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Flood Management Report

9 North Avalon Road, Avalon

Issue B

Prepared for: Happy Hearts Avalon

Prepared by: Hannah Stubley



Flood Management Report

Project no: 2407010

Issue: B

Date: 09/07/2025

Client: Happy Hearts Avalon

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Issue	Engineer	Peer Review	Principal Review	Description	Date
A	H.Stubley	S.Raaff	M.Wachjo	Report for DA submission	29/04/2025
B	H.Stubley	S.Raaff	M.Wachjo	Report for DA submission	09/072025

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1. Introduction

At the request of Richard Smith Architect, Northern Beaches Consulting Engineers have undertaken a hydrologic and hydraulic investigation at 9 North Avalon Road, Avalon to determine the effect of the proposed development on the existing floodplain.

For the undertaking of this report, Northern Beaches Consulting Engineers (NBCE) has analysed the general drainage patterns of the catchment and has considered the effects of overland flow flooding as determined in the Council Supplied Flood information with respect to the proposed development. This report has been prepared in accordance with:

- *Australian Rainfall and Runoff Guidelines 2019*
- *Northern Beaches Council (Pittwater Area)*
- *Pittwater Local Environmental Plan 2014 (LEP) – Section 5.21 & 5.22*
- *Pittwater Development Control Plan (DCP) – Section B3.11 Flood Prone Land*
- *NSW Government Floodplain Management Manual (2005)*
- *Council supplied flood information*

1.1 Aim

This study explores the impact of overland flow flooding envisaged to occur at the subject site up to the PMF storm event. The development under consideration is located at 9 North Avalon Road, Avalon. This area is predicted to experience overland flow flooding during heavy rainfall events. The anticipated flood behaviour within the contributing catchment for the 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) has been assessed in relation to the proposed development at the subject site.

1.2 Description of Development

The proposed development at 9 North Avalon Road, Avalon consists of an extension to an existing childcare centre and new on-site parking. (refer Appendix C). Further, the existing residential dwelling is to be repurposed as new childcare centre facilities.

1.3 Site Conditions

The property is approximately 1226m² and located within the Northern Beaches Council (Pittwater Area) LGA. The subject site is mildly sloping from the western boundary towards the eastern boundary.

1.4 Flood Behaviour

The development lies in the Avalon to Palm beach catchment area. Flooding within the area occurs when intense local rainfall generates runoff exceeding the capacity of council's drainage infrastructure, producing overland flow flooding.

2. Flood Analysis

2.1 Site Flooding Extent

The site flooding extent has been determined using Council's available flood information. All relevant flood information is shown below:

Flood Planning Level (FPL) (Max):	8.78 m AHD ¹
Predicted 1% AEP flood level (Max):	8.28 m AHD
Predicted 1% AEP flood level (Max):	0.17 m
1% AEP Maximum Velocity (Max):	0.07 m/s
Probable Maximum Flood (PMF) level (Max):	9.49 m AHD ²
Probable Maximum Flood (PMF) depth (Max):	0.27 m
Probable Maximum Flood (PMF) velocity:	0.74 m/s
Flood Risk Precinct:	Low - Medium
Flood Life Hazard Category:	H1-H2
Hydraulic Category:	Flood Fringe
Mapping of relevant extents:	Refer Appendix B
Existing ground floor level	FFL 9.41m AHD – 9.48m AHD

¹Note: The 1% AEP FPL is not applicable to the development

²Note: The PMF FPL varies across the site and is based on the PMF depth adjacent to the proposed development.

3. Assessment of Impacts

3.1 Development Matrix

The subject site is classified under the vulnerable and critical use category in figure 2 below.

		Medium Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	Flood effects caused by Development	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	Floor Levels	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	Car Parking	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	Emergency Response	E1 E2	E1	E1	E1	E3
F	Fencing	F1	F1	F1	F1	F1
G	Storage of Goods	G1	G1	G1	G1	
H	Pools	H1	H1	H1	H1	H1

Figure 1 - Development Matrix. Source: Northern Beaches Council Website Information

Table 1 - Assessment of Impacts Table

		Compliance	
	Not Applicable	Yes	No
A Flood effects caused by the development		x*	
B Building Components & Structural		x*	
C Floor Levels		x*	
D Carparking		x*	
E Flood Emergency Response		x*	
F Fencing		x*	
G Storage of Goods		x*	
H Pools	x		

*Note – Compliance achievable should the recommendations outline in this report be adopted

4. Assessment and Recommendations

4.1 Flood Planning Level

A1: Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event:

- (a) There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and
- (b) There are no adverse impacts on surrounding properties; and
- (c) It is sited to minimise exposure to flood hazard.

Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.

Development Compliance: The proposed development is not located within the 1% AEP flood extent and is classified as flood fringe. Therefore, the proposed development is not anticipated to have an adverse impact on the conveyance of flood waters across the site or surrounding properties and is not expected to increase exposure to flood hazard.

A2: Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage.

Consideration may be given for exempting the volume of standard piers from flood storage calculations.

If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.

Development Compliance: The subject site is located within the flood fringe and hence no net loss of flood storage is expected to occur as a result of the development.

4.2 Building Components and Structural Soundness

B1: All buildings shall be designed and constructed with flood compatible materials in accordance with “Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas”, Hawkesbury-Nepean Floodplain Management Steering Committee (2006).

