

Leah Prestia
154 Avalon Pde,
Avalon, 2107
20/10/2021

Re: Flood Report for 154 Avalon Parade Avalon

Dear Leah,

1.0 INTRODUCTION

I refer to your proposed boundary fence at 154 Avalon Pde Avalon (Lot 1 Sec4 DP 800640) as discussed with Myriam Rooney Design. The proposal is detailed in Figures 4 and 5. Northern Beaches Council (NBC) has identified a portion of the property as medium to low Flood Risk Precinct and land risk to life category H1. Therefore, a flood investigation was undertaken of the proposed boundary fencing.

2.0 GENERAL DESCRIPTION

The *site* is located in the upper north western catchment of Careel Creek as shown in Figure 1. There are several features of the topography of the *site* and its location, that are important to the potential flooding processes and the potential impact on the boundary fence.

These are:

1. The *site* catchment as shown in Figure 1 extends from Riviera Avenue and Riverview Road; a catchment area of approximately 14 Ha; a small portion of the Creel Creek catchment.
2. The overland flows are stored in Reserve and is discharged by a 1200 mm diameter pipeline as shown in Figure 3. When the pipeline reaches its capacity (choked) under heavy rainfall conditions, overland flows occurs into Central and Avalon Parade Roads.
3. There is a swale area at the southern end of the reserve that would provide a trap for large debris transported from the catchment (Figure 2). Small floatable debris will flow into Central Road and be transported to Avalon Parade. Debris loading on the *site* western fence is considered low.
4. Overland flows in the Reserve accumulate near the junction of Central Road and Avalon Parade as shown in Appendix A page 8.
5. The *site* is elevated to approximately 21metres AHD approximately 0.8 metres above Central Avalon Parade Roads as shown in Figure 2.

3.0 REVIEW OF EXISTING DATA

The **site** boundary was surveyed by Crux Surveying. Ref 100017-SU-IDT-001 dated 1st October 2021 and incorporated in Figure 4.

The topography for this investigation used the NSW Government Land and Property Lidar 2014 Data Hawkesbury South 3406268-56. Contours were generated by Pittwater Data Services Pty Ltd at 0.2 metre intervals (Figures 1 and 2).

The Careel Creek flooding processes have been extensively studied by a number of investigations commissioned by the then Pittwater, and NBC Councils. The more recent study is:

1. Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory. (Ref 1).

4.0 RESULTS OF INVESTIGATION

The flood study which is relevant to this report is (Ref 1). Flood data based on Ref 1 was obtained from NBC and is shown in Appendix A. The key findings in relation to the fencing design for the 1%AEP flood simulations that relate to the **site** are:

2. The 1%AEP overland flows from the chocked pipeline overtop the headwall and enter Central Road, then flow to Avalon Parade as shown in Figure 1 and 2, Appendix A pages 6 and 8.
3. The core of the flow (Floodway pink appendix A page 8) is predicted to be controlled predominately within the roadway. In the prototype this would occur due to the hydraulic efficiency of the roadway (150mm gutters and relatively smooth surface Figure 1.)
4. Overflows at the western end of the **site** are predicted once the gutter has been overtopped.
5. The hydraulic modelling has **not** shown any overland flowpath through the **site**.
6. The peak depth of flow is approximately 0.15 to 0.20 metres along the boundary as shown in Appendix A page 5. Locations 6 and 7 are inconsistent with the remainder of the locations as shown Appendix A page 5.
7. The 1%AEP is based on a 20 minute rainfall storm where the peak flood levels are over a short time less than 10 minutes.

5 PROPOSED BOUNDARY FENCING

The proposed boundary fencing layout and design is shown in Figures 4 and 5.

The fencing from a flooding perspective, is not to impact on the 1%AEP flood modelled processes in terms of flood levels, velocities and flood storage. In essence the western and northern boundary fence are the only sections that are exposed to the 1%AEP peak flood levels. This inundation is a result of the road gutter overtopping and inundated a portion of the *site*. This area is a flood storage or flood fringe where the velocity are low. The area floods and drains from Central Road and does **not** flow through the *site*.

The brick boundary fence along the northern boundary (parallel to Central road) as shown in Figure 4 will require openings to allow the 1%AEP flood to be stored on the site. The flood storage volume is approximately 2000 litres. Uncontrolled flows through the fence can be accommodated with ground level openings 0.4 long x 0.2 high at 0.5 metres spacing or an equivalent opening area. Openings were based on the required flow rate and Froude No >1.

The open steel fence as shown in Detail A Figures 4 and 5 will not attenuate the flows to the *site* storage area, as the flood depths are generally only 0.2metres.

6.0 CONCLUSION

In conclusion, considering the flooding processes at the *site* the design of the fencing as hown in Figures 4 and 5 will have imperceptible impact of the predicted 1%AEP flood processes. The fence openings are to be maintained free of debris, plantings and grass etc to ensure floods inundate and drain.through the fences.

