

6 May 2024

Element Environment
Suite 10, 1 Mona Vale Road
Mona Vale NSW 2103

Att: Paris Wojcik

Our Ref: N0240449-CRPT.01A

Dear Paris,

Flood Management Report

Project: Pittwater Palms Retirement Village

Address: 82 Avalon Parade
Avalon Beach NSW 2107

This report has been prepared to support the Development Application (DA) for new site entry works at the above address. The subject residential aged-care site is located on Avalon Parade and has a single vehicular driveway access to service all the secondary sub-lots within the Retirement Village (refer to Figure 1). An existing unnamed watercourse is directly adjacent to the north and poses flood-affectation in the 5% AEP, 1% AEP and PMF events.

The site is located within the Northern Beaches Council Local Government Area (LGA).



Figure 1: Site Location

Proposed Development

The scope of works for this development is contained within the vicinity of the vehicular entrance (refer to Figure 2 and Appendix A for concept drawings), including:

- Replace existing internal pebblecrete footpath with new 1200mm wide paved footpath
- Replace existing walls and signages with several new wall signages
- Install new timber slat seating
- Reconstruct existing traffic island with new porphyry paving and replant raised garden bed

This proposal does not alter the usage, operation or traffic behaviour of the existing development.

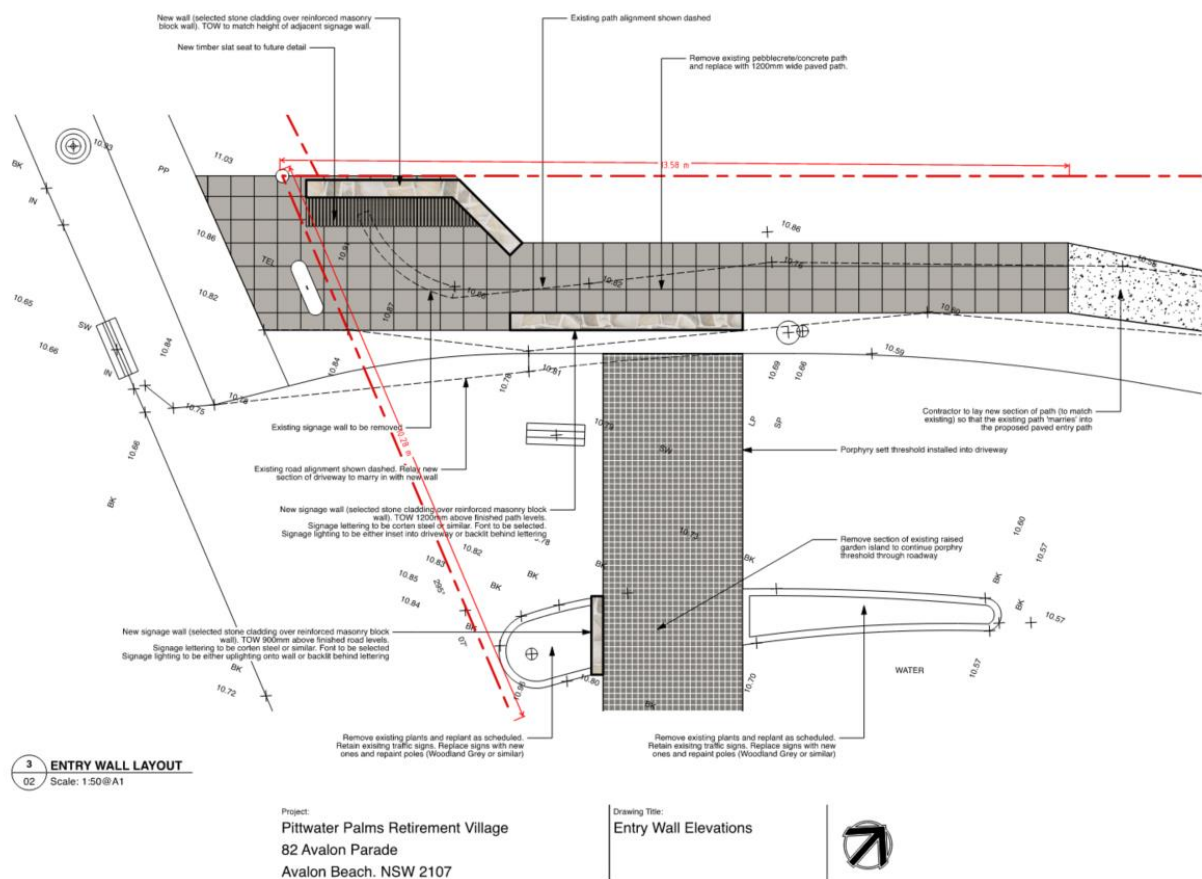


Figure 2: Proposed Development Plan (Stone Rose Landscapes, 16/02/2023)

Existing topographic levels around the extent of works range from RL 10.42 – 11.05 based on ALS LiDAR data provided by Northern Beaches Council (refer to Figure 3).

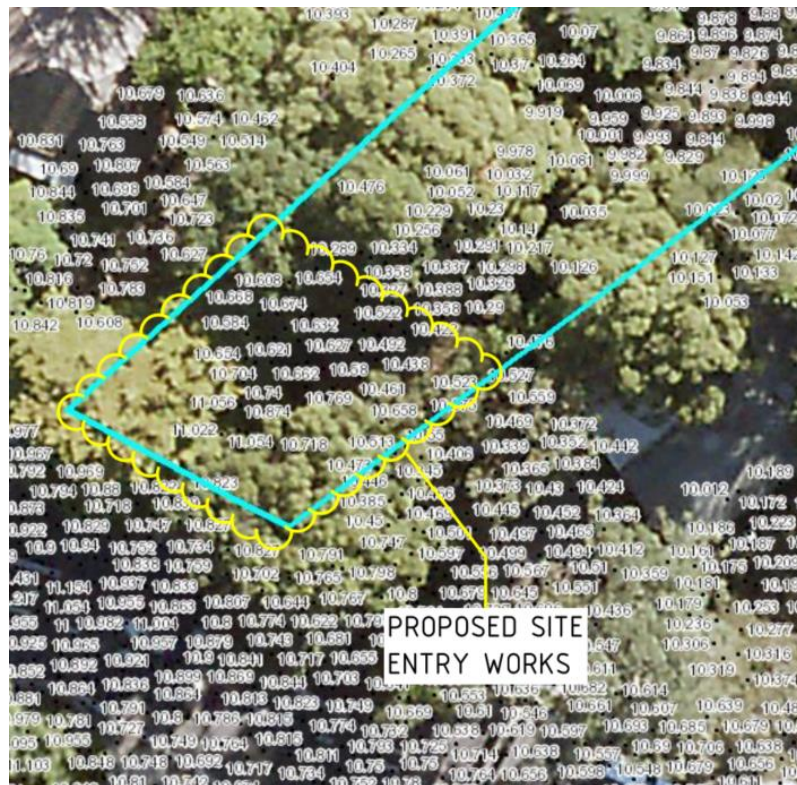


Figure 3: Ground Surface Spot Heights (Northern Beaches Council, 2024)

Council Flood Information

Northern Beaches Council has undertaken a flood study near the site as part of the *Avalon to Palm Beach Floodplain Risk Management Study and Plan* (Manly Hydraulics Laboratory, 2017). Results of this study have been extracted with flood information provided by Council to demonstrate existing flood behaviour (refer to Appendix B).

