

Appendix D

Flood Impact Assessment - Cardno

Our Ref 59918074_L001_Rev1

Contact Andrew Reid

30 November 2017

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Attention Nick Shen

Via email: Roland Martinez <Roland.Martinez@cotteeparker.com.au>

Dear Nick,

12-22 AND 24 ROTHSCHILD AVENUE, ROSEBERY – FLOOD IMPACT ASSESSMENT

A flood level summary prepared for the site as modelled with site conditions at the time of the Flood Studies with peak 1% AEP and PMF water levels for the site was issued on 22 October 2015. It states that in a 1% Annual Exceedance Probability (AEP) event overland runoff is conveyed along the Rothschild Avenue frontage of the site with a depth of flow less than 0.15 m.

This report details the assessment of the stormwater flooding extent for the proposed development at 12-22 and 24 Rothschild Avenue, Rosebery in the Probable Maximum Flood (PMF) event. The development site is not inundated in the 1% AEP event, as noted in previous summary (22 October 2015), hence, modelling for the 1% AEP event was not re-modelled.

The Alexandra Canal Catchment Flood Study & Alexandra Canal Floodplain Risk Management Study were prepared by Cardno and adopted by the City of Sydney on 17 March 2014. The studies utilise a combined 1D/2D hydraulic flood model, SOBEK, to define flood behaviour in the catchment which includes the subject site (12-22 and 24 Rothschild Avenue, Rosebery).

Flood Modelling

A hydraulic model of the Alexandra Canal catchment was developed in SOBEK, a linked one- and two-dimensional modelling system, to estimate flood behaviour as part of the 2014 Flood Studies. The one-dimensional component was utilised to define the channels, pipes and culverts in the study area. The two-dimensional component was utilised to define the overbank flows such as flows along streets and through properties. Further details of the modelling, including the parameters and assumptions of the model are detailed in The Alexandra Canal Catchment Flood Study (Cardno, 2014).

The 2014 Flood Studies model was amended to represent the site layout of the post-development scenario. A critical duration event of 15 minutes was modelled in the post-development scenario for the PMF event.

To assess the development, the following refinements were made to the current model:

- The model grid cell resolution was increased from 4 m to 2 m in and around the subject site (as a child-grid in the model); and
- The revised building footprint extents.

The design and assessment of internal drainage is not within the scope of this modelling and report.

Flood Model Results

The modelled PMF extent (where depths are greater than 0.10 m) in the post-development scenario is shown in Figure 1. Figure 2 shows the change in overland extent in the PMF event compared to the pre-development flood conditions (Cardno, 2014). Peak PMF event water levels for the site are listed in Table 1.

Table 1 – Peak Water Levels

Reference Label on Figure 1	PMF Peak Water Level (m AHD)	Comment
A	19.65	Inundation at this location is due to internal site runoff - not mainstream overland flow in the PMF event. Thus flood level not applicable for flood planning.
B	19.60	
C	19.40	
D	19.40	
E	19.35	
F	19.25	
P1	19.60	
P2	19.00	
P3	18.80	
P4	18.20	
P5	18.45	
P6	18.60	
P7	18.70	
P8	18.80	
P9	19.80	Inundation at this location is due to internal site runoff - not mainstream overland flow in the PMF event. Thus flood level not applicable for flood planning.
P10	19.65	Inundation at this location is due to internal site runoff - not mainstream overland flow in the PMF event. Thus flood level not applicable for flood planning.

Review of Proposed Development

Proposed development of the site comprises a multi-storey building with residential units and two levels of basement car parking. A preliminary review of the following design drawings by Cottee Parker Architects Pty Ltd (attached) was undertaken:

- Basement 2 - Drawing SK2000 (dated 29/11/2017)
- Basement 1 - Drawing SK2001 (dated 29/11/2017)
- Level 1 Plan - Drawing SK2002 (dated 29/11/2017)

Entries to the basement shown on the design plans include a stairwell, lift and vehicular driveway at Mentmore Avenue, a stairwell in the central courtyard, a lift and stairwell in the building fronting Cressy Street, and the Rothschild Avenue frontage has entries to the basement via stairwell and lifts.