Yours Faithfully,



Stephen Wyllie Bsc (Eng) FMA Member

Director

20/10/2021

APPENDIX A



FLOOD INFORMATION REPORT – COMPREHENSIVE

Property: 154 Avalon Parade AVALON BEACH NSW 2107

Lot DP: Lot 1 DP 800640

Issue Date: 10/08/2021

Flood Study Reference: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory

Flood Information for lot ¹:

Flood Risk Precinct – See Map A

Flood Planning Area – See Map A

Maximum Flood Planning Level (FPL) ^{2, 3, 4}: 21.25 m AHD

1% AEP Flood – See Flood Map B

1% AEP Maximum Water Level ^{2, 3}: 20.76 mAHD

1% AEP Maximum Depth from natural ground level³: 0.53 m

1% AEP Maximum Velocity: 0.87 m/s

1% AEP Hydraulic Categorisation: Floodway See Flood Map D

Probable Maximum Flood (PMF) – See Flood Map C

PMF Maximum Water Level ⁴: 21.07 m AHD

PMF Maximum Depth from natural ground level: 0.84 m

PMF Maximum Velocity: 1.55 m/s

PMF Hydraulic Categorisation: Floodway See Flood Map E

Flooding with Climate Change (See Flood Map F)

The following is for the 30% Rainfall intensity increase and 0.9m Sea Level Rise Scenario:

1% AEP Maximum Water Level with Climate change ³: 20.83 m AHD

1% AEP Maximum Depth with Climate Change³: 0.61 m

1% AEP Maximum Velocity with Climate Change³: m/s

Flood Life Hazard Category – See Map G

¹ The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.

² Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/flood planning levels across the site. The maximum Flood Planning Level may be in a different location to the maximum 1% AEP flood level.

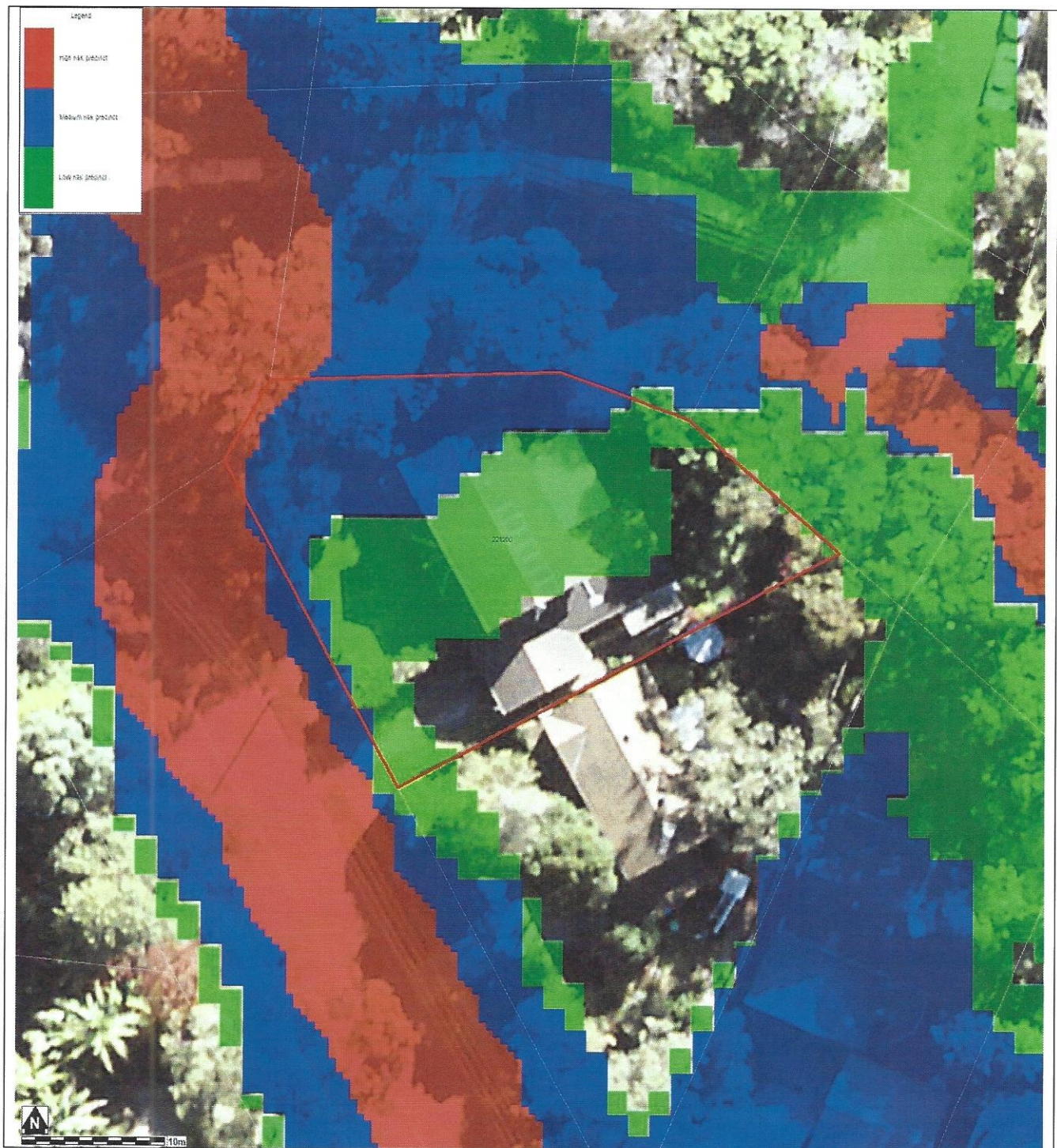
³ Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels.

⁴ Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or FPL.

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's website.