The flood risk precinct, hydraulic category, extents, depths, levels and velocities for the 1% AEP and PMF events are provided in Figure 4 - Figure 7.

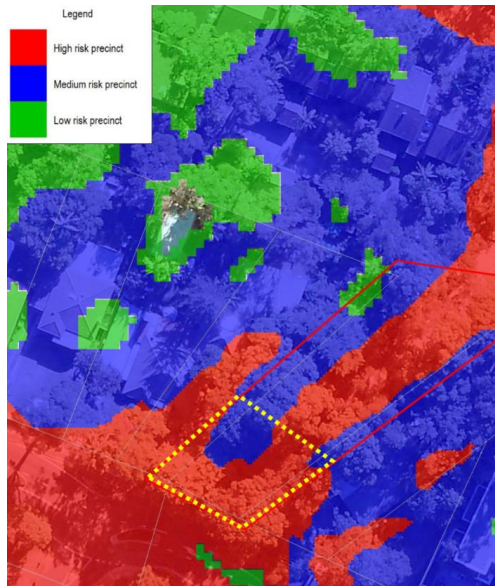


Figure 4: Flood Risk Precinct (Northern Beaches Council, 2024)

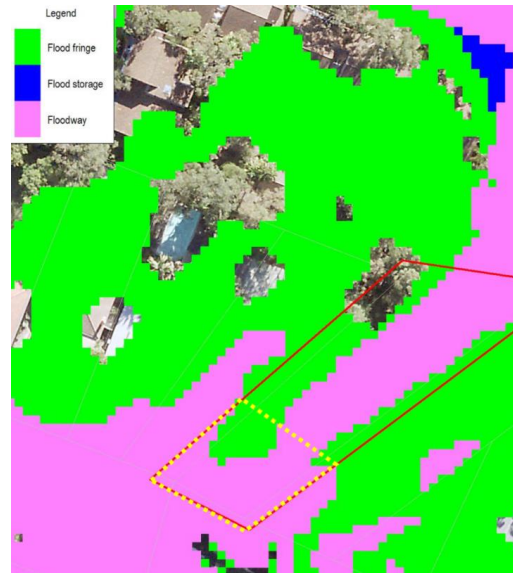


Figure 5: 1% AEP Hydraulic Category (Northern Beaches Council, 2024)

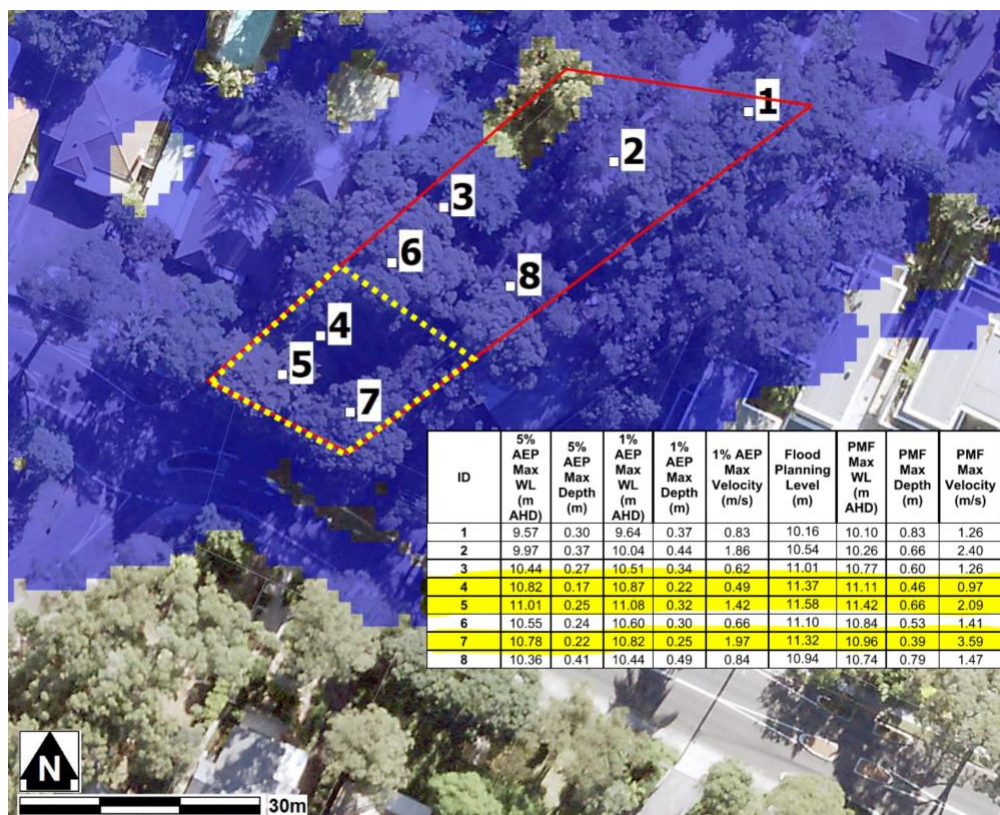


Figure 6: 1% AEP Flood Data (Northern Beaches Council, 2024)