Basement entry locations for the proposed development are shown in Figure 3 and the corresponding flood planning level is listed in Table 2.

Table 2 – Basement Entry Levels

Reference Label/Entries on Figure 3	Basement Entry Level (m AHD)	PMF Peak Water Level (m AHD)	Flood Planning Level (FPL) (m AHD)
B1	18.60	18.60	18.60
B2	18.65	18.65	18.65
B3	18.70	18.70	18.70
B4	18.70	18.70	18.70
B5	19.60	19.60	19.60
B6	19.65	19.60	19.60
B7	19.45	19.45	19.45
B8	19.65	19.40	19.40
B9	19.41	19.35	19.35

Flood Planning Levels (listed in Table 2) for the reference entry locations satisfies the Council's Interim Floodplain Management Policy (May 2014) of entrances to basement areas to be a minimum of 1% AEP event plus 0.5 m or the PMF (whichever is the higher). This flood planning level applies to all possible ingress points including stairwells, lift shaft openings, ventilation ducts and vehicular entrances.

In the 1% AEP event, the Mentmore Avenue, central courtyard and Cressy Street are not considered flood affected and the depth of flow at Rothschild Avenue is shallow, being less than 0.15 m (Summary Report, 22 October 2015). Council's Interim Floodplain Management Policy (May 2014) specifies an FPL for habitable rooms of two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood event is less than 0.25m. The basement entries at Rothschild Avenue are proposed at the PMF level which is above the aforementioned shallow flow criteria.

Please contact me on 9496-7700 if you would like to clarify details of this letter.

Yours faithfully

A handwritten signature in blue ink, appearing to read "A Reid", is positioned above the printed name.

Andrew Reid
Senior Engineer
for **Cardno (NSW/ACT) Pty Ltd**

Attachments - Figures showing modelled PMF extents (2 pages);
Basement Entry Reference Locations (1 page);
Council's Flood Planning Level Requirements (2 pages); and
Proposed Development Reference Drawings by Cottee Parker JPRA (3 pages).

GLOSSARY

Annual Exceedance Probability
(AEP)

The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year. For example, a 1% Annual Exceedance Probability (AEP) flood extent has a one in a hundred chance of being exceeded in any year.

Probable Maximum Flood
(PMF)

The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from Probable Maximum Precipitation (PMP). PMP is the greatest depth of precipitation for a given duration meteorologically possible for a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends.