Development Compliance: All buildings are to be designed and constructed in accordance with Reducing Vulnerability of Buildings to Flood Damage – Guidance on Building in Flood Prone Areas, Hawkesbury-Nepean Floodplain Management Steering Committee (2006). Below are key areas to be considered in the architectural and structural design of the development:

Structural element	Recommendations
Ground Floor	
Raised concrete slab	<ul style="list-style-type: none"> In areas of high silt deposition, use a deeper slab rebate to hold more silt without it bridging the wall cavity.
Suspended timber floor	<ul style="list-style-type: none"> Ventilation needed to ensure drying and to prevent decay of timber components. Allow for some loss of load bearing capacity with manufactured/engineered timber beams. Select plywood flooring with waterproof glue bond. Avoid particleboard flooring (which weakens after immersion) and underfloor thermal and noise insulation or remove it post-flood to assist drying. To reduce the risk of ponding in subfloor areas after flooding has occurred, the sub-floor area is to be filled and levelled to ensure that it is highest at the centre and drains to the edges.

	<ul style="list-style-type: none"> • Provide a minimum 450mm clearance required between underside of timber structure and ground as per BCA. • Timber used in sub-floor structural members and in flooring should be minimum H3 (Avoid using LVL's)
Load Bearing Wall System	
Cavity Brick (double brick)	<ul style="list-style-type: none"> • Provide for ingress of water to balance hydrostatic forces inside and outside of the walls. • Include openings into cavity to facilitate removal of slit from cavity.
Timber wall frame	<ul style="list-style-type: none"> • Provide for ingress of water to balance hydrostatic forces inside and outside of the walls. • Include openings into cavity to facilitate removal of slit from cavity. • With load bearing members such as stud wall frame; lintels; spanning beams: <ul style="list-style-type: none"> - Avoid materials/glue bonds which can weaken significantly with immersion, & - Prevent deterioration from moisture over time by providing adequate drainage and ventilation. • Bracing is critical to resist forces from wind gusts and flowing water.
Non Load Carrying Components Exterior Wall Cladding	
Brick Veneer cladding with stud frame	<ul style="list-style-type: none"> • Improve brick wall stability through use of inside fixed ties. • Use articulation joints to limit cracking from uneven foundation movement. • Provide generous venting through brickwork to balance hydrostatic forces and maximise cavity drying rate to minimise timber decay. • Protect frame from failure and bottom sliding. For locations where there may be a high frequency of flooding use stainless steel or other high durability ties with angled surfaces to promote runoff.
Sheet or plank weatherboard cladding on stud frame e.g. fibre cement, plywood	<ul style="list-style-type: none"> • Use materials not impaired by immersion e.g. fibre cement or waterproof plywood sheets.
Non Load Carrying Components Interior Lining of Walls	
Bare Face Bricks or Cement Render	<ul style="list-style-type: none"> • Staining of light-coloured face bricks may be a consideration.
Plywood with Stud Frame	<ul style="list-style-type: none"> • Grades with waterproof bond recover strength after drying out. • Horizontal sheet fixing can reduce replacement costs. • With a timber frame, the cavity should be well ventilated to reduce the chance of timber decay. • Leave lower edge lining 30mm above bottom wall plate or cut notches to allow entry of water, ventilation, and silt removal. Use deeper skirting boards to cover openings on lining. Screw fixings enables easy removal.
Plasterboard with Stud Frame	<ul style="list-style-type: none"> • As sheets are weakened and can incur permanent damage and loss of strength, ignore wall bracing contribution from lining. • Horizontal sheet fixing can reduce replacement costs. • With a timber frame, the cavity should be well ventilated to reduce chance of timber decay. • Leave at least 30mm above bottom wall plate or cut notches to allow entry of water, ventilation, and silt removal. Use deeper

	skirting boards to cover openings on lining. Screw fixings enables easy removal.
Non load carrying component	
Plasterboard	<ul style="list-style-type: none"> • Insert small air vents in the ceiling to relieve pressure from trapped air in the room and ventilate enclosed areas to reduce risk of timber decay.
Non-structural components (Joinery, built-in furniture):	<ul style="list-style-type: none"> • Avoid false floors in cupboards and wardrobes • Build units on legs to allow for cleaning and free flowing air underneath • Provide holes for drainage and ventilation to closed-off areas and hollow components • Construct joints so they shed water • Use supports at closer centres with structural ply panelling to limit permanent distortion (position supports at less than 500mm centres). • Refer section 6 of Reducing Vulnerability of Buildings to Flood Damage for further details of non-structural component design.

For any existing timber frame structure clad in Gyprock, an allowance must be made to immediately strip the Gyprock after a flooding event to ensure all wall voids can be cleaned of any mud/debris to allow the timber structure to dry before it starts to rot.

B2: All new development must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the Probable Maximum Flood level. Structural certification shall be provided confirming the above.

Development Compliance: All new structures are to be designed and constructed to ensure structural integrity up to the PMF level (refer appendix A for variable PMF levels), taking into account the forces of floodwater, wave action, flowing water with debris and buoyancy and immersion.

B3: All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level within the subject structure must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

Development Compliance: The switchboard and main circuit unit must be fitted above the PMF level (refer appendix A for variable PMF levels). All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the PMF level (refer appendix A for variable PMF levels) and conduits must be laid such that they are free draining. All existing electrical equipment and power points located below the PMF level (refer appendix A for variable PMF levels) within the subject structure must have residual current devices installed that turn off all supply of electricity to the property when flood waters are detected.

4.3 Floor Levels

C2: All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level, whichever is higher.

Development Compliance: The existing childcare centre floor levels vary between 9.41-9.48m AHD. The proposed staff room extension is located at RL 9.45m AHD so as to match the existing floor level adjacent. The maximum PMF depth on site is 0.27m. All floor levels are located minimum 270mm above natural ground level, therefore the proposed development is located above the Probable Maximum Flood Level and this the applicable FPL, refer appendix A.

