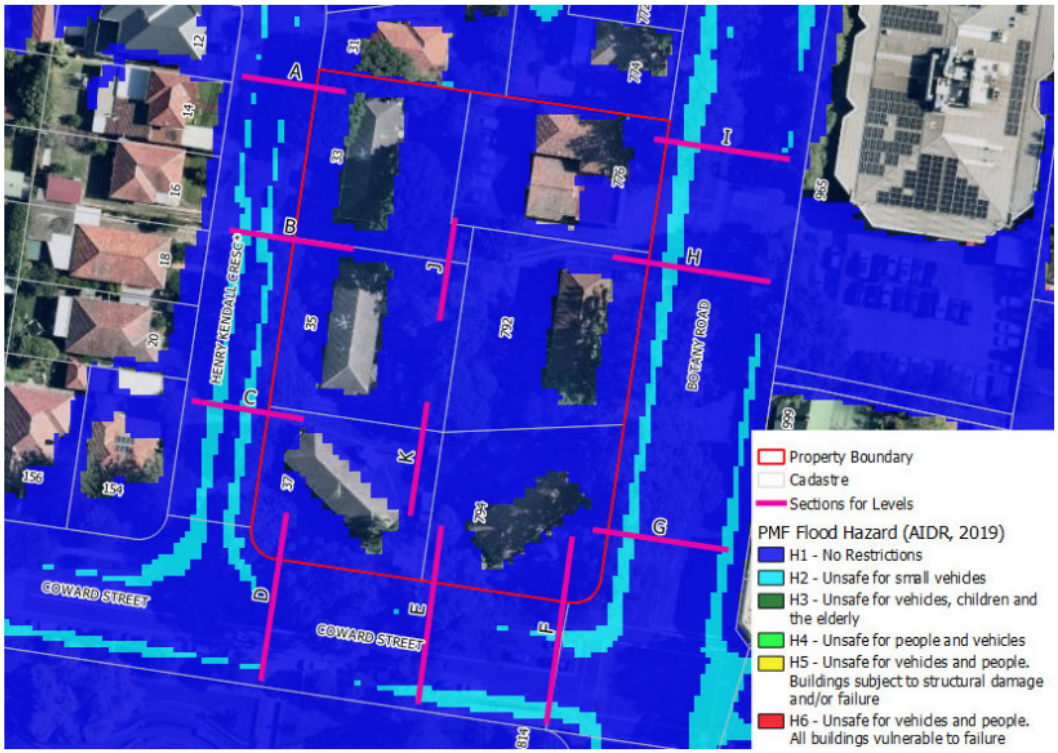



Figure 7 - PMF Flood Hazard Map

Flood hazard mapping for the surrounding areas and local catchment is available in the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd included in Appendix C.

## 5. Flood Control Assessment

### Flood Planning Levels

Section 3.10.13 of Bayside Council's DCP state the following requirements regarding the minimum habitable and non-habitable floor levels for the subject development.

- *Habitable floor levels to be no lower than the 1% AEP flood level plus 0.5m freeboard.*
- *Non-habitable floor levels to be no lower than 1% AEP flood level.*
- *All access, ventilation, driveway crests and any other potential water entry points shall be set at or above the minimum habitable floor level.*

Based on flood levels presented in Chapter 4 that shows the most critical 1% AEP flood level of the site at 8.65m AHD, the Flood Planning Levels (FPL) of the subject site can be summarised in Table 2 below.

| Category | Minimum Required Level (m AHD) |
|---|---|
| Habitable floor level | 9.15 |
| Non-habitable floor level | 8.65 |
| All access, ventilation, driveway crests and any other potential water entry points | 9.15 |

Table 2 - Summary of Flood Planning Levels

Given the size of the development, the proposal for multiple buildings and the varied flood levels onsite which range from RL8.65m AHD to RL8.02m AHD, it may be suitable to position the FFL for each building to the adjacent critical flood level for specific building location onsite. i.e. step the building FFLs with the flood levels that decrease from north to south across the site. This stepping of building FFL should be investigated further during the Development Application phase. It should be noted that the flood levels presented above allow for climate change and include increase in rainfall intensity of 20% (year 2100) and sea level rise of 0.9m (year 2100).

### Flood Risk Assessment

As mentioned in Section 4 above, the highest flood hazard of the flood waters within the site in the events of both 1% AEP and PMF is categorised as 'H1'. This hazard category is classified as Low Flood Hazard in the Flood Advice Letter and Section 3.10.13 of Bayside Council's DCP 2022, and defined as 'generally safe for vehicles, people and buildings' in Australian Institute of Disaster Resilience 2019. This is further illustrated by the shallow flood depths in the event of a 1% AEP (0 – 0.15m) and PMF (0 – 0.30m) in Figure 3 and Figure 4 above.

Furthermore, the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd dated 2019 makes provisional flood hazard as defined under the NSW Floodplain Development Manual (FDM). The WMA flood study identifies the site as Low hazard under both the 1% AEP flood event and PMF event (refer Appendix C for Mapping).

Under clause 3.10.12 of the DCP flood classification within H1 and H2 are considered a 'Low Flood Hazard' As such, the subject site is considered a 'Low Flood Hazard' property and should be

considered suitable for the development from a flood hazard perspective (subject to compliance with Council's policies below).

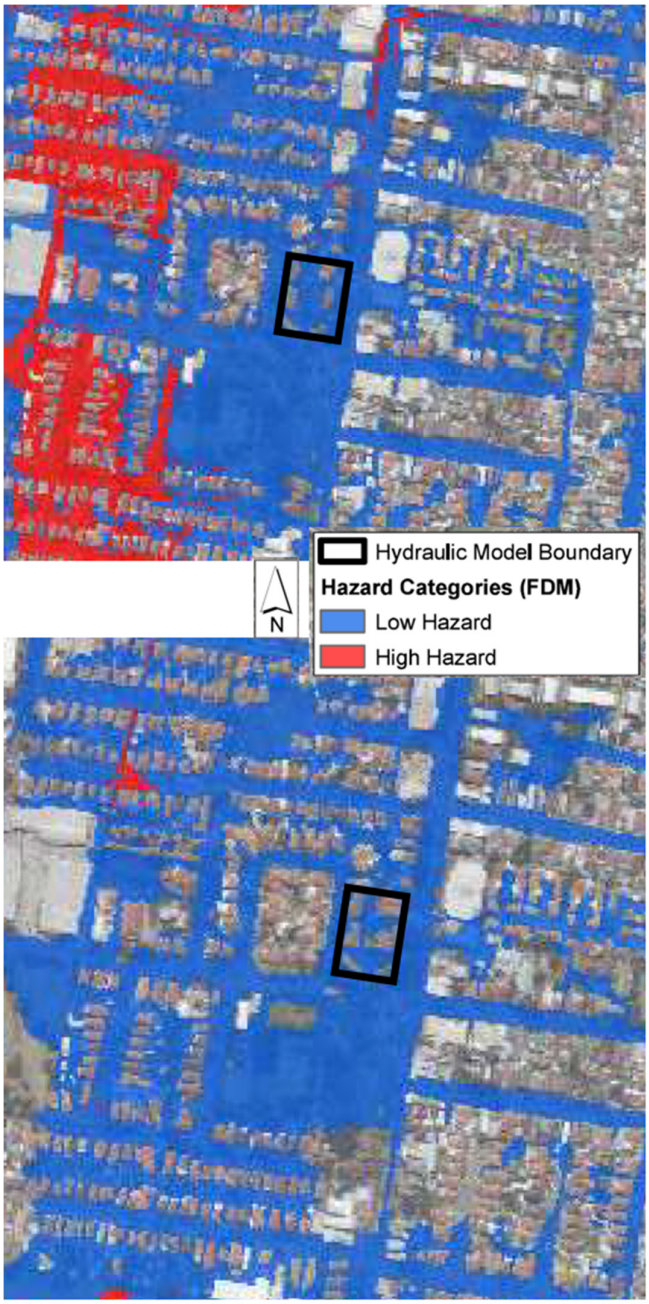



Figure 8: Provisional Hydraulic Hazard (NSW Flood Development Manual) – WMA Water (2019)
PMF event (above) 1% AEP event (below)

**Flood Impacts**

Chapter 3.10.13 'Flood Planning Prescriptive Controls' of the DCP detailed requirements relating to Flood Effects Caused by Development where "The development must not result in increased flooding elsewhere in the floodplain". Additionally, as raised in Council's commentary to the planning proposal dated 14th February 2024,

*"The proposed built form will obstruct flows from entering and result in changes to overland flow behaviour. It must be demonstrated that the proposal will not result in adverse impacts (less than 10mm in the 1% AEP Event and less than 50mm in the PMF Event as per Council's Development Control Plan 2022), and no increase in flood hazard in the surrounding area including the carriageways of Botany Road, Henry Kendall Crescent and Coward Street".*

The applicant acknowledges that any development within the Subject Site shall not result in any significant (as identified above) adverse impact on existing flood behaviour. Given the shallow depth of flooding noted in both the 1% AEP flood event and PMF event, and the proposed building layout (refer Chapter 3 – Proposed Development) it is unlikely that the proposed built form will have a significant impact on existing flood behaviour. Additionally, it is expected that if any significant impacts are identified through detailed two-dimensional hydraulic modelling these impacts could be mitigated through changes to the built form or flood mitigation measures such as flood offset storage.

During the future Development Application phase, the applicant proposes to provide detailed two-dimensional hydraulic modelling to assess the development impact on existing flood behaviour and flow regimes. It is understood Council's Engineers will have the opportunity to review the detailed two-dimensional hydraulic modelling and associated 'impact mapping' (which will be based off a more established architectural concept and built form) during the Development Application approval process.