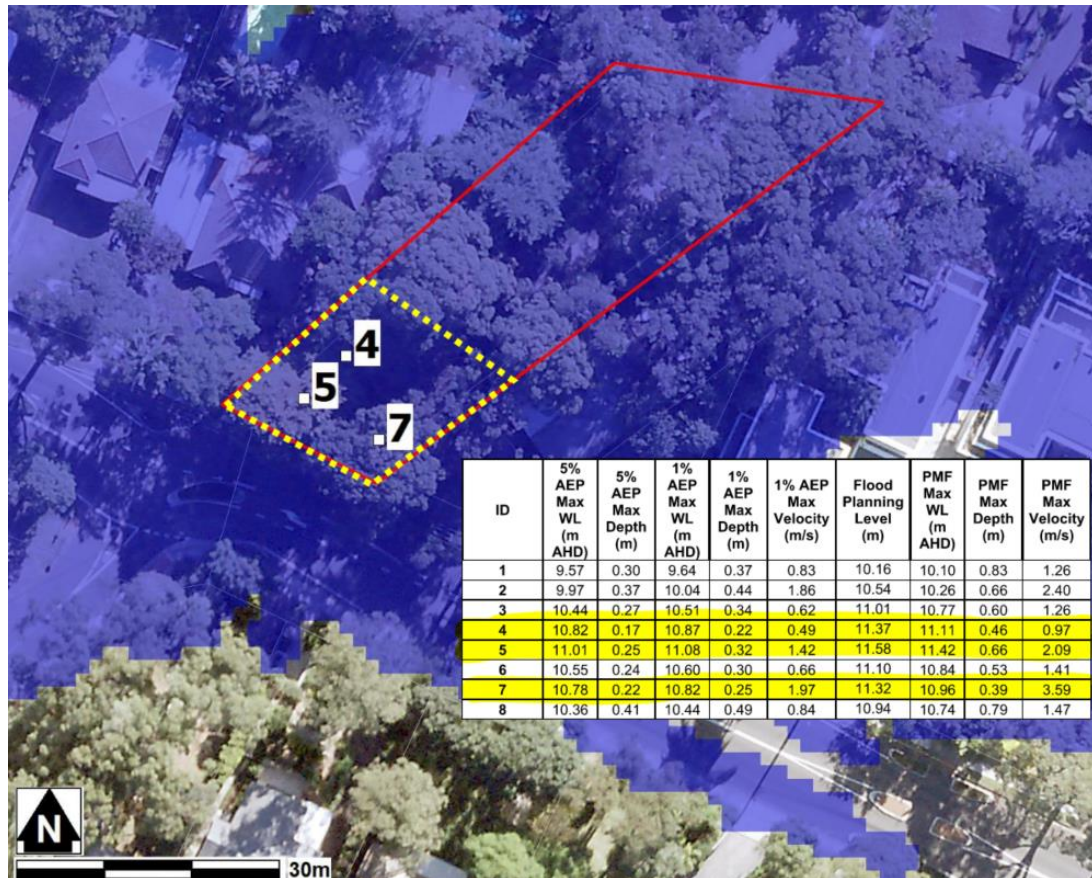


Figure 7: PMF Flood Data (Northern Beaches Council, 2024)

The flood mapping extracted from Council's flood study shows the impact of existing flooding from the watercourse along the northern site boundary. It demonstrates floodwaters dispersing through the driveway entrance and spilling onto Avalon Parade during larger storm events. The flood planning levels (FPLs) are summarised in Table 1.

Assessment Against Council Policy

Refer to Table 1 for an assessment against each of Council's relevant flood policy requirements.

Table 1: Assessment against Northern Beaches Council flood policy

Criteria	Compliance / Comments
A) Flood Effects Caused by Development	Complies. The proposed works is to remain very similar to existing which will allow for the current floodpath along the driveway entry to remain unchanged, posing no additional flow obstructions and not impacting any adjacent properties.
B) Building Components & Structural Soundness	No buildings are proposed within extent of works. Structural soundness of landscape features, materials and walls to be confirmed by Structural design, noting that all development works must be designed and constructed to ensure structural integrity up to the FPL whilst taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion (refer to Clause B, Part E11 of Warringah Development Control Plan)
C) Floor Levels	N/A. Max 1% AEP & PMF flood levels within the extent of works are RL 11.08 and RL 11.42 respectively (refer to points 4, 5 & 6 in Figure 6). Maximum FPL is therefore RL 11.58 , achieving a 500mm freeboard. However, no buildings or habitable spaces are proposed within this area hence flood planning level requirements are not applicable.
D) Carparking	N/A. No carparking provisions or flood planning requirements within driveway entry in the absence of buildings or habitable spaces within these extents. Traffic behaviour, turning movements and site generation shall remain unchanged as the proposed entry works do not alter the nature of traffic or carparking.
E) Emergency Response	No buildings are proposed within extent of works. Access for evacuation and emergency vehicles remain unchanged from existing conditions. The existing site Emergency Response Management Plan can therefore remain unchanged as a result of the proposed works.
F) Fencing	Fencing shall be designed and constructed with flood compatible materials and with open passage for floodwaters to pass through below.
G) Storage of Goods	N/A. No hazard materials to be stored within driveway entry.
H) Pools	N/A. No pools to be installed within driveway entry.

Please contact the undersigned for any further questions and clarification.

