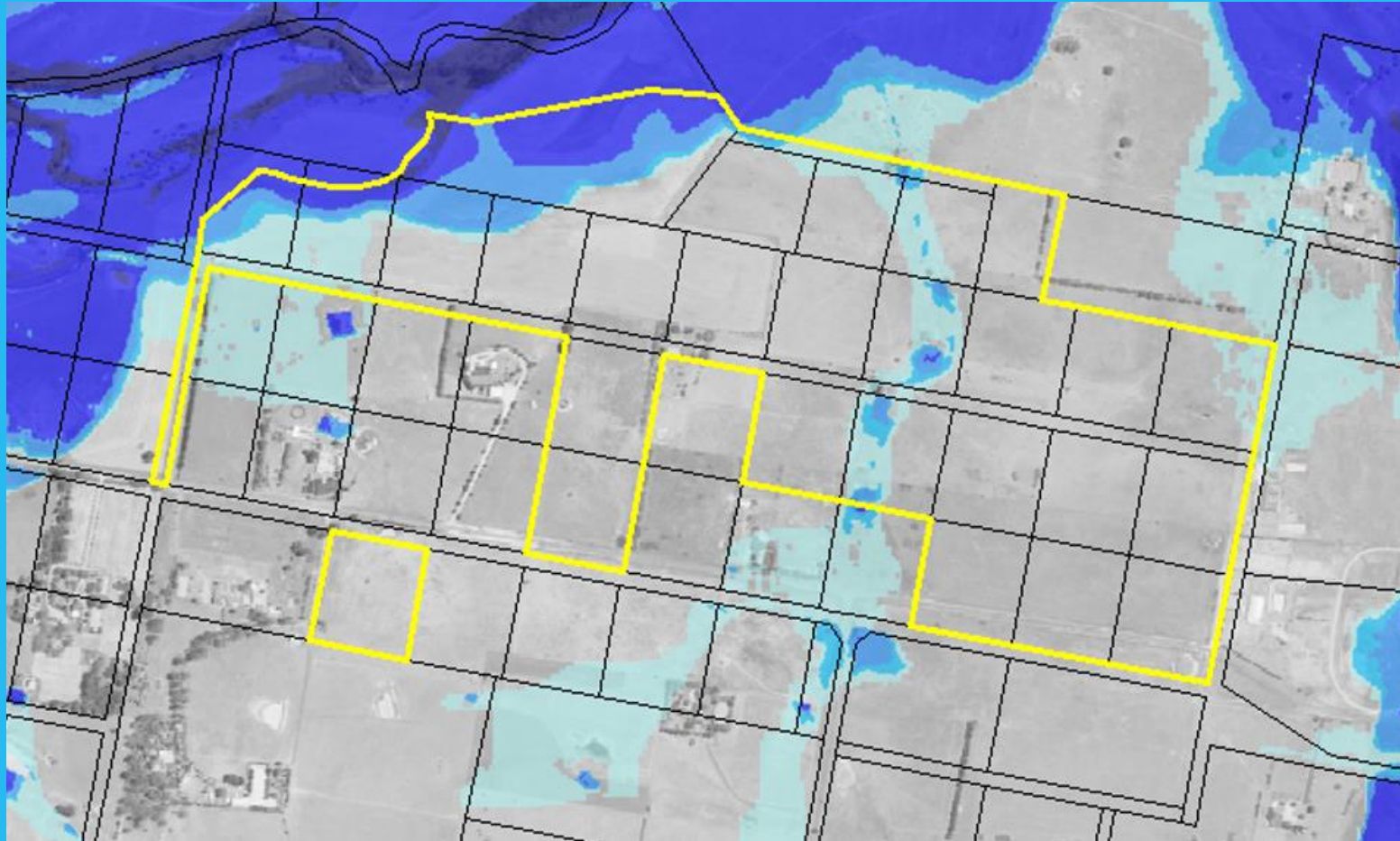


137 Brisbane Grove Road, Goulburn (PP-2024-291)



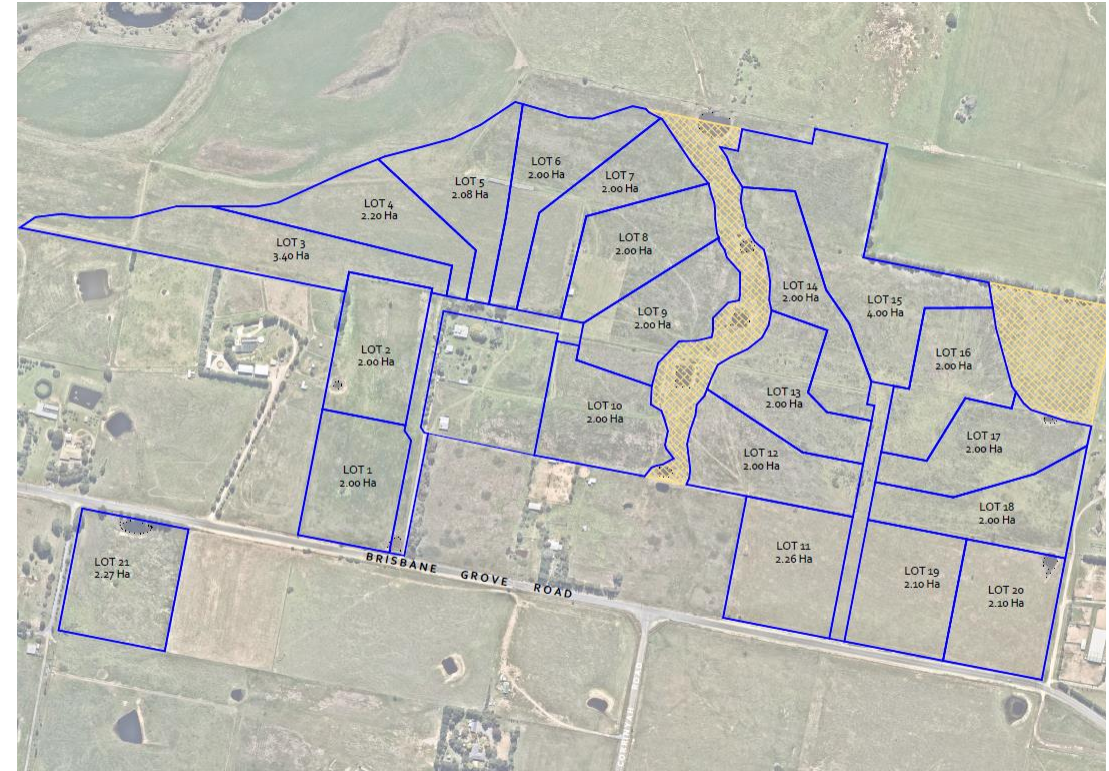
Gateway Determination - Flooding Discussion

Talking Points

- *Development overview*
- *Reference flood models*
- *Flood risk management strategy*
- *Site access and isolation*
- *Management of isolation risks*
- *Discussion of Determination and consistency with NSW Government Policy*

Development Overview

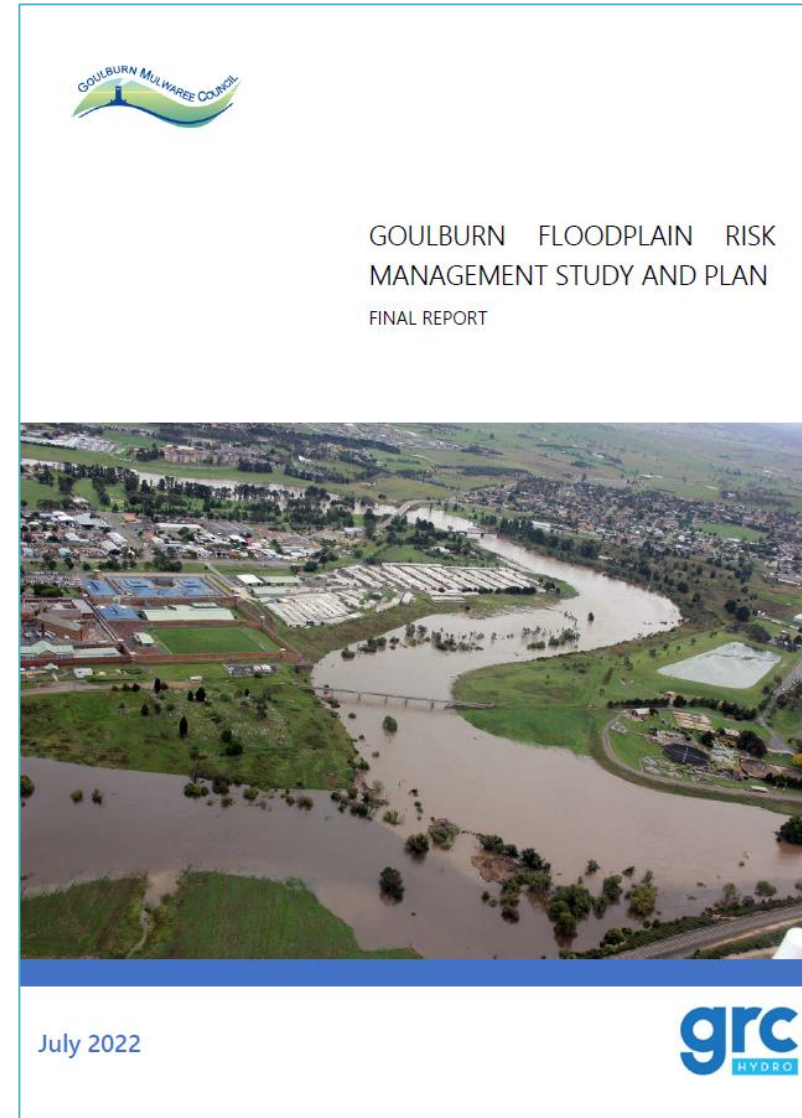
- *Change in land use zoning from 'RU1 Primary Production' to 'R5 Large Lot Residential' (Infill Development)*
- *Minimum lot size of 2 ha – self contained with ablutions, water and power*
- *Results in a potential additional 21 lots for 137 Brisbane Grove Road*
- *A total of 35 additional lots when combined with 2 Brisbane Grove Road*
- *Access to Goulburn is via Braidwood Road. This is a major arterial road with approx. 3,850 people using the road per day*