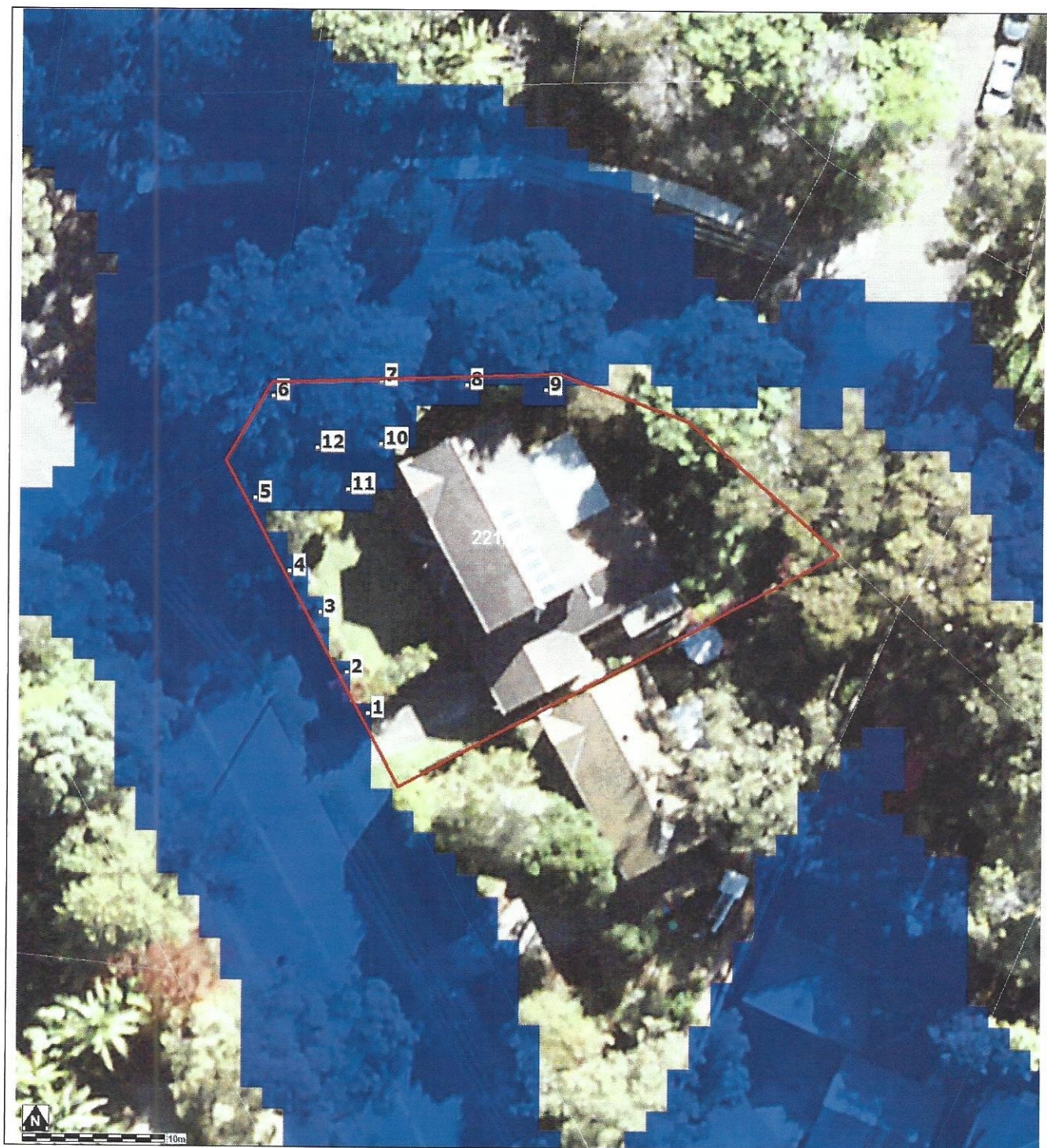
FLOOD MAP A: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 or H6 Life Hazard Classification).
- The **Flood Planning Area** extent is equivalent to the Medium Flood Risk Precinct extent, and includes the High Flood Risk Precinct within it. The mapped extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- None of these mapped extents include climate change.

FLOOD LEVEL POINTS



Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	20.36	0.13	0.60	20.86	20.57	0.33	0.96
2	N/A	N/A	20.38	0.14	0.46	20.87	20.62	0.38	1.04
3	N/A	N/A	20.40	0.15	0.43	20.90	20.70	0.44	1.08
4	N/A	N/A	20.47	0.15	0.55	20.96	20.77	0.44	1.20
5	N/A	N/A	20.61	0.19	0.87	21.18	20.90	0.48	1.55
6	20.69	0.47	20.75	0.53	0.51	21.25	21.06	0.84	1.16
7	20.69	0.38	20.75	0.44	0.26	21.25	21.06	0.76	0.77
8	N/A	N/A	20.73	0.16	0.15	21.23	21.03	0.45	0.63
9	N/A	N/A	20.72	0.16	0.15	21.22	20.98	0.41	0.52
10	20.69	0.19	20.75	0.25	0.13	21.25	21.06	0.56	0.71
11	20.68	0.18	20.73	0.24	0.22	21.24	21.02	0.52	0.90
12	20.68	0.24	20.74	0.30	0.26	21.25	21.03	0.59	0.96

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event

Climate Change Flood Levels (30% Rainfall intensity and 0.9m Sea Level Rise)

ID	CC 1% AEP Max WL (m AHD)	CC 1% AEP Max Depth (m)
1	20.40	0.16
2	20.42	0.18
3	20.47	0.21
4	20.54	0.21
5	20.67	0.25
6	20.83	0.61
7	20.83	0.52
8	20.80	0.23
9	20.78	0.22
10	20.83	0.33
11	20.80	0.31
12	20.82	0.37