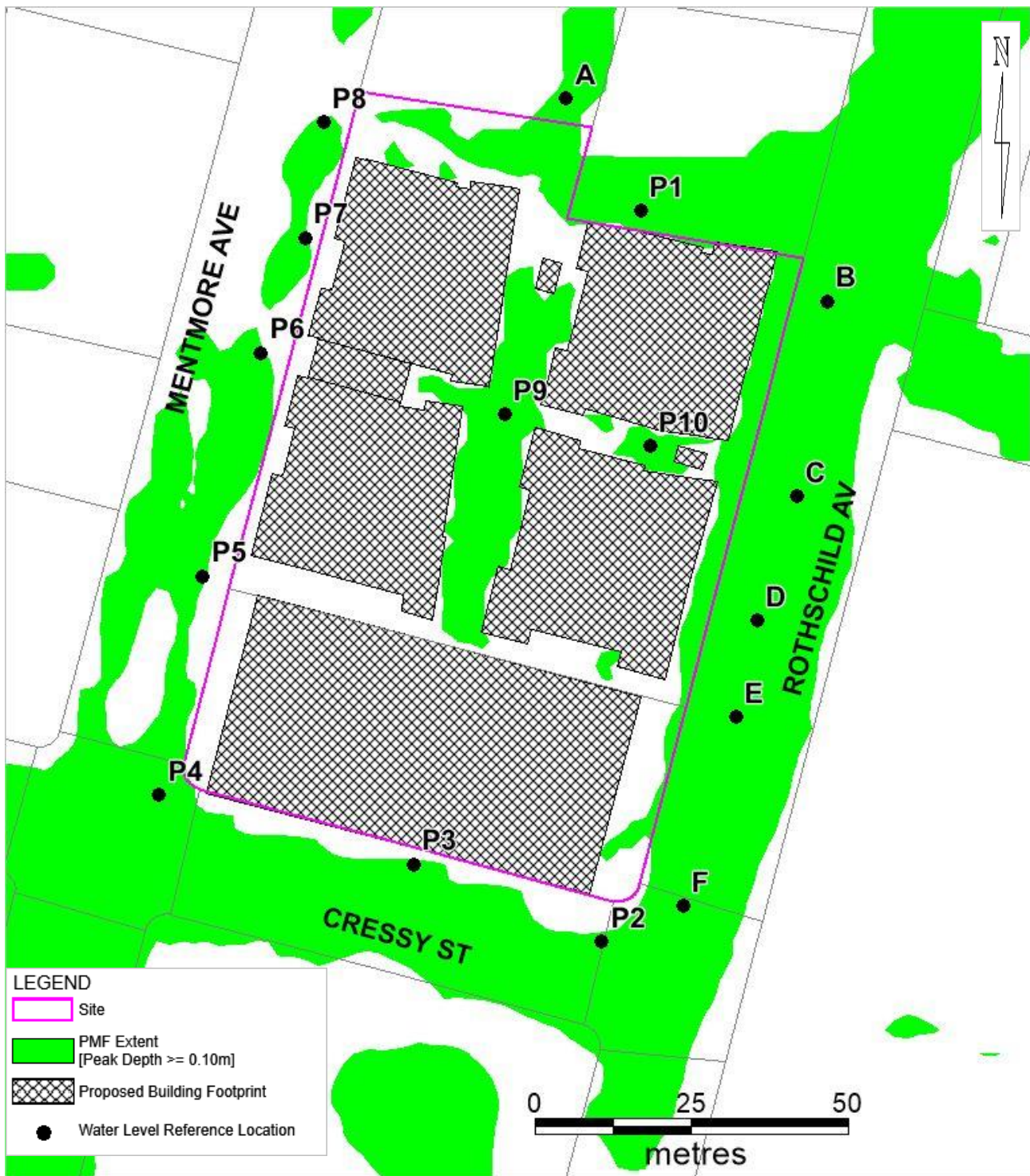


Figure 1 – Results Extract from 1% AEP Event Flood Model (Building Footprint based on drawing by Cottee Parker JPRA)