For and on behalf of JN,

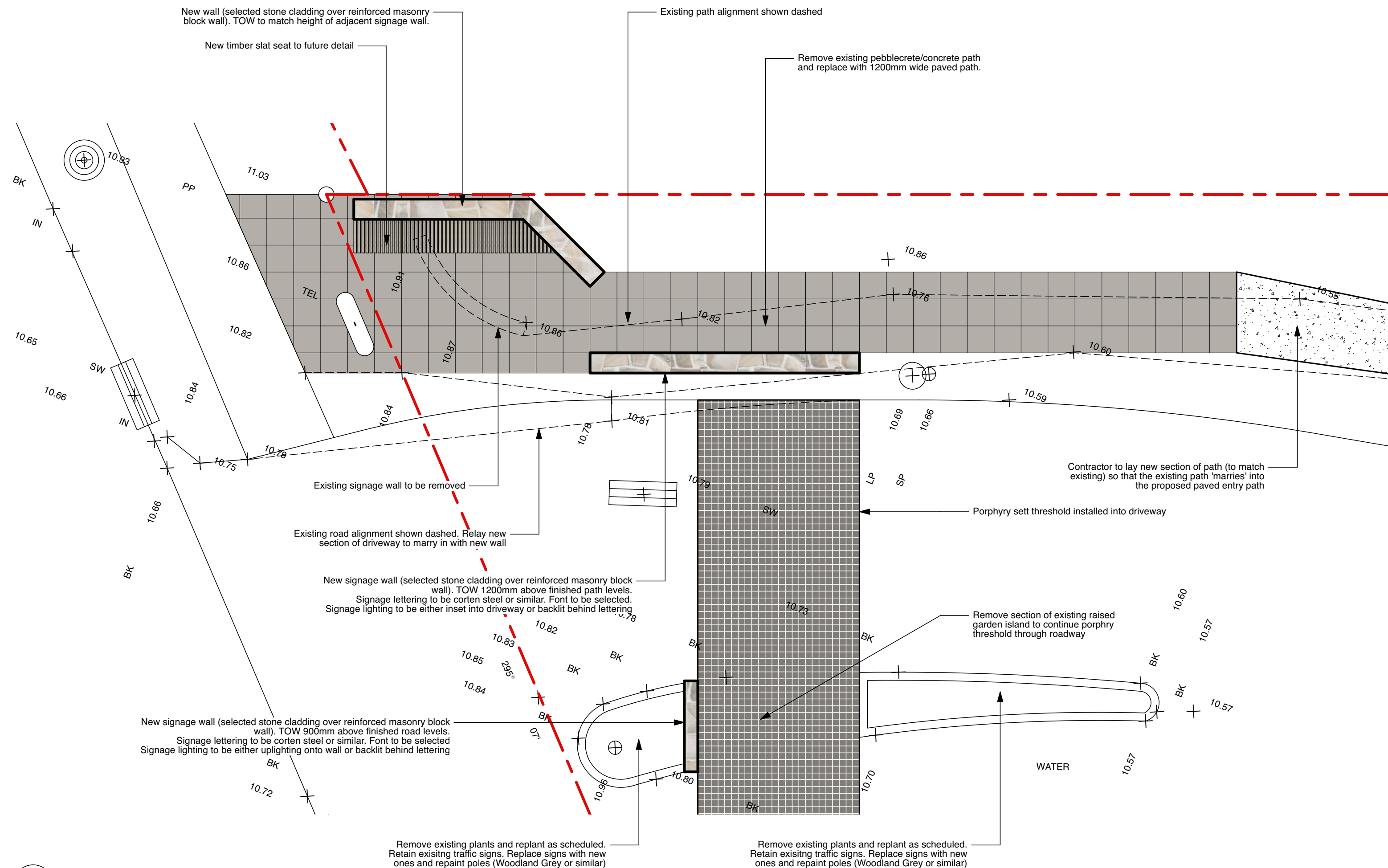


Wing Wu | Civil Project Engineer

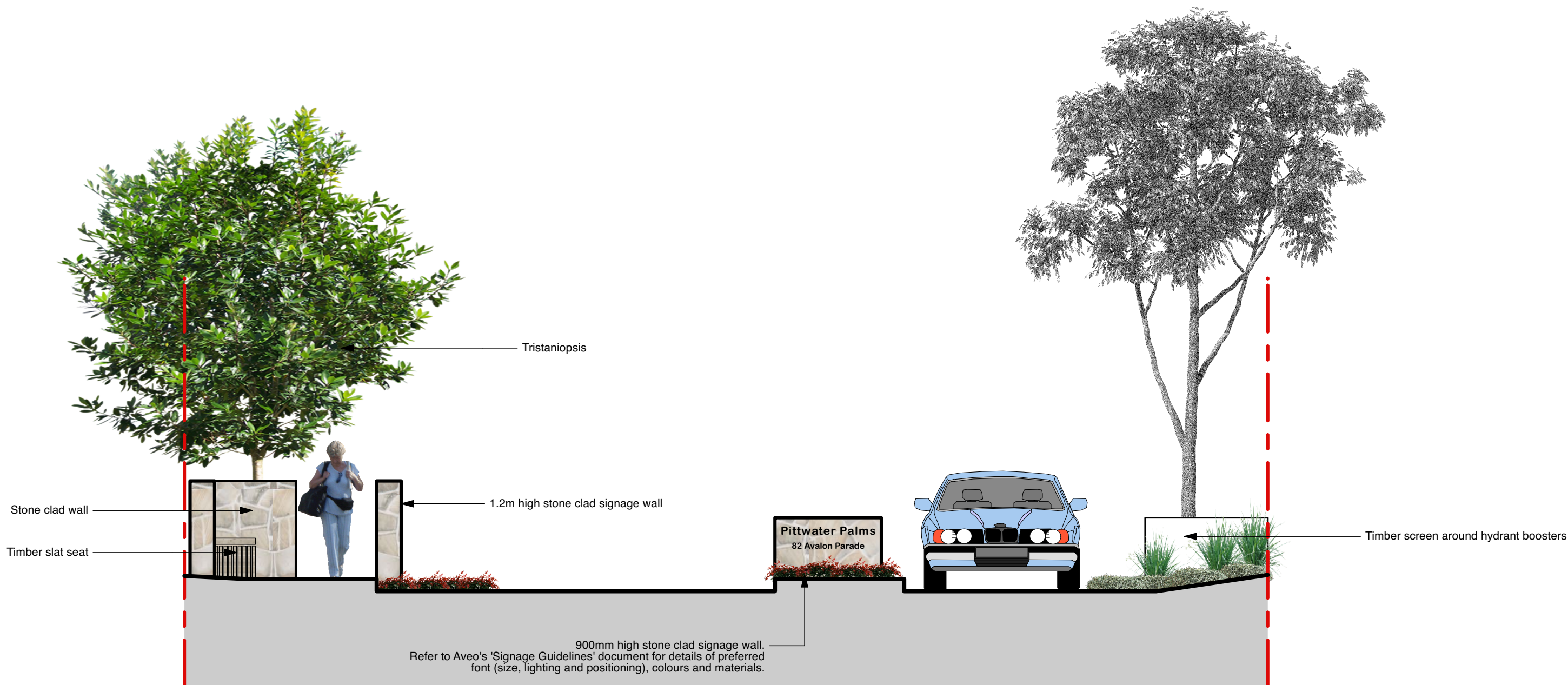
APPENDIX A – Architectural Drawings

Entry Wall Elevations, Stone Rose Landscapes

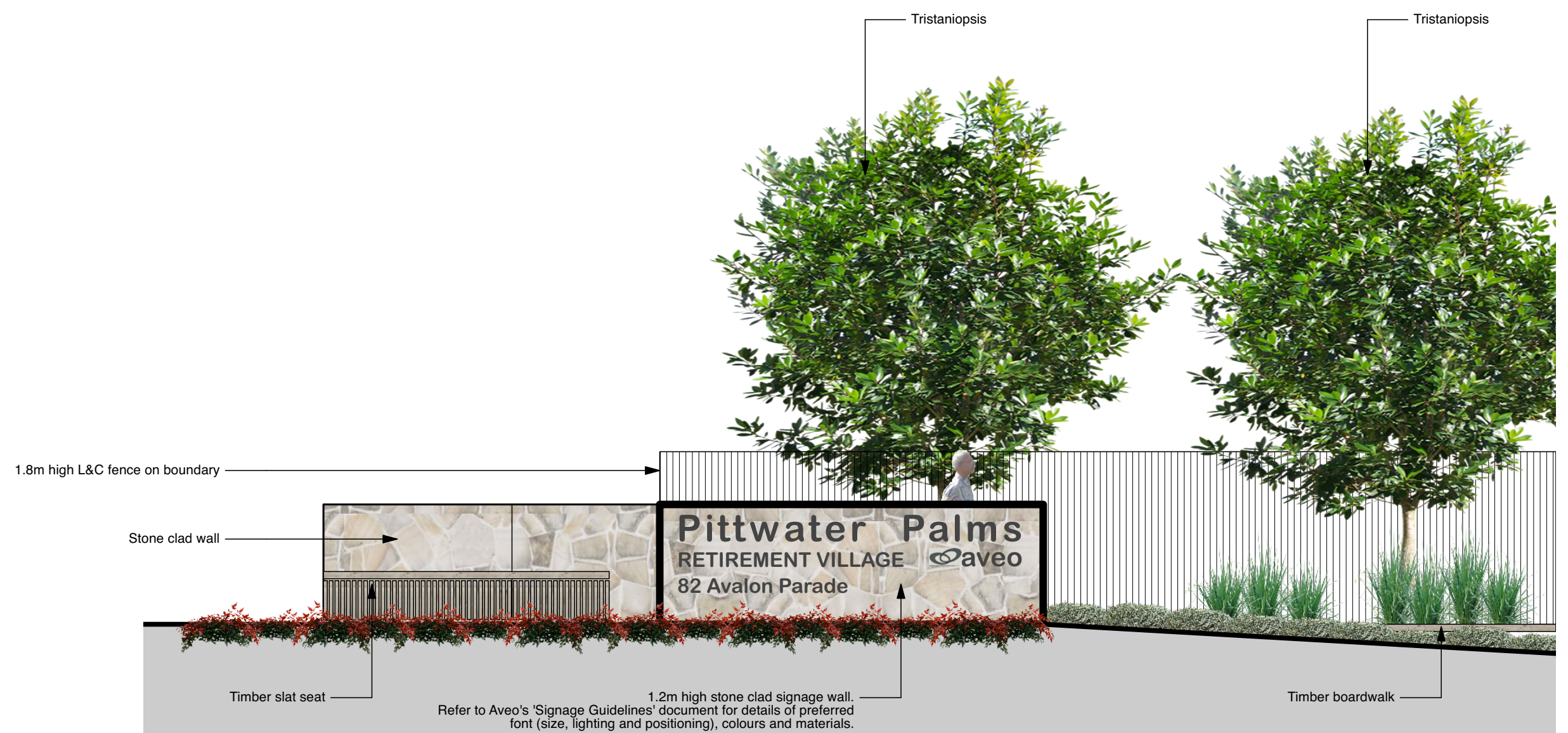
Drawing Ref.: 2201-LC-02 [B], dated 16/02/2023