Notwithstanding future investigations, given the preliminary nature of the project (Planning Proposal) and built form, the property being identified as a 'Low Flood Hazard', and the shallow flood depths in the 1% AEP and PMF flood event it is expected the proposed development will not result in significant flood impacts. If flood impacts are realised during future flood investigations, mitigation measures are present to reduce or remove the flood impacts. As such, in consideration of the aforementioned reasoning, the subject site is considered to be suitable for development from a flood impact perspective.

## 6. Flood Response Strategies

As noted in Chapter 4 – Flood information, the maximum PMF flood level within the subject site is RL8.75m, the maximum 1% AEP flood level within the subject site is RL8.65m. The maximum PMF level is 100mm higher than the 1% AEP flood level. From review of detail flood levels within the site shown in Appendix C it is evident that the PMF level within the site is between 150mm and 50mm higher than the 1% AEP flood level. As noted in Chapter 5 – Flood Controls, the min habitable FFL and carpark entrance levels is 1% AEP flood level + 0.5m freeboard. Therefore, the habitable FFL and carpark entrance levels will always be above the corresponding PMF level onsite.

Review of Provisional Hydraulic Hazard mapping (FDM) the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water (Appendix C) shows potential evacuation, rescue/medivac and resupply routes from the development beyond the PMF floodplain/extent which are identified as 'Low Hazard' in the 1% AEP and PMF flood event.

Review of Provisional Hydraulic Hazard mapping (ADR) the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water (Appendix C) shows potential evacuation, rescue/medivac and resupply routes from the development beyond the PMF floodplain/extent which are identified as 'H1' in the 1% AEP and 'H1 and H2' PMF flood event.

It is noted in the commentary provided by the State Emergency Statement (SES) dated 13th February 2024 the *"the site is impacted by overland flooding as frequently as a 50% Annual Exceedance Probability (AEP) event and appears to become a high flood island during a Probable Maximum Flood (PMF) event with all surrounding streets inundated with flood water."* Although the subject site is isolated to a high flood island by flooding in extreme storm events its should be noted that potential emergency evacuation, rescue/medivac and resupply routes to and from the subject site are available for all storm event up until the PMF flood event.

From review of available documentation, it is evident adequate potential response strategies (evacuation or shelter in place) are available to residents of the proposed development in the event of a flood emergency. It should be noted that the Bayside Flood Emergency Sub Plan: A Sub Plan of the Local Emergency Management Plan (EMPLAN) - Volume 1 of the Bayside Flood Plan dated May 2023 recognises that the evacuation is the primary emergency management strategy.

The applicant appreciates the risks associated with re-development with the floodplain. It is recommended a detailed flood emergency response plan is developed during the Development Application for any proposed developed on the subject site. The response will need to consider the following:

- Recommendations of the Flood Risk Management Manual: The management of flood liable land (2023).
- Recommendations of the Floodplain Development Manual, 2005, particularly the Flood Emergency Response Planning Classification of Communities.
- Council's Policies (refer Chapter 7).
- Bayside Flood Emergency Sub Plan: A Sub Plan of the Local Emergency Management Plan (EMPLAN) - Volume 1 of the Bayside Flood Plan dated May 2023.
- Recommendations of SES letter dated 13th February 2024, summarised below:
- Additional flood modelling be undertaken to better understand the risks to the site and surrounding properties which may result from the proposed development on the site.
- Ensuring that all openings to the basement (ramp, vents, etc) are situated above the Probable Maximum Flood (PMF)
- Consideration is given to the Principles Outlined in the Support for Emergency Management Planning Guideline outlined in Appendix A of the aforementioned letter:

- Any proposed Emergency Management strategy should be compatible with any existing community Emergency Management strategy.
- Decisions should be informed by understanding the full range of risks to the community.
- Development of the floodplain does not impact on the ability of the existing community to safely and effectively respond to a flood.
- Decisions on redevelopment within the floodplain does not increase risk to life from flooding.
- Risks faced by the itinerant population need to be managed.
- Recognise the need for effective flood warning and associated limitations.
- Ongoing community awareness of flooding is critical to assist effective emergency response.

## 7. Addressing the Flood Related Controls

The proposed development is to address the flooding related development controls in Section 3.10.13 of Bayside Council's DCP 2022. Table 11 of the DCP (excerpt below) outlines the controls for various development types subject to Low Flood Hazard.

| Planning Consideration | Land Use Category (Development Type) | | | | | |
|---|---|---|---|---|---|---|
| | Critical & Sensitive Uses & Facilities | Subdivision | Residential | Commercial & Industrial | Recreation and non urban | Concessional Development |
| A. Floor level | A2, A3 | G3 | A1, A3 | A1, A3 | A4 | A5 |
| B. Building Components | B2, B3, B4 | | B1, B3, B4 | B1, B3, B4 | B1, B3, B4 | B1, B3, B4 |
| C. Structural Soundness | C2 | | C1 | C1 | C1 | C1 |
| D. Flood Effects | D1 | | D1 | D1 | D1 | D1 |
| E. Car Parking & Driveway Access | E1, E2, E4 | | E1, E2, E3 | E1, E2, E3 | E1, E2, E3 | E1, E2, E3 |
| F. Evacuation | F2 | | F1 | F1 | F1 | F1 |
| G. Management and Design | G2, G4, G5 | | G2, G4, G5 | G2, G4, G5 | G2, G4, G5 | G2, G4, G5 |

*Figure 9 – Low Flood Hazard – Prescriptive Controls for Development (Table 11, Section 3.10.13 of Bayside Council DCP 2022)*

Given that the proposed development falls within 'residential' under the land use category (development type), the specific controls for the development can be summarised as follows.

*Table 3 Flooding Controls for the Subject Development (Residential, Low Flood Hazard)*

| No. | ***Clause*** |
|---|---|
| A1 | *Habitable floor levels to be no lower than the 1% AEP flood level plus 0.5m freeboard.* |
| A3 | *Non-habitable floor levels to be no lower than 1% AEP flood level.* |
| B1 | *All structures to have flood compatible building materials (Schedules – Chapter 9.5.3) below the 1% AEP flood level plus 0.5m freeboard. Any part of the building that is erected at or below the 1% AEP flood level + 0.5m freeboard shall be constructed of flood compatible material.* |
| B3 | *Flow-through open form fencing (louvres or pool fencing) is required for all new fencing and all new gates up to the 1% AEP flood level to allow floodwaters to flow through.* |
| B4 | *All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the 1% AEP flood level plus 0.5m freeboard.*<br><br>*All existing electrical equipment and power points located below the 1% AEP flood level plus 0.5m freeboard within the subject structure must have residual current devices installed that turn off all electricity supply to the property when floodwaters are detected.* |
| C1 | *All new development must be designed and constructed to ensure structural integrity up to the 1% AEP flood level plus 0.5m freeboard, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Structural certification shall be provided confirming the above.*<br><br>*Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the PMF level. Structural certification shall be provided confirming the above.* |
| D1 | *The development must not result in increased flooding elsewhere in the floodplain. A flood assessment report (refer to Schedules – Chapter 9.5.4) shall be provided to demonstrate that the development:*<br>• *Does not divert floodwaters to the detriment of elsewhere on the floodplain.*<br>• *Does not increase flood level or velocity elsewhere on the floodplain.*<br>• *Does not result in a detrimental loss of flood storage.*<br>• *Reduces the existing flood hazard, where possible.*<br><br>*A flood impact assessment for a site is not required where the flood storage and floodway capacity are retained. For example, a building can be elevated to retain the existing floodway and flood storage to permit the free flow of water under the building.* |
| E1 | *The minimum finished floor level of open car parking spaces or carports shall be at or above natural ground level. A flow-through roller door (or horizontal louvres) is permitted for a carport structure. Carports must be of open design, with at least 2 sides completely open such that flow is not obstructed up to the 1% AEP flood level. Otherwise, it will be considered to be enclosed.*<br><br>*Open car parking areas shall not be located within a floodway.* |
| E2 | *For above ground level garages, the minimum surface level shall be no lower than the 1% AEP flood level.* |
| E3 | *Basement garages/storage/car parking, low-level driveways must be physically protected from inundation by floods equal to or greater than the 1% AEP flood level plus 0.5m freeboard. The crest of the driveway shall be located within the property boundary. All access, ventilation, driveway crests and any other potential water entry points to any enclosed car parking shall be above the 1% AEP flood level plus 0.5m freeboard level.* |

| | |
|---|---|
| | *Council will not accept any options that rely on the electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark for new development. Flood barriers may be accepted for an existing development to improve flood protection.* |
| F1 | *A qualified civil engineer shall be engaged to prepare an onsite emergency response flood plain is required to detail whether evacuation procedures are required and if so, how they will be initiated, warning signs and preservation of flood awareness as owners and/or occupants change through time. Adequate flood warning systems (such as water level sensors, and alarm stations), signage and exits shall be available to allow safe and orderly evacuation without increased reliance upon the SES or other authorised emergency services personnel. The evacuation plan shall be easily accessible to current and future occupants.*<br><br>*If safe evacuation cannot be achieved within a sufficient response time then a shelter-in-place refuge is required, together with a plan for self-sufficiency for up to 12 hours. This plan must consider as a minimum: sufficient area for all the occupants, adequate clean water for all occupants; portable radio with spare batteries; torch with spare batteries; first-aid kits; emergency power; and a practical means of medical evacuation.*<br><br>*Note that in the event of a flood, occupants would be required to evacuate if ordered by Emergency Services personnel regardless of the availability of a shelter-in-place refuge.* |
| G2 | *Subdivision of the land must not create a parcel with unreliable access, evacuation route and increased reliance on SES. Opportunities shall be investigated to amalgamate the development site with the adjacent site to provide safe and reliable access during the flood.* |
| G4 | *Where a building is elevated to retain the existing floodway, overland flow path and flood storage, the undercroft area is to remain open to permit the free flow of water under the building. A positive covenant is required.* |
| G5 | *Pool located within the 1% AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site.*<br><br>*All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the 1% AEP plus 0.5m freeboard level. All chemicals associated with the pool are to be stored at or above the 1% AEP plus 0.5m freeboard level.* |

## 8. Conclusion

The Subject Site is identified as a flood affected property as identified with the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd dated 2019. Flood advice has been sought from Bayside Council which confirms indicates that the development subject site is not affected by the 1% AEP (Annual Exceedance Probability) flood, but it is affected by the Probable Maximum Flood (PMF).

