

C.K. Engineering Services

Flood Risk Assessment

22 Collins Crescent Yagoona

Reference No 211608

May 2022



Prepared for:

A&K Engineering

117 Waterloo Rd,
Greenacre NSW 2190

C.K Engineering Services

49 Flora Street,
Roselands NSW 2196
ckatsoulas@gmail.com

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1 Introduction

A&K Engineering commissioned C.K. Engineering Services in May 2022 to prepare a flood risk assessment report. The scope of the report is to investigate the flood risk to the subject property in support of a Development application to Council for a dual occupancy and outbuilding on one lot.

1.1 Site Location

The subject site is located in the suburb of Yagoona within the Canterbury Bankstown Local Government Area and is approximately 1km east of Bankstown Aerodrome. See Figure 1 below for details.

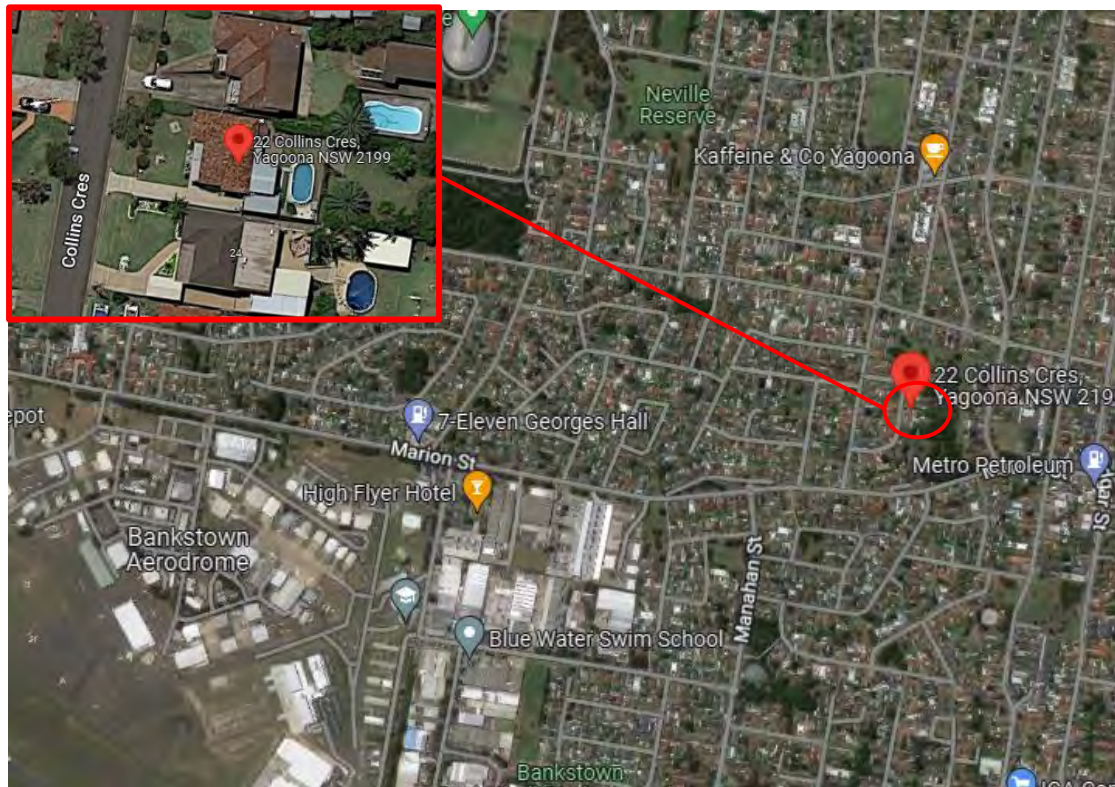


Figure 1 - Site Location

1.2 Existing Site Features

The subject property is situated within a known overland flowpath and is shown highlighted in red against the approximate extent of flooding shown in Figure 2 below. The overland flooding shown in yellow/green in Figure 2 was provided by Canterbury Bankstown in the Stormwater Systems Report (SSR) dated 9 September 2021. The overland flow travels in a southerly direction and affects the rear portion of the subject site. There is an existing Council pipe that runs through the subject site and the development will be connected to this pipe. A site survey was carried out for the property and the plan is attached in Appendix A.