C3: All new development must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no net loss of flood storage in all events up to the 1% AEP event.

For suspended pier/pile footings:

- (a) The underfloor area of the dwelling below the 1% AEP flood level is to be designed and constructed to allow clear passage of floodwaters, taking into account the potential for small openings to block; and
- (b) At least 50% of the perimeter of the underfloor area is of an open design from the natural ground level up to the 1% AEP flood level; and
- (c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway

Development Compliance: All proposed development is located above and outside the extent of the 1% AEP flood event. Therefore, the development is not anticipated to impede the floodway or flood conveyance on the site.

4.4 Car Parking

D1: Open carpark areas and carports shall not be located within a floodway.

Development Compliance: The proposed open carpark is not located within a floodway. It is within the flood fringe and hence is compliant with this condition.

D2: The lowest floor level of open carparks and carports shall be constructed no lower than the natural ground levels, unless it can be shown that the carpark or carport is free draining with a grade greater than 1% and that flood depths are not increased.

Development Compliance:

D4: Where there is more than 300mm depth of flooding in a car park or carport during a 1% AEP flood event, vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site. Protection must be provided for all events up to the 1% AEP flood event

Development Compliance: The proposed carpark is not located within the 1% AEP or PMF flood extent. Therefore, vehicle barriers or restraints are not required.

4.5 Emergency Response

E1: *If the property is affected by a Flood Life Hazard Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the Flood Management Report.*

Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where:

- a) The floor level is at or above the Probable Maximum Flood level; and*
- b) The floor space provides at least 2m² per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m² per person for less than 6 hours;*
- c) It is intrinsically accessible to all people on the site, plainly evident, and self-directing, with sufficient capacity of access routes for all occupants without reliance on an elevator; and*
- d) It must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; and a first aid kit*

Development Compliance: The property is affected by a Flood Life Hazard Category of H1 only. Therefore, control E1 does not apply to this development.

4.6 Fencing

F1: *Fencing, (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. At least 50% of the fence must be of an open design from the natural ground level up to the 1% AEP flood level. Less than 50% of the perimeter fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75mm.*

Development Compliance: All fencing is to be constructed of an open design 170mm above natural ground level within the 1% AEP flood extent, refer to Appendix A for flood overlay extent. The fencing must be a minimum of 50% open from natural ground level up to the 1% AEP flood level (150m above natural ground level), with openings a minimum of 75mm x 75mm.

4.7 Storage of Goods

G1: *Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.*

Development Compliance: All hazardous or potentially polluting materials are to be stored above the FPL of 8.78m AHD.

4.8 Pittwater LEP Compliance

The proposed development consists of alterations and additions to an existing childcare centre. Therefore, the development is considered as a sensitive and hazardous development. The existing and proposed ground floor level of the childcare centre is located at/above the Probable Maximum Flood (PMF), refer section 4.3 of this report. The site is located within a H1 hazard category during the PMF event which is considered generally safe for people, vehicles and buildings in accordance with the Flood risk management guideline FB03 – NSW Department of Planning and Environment. Flood free evacuation is also available outside the extent of the PMF. Therefore, the proposed development will allow for safe occupation and efficient evacuation of people in the event of a flood and has appropriate measures to manage risk to life in the event of a flood.

Further the proposed development is located outside the extent of the 1% AEP flood event with the proposed ground floor level above the PMF. Therefore, the proposed development is not anticipated to adversely affect the environment in the event of a flood.

Therefore, the proposed development is generally in compliance with Section 5.21 – Flood Planning and Section 5.22 Special flood considerations from the Pittwater Local Environmental Plan (PLEP) 2014.

5. Conclusion

In accordance with accepted engineering practice, NBCE have undertaken a flood study at the above-mentioned site. No anticipated increased flooding is envisaged to occur at the subject site due to the proposed development should the recommendations of this report be carried out. The flood information provided by Northern Beaches Council has been used for this assessment. The recommendations of this report should be adopted for the development to meet the requirements of *Northern Development Control Plan (DCP)*. Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L

Author:



Hannah Stubley

Engineer 3

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Reviewed By:



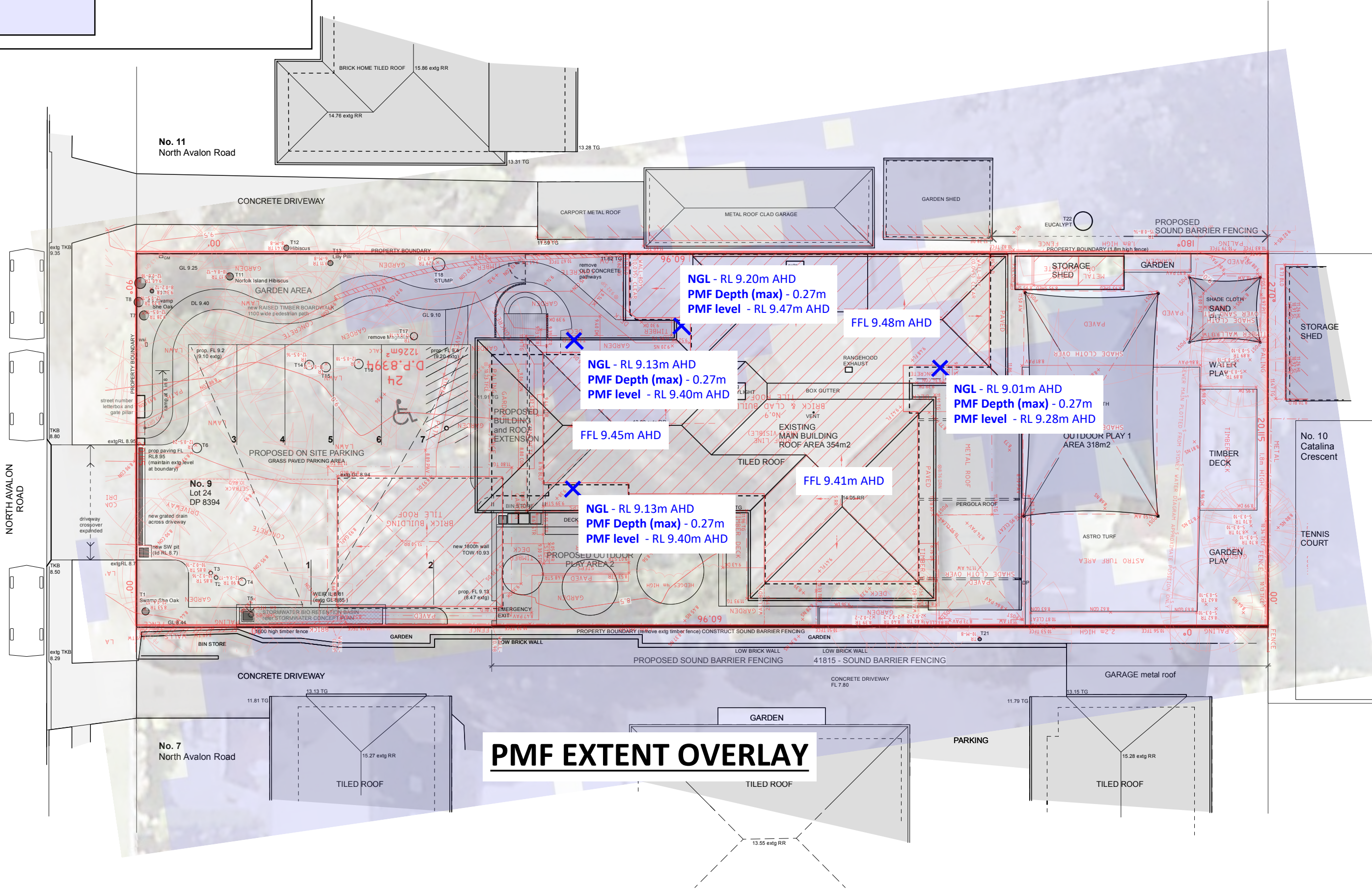
Michael Wachjo

Director | B.E.(Civil), MIEAust.

APPENDIX A

Flood Extent Overlay

PMF EXTENT



NGL - RL 9.20m AHD
PMF Depth (max) - 0.27m
PMF level - RL 9.47m AHD

FFL 9.48m AHD

NGL - RL 9.13m AHD
PMF Depth (max) - 0.27m
PMF level - RL 9.40m AHD

FFL 9.45m AHD

NGL - RL 9.01m AHD
PMF Depth (max) - 0.27m
PMF level - RL 9.28m AHD

FFL 9.41m AHD

NGL - RL 9.13m AHD
PMF Depth (max) - 0.27m
PMF level - RL 9.40m AHD

PMF EXTENT OVERLAY

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APPENDIX B

Council Flood Information

BASIC FLOOD INFORMATION REPORT

Property: 9 North Avalon Road AVALON BEACH NSW 2107

Lot DP: Lot 24 DP 8394

Issue Date: 30/10/2024

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}: 8.78 m AHD

Map B - 1% AEP Flood

1% AEP Maximum Water Level ^{2, 3}: 8.28 m AHD

1% AEP Maximum Depth from natural ground level³: 0.17 m

1% AEP Maximum Velocity: 0.07 m/s

Map C - 1% AEP Hydraulic Categorisation

1% AEP Hydraulic Categorisation: Flood fringe

Map D - Probable Maximum Flood (PMF)