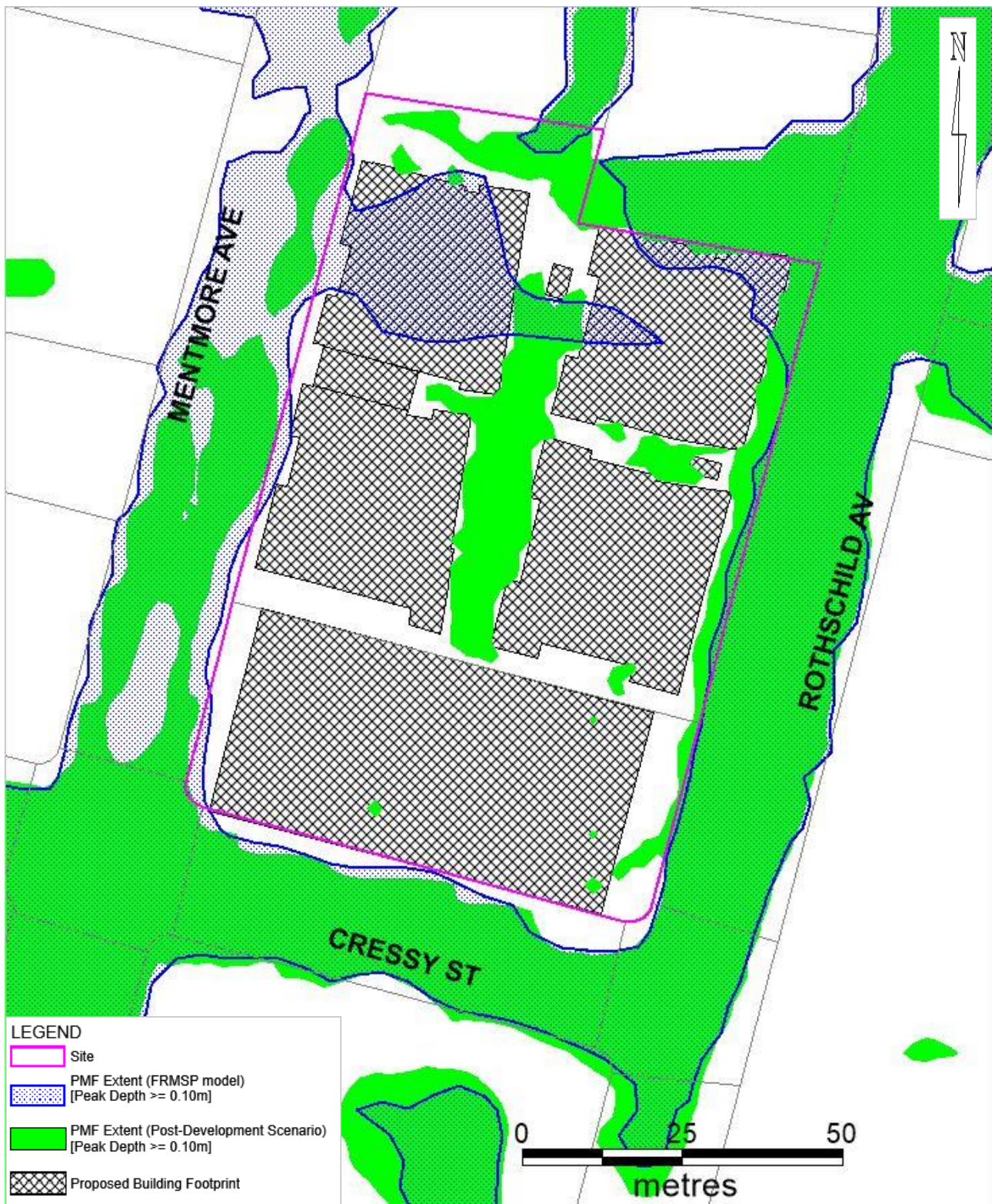


Figure 2 – Results Extract from PMF Event Flood Model (Building Footprint based on drawing by Cottee Parker JPRA)



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5 Flood Planning Levels

A Flood Planning Level refers to the permissible minimum building floor levels. For below-ground parking or other forms of below-ground development, the Flood Planning Level refers to the minimum level at each access point. Where more than one flood planning level is applicable the higher of the applicable Flood Planning Levels shall prevail.

Development		Type of flooding	Flood Planning Level
Residential	Habitable rooms	Mainstream flooding	1% AEP flood level + 0.5 m
		Local drainage flooding (Refer to Note 2)	1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m
		Outside floodplain	0.3 m above surrounding ground
	Non-habitable rooms such as a laundry or garage (excluding below-ground car parks)	Mainstream or local drainage flooding	1% AEP flood level
Industrial or Commercial	Business	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level
	Schools and child care facilities	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level + 0.5m
	Residential floors within tourist establishments	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m
	Housing for older people or people with disabilities	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or a the PMF, whichever is the higher
	On-site sewer management (sewer mining)	Mainstream or local drainage flooding	1% AEP flood level
	Retail Floor Levels	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below-ground garage/ car park	Single property owner with not more than 2 car spaces.	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m