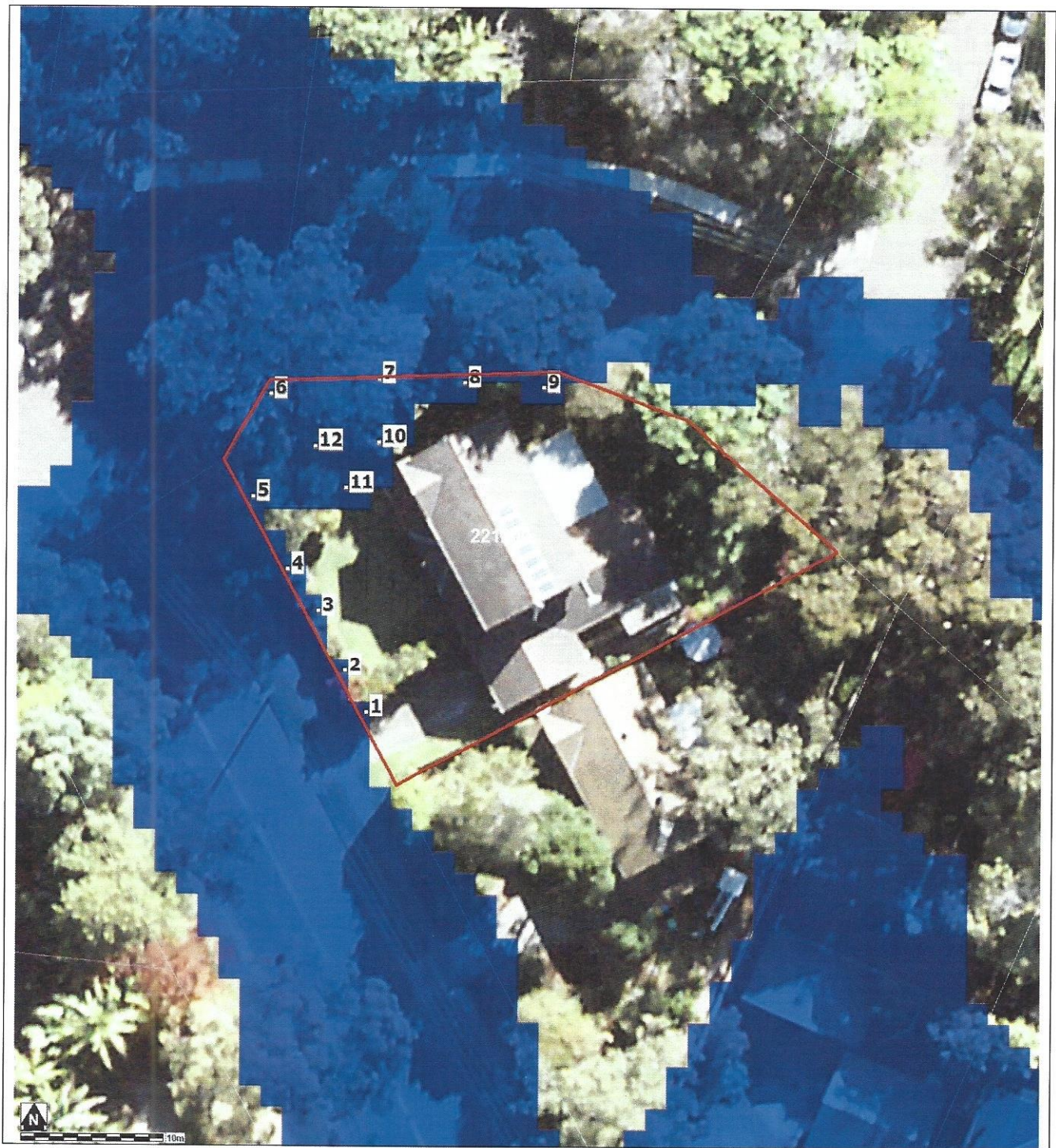
WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event.

A variable Flood Planning Level might apply. Freeboard is generally 0.5m above the maximum 1% AEP water level. However for overland flow with a depth less than 0.3m and a VelocityxDepth product less than 0.3m²/s, a freeboard of 0.3m may be able to be justified.