Draft Preliminary Plan (Sowdes 2025)

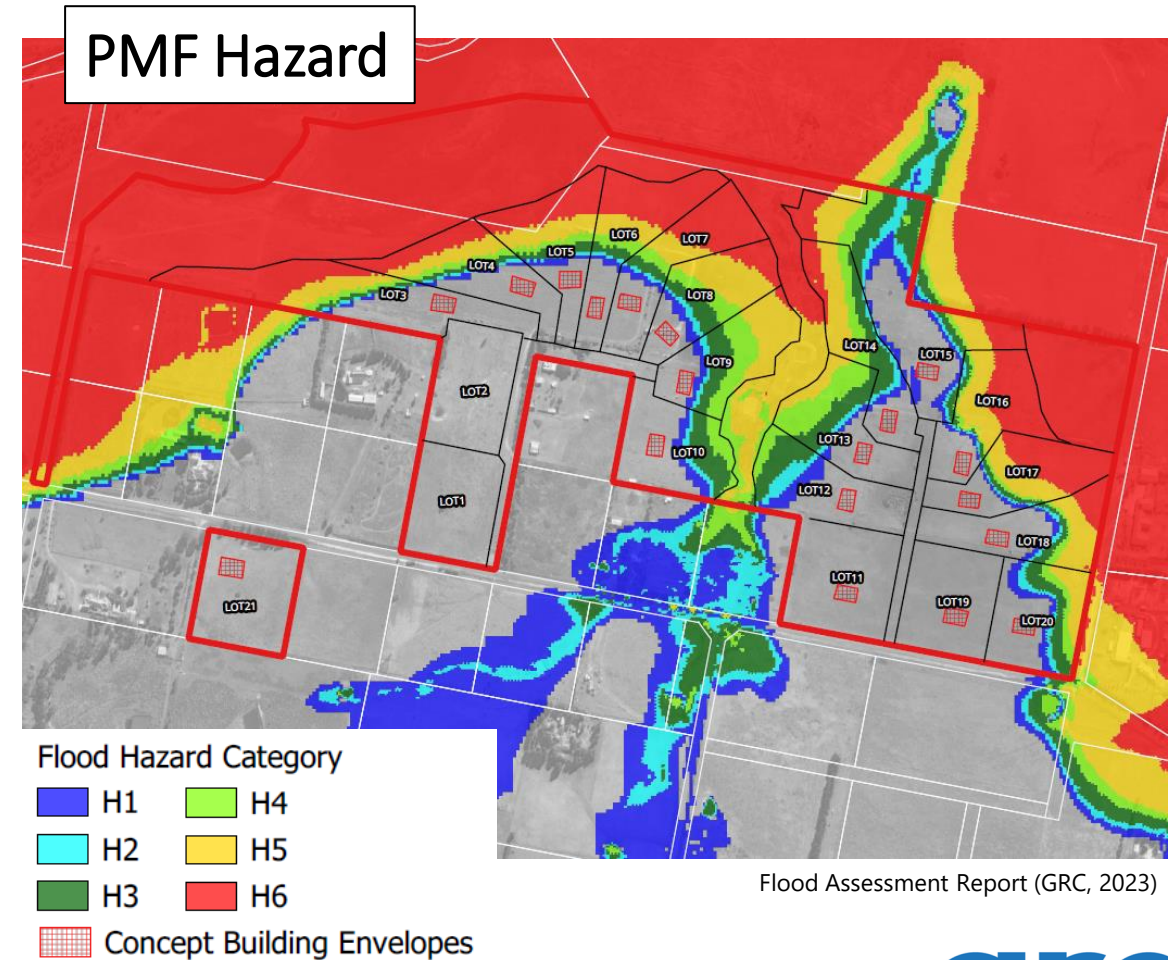
Reference Flood Models

- *Council flood models used for basis of analysis*
- *Goulburn Overland Flow Modelling (GRC Hydro, 2021)*
- *Goulburn Floodplain Risk Management Study and Plan (GRC Hydro, 2021)*
- *Wollondilly and Mulwaree Rivers Flood Study (WMAwater, 2016)*



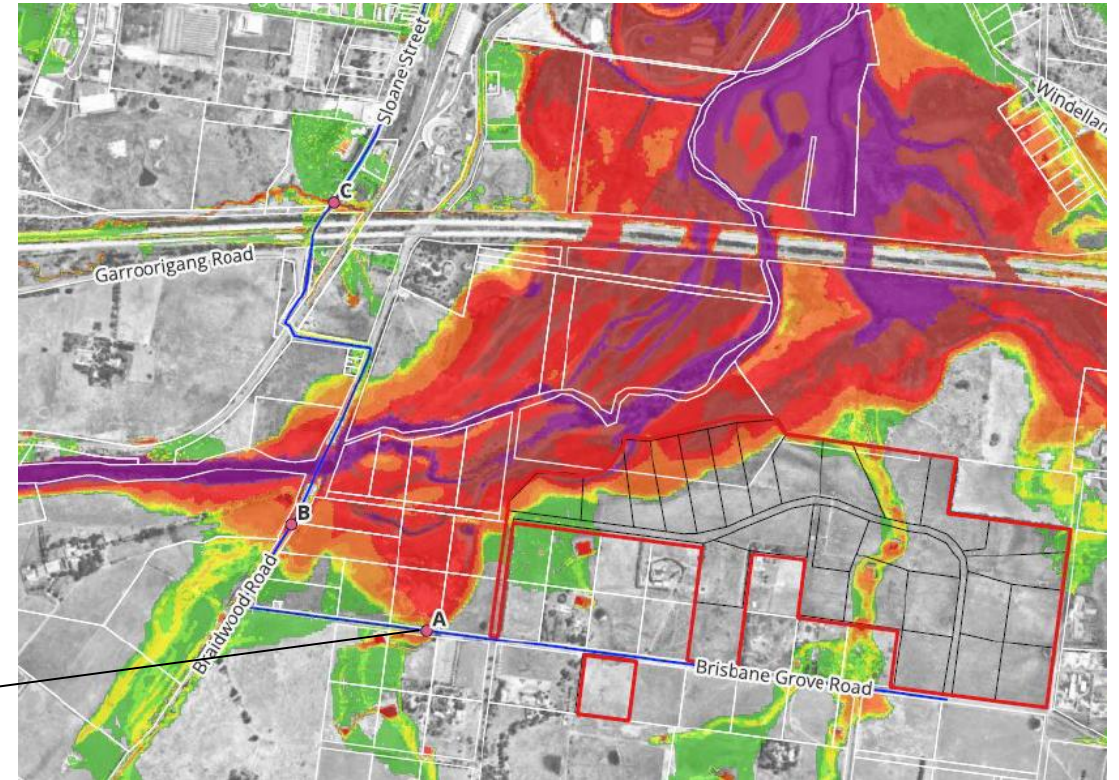
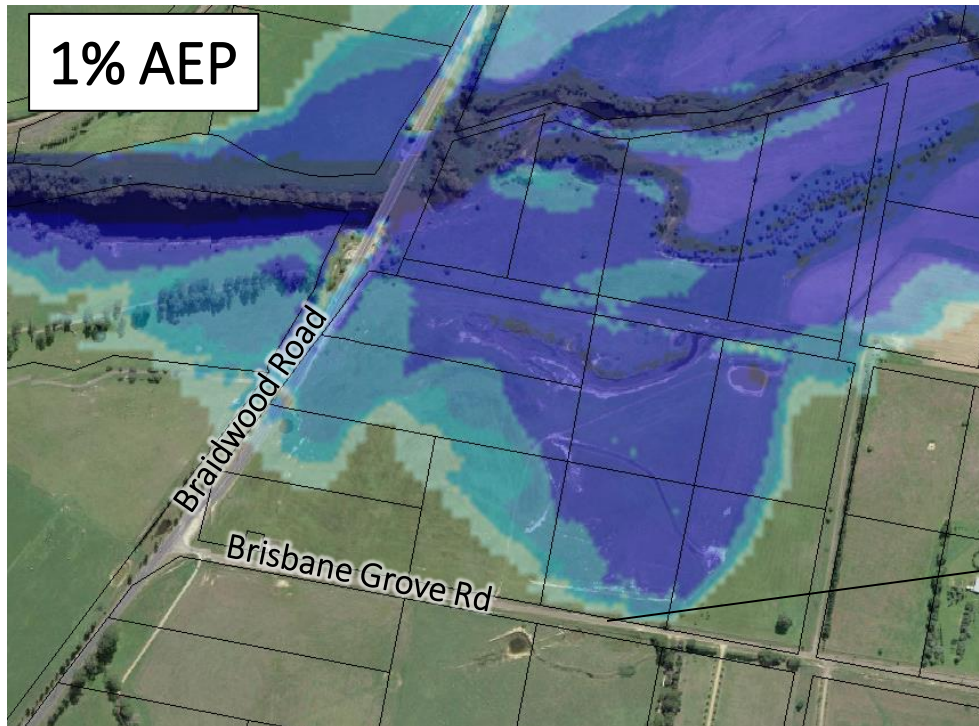
Flood Risk Management Strategy

- Land within the Flood Planning Area (FPA) to be zoned as C2 Environmental Conservation –
- All future development will be situated outside of the PMF extent
- Internal site road layout allows for PMF access to all lots from local roads external to the site
- No civil/road works within the PMF extent as part of future development of the site
- The risk of isolation is managed through measures developed in consultation with NSW Ambulance, Rural Fire Service and Goulburn Mulwaree Council .