Development	Type of flooding	Flood Planning Level
All other below-ground car parks	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or the PMF (whichever is the higher) See Note 1
Below-ground car park outside floodplain	Outside floodplain	0.3 m above the surrounding surface
Above ground car park	Enclosed car parks	1% AEP flood level
	Open car parks	5% AEP flood level
Critical Facilities	Floor level	1% AEP flood level + 0.5m or the PMF (whichever is higher)
	Access to and from critical facility within development site	1% AEP flood level

Notes

1) The below ground garage/car park level applies to all possible ingress points to the car park such as vehicle entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.

2) Local drainage flooding occurs where:

- The maximum cross sectional depth of flooding in the local overland flow path through and upstream of the site is less than 0.25m for the 1% AEP flood; and
- The development is at least 0.5m above the 1% AEP flood level at the nearest downstream trapped low point; and
- The development does not adjoin the nearest upstream trapped low point; and
- Blockage of an upstream trapped low point is unlikely to increase the depth of flow past the property to greater than 0.25m in the 1% AEP flood.

3) Mainstream flooding occurs where the local drainage flooding criteria cannot be satisfied.

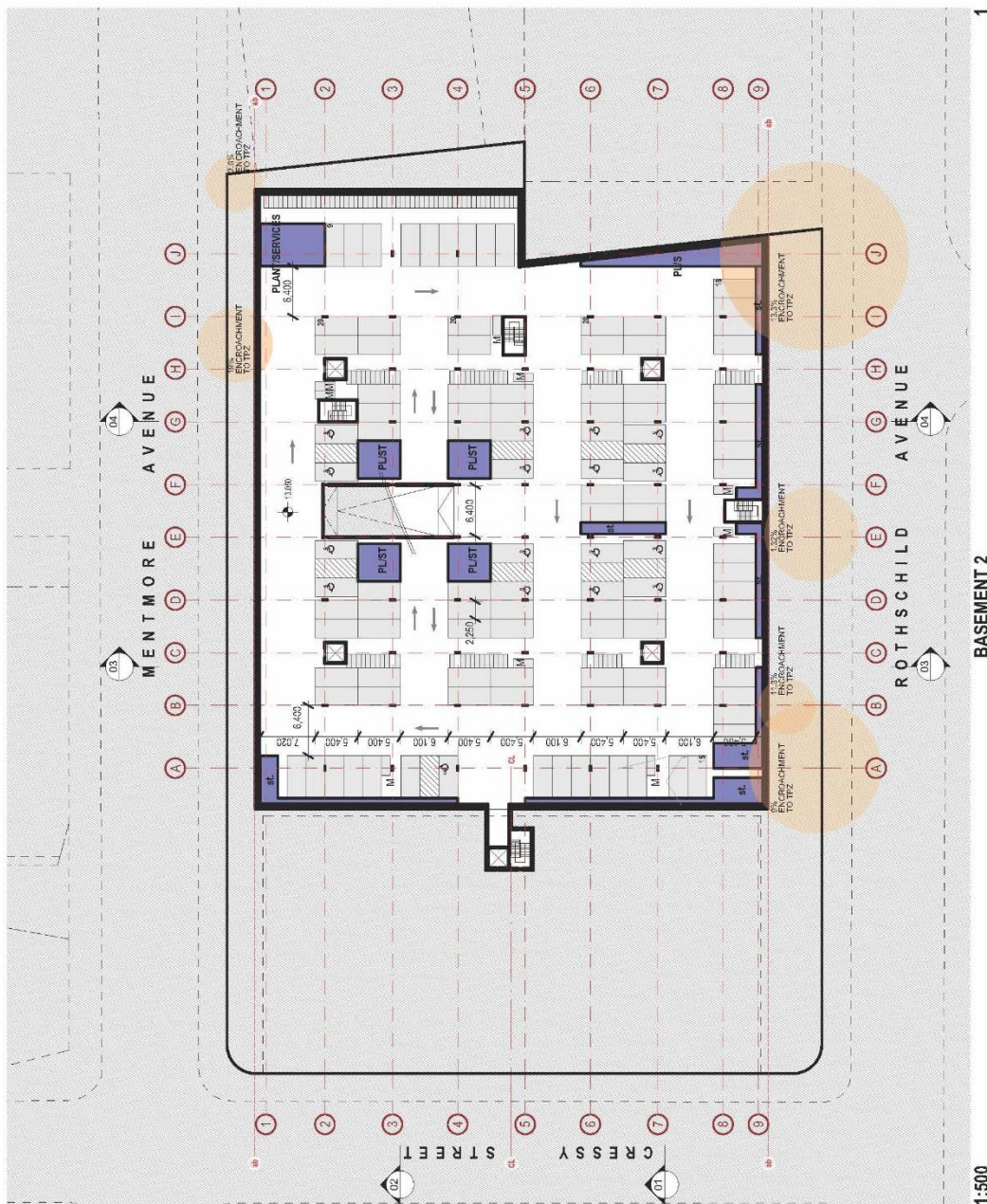
4) A property is considered to be outside the floodplain where it is above the mainstream and local drainage flood planning levels including freeboard.