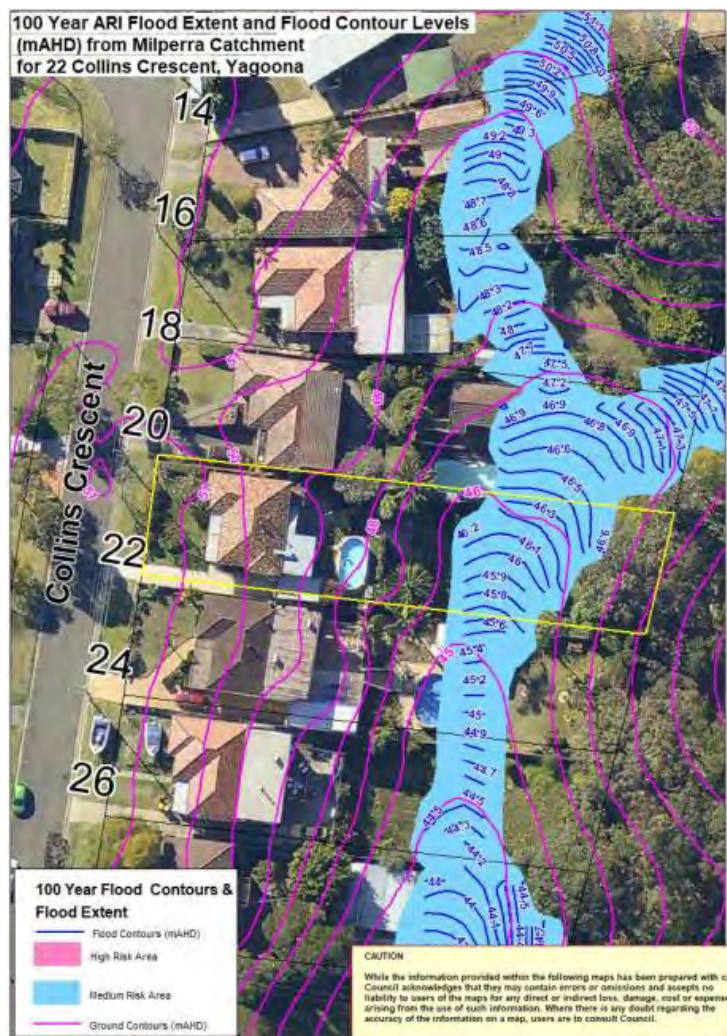


Figure 2 - 1% AEP flood extents

1.3 Proposed Development

The proposed development includes a new dual occupancy and outbuilding to one of the lots.

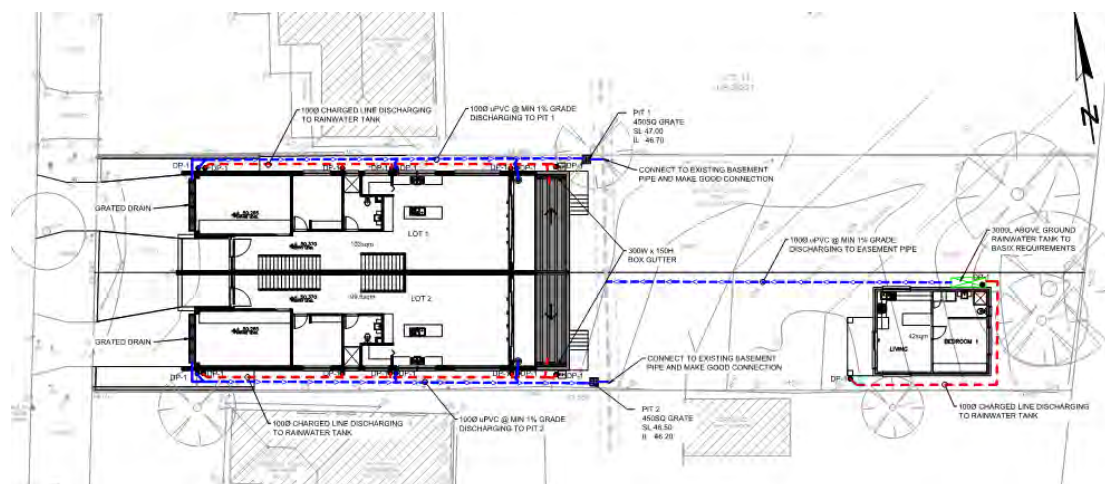


Figure 3 - proposed development

2 Review Of The Stormwater Systems Report

Canterbury Bankstown Council has provided a stormwater systems report that details the flood inundation of the site. The SSR information is taken from the Milperra Catchment flood study. The SSR confirms that the flood level at 22 Collins Crescent Yagoona achieves a flood level ranging between RL 46.5 – 45.6m AHD. The SSR shows that the flows could reach depths of 100-200mm at the subject site.

The lowest proposed floor level of the dual occupancy and outbuilding are RL 47.67 and RL 47.15 and will provide 1.37m and 1.57 freeboard to the dual occupancy and 0.85m freeboard to the outbuilding.

3 Flood Risk Assessment

3.1 Flood Risk Management Objectives

The Canterbury Bankstown DCP2021 schedule 5 provides general controls for stormwater flooding affected lots and the objectives of the DCP with respect to flooding are as follows:

- ◆ To reduce private and public losses resulting from floods.
- ◆ To enable safe access or evacuation of people to the existing public road network during flooding.
- ◆ To maintain the existing flood regime and flow conveyance capacity.
- ◆ To avoid significant adverse effects on the floodplain environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of any river bank or watercourse.
- ◆ To limit land uses to those compatible with flow conveyance function and flood hazard.

The flood risk assessment will be undertaken in accordance with the procedure provided in Schedule 5 of DCP 2021.

3.2 Land Use Category

The proposed development is classed as residential property and lies within the Milperra Catchment.