Site Access and Isolation

- Brisbane Grove Road – mainstream affected in 0.2% AEP

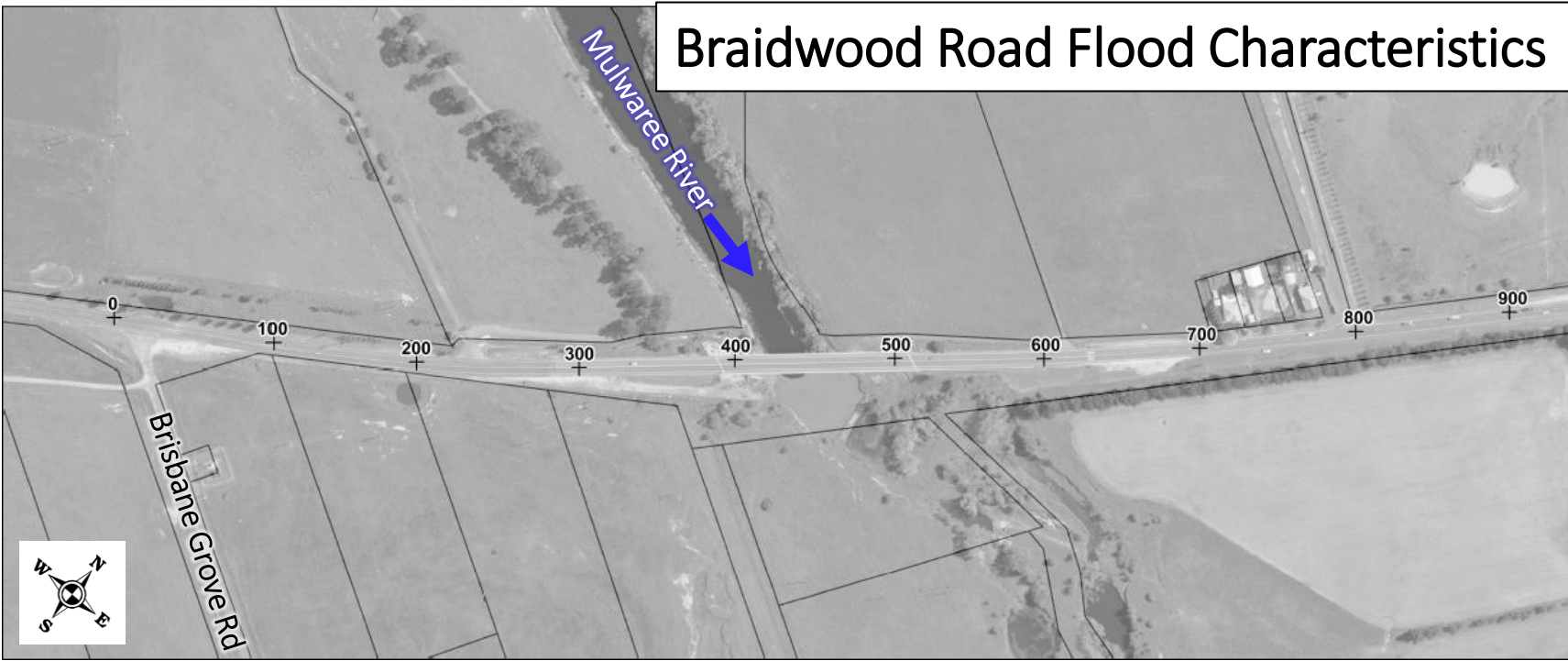


Flood Assessment Report (GRC, 2023)

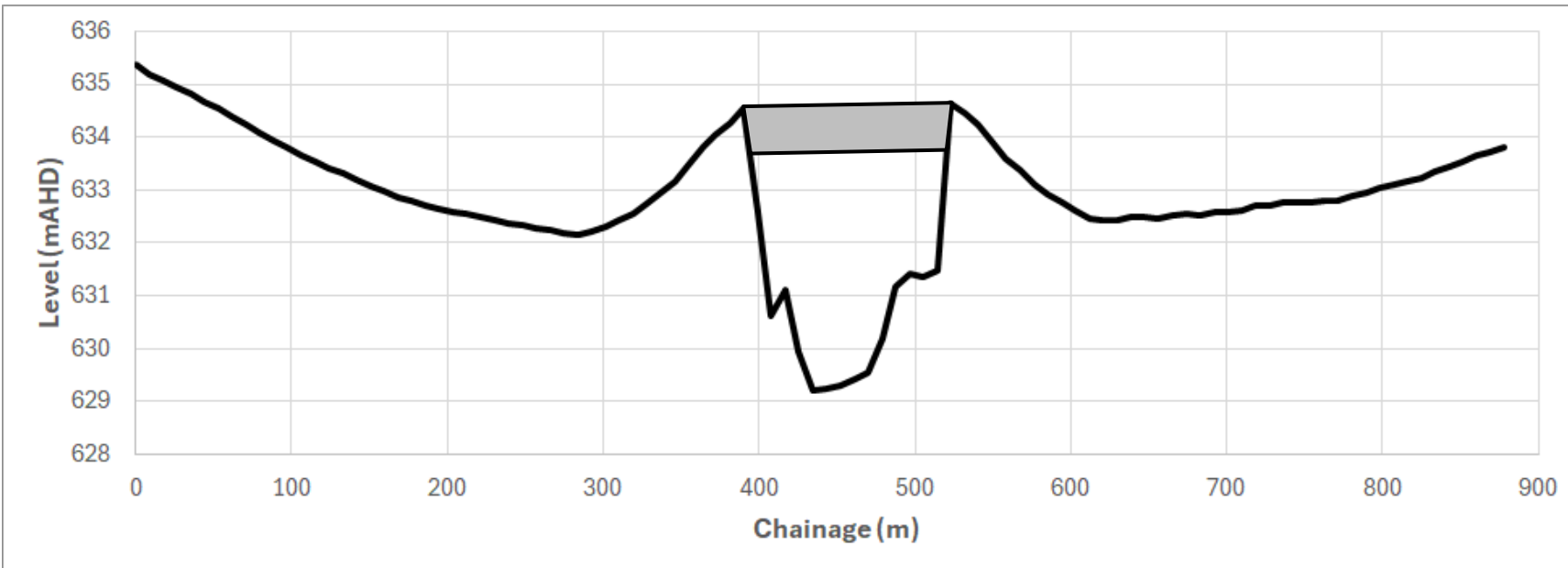
- Sloane Street – mainstream affected in PMF

Isolation occurs primarily due to flooding of Braidwood Road

Braidwood Road Flood Characteristics



○ *Plan view*



○ *Long Section*

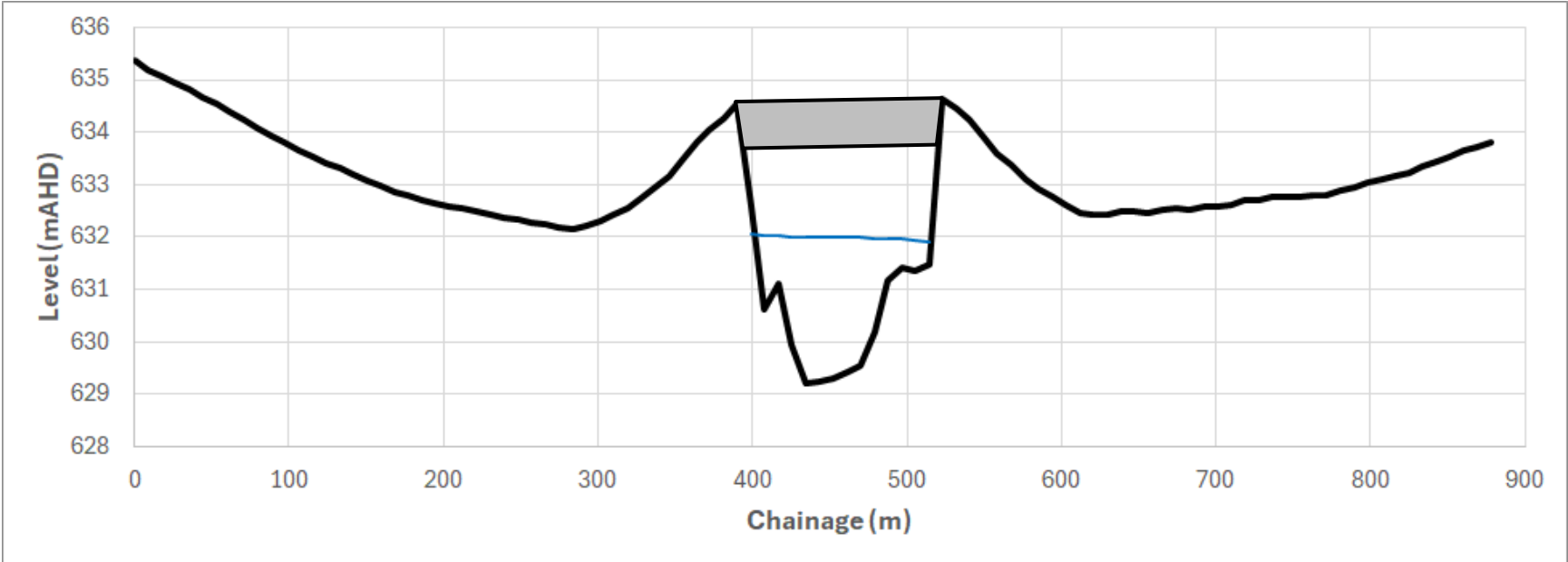
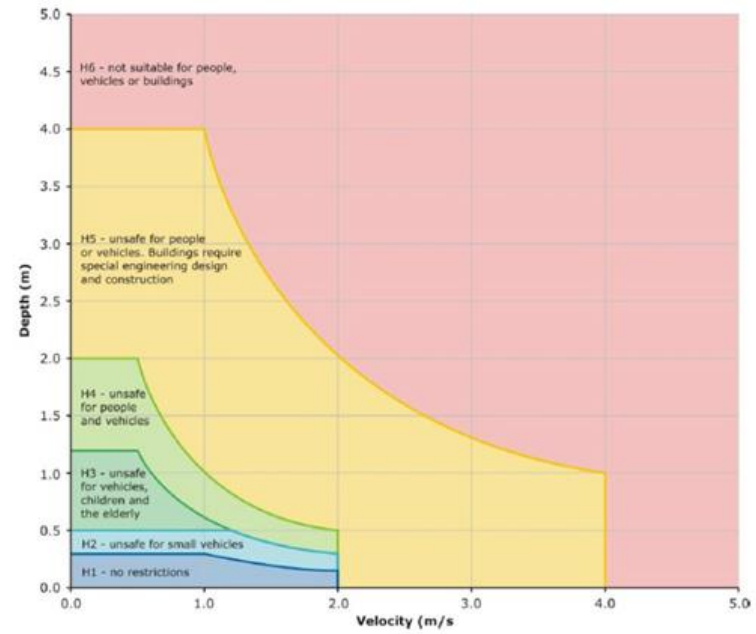
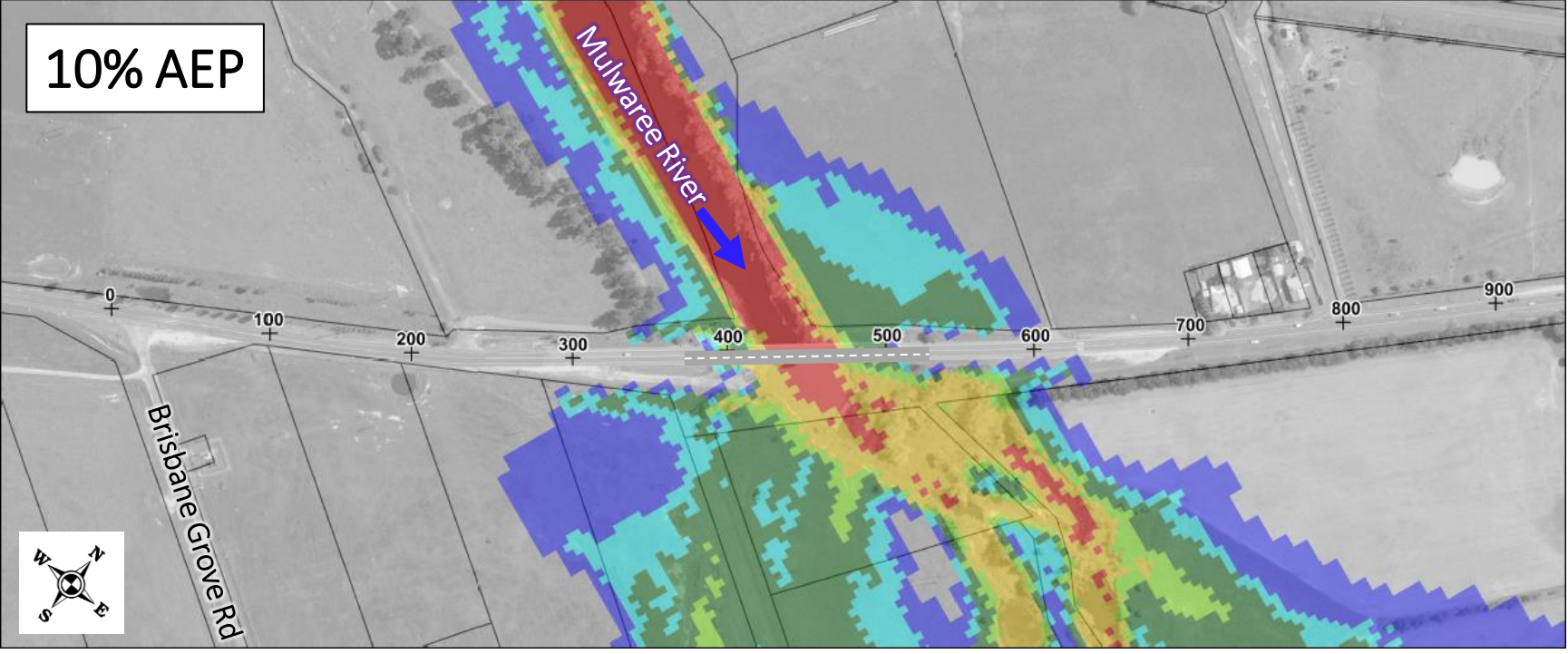