Flood level, depth and extent mapping has been presented for the subject site (Refer Chapter 4 – Flood information). Shallow depths of flooding are recorded on the subject site with a 1% AEP Flood depth within the subject site boundary is generally limited to 0.0-0.15m in depth and a PMF Flood depth within the subject site boundary is generally limited to 0.0-0.30m in depth.

Flood hazard mapping has been presented for the subject site which shows the subject site as hazard category H1 (Generally safe for vehicles, people and buildings) in the 1% AEP flood and PMF. Flood hazard mapping presented in Appendix C and Chapter 4 shows the surrounding road reserve being generally classified as hazard category H1 in the 1% AEP flood event, and H1 and H2 in the PMF event.

Notwithstanding future investigations, given the preliminary nature of the project (Planning Proposal) and built form, the property being identified as a 'Low Flood Hazard', and the shallow flood depths in the 1% AEP and PMF flood event it is expected the proposed development will not result in significant flood impacts. If flood impacts are realised during future flood investigations, mitigation measures are present to reduce or remove the flood impacts.

From review of available documentation, it is evident adequate potential response strategies (predominantly evacuation) are available to residents of the proposed development in the event of a flood emergency.

The applicant recongise the risk of developing within the floodplain. Future flood investigations and reporting is recommended to support any future Development Applications within the subject site. Detailed two-dimensional hydraulic modelling will be required when the built form is further developed to assess the development impact on existing flood behaviour and flow regimes. Additionally, a detailed Flood Emergency Response Plan adopting the aforementioned recommendations (Chapter 6) is recommended to be provided with any Development Application.

Adequate flood information is available, and presented above, to confirm within reasonable confidence that a detailed building scheme can be developed for the subject site which complies with Council's relevant flood controls, flood related guidelines and standards and key recommendations from relevant authorities and stakeholders e.g. Council and the SES etc.

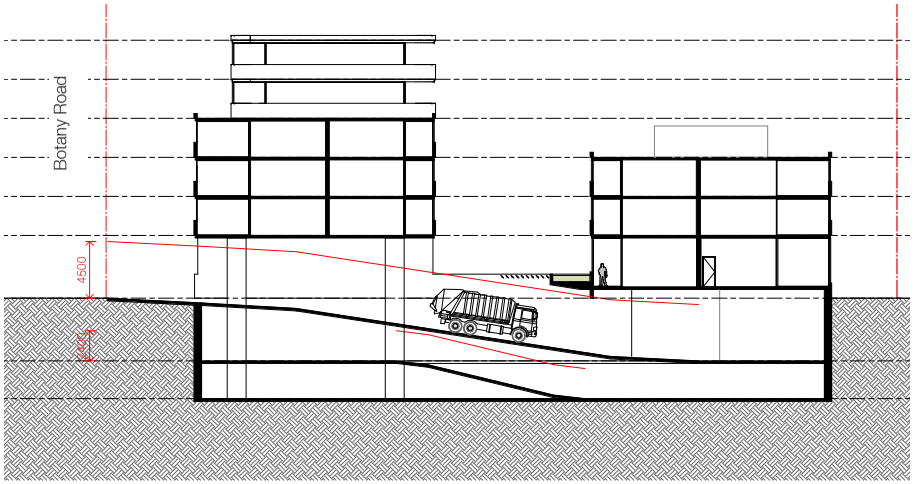
**Appendix A – Excerpts of the Urban Design Study has been prepared by SJB**

## 5.8 Architectural test fit of building envelope - Ground Plan

Key

- Site boundary
- 1 bedroom
- 2 Bedroom
- 3 bedroom


Ground floor




Section

## Appendix B – Flood Advice Letter from Bayside Council

Wednesday 06 March 2024

Our Ref: FA – 2024/34
Henry & Hymas Consulting Engineers
828 PACIFIC HIGHWAY
GORDON NSW 2072

**Flood Advice Certificate for Multiple Lots:**
**776 BOTANY ROAD, 792 BOTANY ROAD, 794 BOTANY ROAD, 33 HENRY KENDALL CRESCENT, 35 HENRY KENDALL CRESCENT & 37 HENRY KENDALL CRESCENT MASCOT**

This certificate is generated from the information provided from the flood study identified below. Council cannot comment on the accuracy of the result.

This certificate has been generated from the following study:

**Mascot, Rosebery & Eastlakes Flood Study, WMA Water Ltd, 2019**

The information provided can be used to assist in understanding the extent of flooding affecting this property and can be used to assist in preparation of a development application and associated flood reports. It is recommended that the information in this report be interpreted by a suitably qualified professional.

The information is provided in good faith and in accordance with the provisions of s.733 of the Local Government Act.

For the purposes of complying development, this certificate identifies if the property is:

a) A flood storage area
b) A floodway area
c) A high hazard area

Flood maps are provided below. A suitably qualified engineer should be engaged to determine whether the property is:

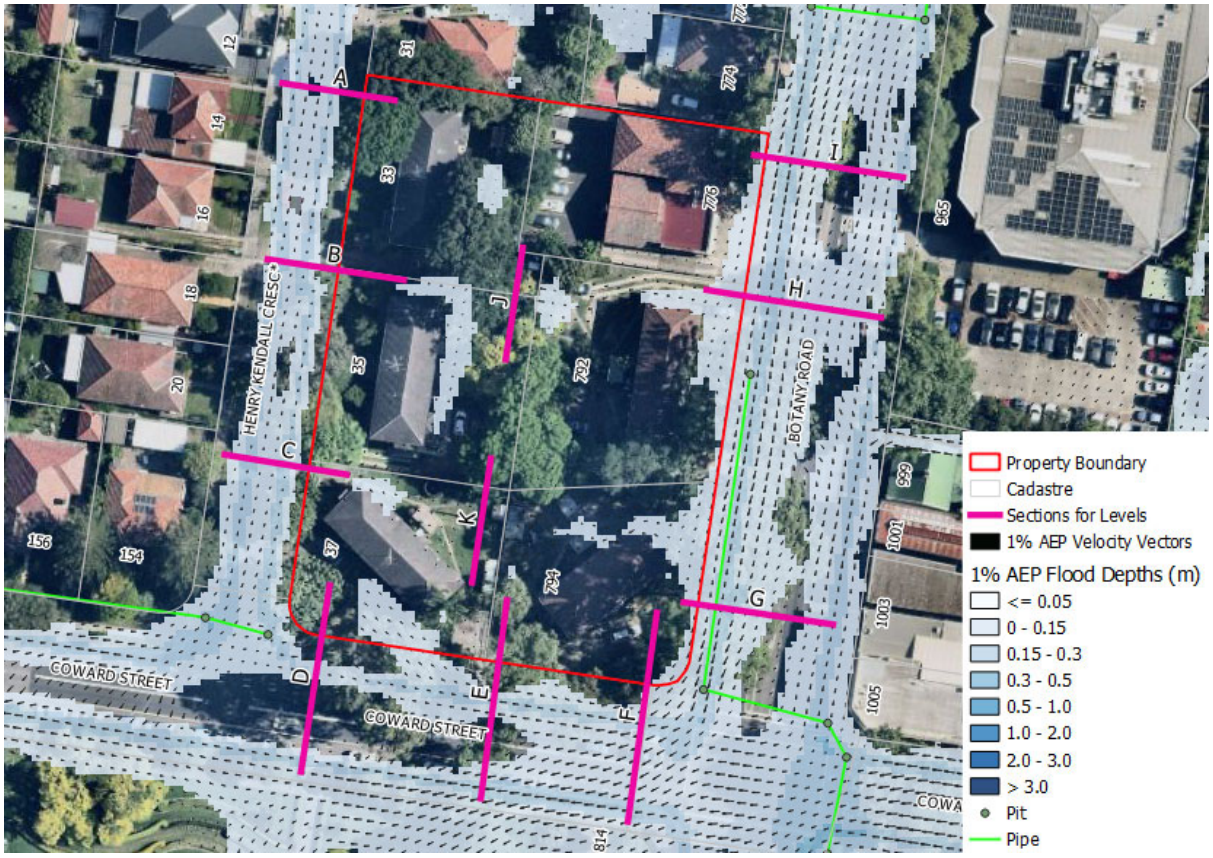
d) A flow path
e) A high risk area

| | |
|---|---|
| Is this property affected during the 1% AEP Flood Event? | **No** |
| Is this property affected during the PMF Event | **Yes** |
| 1% AEP Flood Hazard<br>Note Council considers flooding H3-H6 as high hazard. See below for more information. | **H1** |
| 1% AEP Flood Function | **Flood Fringe** |