PMF Maximum Water Level ⁴: 9.49 m AHD

PMF Maximum Depth from natural ground level: 0.27 m

PMF Maximum Velocity: 0.74 m/s

Map E - Flood Life Hazard Category in PMF

- (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

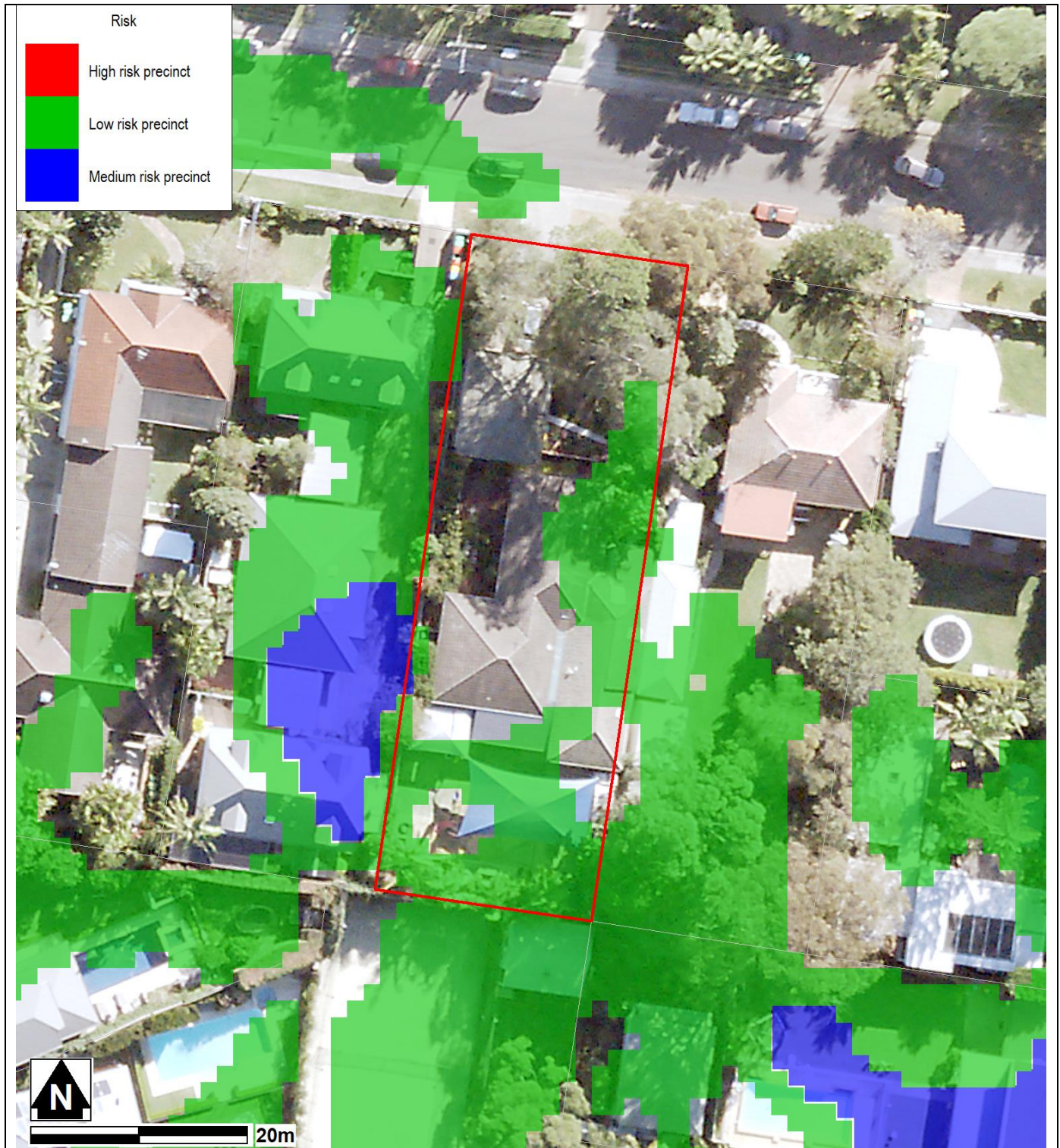
General

- 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.

Property

- Please note that as the property is outside the Flood Planning Area (Medium Flood Risk Precinct), a formal Flood Management Report would not need to be submitted to council with a Development Application for Residential Development.