Table 5: Frequency, depth and duration of inundation of Braidwood Road

Events	Max Depth (m)	Duration of inundation	Duration with depth > 0.5 m
10%	-	-	-
5%	0.03	3.7	-
1%	0.57	22.5	8.5
0.5%	0.74	26.2	14.5
0.2%	0.98	30.2	20.5
PMF	8.62	38.4	35.7

Flood Assessment Report (GRC, 2023)

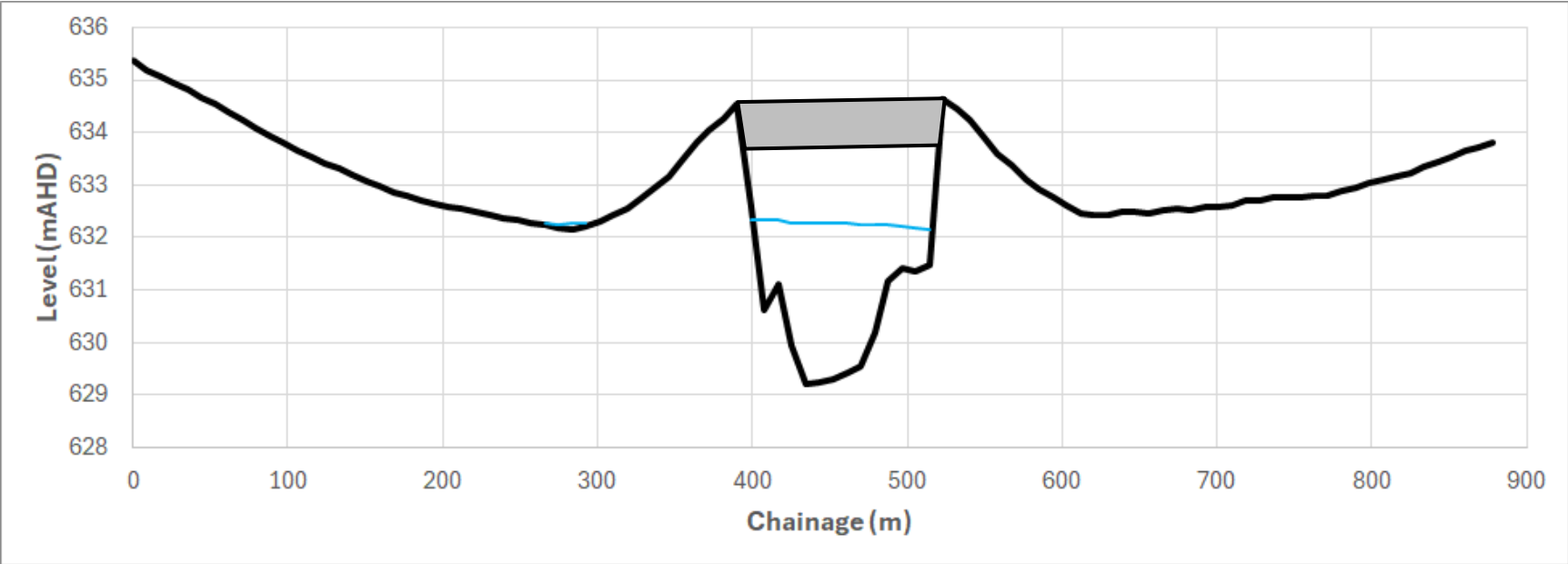
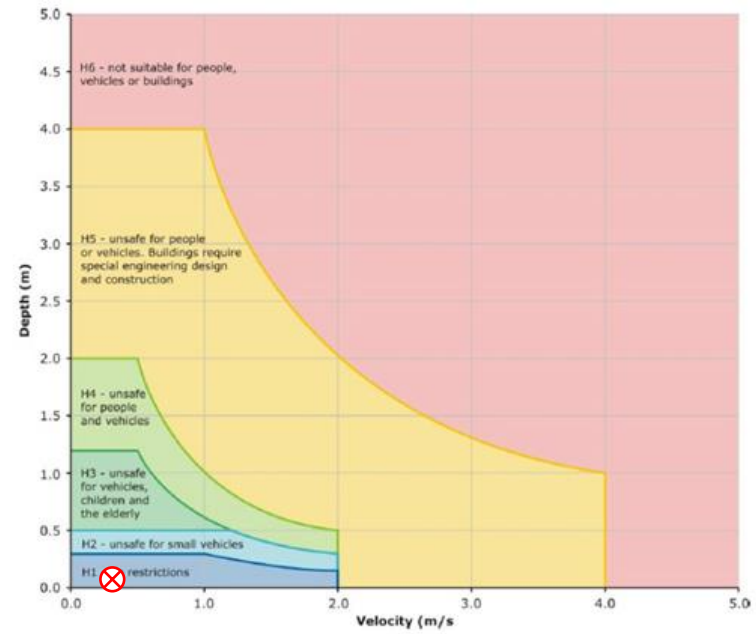
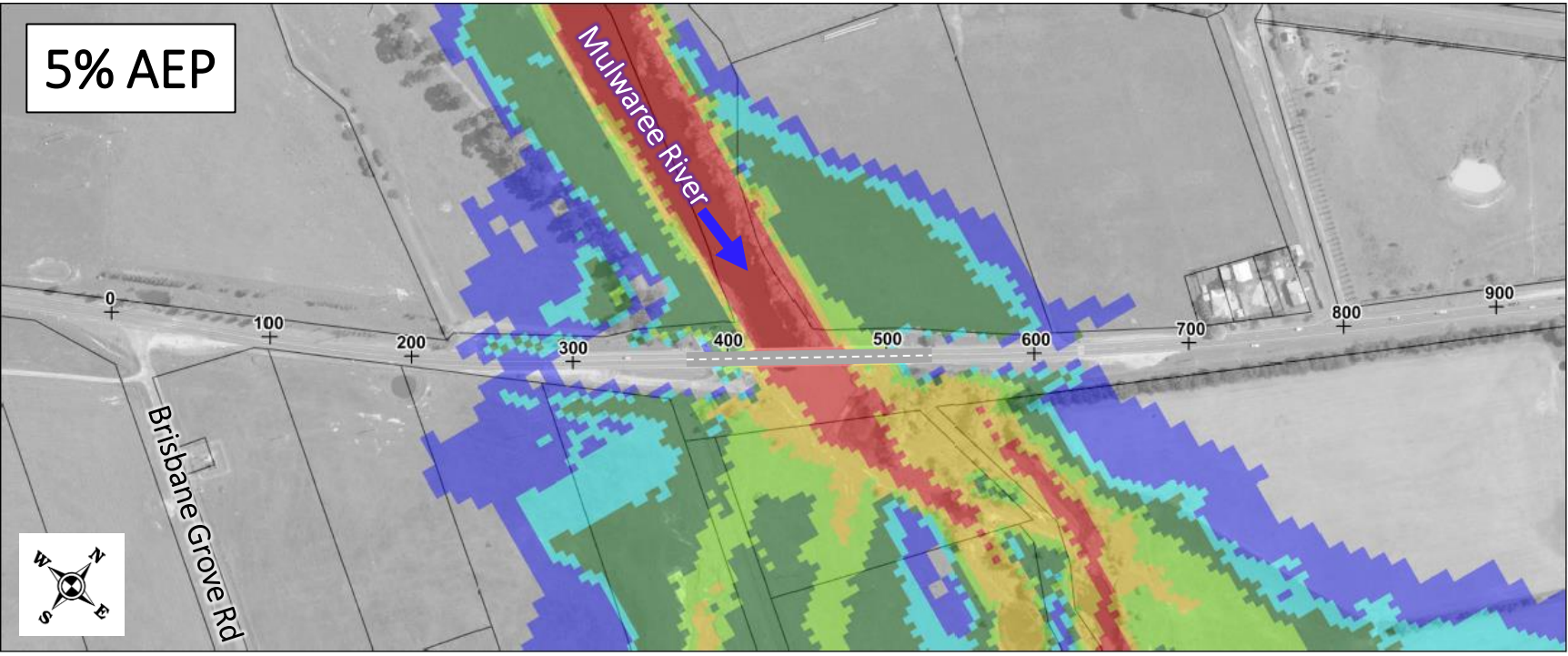