3 ENTRY WALL LAYOUT
02 Scale: 1:50@A1



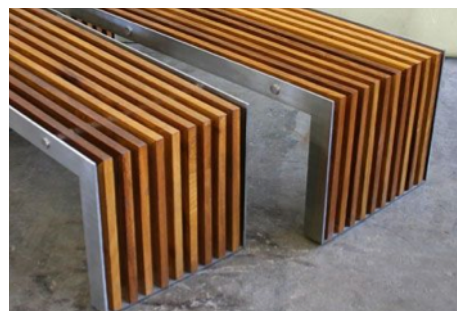
1 AVALON PARADE ELEVATION
02 Scale: 1:50@A1



2 SIGNAGE WALL ELEVATION
02 Scale: 1:50@A1

- KEY
- EXISTING TREES TO BE REMOVED
 - EXISTING TREES TO BE RETAINED
 - NEW TREES
 - PLANTING
 - EXISTING PLANTING TO BE RETAINED
 - LAWN
 - PAVING
 - DECKING
 - CONCRETE PATH/ DRIVEWAY
 - MULCH
 - GRAVEL PATH
 - WALLS
 - 1.8m TIMBER FENCE
 - 1.2-0.8m TIMBER FENCE
 - STEEL EDGING

Note:
Where mass planting abuts turf
install steel edge as specified.



APPENDIX B – Comprehensive Flood Information Report

Extracted from *Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017*

Northern Beaches Council, issued 25/03/2024

COMPREHENSIVE FLOOD INFORMATION REPORT

Property: Driveway – 82 Avalon Parade, Avalon

Issue Date: 25/03/2024

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

Flood Information¹:

Map A - Flood Risk Precincts

Maximum Flood Planning Level (FPL) ^{2, 3, 4}: 11.67 m AHD

Map B - 1% AEP Flood & Key points

1% AEP Maximum Water Level ^{2, 3}: 11.17 m AHD

1% AEP Maximum Depth from natural ground level³: 0.56 m

1% AEP Maximum Velocity: 2.51 m/s

Map C - 1% AEP Hydraulic Categorisation

1% AEP Hydraulic Categorisation: Floodway and Flood Fringe

Map D - Probable Maximum Flood

PMF Maximum Water Level (PMF) ⁴: 11.50 m AHD

PMF Maximum Depth from natural ground level: 0.89 m

PMF Maximum Velocity: 3.63 m/s

Map E - Flooding with Climate Change

1% AEP Maximum Water Level with Climate change ³: 11.24 m AHD

1% AEP Maximum Depth with Climate Change³: 0.64 m

Map F - Flood Life Hazard Category in PMF

Map G - Indicative Ground Surface Spot Heights

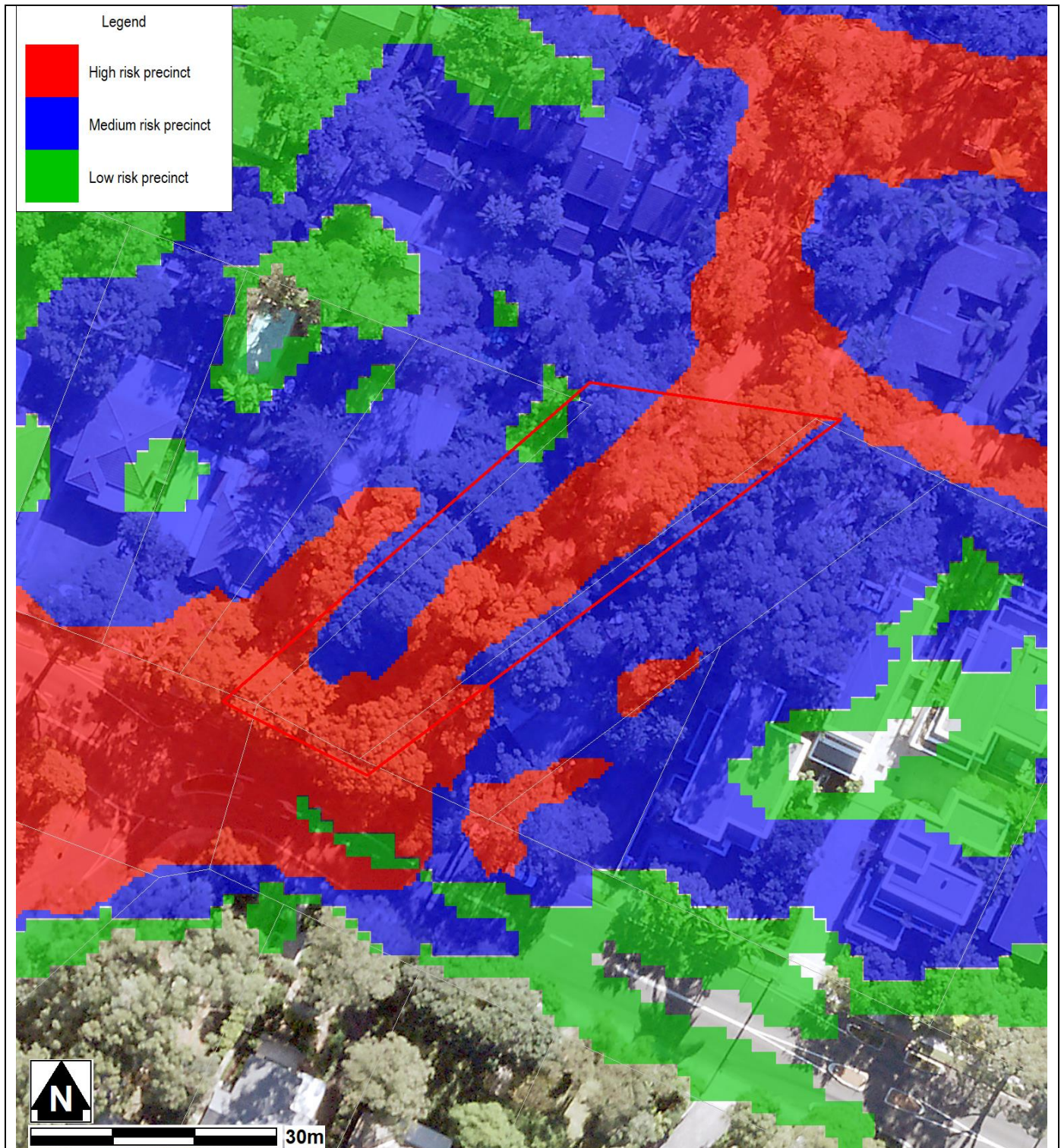
- (1) The provided flood information does not account for any local overland flow issues nor private stormwater drainage systems.
- (2) Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning 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

Notes

General

- 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 online [Flood Study Reports](#) webpage.
- If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.
- If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL.
- Areas affected by an EPL in the former Pittwater LGA are mapped on Council's online [Estuarine Hazard Map](#). Note that areas in the former Manly LGA affected by an EPL have been identified and will be soon added to this map.
- Council's drainage infrastructure is mapped on Council's [Stormwater Map](#). Note that locations are indicative only and may not be exactly as shown.