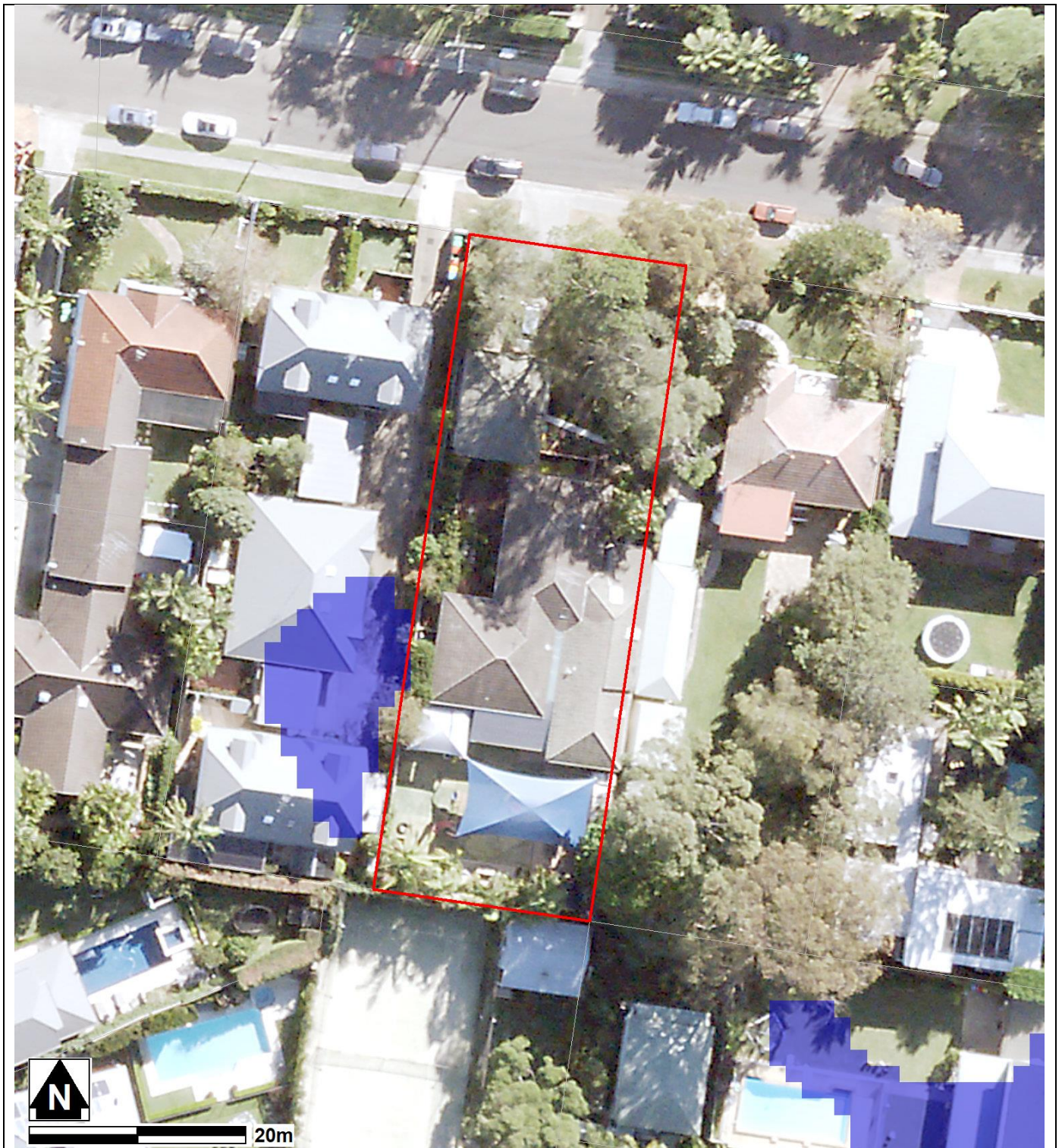
MAP A: FLOOD RISK PRECINCTS



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.

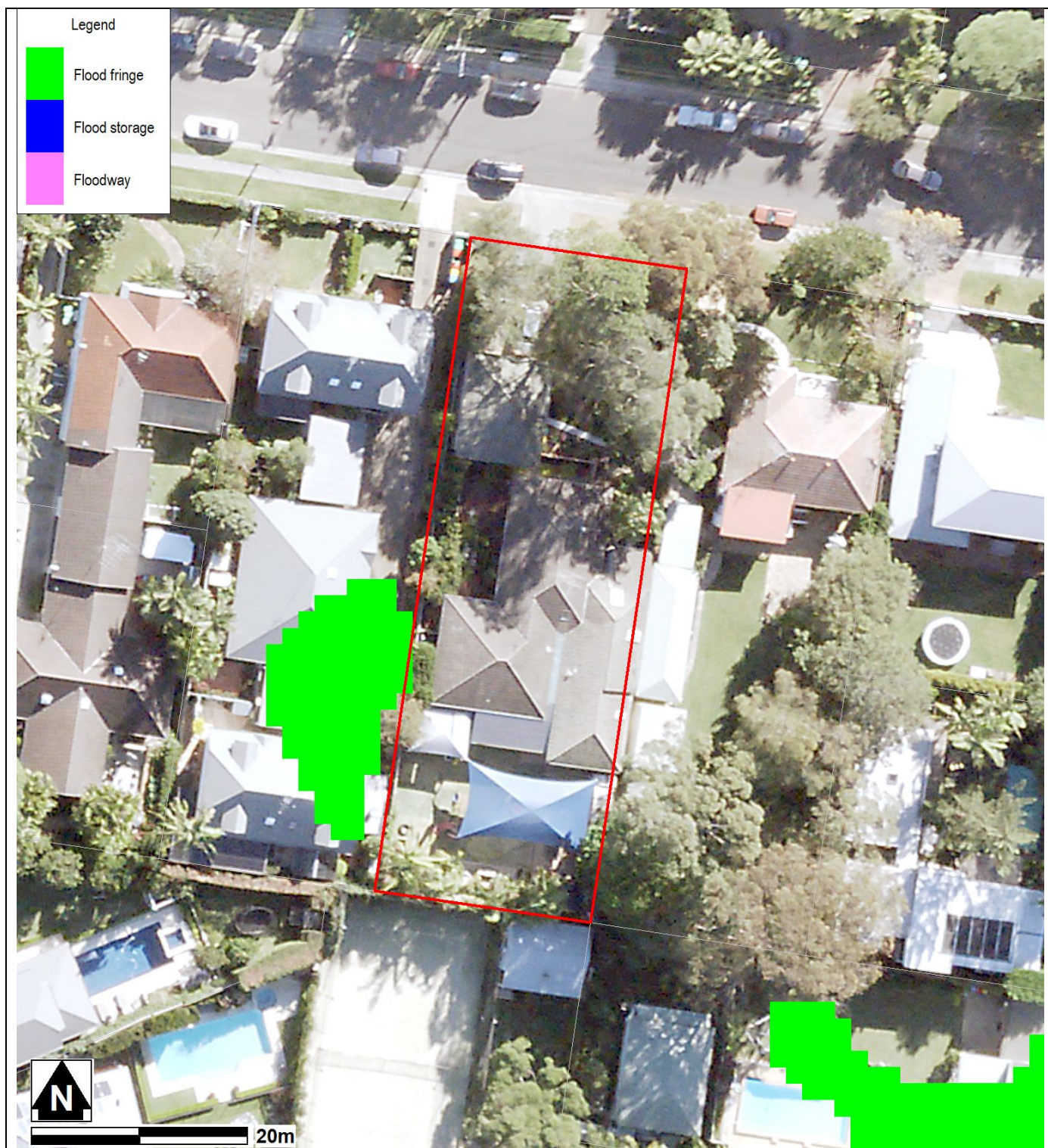
MAP B: FLOODING - 1% AEP EXTENT



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: NearMap 2014) are indicative only.