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PMF	8.62	38.4	35.7

Velocity = ~0.3 m/s

Flood Assessment Report (GRC, 2023)

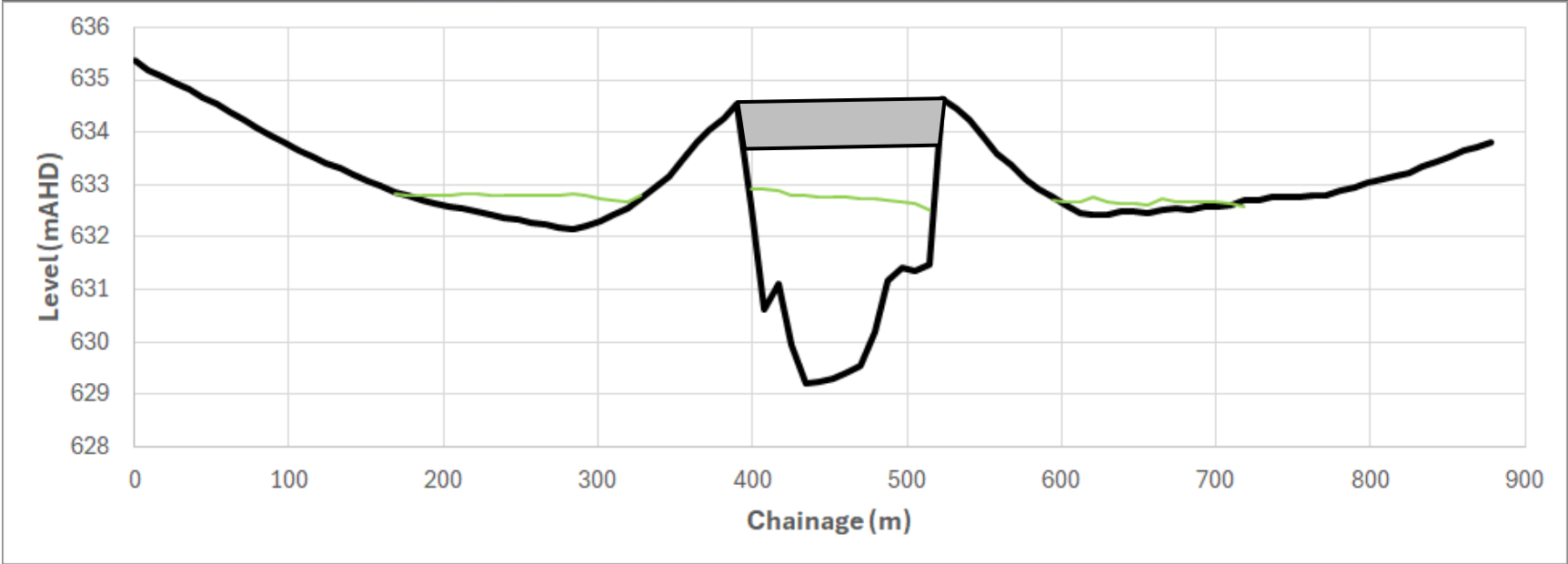
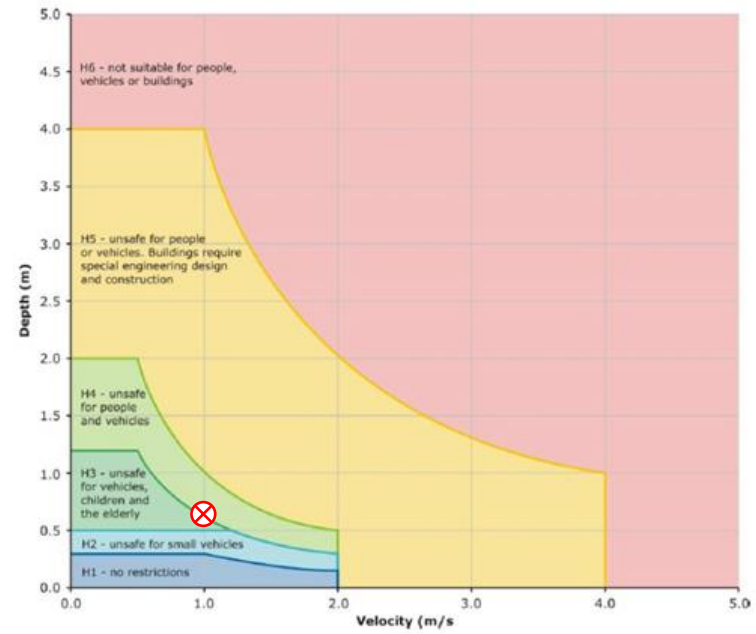
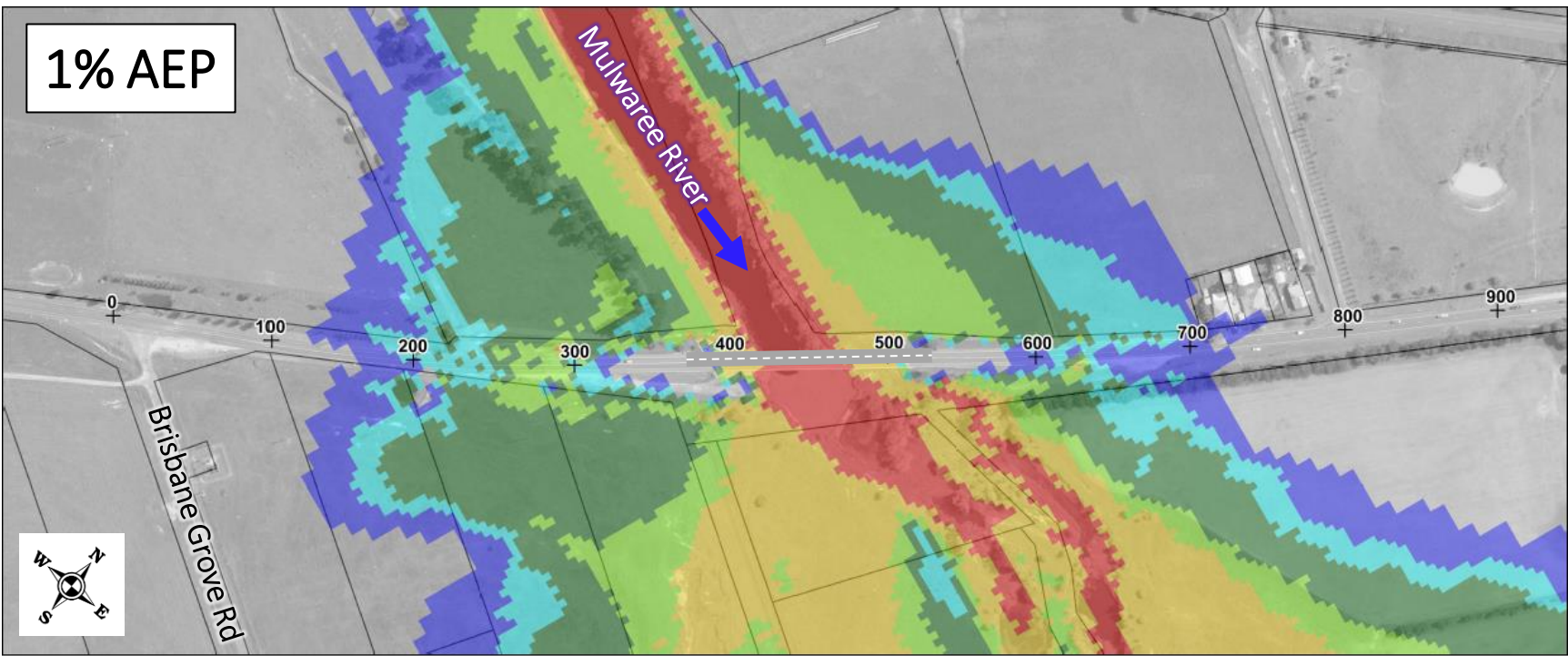


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0.2%	0.98	30.2	20.5
PMF	8.62	38.4	35.7

Velocity = ~1.0 m/s

Flood Assessment Report (GRC, 2023)