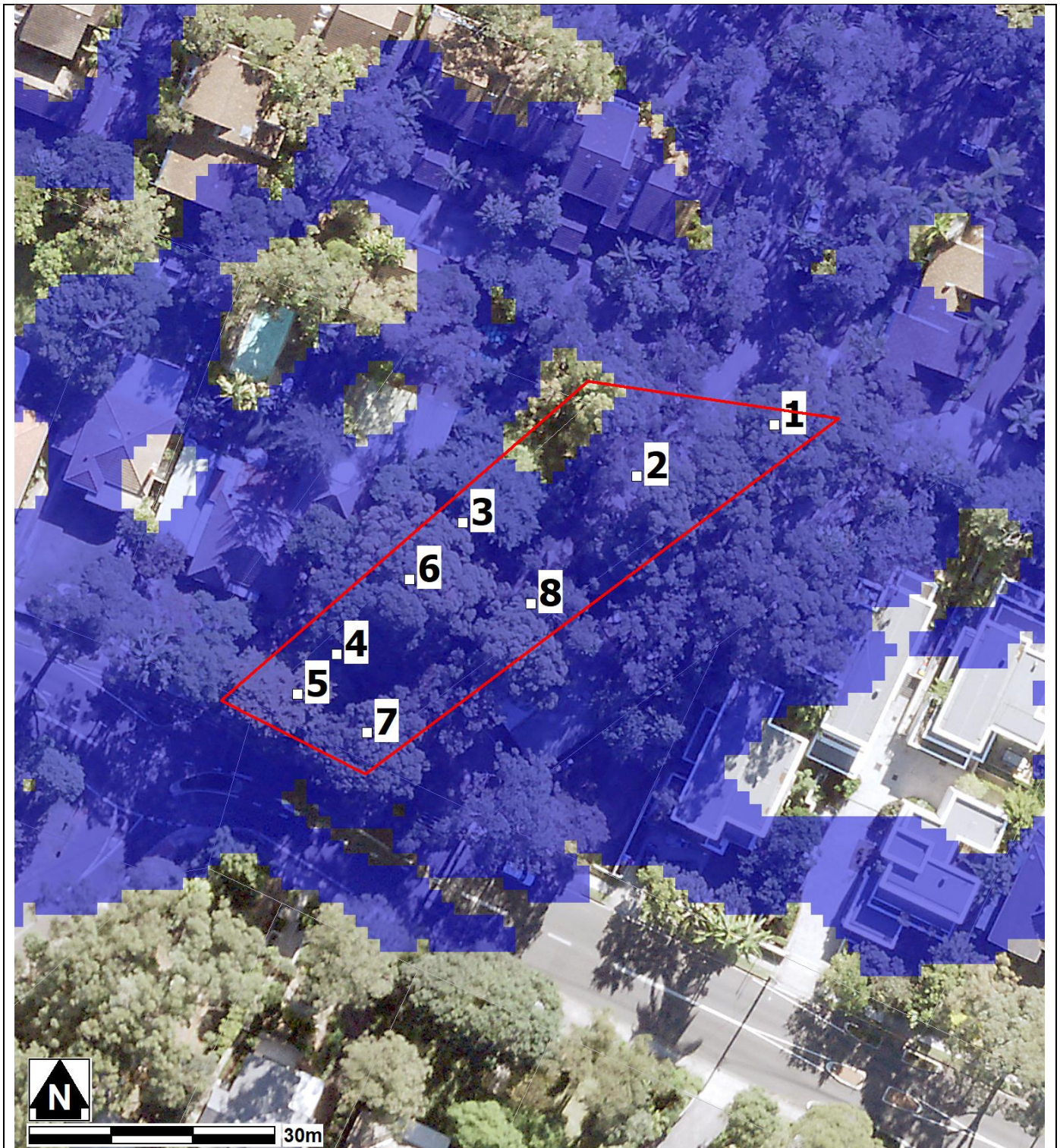
MAP A: FLOOD RISK PRECINCTS



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.
- 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.

MAP B: FLOODING - 1% AEP EXTENT & KEY POINTS



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 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	9.57	0.30	9.64	0.37	0.83	10.16	10.10	0.83	1.26
2	9.97	0.37	10.04	0.44	1.86	10.54	10.26	0.66	2.40
3	10.44	0.27	10.51	0.34	0.62	11.01	10.77	0.60	1.26
4	10.82	0.17	10.87	0.22	0.49	11.37	11.11	0.46	0.97
5	11.01	0.25	11.08	0.32	1.42	11.58	11.42	0.66	2.09
6	10.55	0.24	10.60	0.30	0.66	11.10	10.84	0.53	1.41
7	10.78	0.22	10.82	0.25	1.97	11.32	10.96	0.39	3.59
8	10.36	0.41	10.44	0.49	0.84	10.94	10.74	0.79	1.47

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

ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	9.72	0.45
2	10.10	0.50
3	10.58	0.41
4	10.94	0.29
5	11.17	0.41
6	10.67	0.36
7	10.85	0.28
8	10.52	0.58