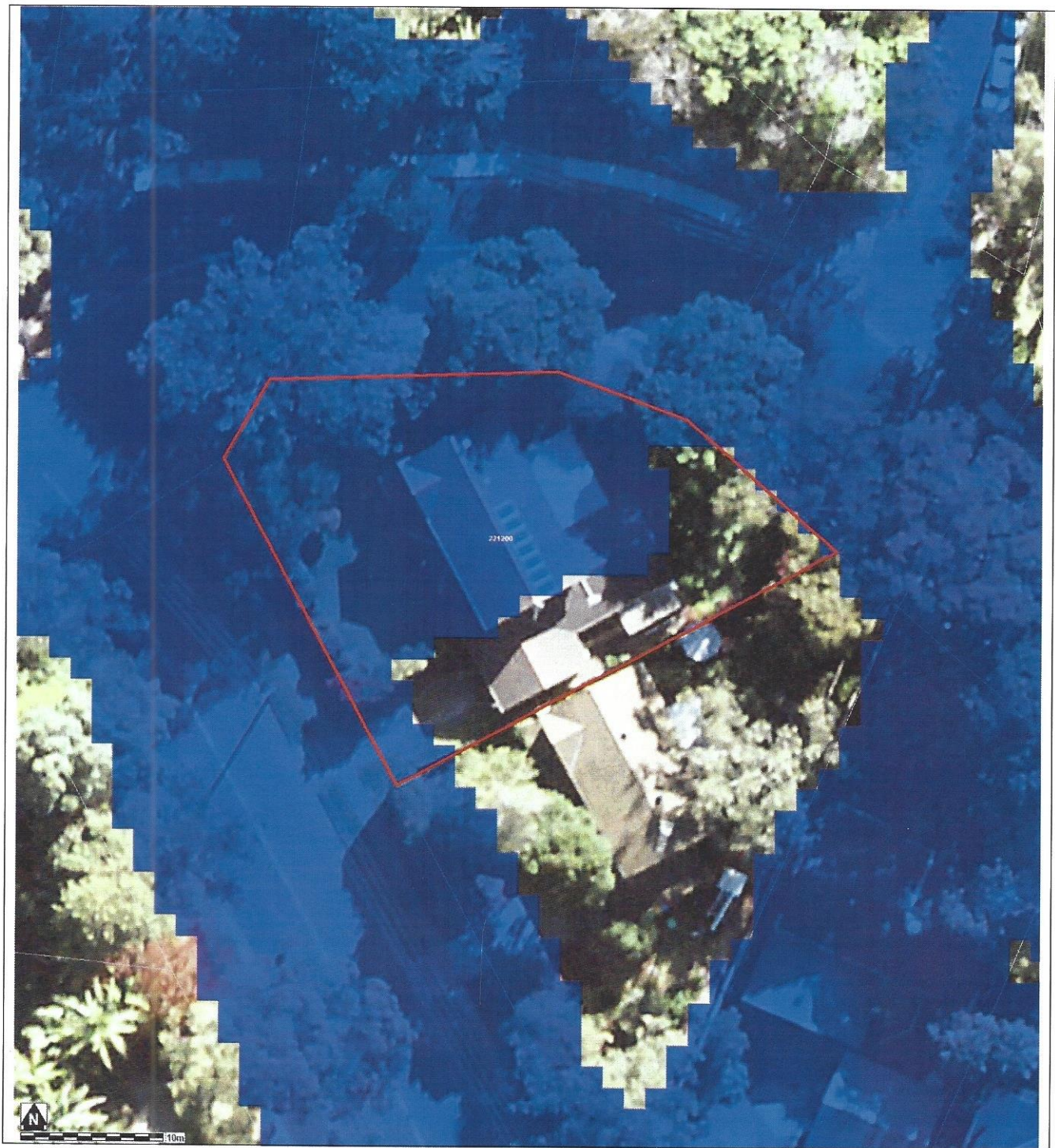
FLOOD MAP B: FLOODING - 1% AEP EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: Near Map 2014) are indicative only.

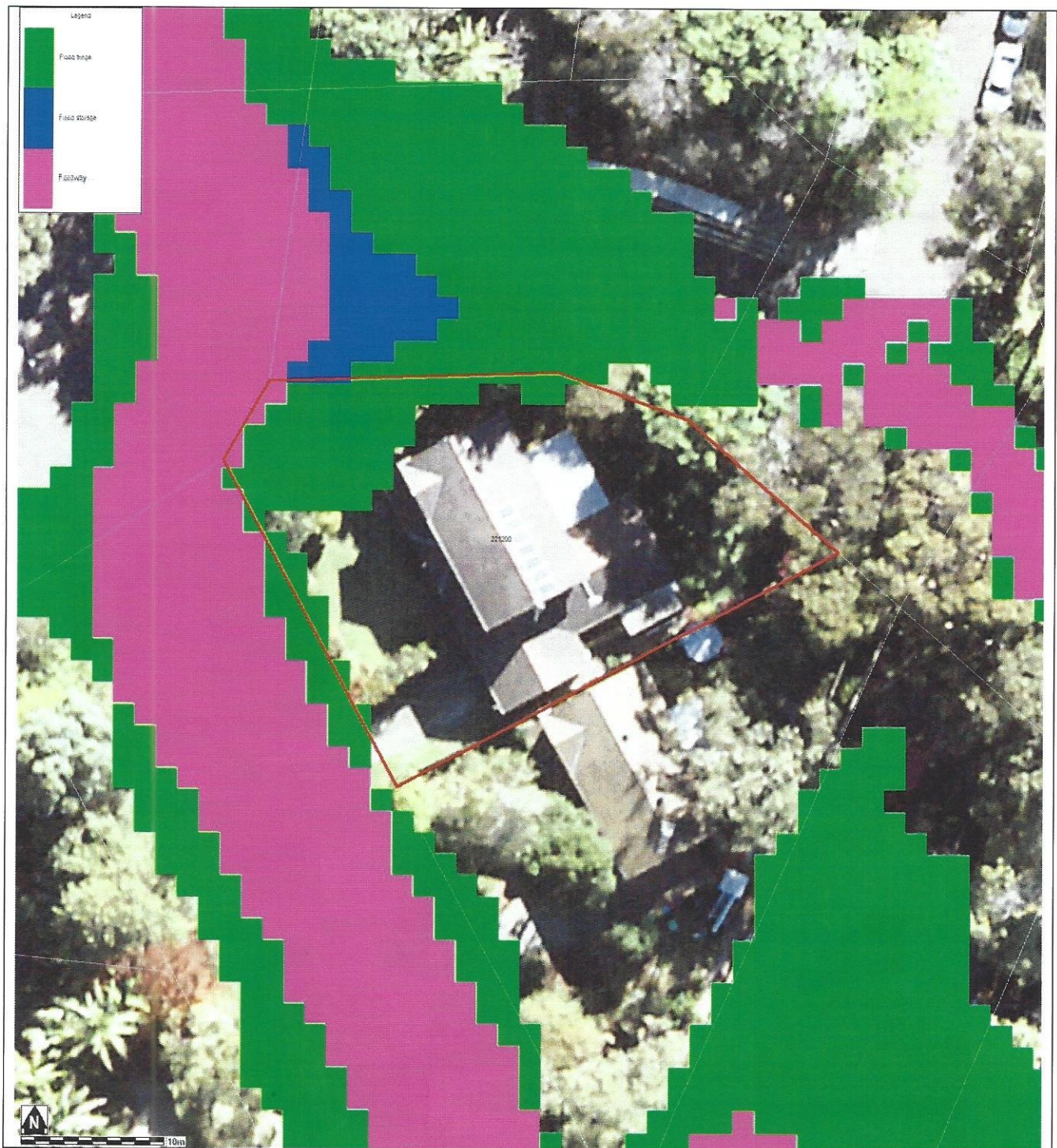
FLOOD MAP C: PMF EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only