3.3 Flood Risk Precinct

The flood information from the SSR shows that the site is partially flood affected at the rear of the property with flood depths of the 1%AEP between 100-200mm depth. The velocity depth product at this location ranges between 0.05 to 0.20 m²/s. **The site therefore is within the Medium Flood Risk Precinct.**

3.4 Prescriptive Controls

The prescriptive controls are provided in Schedule 5 of the Canterbury Bankstown DCP 2021 for Medium risk flood precincts. Compliance with the controls is described below.

Floor Level

Non-habitable floor levels should be no lower than the 20-year flood unless justified by a specific assessment.

All habitable floor levels to be equal to or greater than the 100-year flood level plus freeboard.

The maximum 1%AEP flood level adjacent to the buildings is at RL 46.3m and 46.1m AHD to the respective dual occupancy units and RL 46.3m AHD to the outbuilding. The minimum proposed floor levels for both dual occupancy units are set to RL 47.67m AHD and to the outbuilding RL 47.15m AHD and provide greater than 500mm freeboard to the 1%AEP flood level.

Building Components

All structures to have flood compatible building components below or at the 1% AEP flood level plus freeboard.

The proposed buildings will provide building components in accordance with clause 3.5 of this report and will comply with this control.

Structural Soundness

Applicant to demonstrate that any structure can withstand the forces of floodwater, debris & buoyancy up to & including a 1% AEP flood plus freeboard or up to the PMF if required to satisfy evacuation criteria.

The front portion of the site and both units are free of the PMF flood and there will be no evacuation problems during the PMF event. The proposed units will be certified by a structural engineer that the units can withstand the forces of floodwater, debris & buoyancy up to & including the greater of the 1% AEP flood plus freeboard or PMF for each structure. The flood level for structural soundness is to be set as follows

Unit 1	-	RL 47.1m AHD (PMF event)
Unit 2	-	RL 46.8m AHD (PMF event)
Outbuilding	-	RL 47.0m AHD (PMF event)

Flood Effects

Applicant to demonstrate to Council's satisfaction (by way of an engineer's report if requested) that the development will not increase flooding effects elsewhere, having regard to: loss of flood storage; changes in flood levels, flows and velocities; the cumulative impacts of multiple developments in the vicinity. The report should also identify the presence of any "major overland flow paths". Note: Where major overland flow paths are present, this may result in restrictions of the proposed development to maintain the functioning of the flowpath, and/or to manage the impacts of development on properties.

Council may require that the creation of an easement, or that a Restriction be placed on the Title Certificate identifying the location of "major overland flow paths" or locations of significant backwater flooding.

The proposed development is beyond the 1%AEP flood extent and will not have any flood affectation to neighbouring lots or loss of flood storage. There is an existing easement in place for the flowpath.

Parking and Driveway Access

The minimum surface level of open car parking spaces or carports shall be as high as practical, and not below:

- (a) the 20 year flood level; or*
- (b) the level of the crest of the road at the location where the site has access (whichever is the lower).*

In the case of garages, the minimum surface level shall be as high as practical but no lower than the 20-year flood. Surface levels should also be determined having regard to the control Number 4 below relating to depths of inundation over driveways.

Garages capable of accommodating more than 3 vehicles on land zoned for urban purposes, or enclosed car parking must be protected from inundation from the 100 year flood.

The level of the driveway providing access between the road and the parking spaces should be as high as practical, and not lower than 0.3 metres below the 100-year flood level. However, Council may consider a lower level for the driveway in the following circumstances, where risk to human life is not compromised:

- (a) Where the road is lower than the parking space, no part of the driveway should be inundated to a greater depth than the roadway.*
- (b) Where the car parking space is lower than the road, the depth of inundation over the driveway must not be greater than the car park inundation depth, and the driveway must rise continuously in an egress direction.*
- (c) Where the car parking space and road are both below the 100-year flood level, the depth of inundation over the driveway must not be greater than the depth at either the car parking space or the road. Where feasible, the driveway should rise continuously in the egress direction.*

Enclosed car parking and car parking areas capable of accommodating more than 3 vehicles (other than on rural zoned land with a floor level below the 20 year flood level or more than 0.8 metres below the 100 year flood level shall have adequate warning signs, signage and exits.

Restraints or vehicle barriers to be provided to prevent floating vehicles leaving the site in a 100-year flood.

.All garages and parking spaces will be near the road frontage and not in close proximity to the 1%AEP or PMF flood extents. Garages therefore will not be impacted by the overland flooding.

Evacuation

1. *Reliable access for pedestrians or vehicles is required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF. Such a refuge may comprise a minimum of 20% of the gross floor area of the dwelling being above the PMF level. An engineer's report may be required.*
2. *The development should be consistent with any flood evacuation strategy, flood plan or similar strategy that has been adopted by Council.*

The proposed units are above the 1%AEP flood level and all occupants will have satisfactory access to safe areas above the PMF event. The occupants to the outbuilding will be able to evacuate to the street as the maximum depths will be 300mm that is satisfactory for able adults.