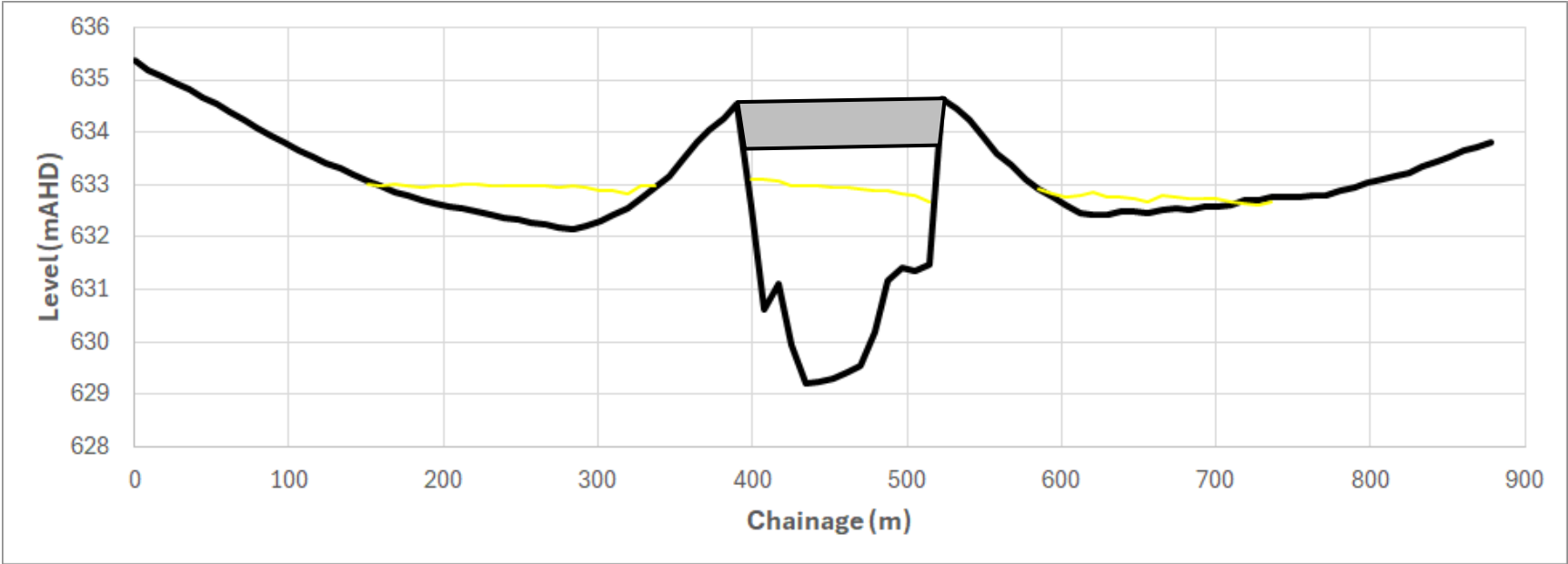
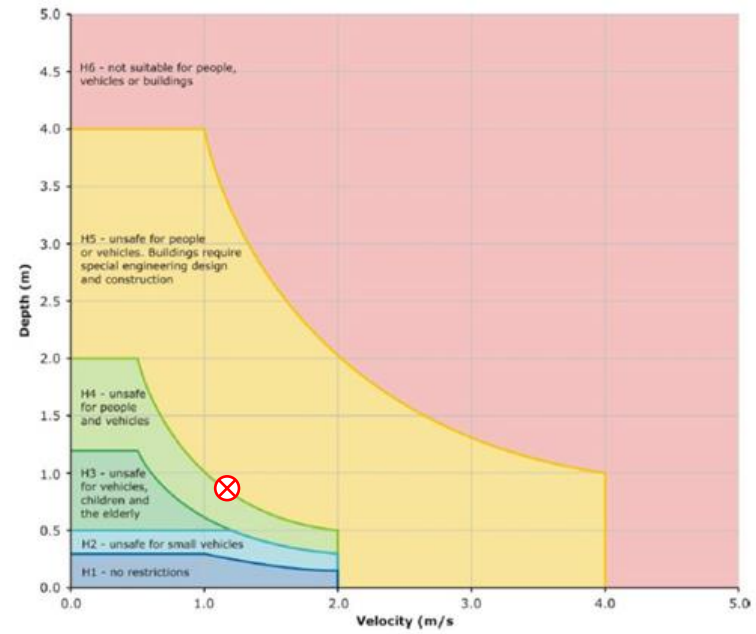
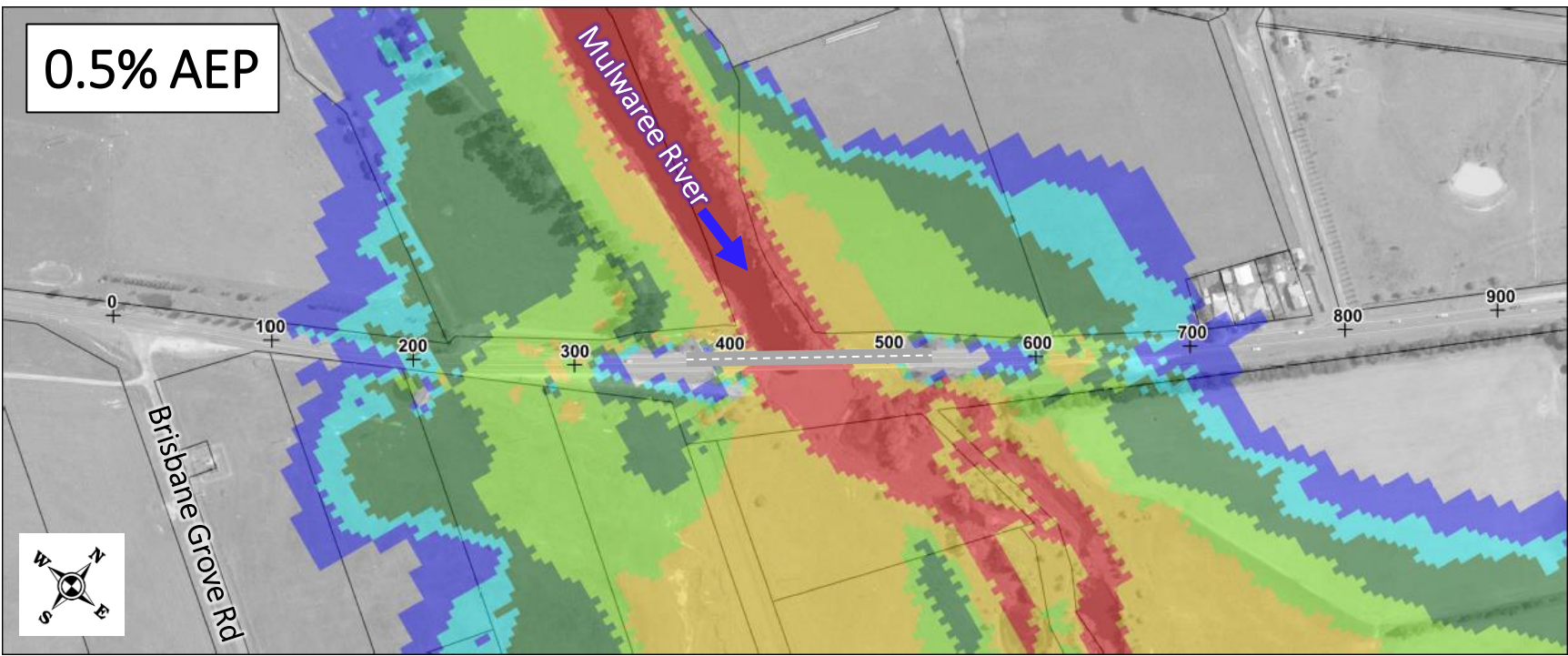


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PMF	8.62	38.4	35.7

Velocity = ~1.1 m/s

Flood Assessment Report (GRC, 2023)