BIKE COUNT	TOTAL
BASEMENT 02	124
BASEMENT 01	124
	248
	248 REQ

MOTORBIKE SPOT	TOTAL
BASEMENT 02	9
BASEMENT 01	10
	19
	19 REQ

BAY COUNT	TOTAL
BASEMENT 02	
	110
BASEMENT 01	
	109
	219
	219 REQ



1:500

REV	DATE	DESCRIPTION
A	29.11.2017	PLANNING PROPOSAL

PROJECT NO: 7002

COTTEPARKER
JPR
STONEY
Level 4, 55 Stirling Street
MELBOURNE VIC 3010
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F 03 9246 6133
COTTEPARKER@JPR.COM.AU
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PROJECT:
12222 & 24 ROTHSCILD AVENUE
PROJECT ADDRESS:
12222 & 24 ROTHSCILD AVENUE
CLIENT:
MAVILLE GROUP LTD.
DRAWING:
BASEMENT 02 AMENITY STUDY
FLOORPLAN



0 5 10 15m
DRAWING NOT TO SCALE IF REPRODUCED

FILE: 7002 Rothchild Ave DA Master.ppt

Reference Architectural Drawing by Cottee Parker JPRA



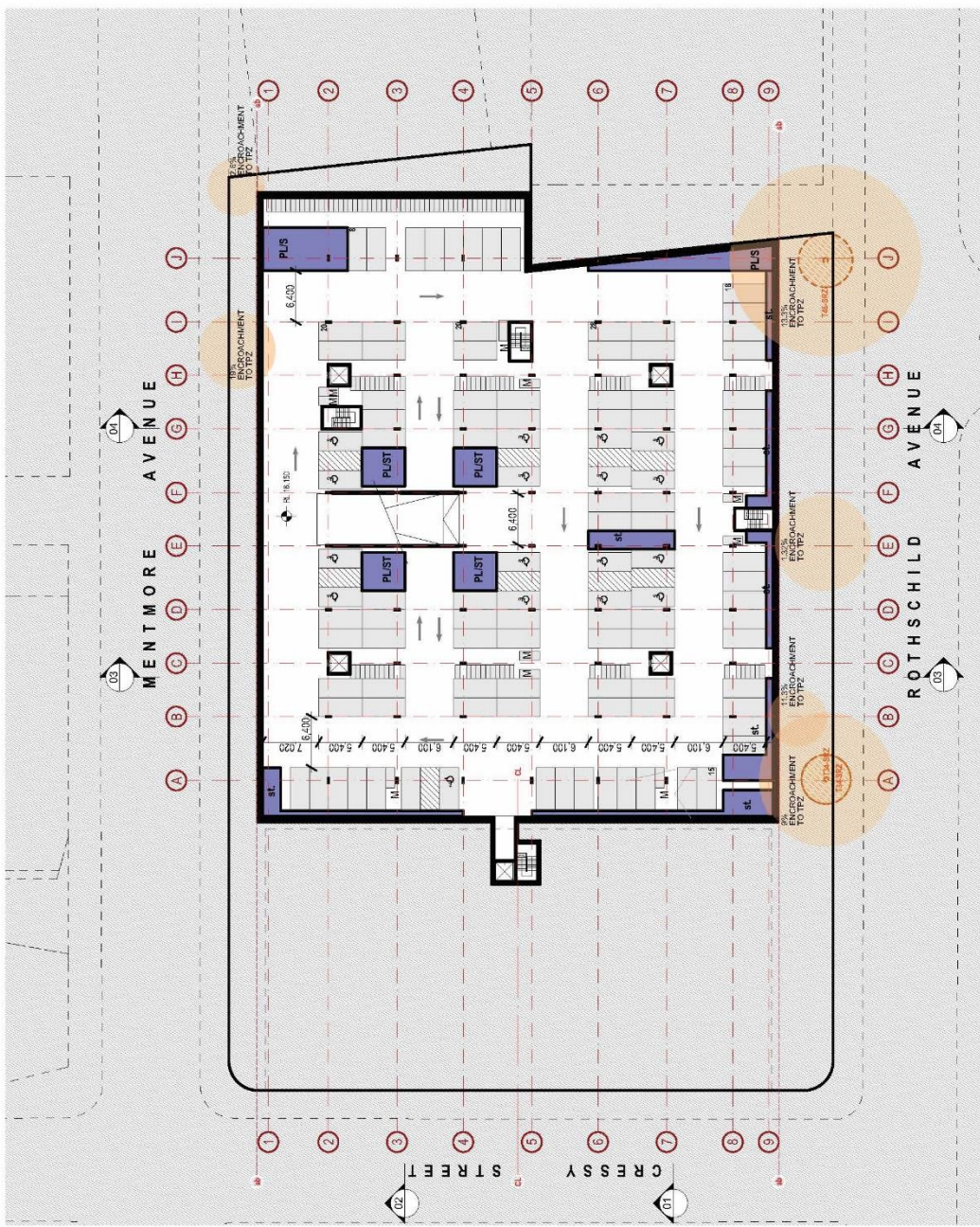
BIKE COUNT	TOTAL
BASEMENT 02	
BASEMENT 01	124
	124
	248
	248 REQ

MOTORBIKE SPOT	TOTAL