3.5 Construction Materials

The proposed development may adopt the following materials, deemed to be flood compatible, for any new construction:

Component	New Material Description
Flooring & sub-floor structure	Timber floor (T&G boarding, marine plywood), concrete
Floor covering	Tiles, hardwood timber flooring.
Wall Structure	Brick veneer construction. CFC cladding, Dintel
Doors	Standard timber frame.
Wall linings	Fibrous plaster board. V-jointed lining boards
Insulation	Reflective, Bat or blanket insulation types.
Windows	Aluminium frame, timber frame
Nails, bolts, hinges & fittings	Mild steel, stainless steel
Front fence	Rendered Masonry & plinth wall to metal palisade.

3.6 Waterproofing

The subject site will adopt the following waterproofing methods for any new construction. For the purpose of this section, the FPL stands for Flood Planning level being as follows:

- Unit 1 - RL 46.8m AHD
- Unit 2 - RL 46.6m AHD
- Outbuilding - RL 46.8m AHD

Table 1 - Waterproof standard construction

Component	Construction Standard
Main power supply	Subject to the approval of Energy Australia the incoming main commercial service equipment, including all metering equipment should be located above the FPL. The dwelling must be able to be easily disconnected from the main power supply.
Wiring	All new wiring, power outlets, switches, etc., should, to the maximum extent possible, be located above the FPL.
Equipment	All equipment installed below or partially below the FPL should be capable of disconnection by a single plug and socket assembly.
Heating & Air Conditioning Systems	Heating and air conditioning systems should, to the maximum extent possible, be installed in areas and spaces of the house above the FPL. When this is not feasible every precaution should be taken to minimise the damage caused by submersion.

3.7 Flood Warning Signs

A flood warning sign shall be erected in the rear courtyard to each unit to warn occupants that the rear yard is subject to flooding. It is recommended that the sign as shown in Figure 4 shall be erected at a height 500mm above the 1% AEP flood level, ie above RL 46.8m AHD.



Figure 4 - Flood Warning Sign

3.8 Flood Evacuation and Response Strategy

The PMF flood level ranges between RL 45.7m and 46.7m AHD and occupants will be able to exit the property along Collins Crescent to safer ground above the PMF as water rises from the rear courtyard. Occupants will have adequate time to exit the building.

The following procedure should be followed during extreme flood events

Before a Flood Occurs

Prepare an Emergency Kit which should contain emergency phone numbers, a portable radio, torch, spare batteries for both, first aid kit, strong shoes, rubber gloves and a waterproof bag for valuables.

Develop your own family flood plan and be prepared if flooding should occur while the kids are coming home from school, or when you are returning from work.

For further information on being flood prepared contact the SES on 1800 201 000.

Permanently store chemicals, poisons and mementoes (such as photos) as high as possible.

Ensure any gaps under the building to allow flow through or to store floodwaters remain open.

During Heavy Rain and Prolonged Storms

Listen to local radio stations for updates and advice particularly ABC 702 AM. However the property is in an area subject to flash flooding and it is unlikely that a specific flood warning will be issued for your local area. Monitor any flow of water around the home.

If water starts to run adjacent to the house.

- i) Secure objects likely to float and cause damage e.g. garbage bins.
- ii) Collect Emergency Kit plus legal papers, insurance policies, mobile phones, special requirements for babies or the elderly, medications and raincoats/umbrellas.
- iii) Put on strong shoes or gumboots,
- iv) Be prepared to evacuate if instructed to do so by the police, or by SES personnel.
- v) Continually monitor the depth of water flowing down the driveway or adjacent to the house.

By the time the water level in the driveway or adjacent to the house is 200 mm deep, decide whether to Evacuate the site, or Remain within the building. If you choose to evacuate, then:

Turn off and disconnect any large electrical items such as a TV or computer that cannot be raised.

Collect the items from above and evacuate the site by vehicle towards higher ground.

Take care when evacuating as during floods many streets and roads will be cut by floodwaters. Travelling through floodwaters on foot, or even in a vehicle can be very dangerous as the water may be polluted, obstructions can be hidden under the floodwaters, or you or your vehicle could be swept away in fast flowing water.

If you choose to Remain within the building.

Unless instructed to do so by the police or by SES personnel, do not attempt to evacuate once the floodwaters are 300 mm deep or more as even vehicles can be unstable and it is too dangerous.

In the case of a medical emergency ring 000 as normal, but explain about the flooding.

Raise any items within the home that may be damaged by water (e.g. photo albums) to as high a level as possible, with electrical items on top.

If floodwaters approach the floor level, place damp towels across the bottom and lower sides of external doors to slow down the entry of water through the door. Turn off and disconnect any large electrical items.

If floodwaters enter the building, proceed to the second floor.

Other Items

Should water enter the building, any electrical items affected by flood waters need to be checked by an electrician before turning on, or operating.

A coloured laminated copy of this flood response plan must be permanently attached (glued) on an inside cupboard door in the kitchen or laundry.

This Flood Emergency Response Plan should be reviewed in 2020 and every 5 years after that, particularly with the potential effects of Climate Change and increased rainfall intensities.