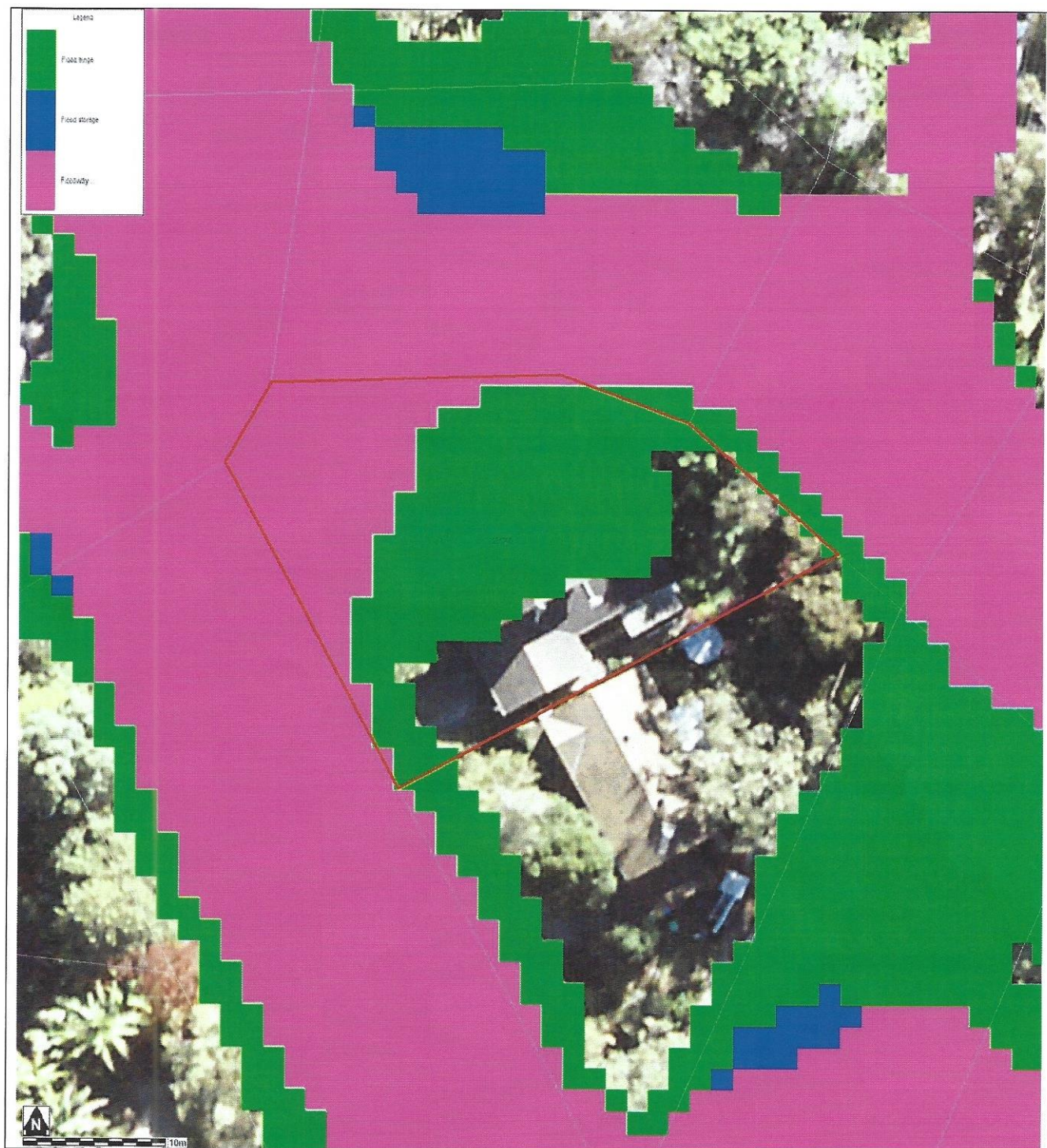
FLOOD MAP D: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only