BASEMENT 02	
BASEMENT 01	9
	10
	19
	19 REQ

BAY COUNT	TOTAL
BASEMENT 02	
BASEMENT 01	110
	109
	219
	219 REQ

LEGEND

- SITE BOUNDARY
- SETBACK CONTROLS
- EXISTING TREE RETAINED
- EXISTING TREE PROTECTION ZONE (TPZ)
- ENCRoACHMENT TO EXISTING TREE (TPZ)
- UNIT RECEIVING OVER 2 HOURS OF SUNLIGHT IN MIDWINTER (REFER SK2000 SERIES FOR DETAIL)
- NATURALLY CROSS VENTILATED UNITS



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REV A

DATE 28.11.2017

DESCRIPTION PLANNING PROPOSAL

COTTEEPARKER

JPRA

STONEY

12-22 & 24 ROTHSCILD AVENUE

12-22 & 24 ROTHSCILD AVENUE

CLIENT: JPM GROUP LTD.

12-22 & 24 ROTHSCILD AVENUE

STONEY NSW 2015

T: 02 2008 1133

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PROJECT: 7002

PROJECT NO: 7002

SK2001 A

PLAN

BASEMENT 01 AMENITY STUDY FLOOR

Reference Architectural Drawing by Cottee Parker JPRA



Reference Architectural Drawing by Cottee Parker JPR