3.9 Conclusion

The Flood Risk Assessment for the proposed development at 22 Collins Crescent Yagoona reveals that the subject land is within a medium risk flood precinct and has ponding depths in the rear courtyard between 100 to 200mm and velocity depth product between 0.05 to 0.20m²/s.

It is recommended that the proposed development is supported and that the following minimum floor levels (or greater) be adopted for the development.

Unit 1

Minimum Habitable Ground Floor Level RL 46.8m AHD

Unit 2

Minimum Habitable Ground Floor Level RL 46.6m AHD

Outbuilding

Minimum Habitable Ground Floor Level RL 46.8m AHD

APPENDIX A - SITE SURVEY PLAN

APPENDIX B – STORMWATER SYSTEMS REPORT



Level 1, 66 - 72 Rickard Road, Bankstown NSW
PO Box 8, Bankstown NSW 1885
Tel: (02) 9707 9010 - Fax: (02) 9707 9408
DX 11220 BANKSTOWN
council@cbc.city.nsw.gov.au

CITY OF CANTERBURY BANKSTOWN

To: Adnan Akram Issa
22 Collins Crs
YAGOONA NSW 2199

STORMWATER SYSTEM REPORT 22 Collins Crescent, YAGOONA NSW 2199

Date: 09-Sep-2021
Ref: WP-SIA-1707/2021
Development type: **Dual Occupancy**

NO

FLOOD/OVERLAND FLOW STUDY REQUIRED

The site is affected by the following Council & Private stormwater system components:

- A 6.096 m wide drainage easement (**DP 18090**) located within the site.
- An unknown diameter stormwater pipeline and associated 1.22m wide easement (**Refer Dealing H 370504**) located within the site
- Overland flowpath for excess stormwater runoff from the upstream catchment to the east of the site.

The site will be subject to stormwater inundation from this overland flowpath during large storm events. Refer to the attached "**100 Year ARI Flood Extent Maps from Milperra Catchment Study**" showing the flood contours to m AHD**. Provision should be made on site, and at boundary fences, for this stormwater runoff to pass unobstructed over the site. Stormwater flowing naturally onto the site must not be impeded or diverted.

For this development, a flood /overland flow study to determine the 100 year ARI* water surface level is not necessary provided that the **proposed development including floor levels, shall comply with the development controls specified in Part B12 Schedule 5, of Bankstown's Development Control Plan 2015 - Catchments Affected by Stormwater Flooding.**

The Development Application submission shall be based on an AHD datum for levels where sites are affected by overland flow / flooding. Refer Bankstown Council's *Development Engineering Standards**.**

Habitable floor levels are to be 500mm above the 100 year ARI* flood level at the site adjacent to the propped buildings.

Runoff on the site, and naturally draining to it is to be collected and disposed of to Council's requirements detailed in Bankstown Council's *Development Engineering Standards****.

All structures and buildings must be located clear of pipelines and easements (for overland flow path).

This report is given without the benefit of development plans or a site survey. Council may choose to vary some report requirements following evaluation of detailed plans when they are submitted.

This report relates to the exposure of the subject site to Council's stormwater system, both underground and overland. It does not assess the suitability or otherwise of this site for the proposed development.