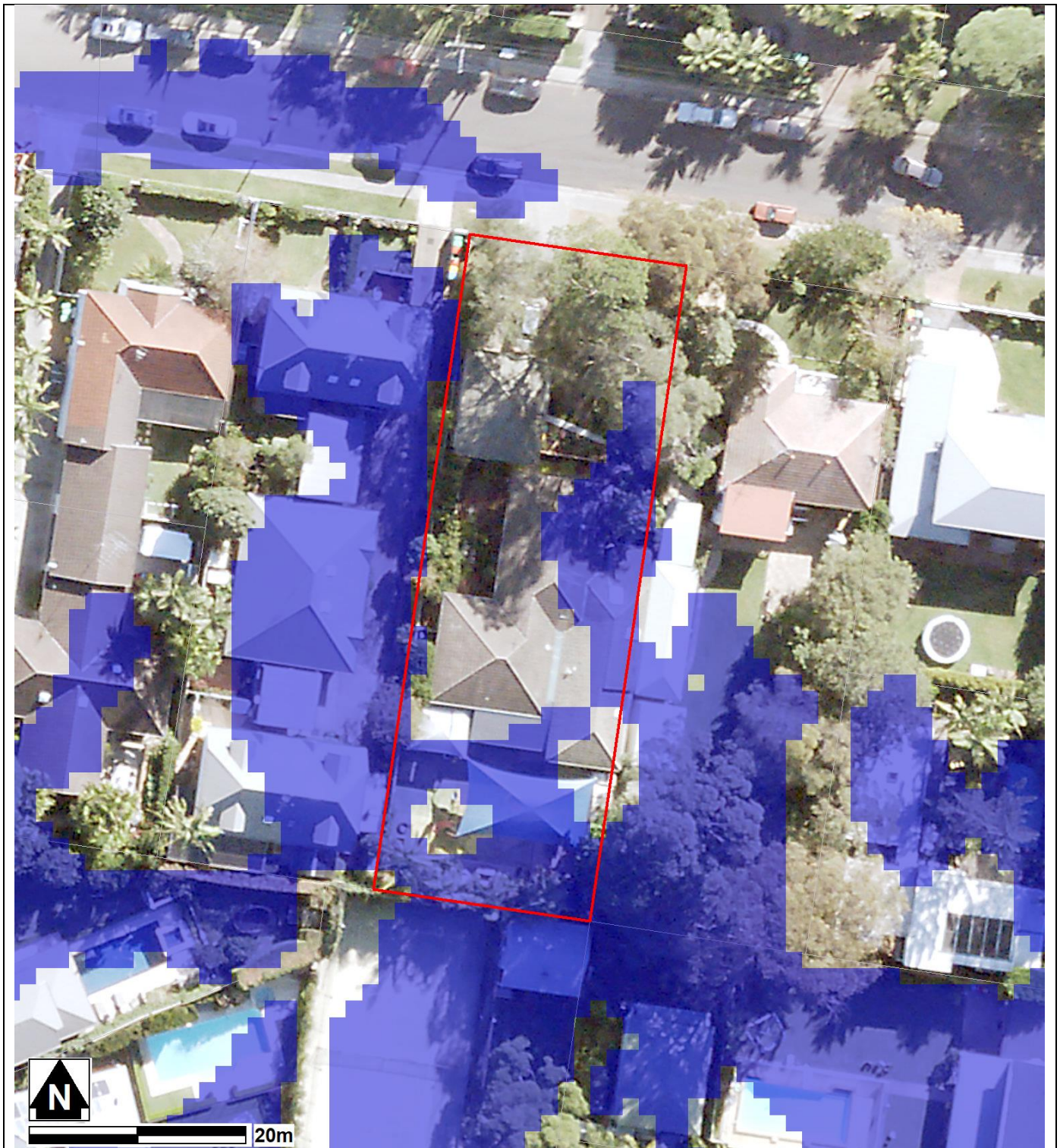
MAP C: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



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.