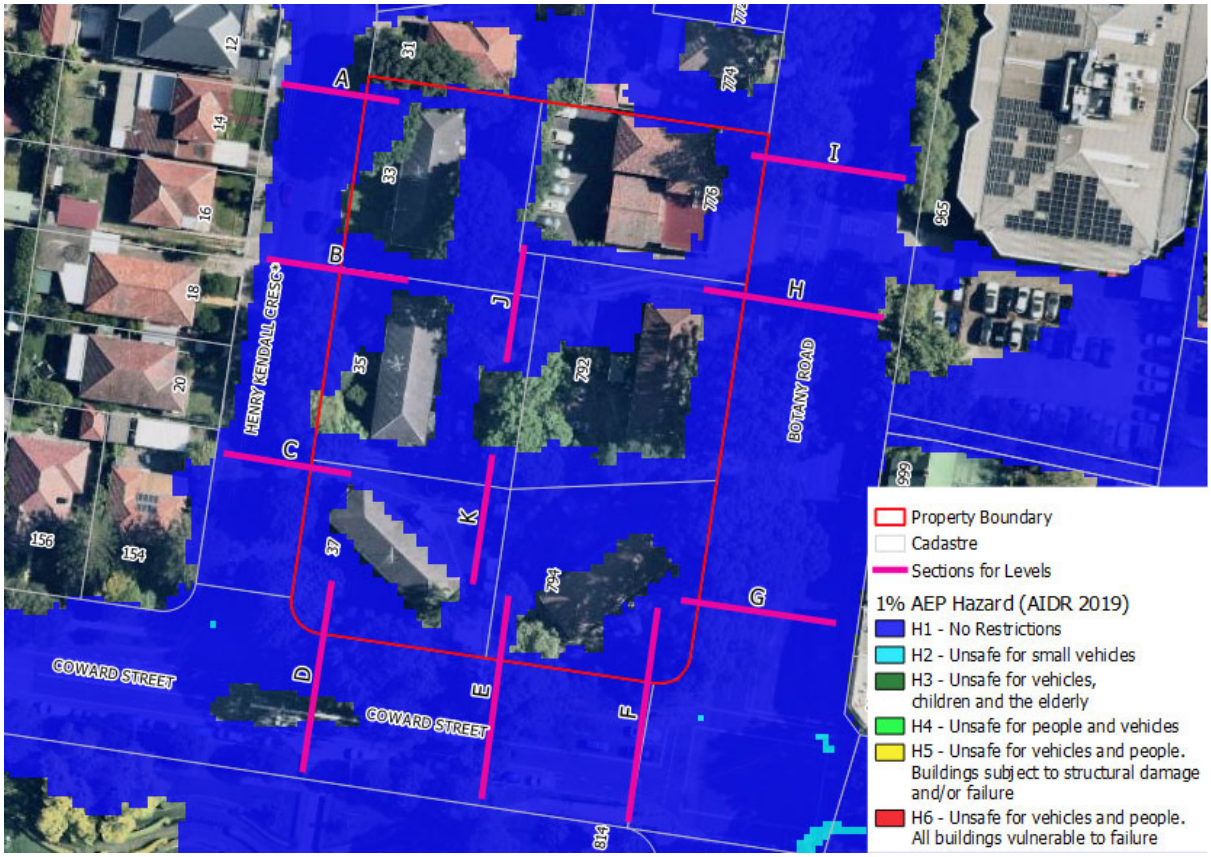
Should you require any further information, contact Council's Stormwater and Floodplain Engineer, Aaron Biffin, on 02 9366 3840.

# 1% AEP Flood Information

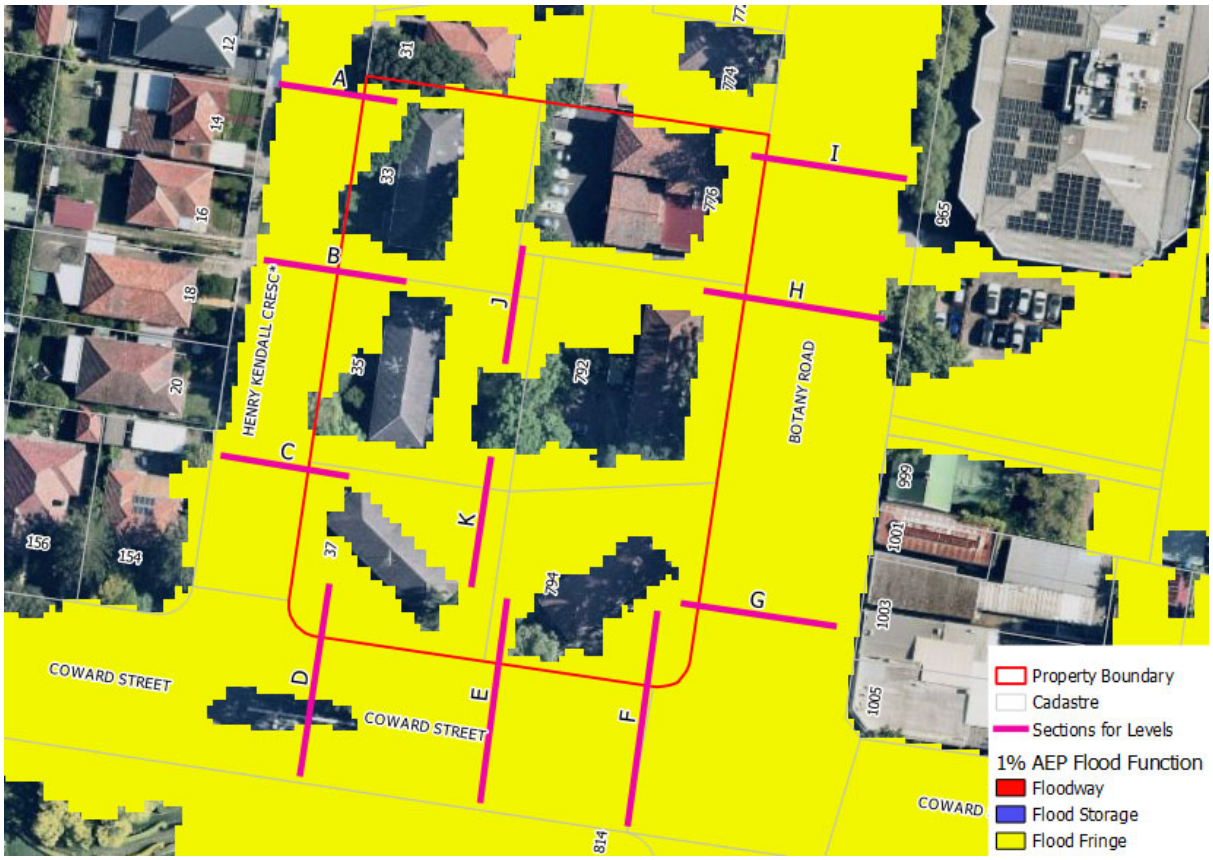
| Location | 1% AEP Flood Level (m AHD) | 1% AEP Flood Level including sea level rise of 0.9m (year 2100) (m AHD) | 1% AEP Flood Level including increase in rainfall intensity of 20% (year 2100) (m AHD) |
|---|---|---|---|
| **A** | 8.20 | 8.20 | 8.20 |
| **B** | 8.19 | 8.19 | 8.20 |
| **C** | 8.06 | 8.06 | 8.07 |
| **D** | 8.02 | 8.02 | 8.02 |
| **E** | 8.22 | 8.22 | 8.23 |
| **F** | 8.37 | 8.37 | 8.38 |
| **G** | 8.39 | 8.39 | 8.41 |
| **H** | 8.56 | 8.56 | 8.57 |
| **I** | 8.64 | 8.64 | 8.65 |
| **J** | 8.27 | 8.27 | 8.27 |
| **K** | 8.20 | 8.20 | 8.21 |