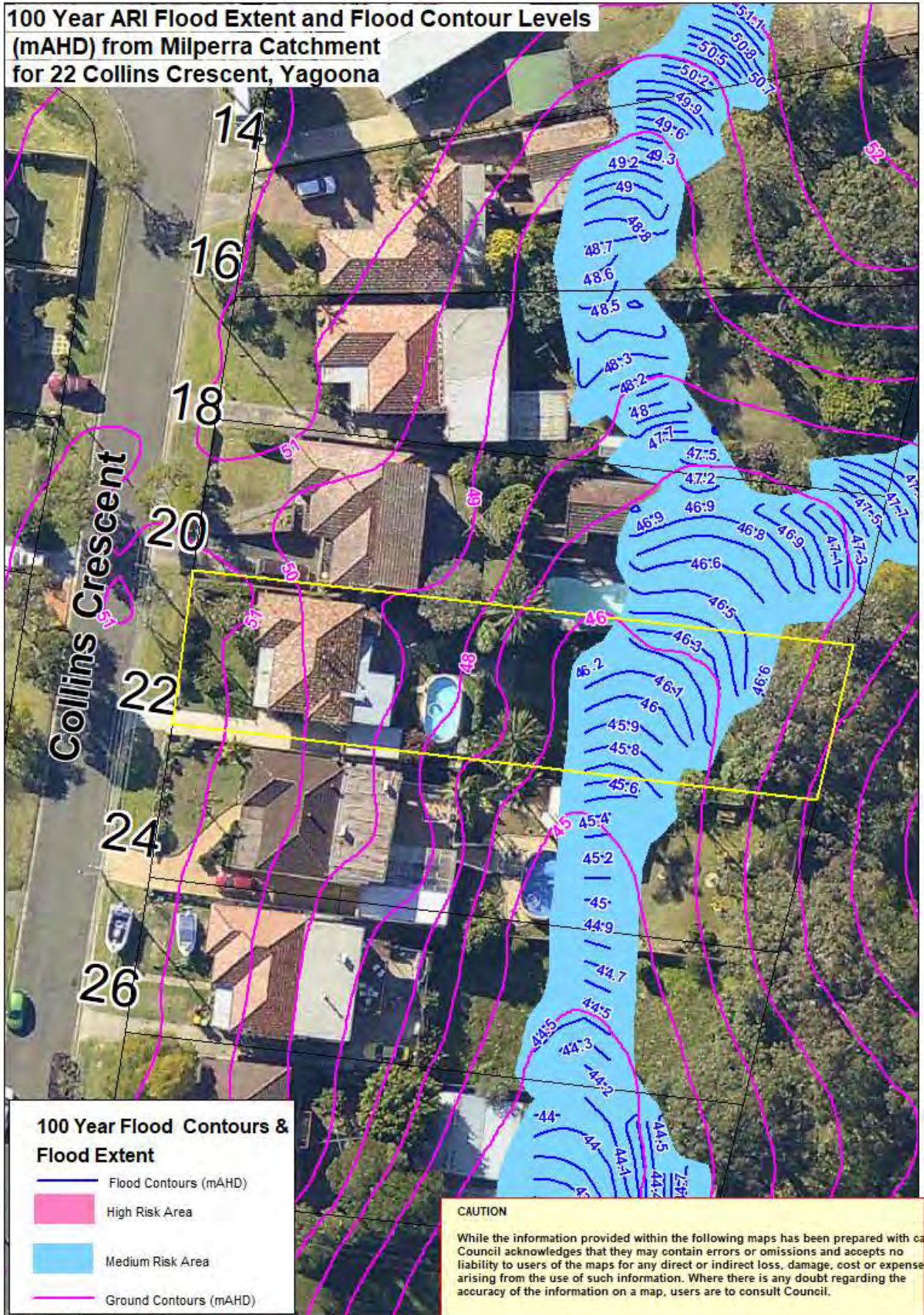
* Average Recurrence Interval

** Australian Height Datum

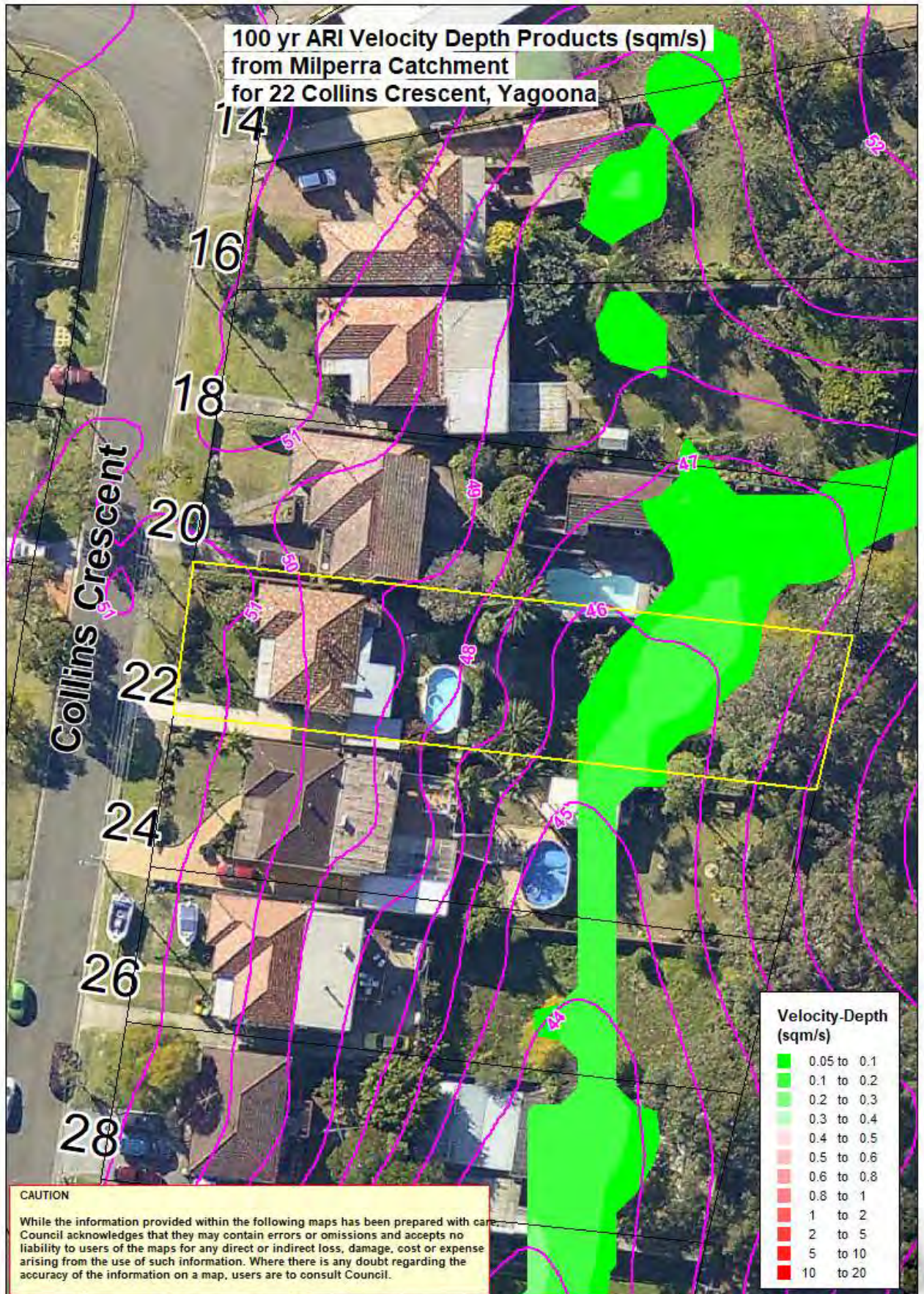
*** Bankstown Council's *Development Engineering Standards* and *Bankstown's Development Control Plan 2015* is available from Council's Customer Service Centre.