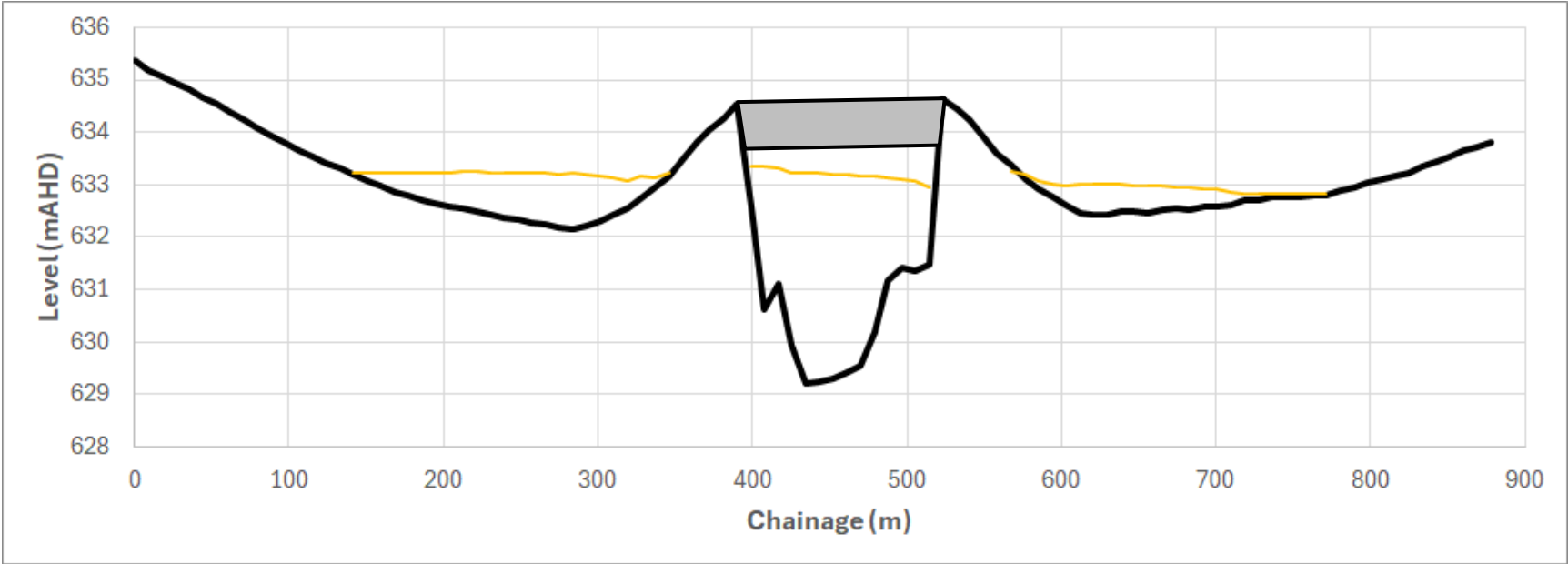
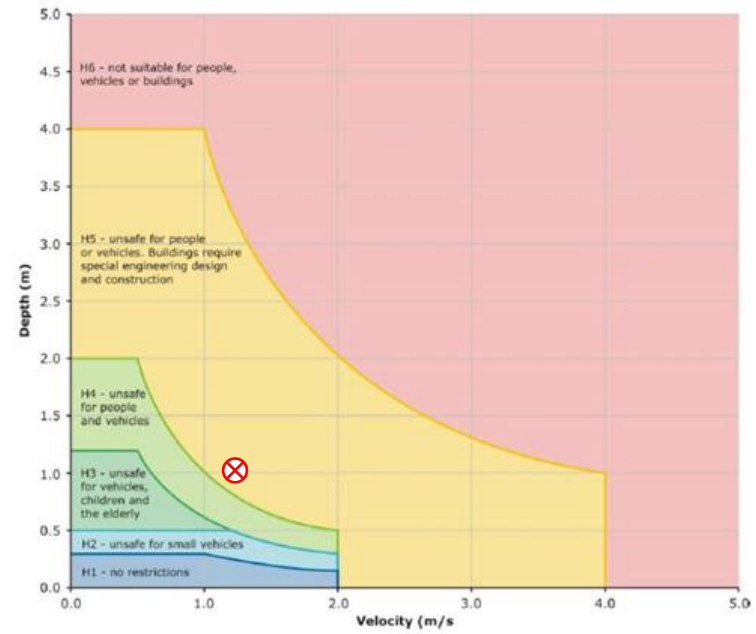
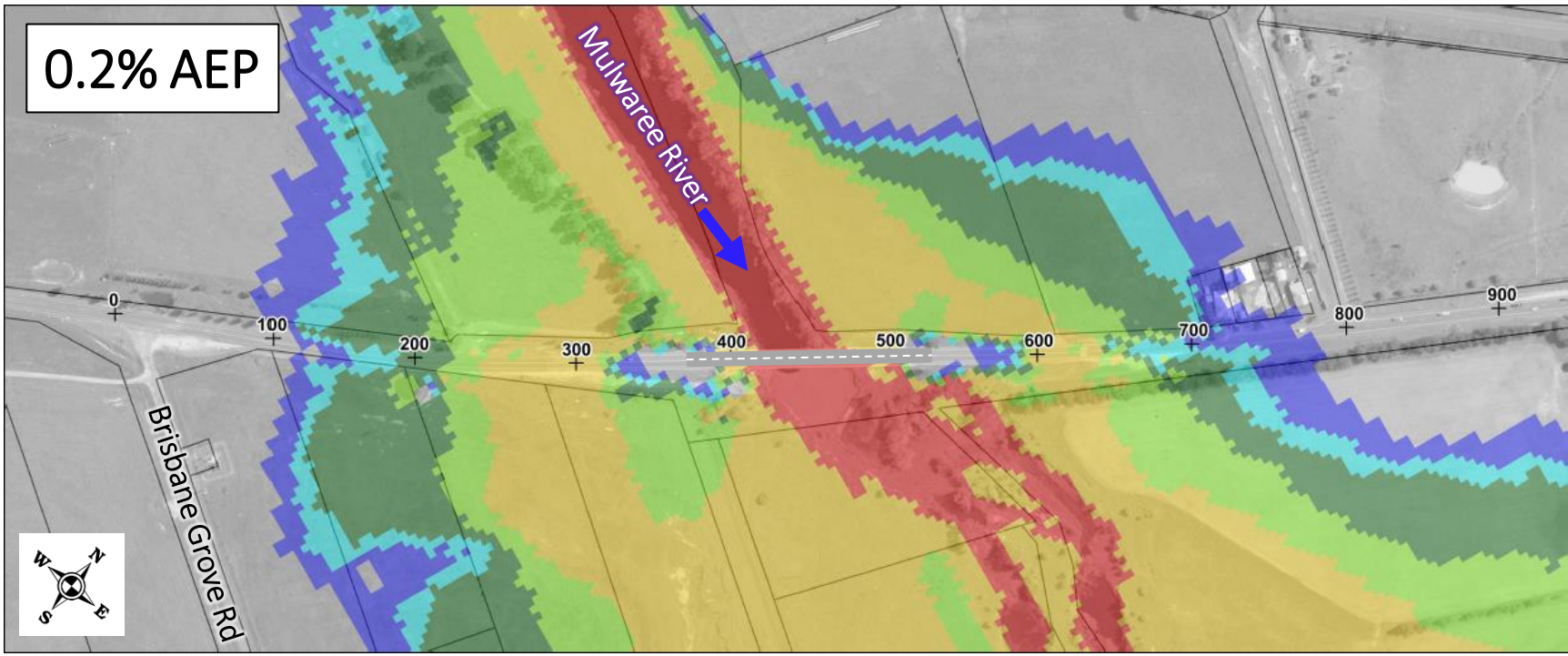


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PMF	8.62	38.4	35.7

Velocity = ~1.3 m/s

Flood Assessment Report (GRC, 2023)

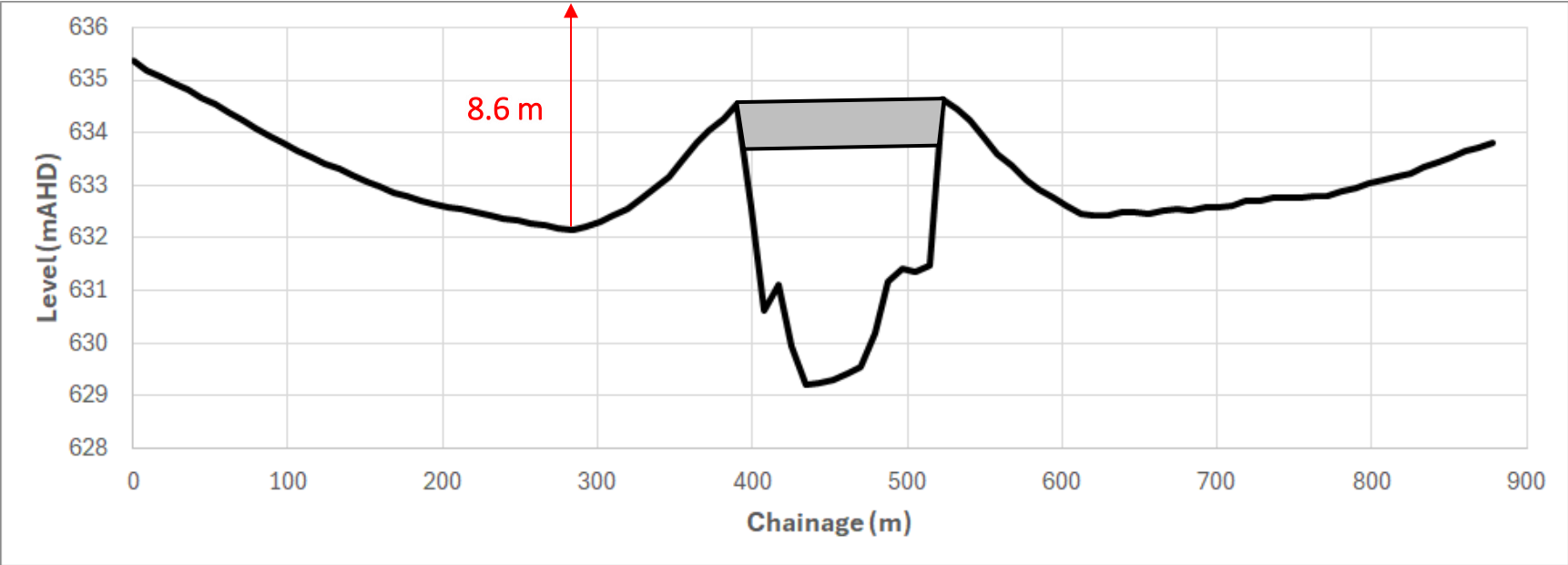
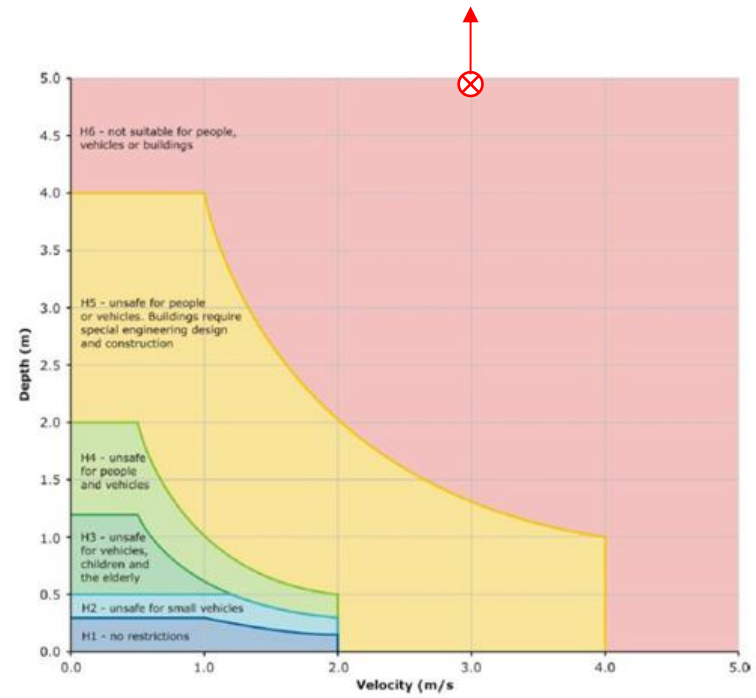


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0.5%	0.74	26.2	14.5
0.2%	0.98	30.2	20.5
PMF	8.62	38.4	35.7

Velocity = ~3 m/s

Flood Assessment Report (GRC, 2023)

Isolation Risks

- *The risk associated with isolation are:*
- *Human behaviour – people intentionally entering floodwaters*
- *Secondary risks – Fire or medical emergency which occur when emergency service access is cut*
- *Joint probability assessment found that the probability that future site dwelling or occupant will experience either a fire or medical emergency whilst Braidwood Road is inundated is ~0.1% AEP – for 2 & 137 Brisbane Grove Road proposals combined*