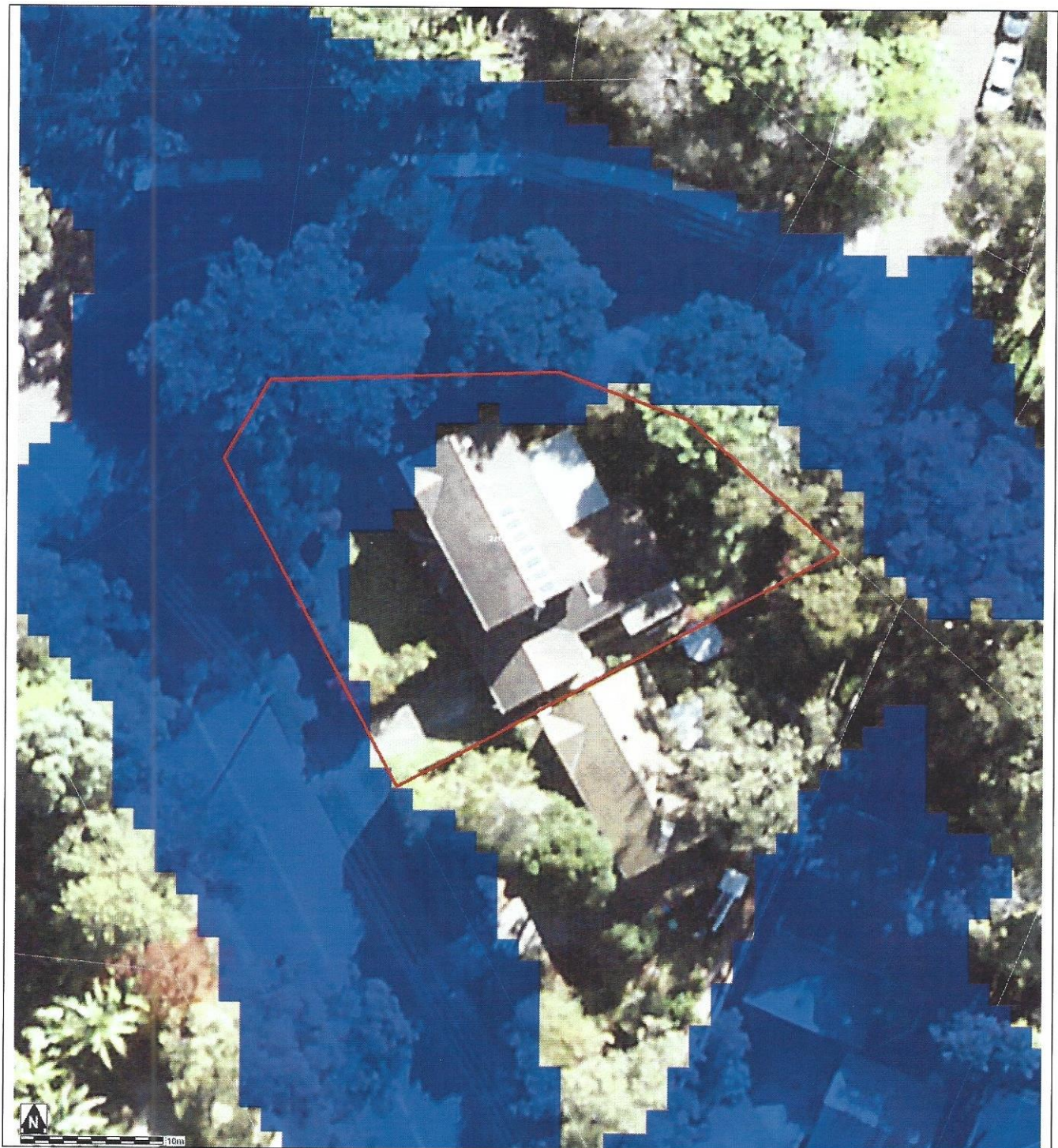
FLOOD MAP E: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only

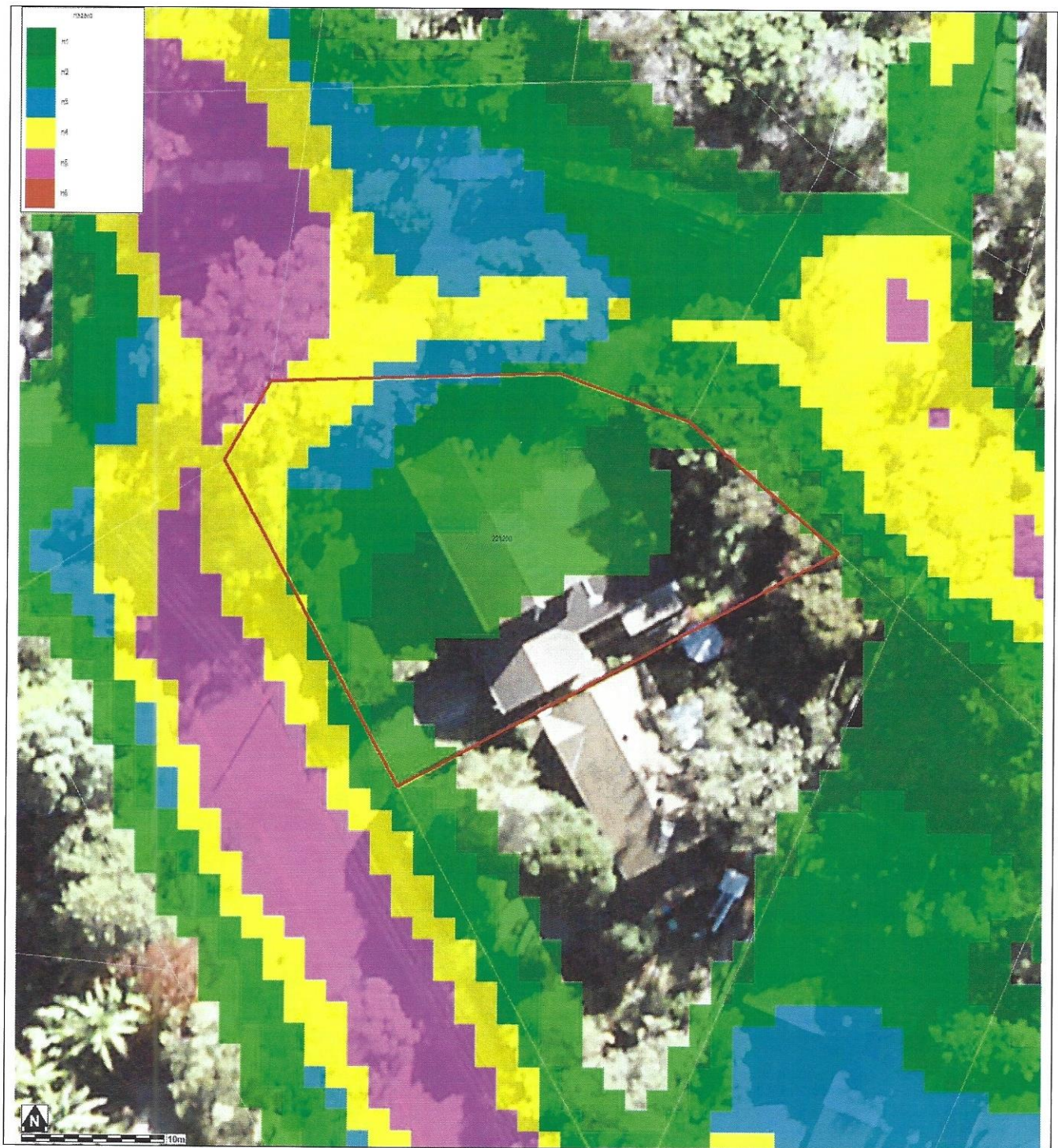
FLOOD MAP F: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Note:

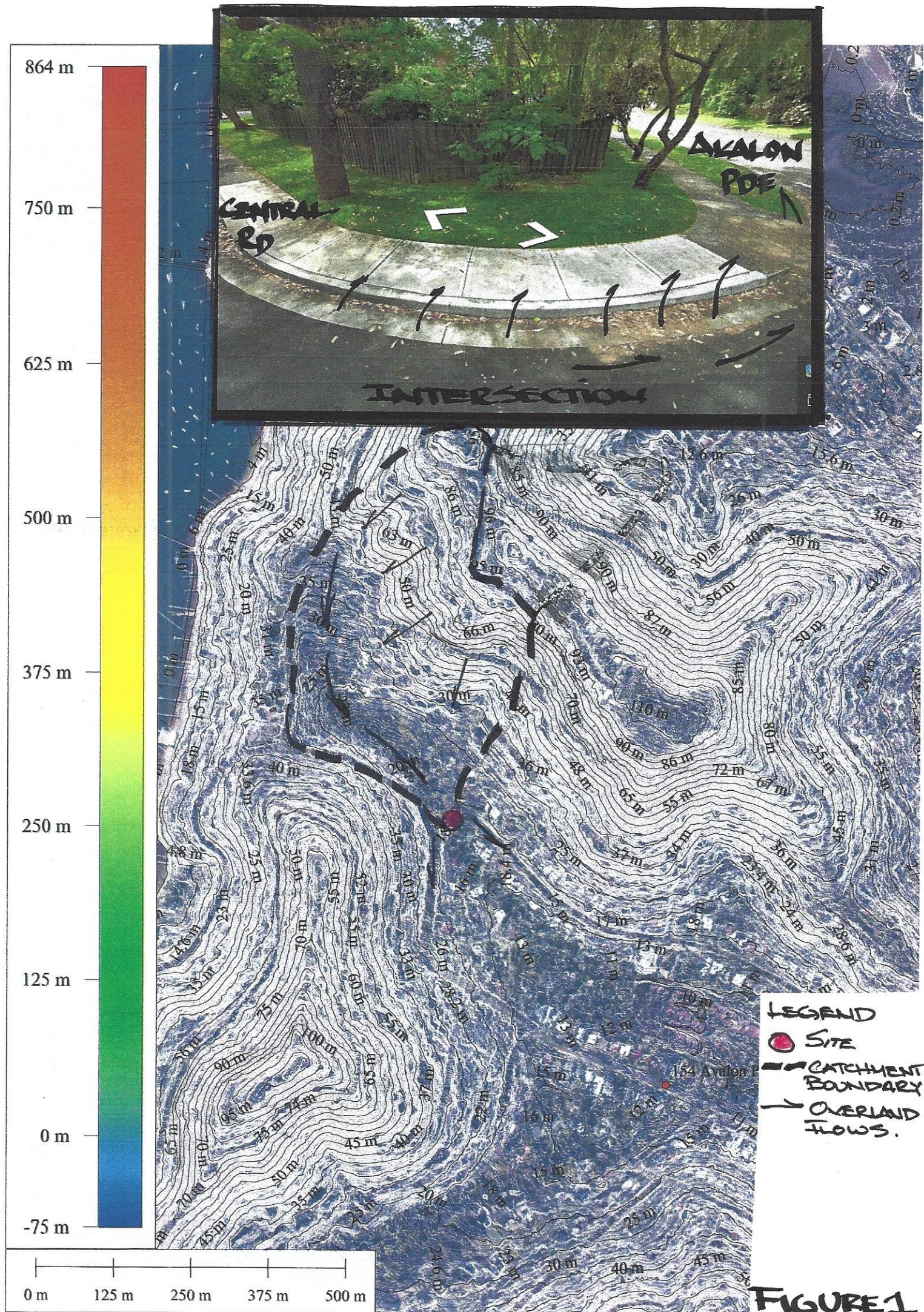
- Extent represents the 1% annual Exceedance Probability (AEP) flood event including 30% rainfall intensity and 0.9m Sea Level Rise climate change scenario
- Flood events exceeding the 1% AEP can occur on this site.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP G: FLOOD LIFE HAZARD CATEGORY



Notes:

- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: Near Map 2014) are indicative only.



154 Avalon Parade Avalon