Pushpa Goonetilleke
ENGINEER

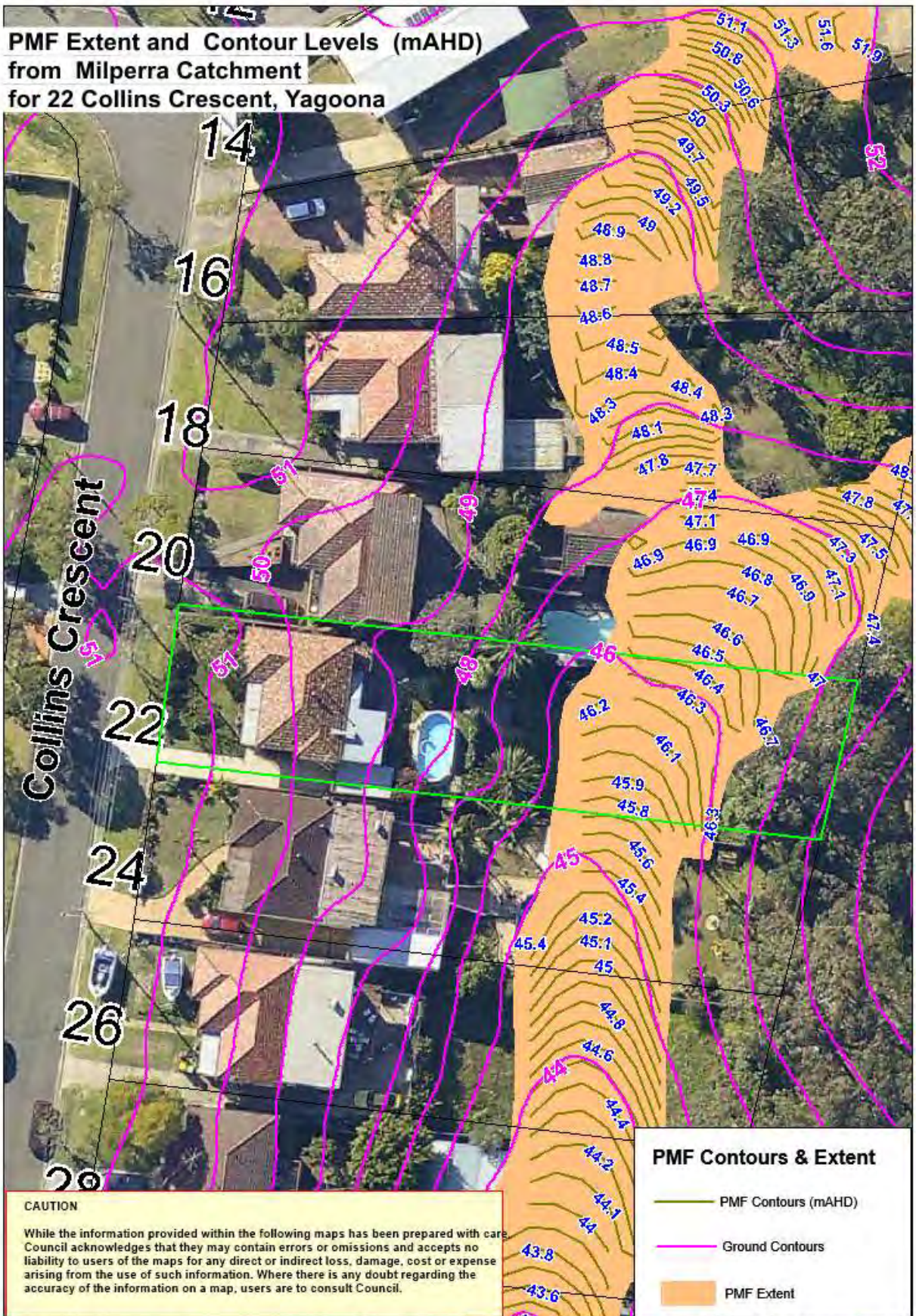
100 Year ARI Flood Extent and Flood Contour Levels (mAHD) from Milperra Catchment for 22 Collins Crescent, Yagoona