1% AEP Flood Depth Map



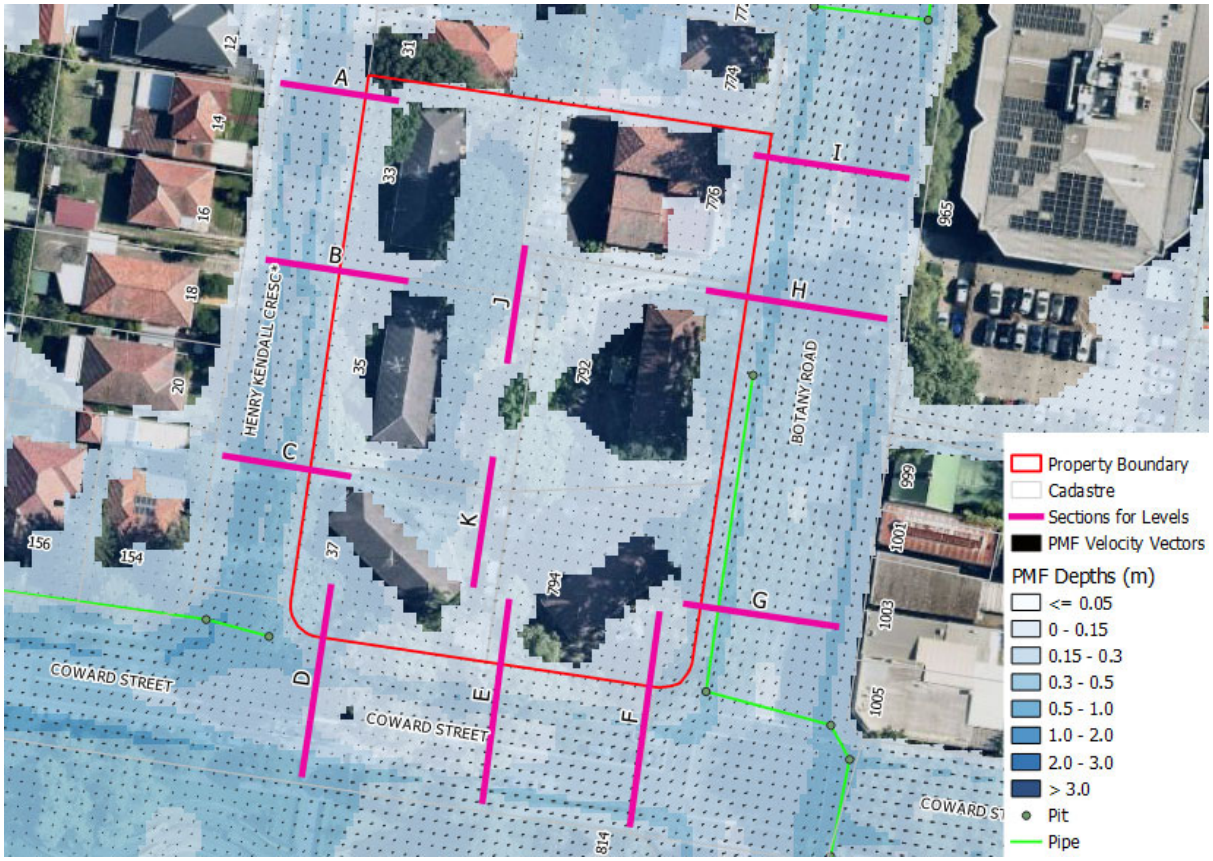

1% AEP Flood Hazard



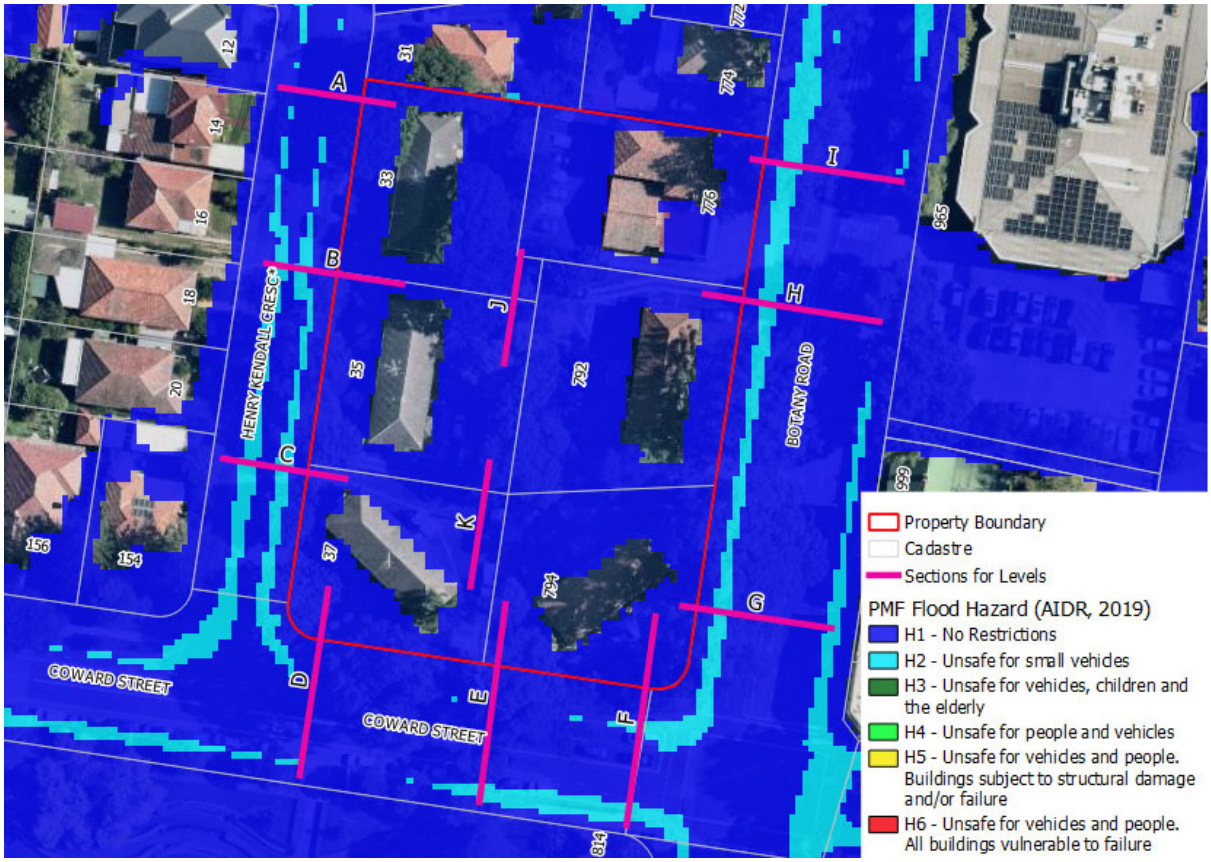

1% AEP Flood Function Map

# PMF Flood Information

| Location | PMF Level (m AHD) |
|---|---|
| **A** | 8.25 |
| **B** | 8.30 |
| **C** | 8.17 |
| **D** | 8.17 |
| **E** | 8.30 |
| **F** | 8.47 |
| **G** | 8.52 |
| **H** | 8.68 |
| **I** | 8.75 |
| **J** | 8.37 |
| **K** | 8.31 |




PMF Flood Depth Map




PMF Flood Hazard Map

# Flood Control Information

**COMPLYING DEVELOPMENT ON FLOOD CONTROL LOTS**

Development under the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 must not be carried out on any part of a flood control lot, other than a part of the lot that the council or a professional engineer who specialise in hydraulic engineering has certified, for the purposes of the issue of the relevant complying development certificate, as not being any of the following:

a) A flood storage area;
b) A floodway area;
c) A flow path;
d) A high hazard area;
e) A high risk area.

**FLOOD PLANNING LEVEL (FPL)**

The minimum habitable floor level for residential, commercial and industrial development on this land is the **1% AEP flood level + 0.5m freeboard.**

The minimum non-habitable floor level for residential, commercial and industrial development on this land is the 1% AEP flood level (no freeboard is required).

*Note: The minimum habitable floor level for critical, sensitive uses & facilities (such as childcare centres, educational establishments, seniors housing etc.) on this land is the 1% AEP flood level + 0.5m freeboard or the PMF flood level, whichever is higher.*

**CAR PARKING & DRIVEWAY ACCESS**

For above ground level garages, the minimum garage floor level shall be the 1% AEP flood level.

Basements and below ground garages/storage are to be physically protected to the minimum habitable floor level. All access, ventilation, driveway crests and any other potential water entry points shall be set at or above the minimum habitable floor level. Flood gates/barriers are not permitted for new building development.

The minimum level of an open hardstand car parking space or carport is the natural ground level. Carports must be of open design, with at least 2 sides completely open as otherwise, it will be enclosed and considered to be a garage. Open hardstand/carport parking spaces shall not be in a floodway or high hazard floodwaters.

**FLOOD IMPACT**

The development must not result in increased flooding elsewhere in the floodplain or redirect flows onto adjoining properties.

A hydraulic/flood/civil engineer is to be engaged to prepare a flood impact assessment report (refer to Bayside DCP 2022 section 9.5.4). The impact on the floodplain before and after development is to be assessed using a 2D hydraulic model. A TUFLOW model has been created for Bayside Council for the catchment. The model will be made available to a nominated Consulting Engineer subject to entering into a Model and Data Licence Agreement and payment of the fee as listed in Council's fees and charges.

A flood impact assessment report may not be required for small scale development (e.g., alts & adds, single dwellings and dual occupancies) where the flood storage and floodway capacity are retained as part of the development. Some examples of this are the following:

- The building/works are not located in the flood affected area.
- The building is designed to allow the free flow of floodwater under the building (e.g., constructed as a suspended slab on pier and beam foundation with a void below up to the 1% AEP flood level).

**FLOW THROUGH FENCING**

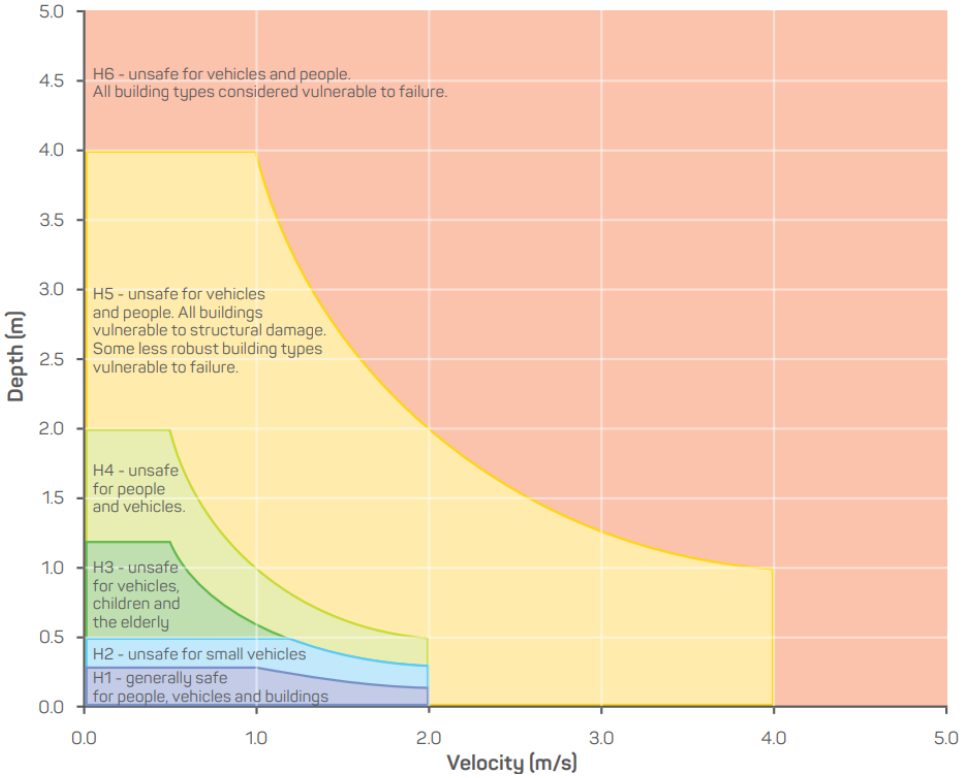
Flow through open form fencing (louvres or pool fencing) is required for all new fencing and gates up to the 1% AEP Flood Level to allow flood water flow through.