WL – Water Level

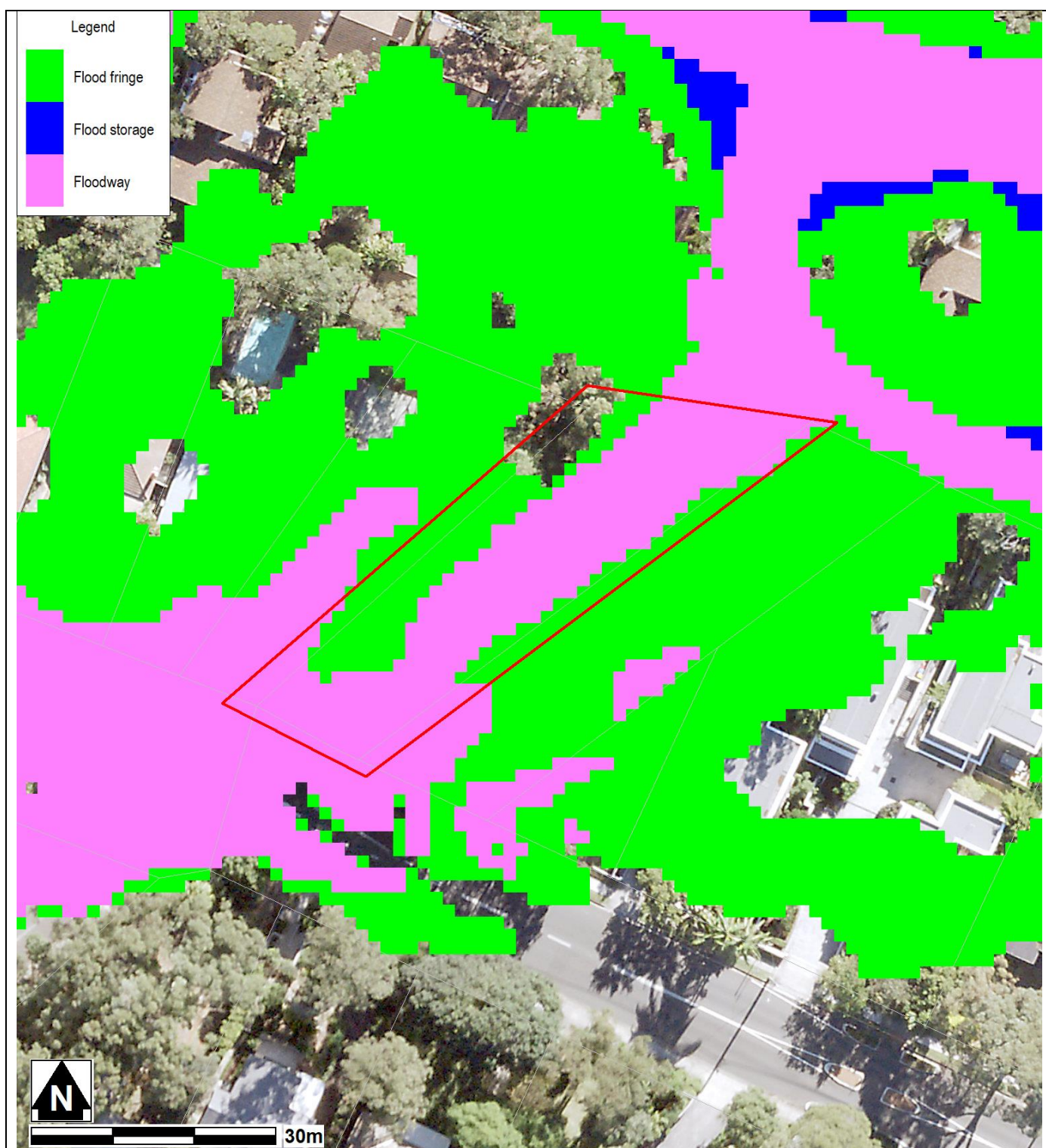
PMF – Probable Maximum Flood

N/A - No Peak Water Level/Depth/Velocity Available.

Notes:

- The flood planning levels above are calculated by adding a 0.5m freeboard to the 1% AEP water level. However, if the depth of flow is less than 0.3m and a Velocity X Depth product is less than 0.3m²/s, a freeboard of 0.3m may be able to be justified for development.