Table 6: High-level joint probability assessment

Variable	AEP*	DEP*	Comment
Isolation Occurring	5% AEP	0.014%	Probability of isolation due to flooding of Braidwood Road.
Average chance of medical emergency	7.8%	0.022%	Average daily number of emergency department presentation at Goulburn Hospital = 7 (https://www.aihw.gov.au/reports-data/myhospitals/hospital/h0142) Population of Goulburn = 32,294 (census)
Average chance of fire emergency	0.13%	0.0004%	Average annual number of NSW house fires = 4,500 (https://www.fire.nsw.gov.au/page.php?id=9216) Number of NSW dwellings is ~3,364,770 (census)
Combined Probability (assuming independence of the variables)			
Road flooding & medical emergency	-	$3.0 \times 10^{-6}\%$	Occurrence of a medical emergency whilst Braidwood Road is flooded.
Road flooding & fire emergency	-	$5.1 \times 10^{-8}\%$	Occurrence of a fire emergency whilst Braidwood Road is flooded.
Site Characteristics			
Number of occupants	88		See site lot layout in Section 2.
Number of dwellings	35		Assumed 2.5 people per dwelling as per Goulburn average (census)
Binomial Distribution Calculations			
Chance of medical emergency at the site whilst isolated	0.1%	$2.6 \times 10^{-4}\%$	The estimated probability of a medical emergency occurring for one or more future occupants whilst Braidwood Road is flooded and the site is isolated.
Chance of fire emergency at the site whilst isolated	$7 \times 10^{-4}\%$	$1.8 \times 10^{-6}\%$	The estimated probability of a fire emergency occurring for one or more future dwellings whilst Braidwood Road is flooded and the site is isolated.
Total Probability	0.1%		1 in 1,000 AEP

*AEP = Annual Exceedance Probability, DEP = Daily Exceedance Probability

Flood Assessment Report (GRC, 2023)

Management of Isolation Risks

- *Consultation undertaken with NSW SES, FRNSW, Ambulance NSW and Council – risk management measures developed*
- *Fire Emergency - provision and maintenance of a Home Fire Safety Kit*
- *Medical Emergency - provision and maintenance of an Automated External Defibrillator and First Aid Kit*
- Measures implemented through requirements in the development control plan and Section 88b provisions.



GRC Hydro
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Sydney NSW 2000
Tel: +61 409 833 039
www.grchydro.com.au

Job Number: 230048 / 230049
Date: 29 August 2023

Minutes from Goulburn planning proposals - Emergency services meeting

Project: South Goulburn planning proposals
Date & Time: 24/08/2023 3.00 pm
Subject: Secondary flood risk due to loss of emergency services access
Location: MS Teams
Attendance: Goulburn Council RFS GRC Hydro
Kate Wooll Lyn Liston Zac Richards
David Kiernan Martin Webster William Tang
NSW Ambulance
Steven Owen

Apologies: Nil

Meeting name	Goulburn planning proposals - Secondary flood risk due to loss of emergency services access
Meeting purpose	Meeting to discuss planning proposals to rezone land within Goulburn Mulwaree LGA and potential secondary flood risks which could result from flooding of access roads and reduce access for emergency services.
Agenda	<ol style="list-style-type: none"> 1. Introduction 2. Flood Risk Assessment 3. EM01 – Support for Emergency Management Planning 4. Conclusions and Discussion

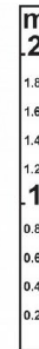
GRC Hydro Pty Ltd ABN: 71 617 368 331

Flood Assessment Report (GRC, 2023)



Management of Isolation Risks

- *Human Behaviour management measures*
 - *Provision of adequate services - access of adequate ablutions, water, power and basic first aid equipment will be required for future dwellings (as per EM01, Section D4.2.4)*
 - *Flood warning signage - Flood depth markers and warning signs for the Braidwood Road crossing of Mulwaree River to reduce the risk of vehicles entering floodwaters. – currently no warning signs to notify the existing community*
 - *Notification of flood isolation risk - the site will be nominated as an area of Special Flood Considerations due to isolation risks. This will be defined in Council's DCP, and on Section 10.7 (2) and 88b certificates and will notify property owners of risk of isolation to increase community awareness*



A measure showing the depth of floodwater across a road

Consistency with NSW Policy

- Gateway Determination – *‘unacceptable risk . . . due to the risk associated with isolation of the site . . . for approximately 23 hours during the 1% [AEP] flood event. This time period is excessive and far exceeds the isolation period maximum in State flood policy’*
- *Unclear reference to ‘State flood policy’ presumably - ‘Shelter in place guideline for flash flooding’ (SIPG)*

What is shelter in place?

Shelter in place is the internal movement of a building’s occupants to an area within the building above the probable maximum flood (PMF) level before their property becomes inundated by flood waters.

Shelter in place guideline for flash flooding (2025)

Consistency with NSW Policy

- *SIPG does not apply at the site as development is outside of PMF extent and will not be inundated by flood waters*
- *Flood risk outside of the floodplain is lower than for buildings surrounded by flood waters*

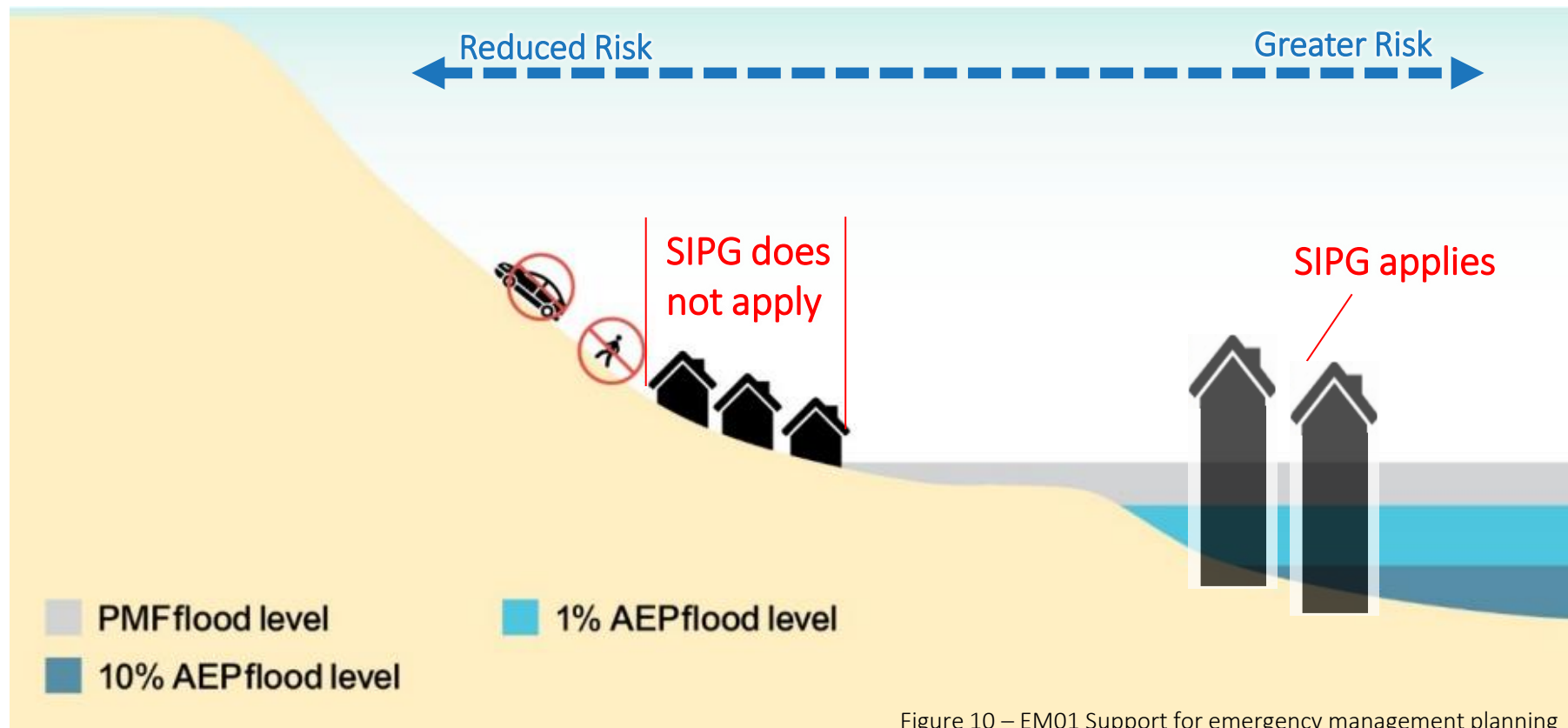


Figure 10 – EM01 Support for emergency management planning

Consistency with NSW Policy

- Noting that SIPG do not apply, the guideline recommends the ‘duration of shelter in place due to isolation by floodwaters is less than 12 hours’
- As per the Flood Assessment Report, the site is estimated to be isolated from emergency services during a 1% AEP for ~8.5 hours
- ‘Support for Emergency Management Planning (EM01)’ states that the ‘*primary strategy for the NSW SES is evacuation of people to an area outside of the effects of flooding that has adequate facilities to maintain the safety of the community*’. – The proposal meets these requirements through implementation of the risk management measures and locating future development outside of the PMF extent

Consistency with NSW Policy

- Gateway Determination – *‘The planning proposal has potential to significantly increase the need for government investment on emergency management services, flood mitigation and emergency response measures’*
- Flood mitigation - Braidwood Road has an average of 3,850 people using the road per day, with the proposal (cumulatively with 2 Brisbane Grove Road) resulting in an approximate 12% increase. *If the risk of Braidwood Road flooding does not currently require flood mitigation, then the proposal will not result in the need for significant expenditure for flood mitigation works.*
- Emergency management and response – *Probability of a secondary risk occurring whilst the site is isolated is ~0.1% AEP. The need for additional expenditure to manage such a low probability event is unlikely and therefore does not meet the Ministerial Direction requirement of ‘likely to result in a significantly increased requirement for government spending’.*