**FLOOD RISK MANAGEMENT**

A Flood Risk Management Plan prepared by a suitably qualified civil engineer is required to be lodged with the DA which will detail whether evacuation procedures are required and if so, how they will be initiated, warning signs and preservation of flood awareness as owners and/or occupants change through time. The flood risk management plan is to be in accordance with section 3.10.13 of the Bayside DCP.

**Flood Hazard**

The flood hazard categories used in this flood certificate have been adapted from Australian Institute of Disaster Resilience, Guideline 7-3, Flood Hazard (2019). The hazard categories are provided in the chart below. The definitions of each have also been tabulated below.




| Hazard Vulnerability Classification | Description |
|---|---|
| **H1** | Generally safe for vehicles, people and buildings. |
| **H2** | Unsafe for small vehicles. |
| **H3** | Unsafe for vehicles, children and the elderly. |
| **H4** | Unsafe for vehicles and people. |
| **H5** | Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure. |
| **H6** | Unsafe for vehicles and people. All building types considered vulnerable to failure. |

**DEFINITIONS**

**1% Annual Exceedance Probability (AEP) Flood:** This means there is a 1% chance of a flood of this height, or higher, occurring in any one year.

**Probable Maximum Flood (PMF) Flood:** This is the largest flood that could conceivably occur at a particular location.

**Floodway area:** Land that is a pathway taken by major discharges of floodwaters, the partial obstruction of which would cause a significant redistribution of floodwaters, or a significant increase in flood levels. Floodways are often aligned with natural channels, are usually characterised by deep and relatively fast flowing water and have major damage potential.

**Flood Storage Area:** Those parts of the floodplain that are important for the temporary storage of flood waters. The loss of storage areas may increase the severity of flood impacts by reducing natural flood attenuation.

**Flood Fringe Area:** The remaining land in the Flood Planning Area after the Floodway area and Flood Storage area have been defined.

**Flood Planning Level (FPL):** The combination of the flood level from the defined flood event and freeboard selected for flood risk management purposes. Different FPL apply to difference types of the development. The FPL is a height used to set floor levels for development in flood prone areas.

**Freeboard:** is a factor of safety expressed as the height above the design flood level. 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 and impacts that are specific event related, such as levee and embankment settlement, and other effects such as “greenhouse” and climate change.

**Habitable Floor Area:** in a residential situation: a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom; in an industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.

**Non-Habitable Floor Area:** Enclosed spaces of a specialised nature occupied neither frequently nor for extended periods (e.g., storage shed, patio, deck)

**Australian Height Datum (AHD):** A common national surface level datum approximately corresponding to mean sea level

## Appendix C – Key flood mapping from the Mascot, Rosebery & Eastlakes Flood Study prepared by WMA Water Ltd

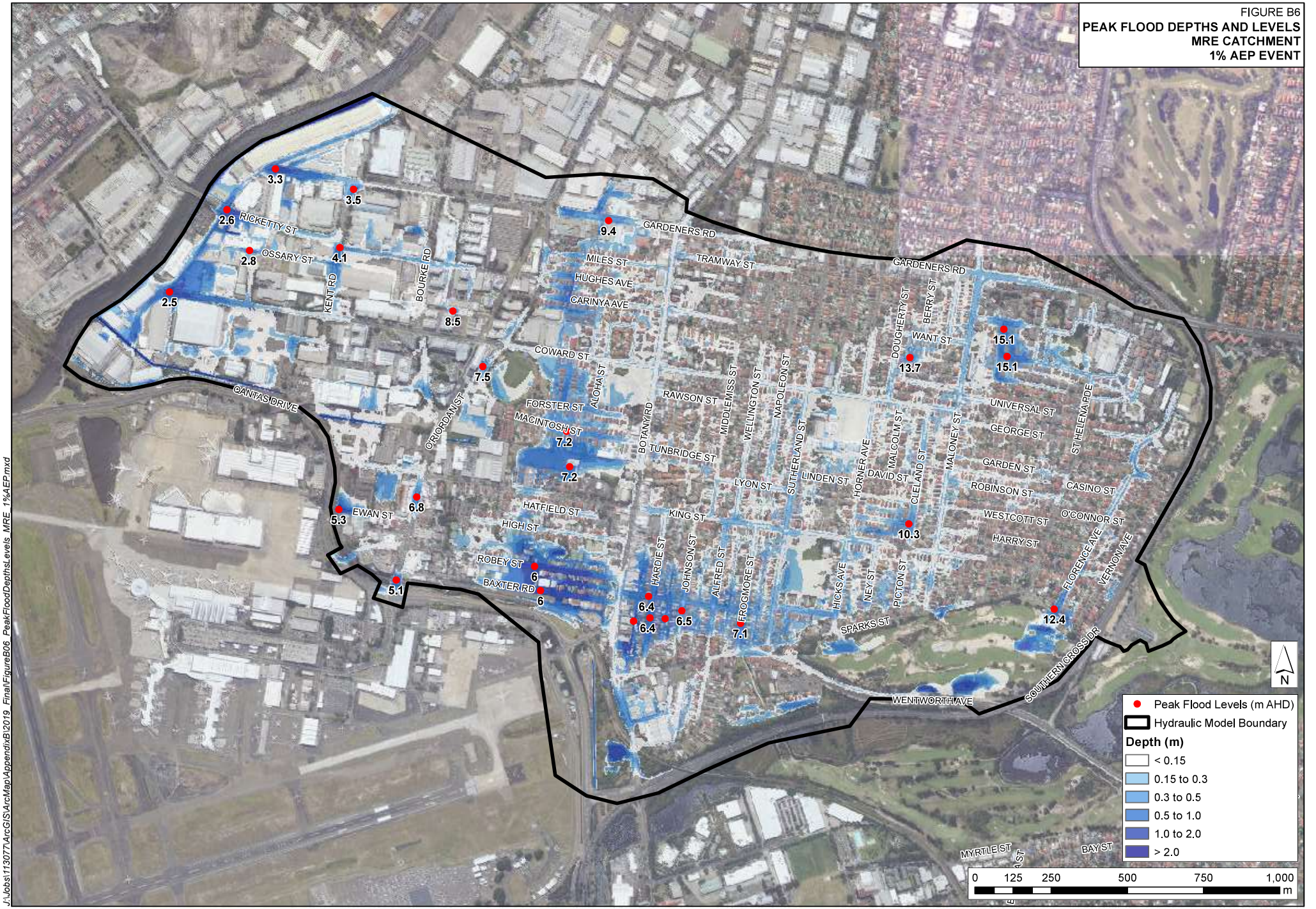
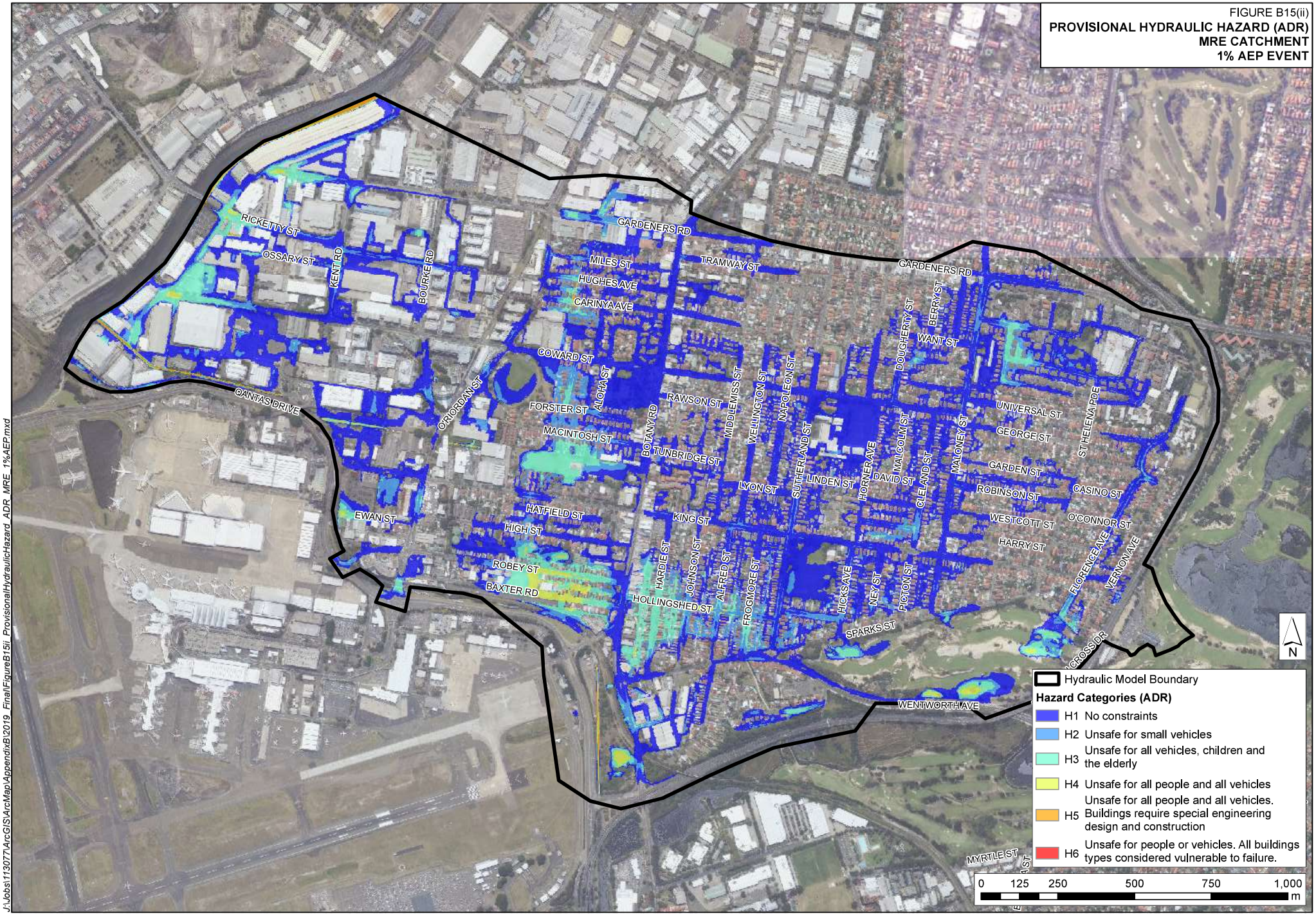