MAP C: 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

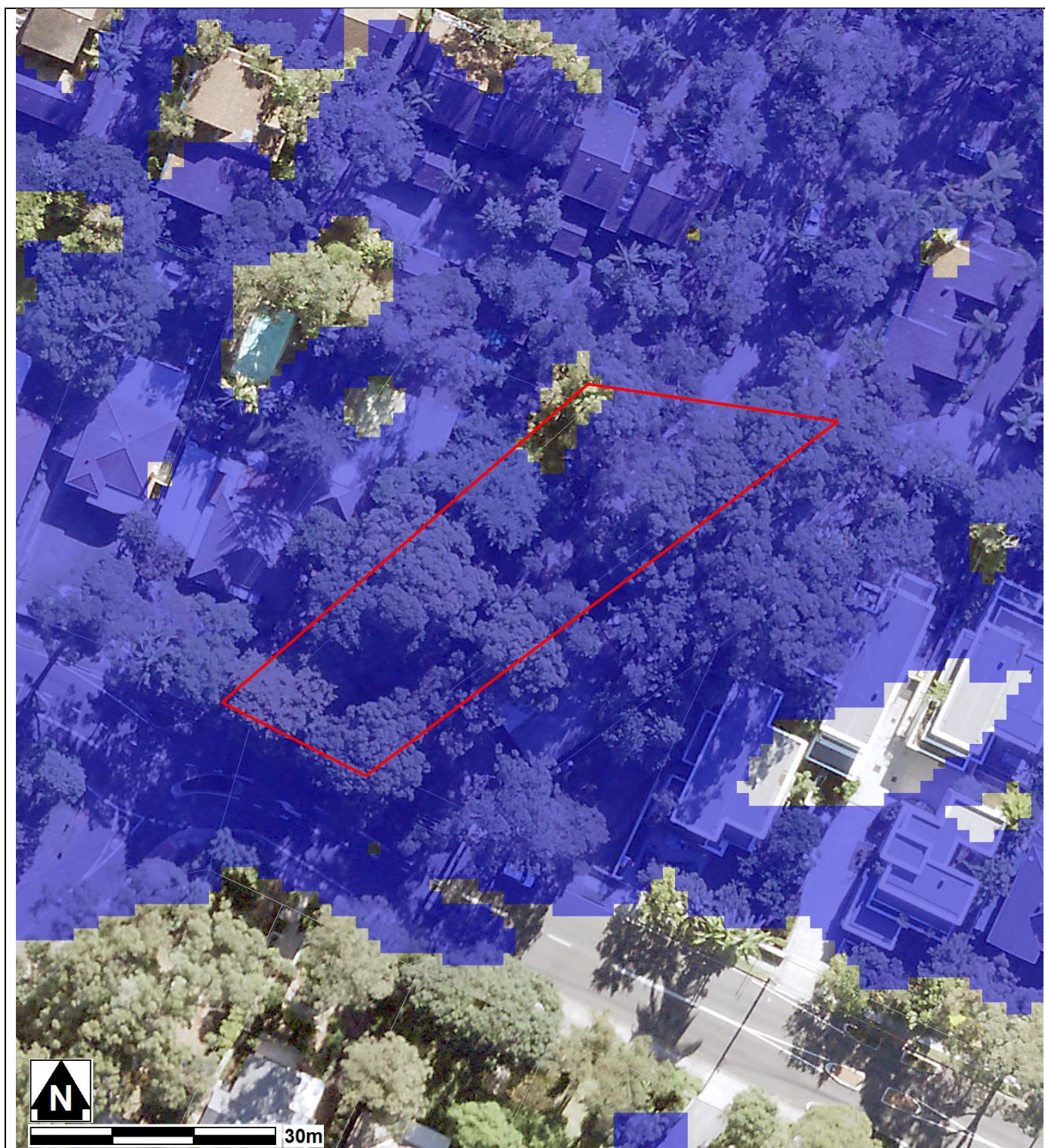
MAP D: PMF EXTENT MAP



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

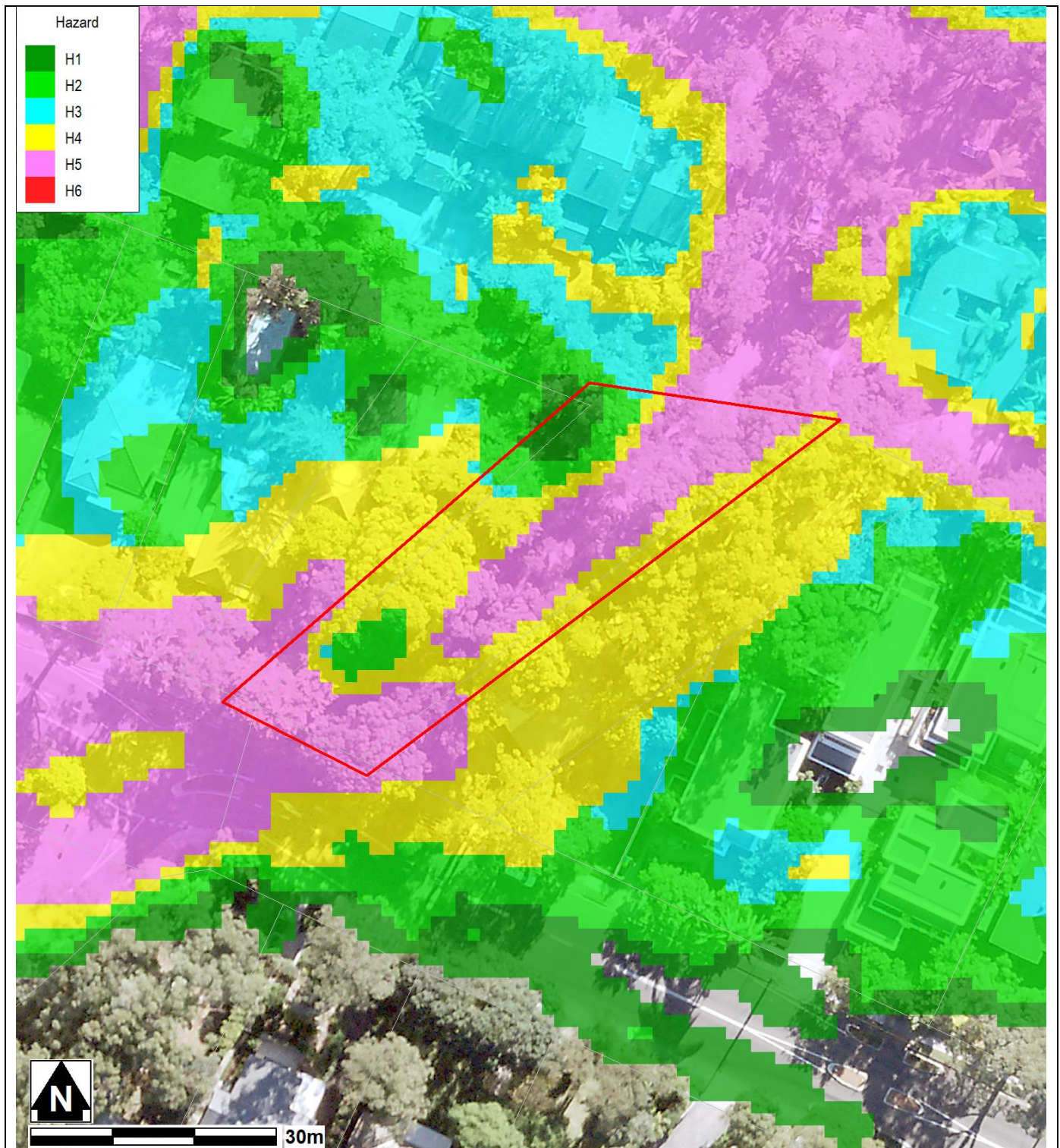
MAP E: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Notes:

- 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

MAP F: FLOOD LIFE HAZARD CATEGORY IN PMF



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.

MAP G: INDICATIVE GROUND SURFACE SPOT HEIGHTS



Notes:

- The surface spot heights shown on this map were derived from Airborne Laser Survey and are indicative only.
- Accuracy is generally within $\pm 0.2\text{m}$ vertically and $\pm 0.15\text{m}$ horizontally, and Northern Beaches Council does not warrant that the data does not contain errors.
- If accuracy is required, then survey should be undertaken by a registered surveyor.

Preparation of a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on how to determine what rules apply on flood prone land, and how to prepare a Flood Management Report. The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood related planning requirements.

Planning Requirements for Flood Prone Land

Development must comply with the requirements for developing flood prone land set out in the relevant Local Environment Plan (LEP) and Development Control Plan (DCP). There are separate LEPs and DCPs for each of the former Local Government Areas (LGAs), although preparation of a LGA-wide LEP and DCP is currently under way.

The clauses specific to flooding in the LEPs and DCPs are as follows:

LEP Clauses	DCP Clauses
Manly LEP (2013) – 5.21 Flood Planning Manly LEP (2013) – 5.22 Special Flood Considerations	Manly DCP (2013) – 5.4.3 Flood Prone Land
Warringah LEP (2011) – 5.21 Flood Planning Warringah LEP (2011) – 5.22 Special Flood Considerations Warringah LEP (2000) – 47 Flood Affected Land *	Warringah DCP (2011) – E11 Flood Prone Land
Pittwater LEP (2014) – 5.21 Flood Planning Pittwater LEP (2014) – 5.22 Special Flood Considerations	Pittwater 21 DCP (2014) – B3.11 Flood Prone Land Pittwater 21 DCP (2014) – B3.12 Climate Change

* The Warringah LEP (2000) is relevant only for the “deferred lands” which affects only a very small number of properties, mostly in the Oxford Falls area.

Development on flood prone land must also comply with Council’s Water Management for Development Policy, and if it is in the Warriewood Release Area, with the Warriewood Valley Water Management Specification and Clause C6.1 of the Pittwater 21 DCP (2014). Guidelines for Flood Emergency Response Planning are available for addressing emergency response requirements in the DCP. These documents can be found on Council’s website on the [Flooding page](#).

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP clauses.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land (with exceptions noted below), for Council to consider the potential flood impacts and applicable controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

There are some circumstances where a formal Flood Management Report undertaken by a professional engineer may not be required. However the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the existing ground floor level is above the FPL
- Internal works only, where habitable floor areas below the FPL are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

What is the purpose of a Flood Management Report?

The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood planning requirements, particularly the development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Preparation of a Flood Management Report

The technical requirements for a Flood Management Report include (where relevant):

1. Description of development

- Outline of the proposed development, with plans if necessary for clarity
- Use of the building, hours of operation, proposed traffic usage or movement
- Type of use, eg vulnerable, critical, residential, business, industrial, subdivision, etc

2. Flood analysis

- 1% AEP flood level
- Flood Planning Level (FPL)
- Probable Maximum Flood (PMF) level
- Flood Risk Precinct, ie High, Medium or Low
- Flood Life Hazard Category
- Mapping of relevant extents
- Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the relevance to the proposed development

If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL. If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.

3. Assessment of impacts

- Summary of compliance for each category of the DCP, as per the table below.

	Compliance		
	N/A	Yes	No
A) Flood effects caused by Development			
B) Building Components & Structural Soundness			
C) Floor Levels			
D) Car parking			
E) Emergency Response			
F) Fencing			
G) Storage of Goods			
H) Pools			

- Demonstration of how the development complies with any relevant flood planning requirements from the DCP, LEP, Water Management for Development Policy, and if it is in the Warriewood Valley Urban Land Release Area, with the Warriewood Valley Water Management Specification (2001)
- For any non-compliance, a justification for why the development should still be considered.
- Calculations of available flood storage if compensatory flood storage is proposed
- Plan of the proposed development site showing the predicted 1% AEP and PMF flood extents, as well as any high hazard or floodway affectation
- Development recommendations and construction methodologies
- Qualifications of author - Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Institution of Engineers Australia
- Any flood advice provided by Council
- Any other details which may be relevant

Further information and guidelines for development are available on Council's website at:

<https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land>

Council's Flood Team may be contacted on 1300 434 434 or at floodplain@northernbeaches.nsw.gov.au .