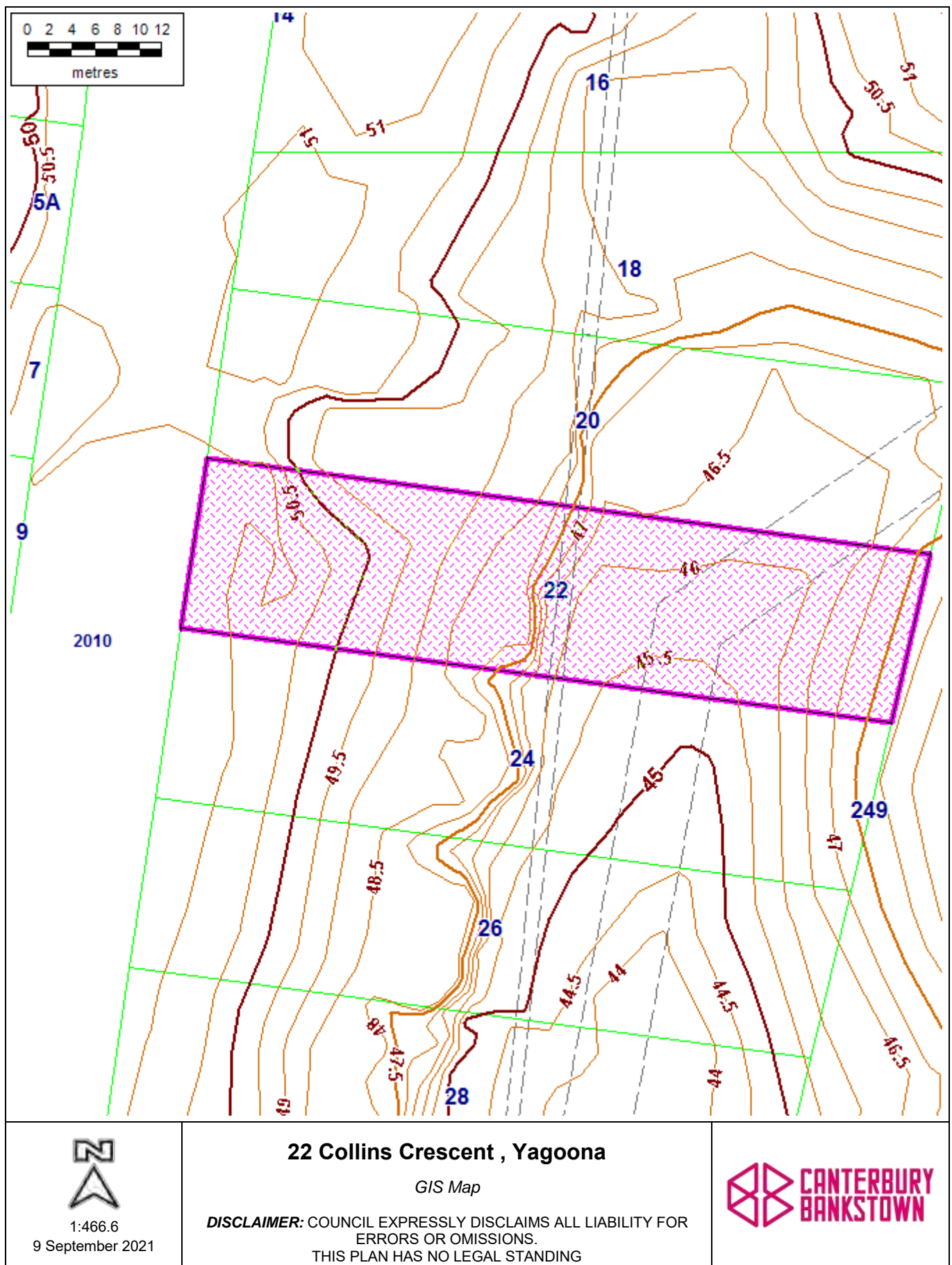


100 yr ARI Velocity Depth Products (sqm/s)
from Milperra Catchment
for 22 Collins Crescent, Yagoona



**PMF Extent and Contour Levels (mAHD)
from Milperra Catchment
for 22 Collins Crescent, Yagoona**







1:612.3
9 September 2021

22 Collins Crescent , Yagoona

Aerial Map

DISCLAIMER: COUNCIL EXPRESSLY DISCLAIMS ALL LIABILITY FOR
ERRORS OR OMISSIONS.
THIS PLAN HAS NO LEGAL STANDING



Legend



Suburb



Drainage Conduits



Drainage Devices



Sydney Water



Contour Major 5m



Contour Intermediate 2.5m



Contour Minor 0.5m



_25cm Contour Interval (Major)



_25cm Contour Interval (Basic)



_25cm Contour Interval (Minor)



Parcel



Parcel Associate

Z

Parcel Vinculum



Jetty



Easements



Road Boundaries



Aerial Photo 14052019



Road Names



Airport Internal Road



Water Boundary



Railway



Airport Taxiway