FIGURE B6
PEAK FLOOD DEPTHS AND LEVELS
MRE CATCHMENT
1% AEP EVENT
J:\Jobs\113077\ArcGIS\ArcMap\AppendixB\2019_FinalFigureB06_PeakFloodDepthsLevels_MRE_1%AEP.mxd
3.3
3.5
2.6
RICKETTY ST
2.8
OSSARY ST
4.1
2.5
KENT RD
BOURKE RD
8.5
9.4
GARDENERS RD
MILES ST
TRAMWAY ST
HUGHES AVE
CARINYA AVE
COWARD ST
7.5
QANTAS DRIVE
O'RIORDAN ST
FORSTER ST
MACINTOSH ST
7.2
7.2
ALOHA ST
BOTANY RD
RAWSON ST
TUNBRIDGE ST
MIDDLEMISS ST
WELLINGTON ST
NAPOLEON ST
SUTHERLAND ST
LINDEN ST
LYON ST
HORNER AVE
MALCOLM ST
DAVID ST
CLELAND ST
MALONEY ST
DOUGHERTY ST
BERRY ST
WANT ST
13.7
15.1
15.1
GARDENERS RD
UNIVERSAL ST
GEORGE ST
ST HELENA PDE
GARDEN ST
ROBINSON ST
CASINO ST
WESTCOTT ST
O'CONNOR ST
HARRY ST
FLORENCE AVE
VERNON AVE
10.3
12.4
5.3
EWAN ST
6.8
HATFIELD ST
HIGH ST
KING ST
ROBEY ST
6
BAXTER RD
6
5.1
HARDIE ST
JOHNSON ST
ALFRED ST
FROGMORE ST
HICKS AVE
NEY ST
PICTON ST
6.4
6.4
6.5
7.1
SPARKS ST
SOUTHERN CROSS DR
WENTWORTH AVE
MYRTLE ST
BAY ST
N
Peak Flood Levels (m AHD)
Hydraulic Model Boundary
Depth (m)
< 0.15
0.15 to 0.3
0.3 to 0.5
0.5 to 1.0
1.0 to 2.0
> 2.0
0
125
250
500
750
1,000
m

FIGURE B15(ii)
**PROVISIONAL HYDRAULIC HAZARD (ADR)**
**MRE CATCHMENT**
**1% AEP EVENT**

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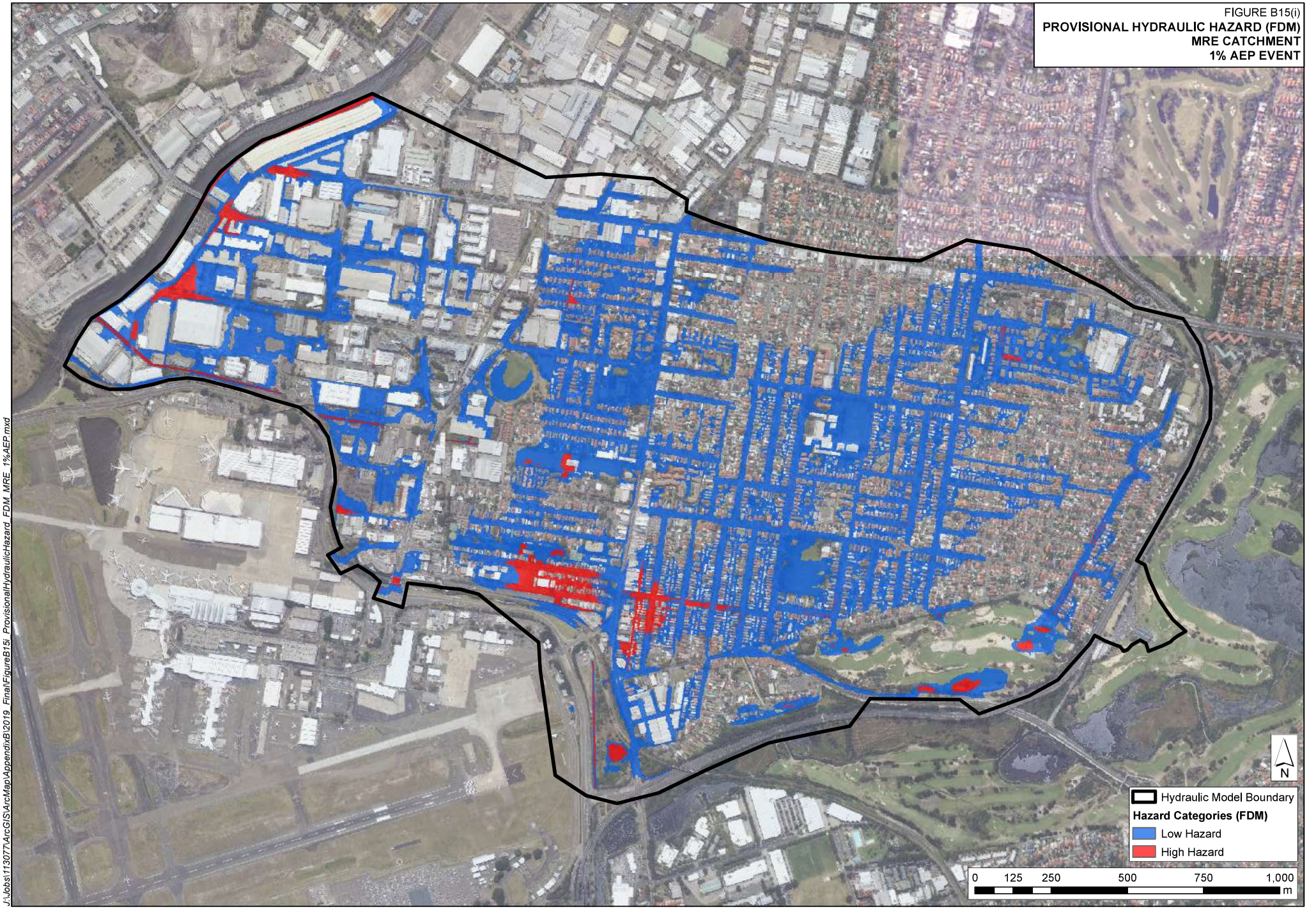
FIGURE B15(i)
PROVISIONAL HYDRAULIC HAZARD (FDM)
MRE CATCHMENT
1% AEP EVENT
N
Hydraulic Model Boundary
Hazard Categories (FDM)
Low Hazard
High Hazard
0 125 250 500 750 1,000
m
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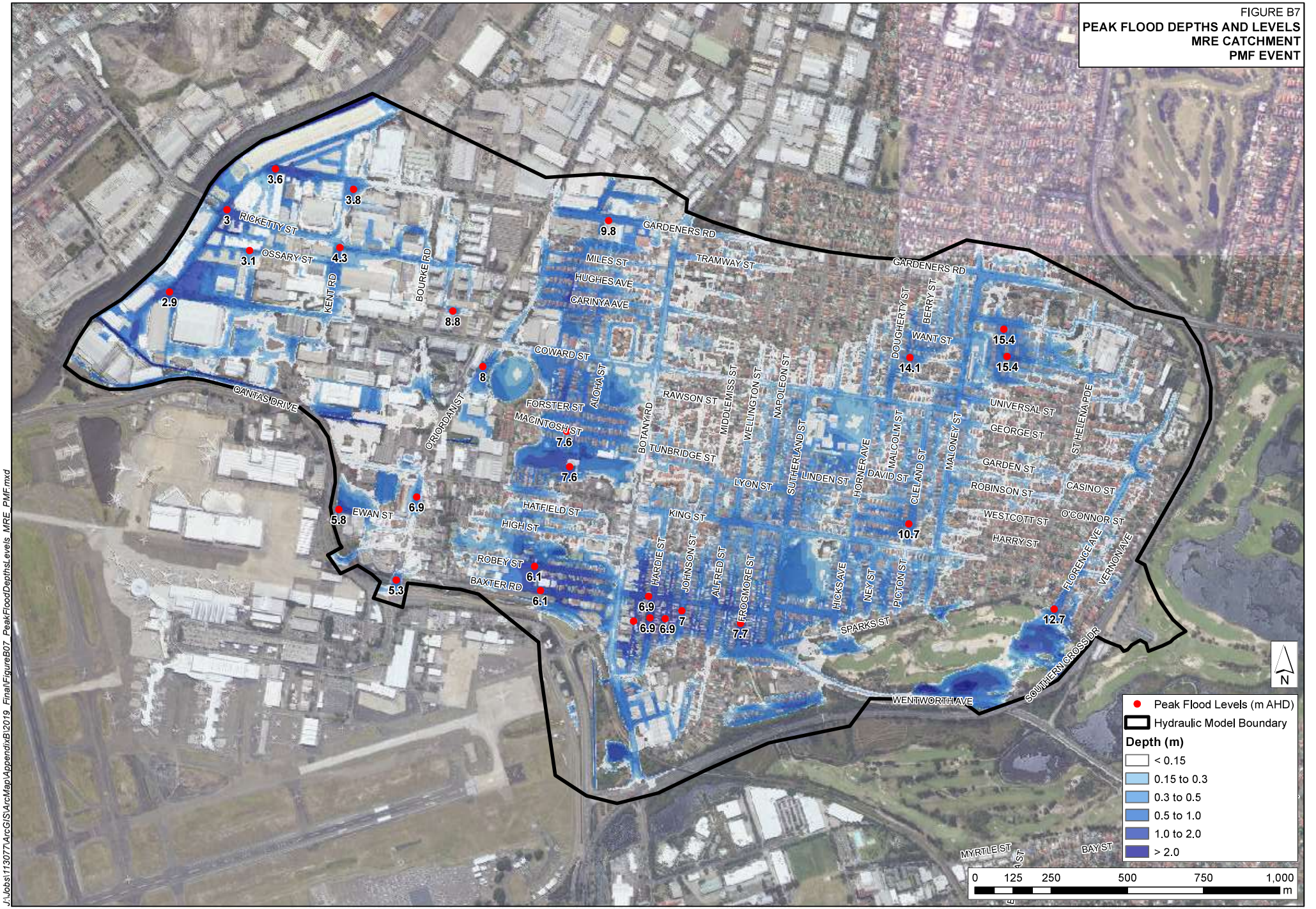


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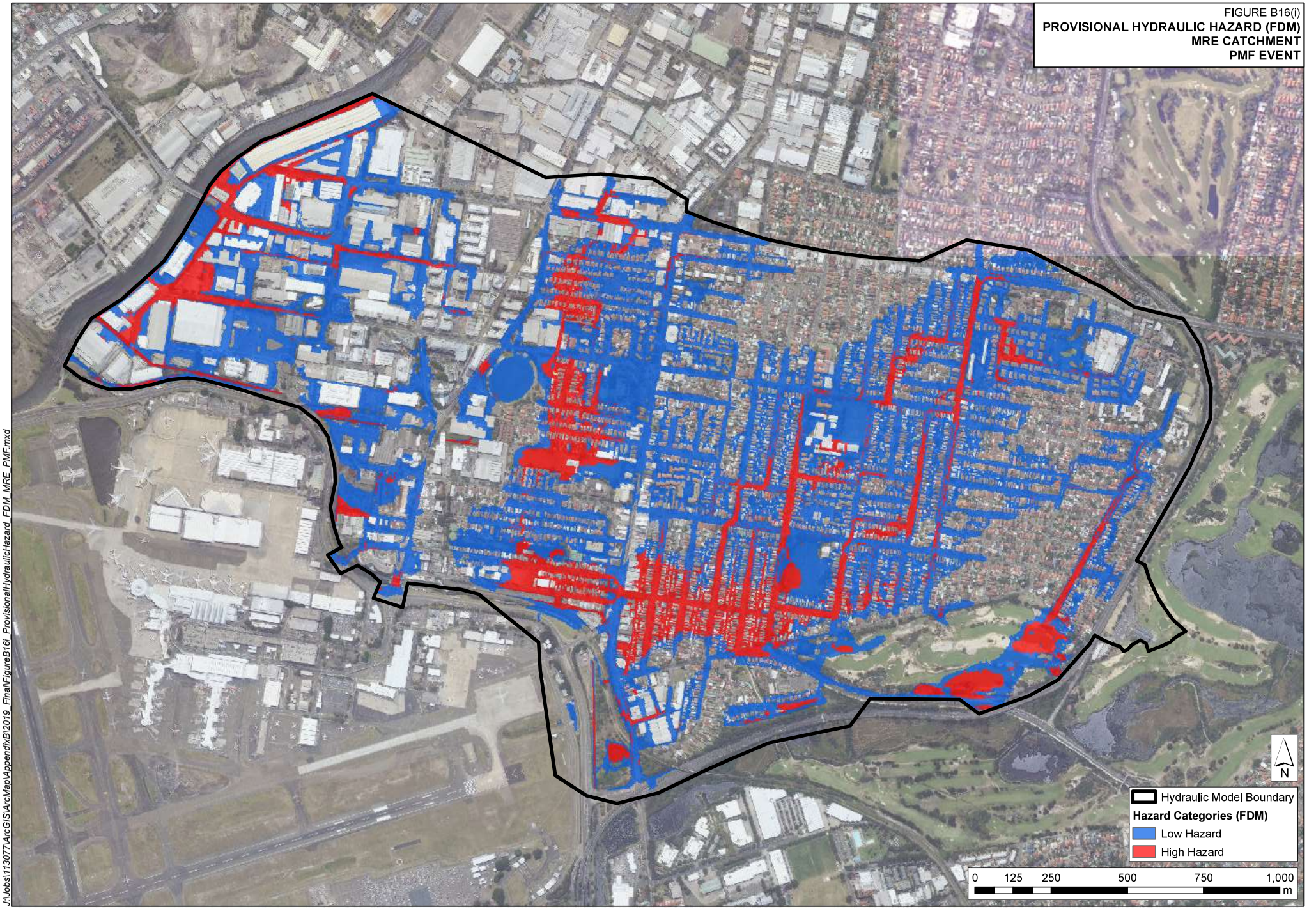
FIGURE B16(i)
PROVISIONAL HYDRAULIC HAZARD (FDM)
MRE CATCHMENT
PMF EVENT
N
Hydraulic Model Boundary
Hazard Categories (FDM)
Low Hazard
High Hazard
0 125 250 500 750 1,000
m
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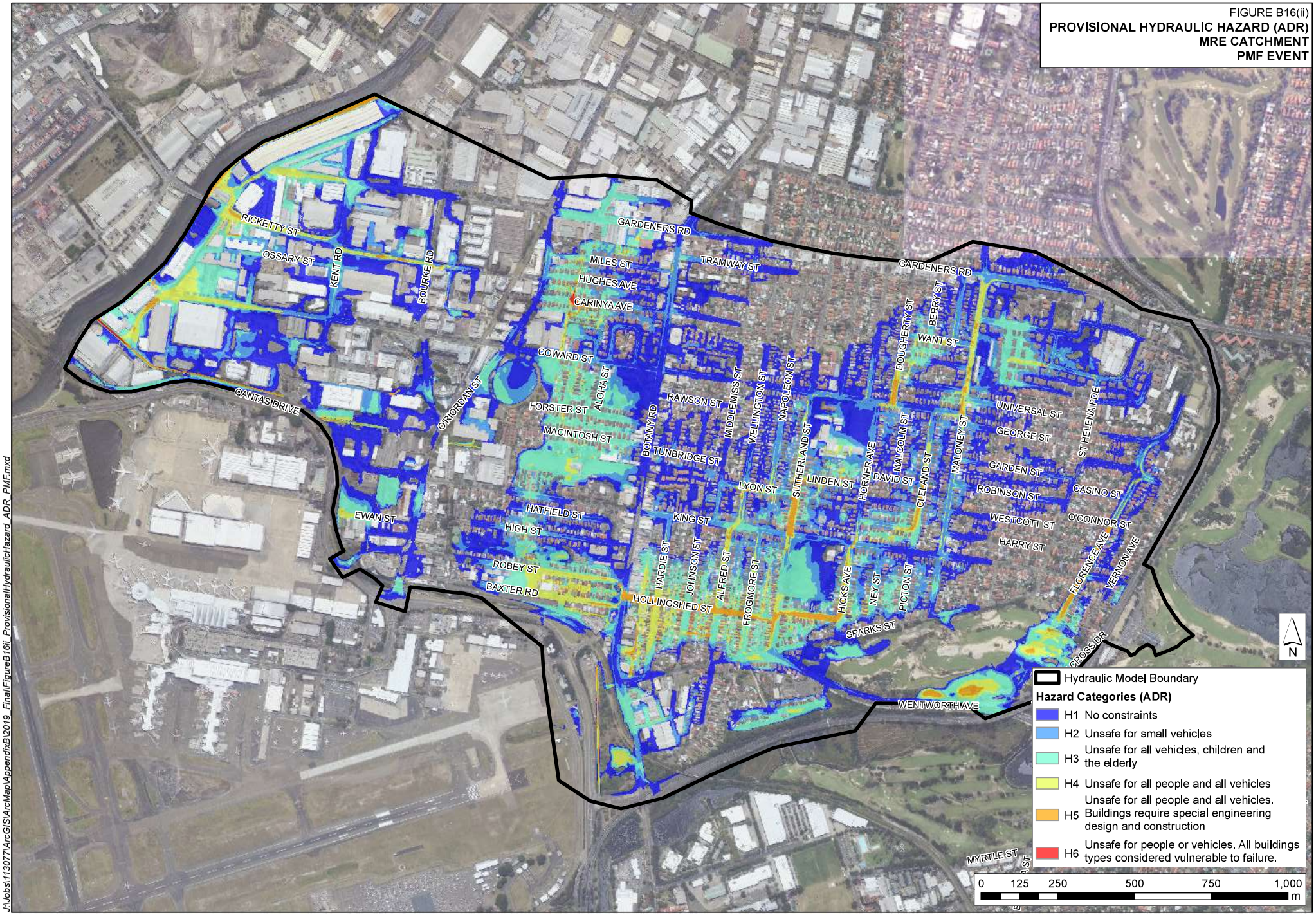


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