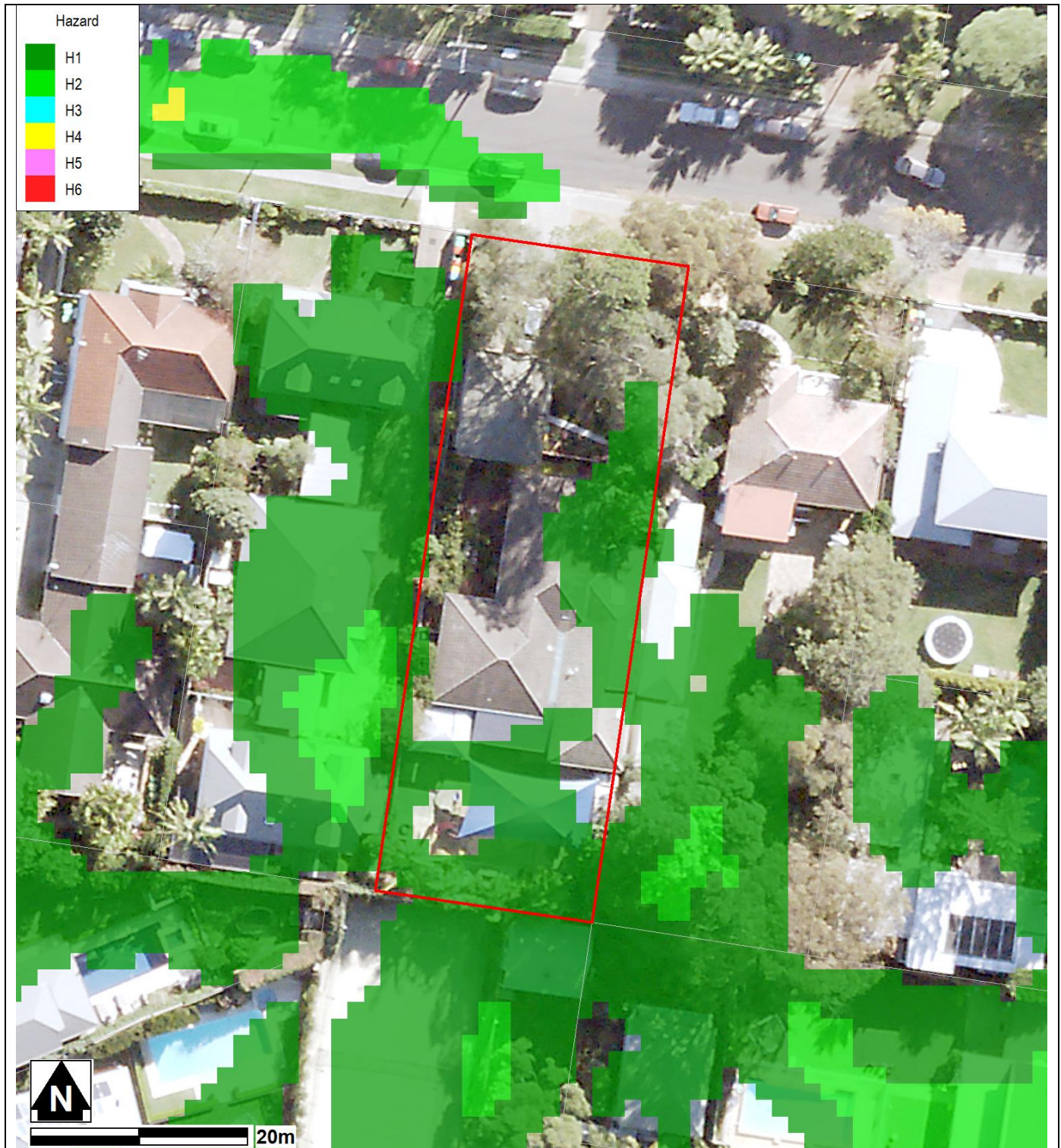
MAP D: PROBABLE MAXIMUM FLOOD EXTENT



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: 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: NearMap 2014) are indicative only.

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:

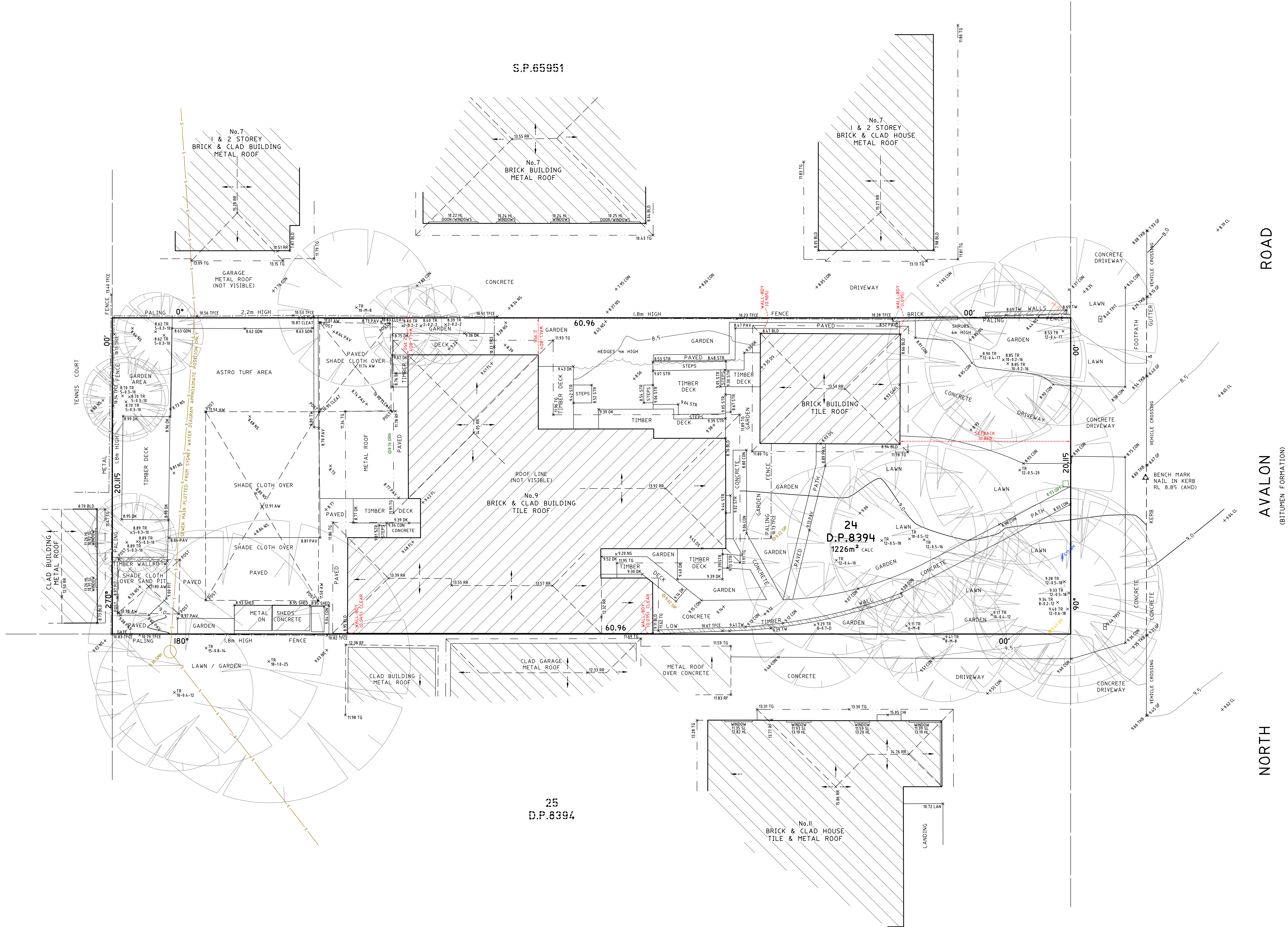
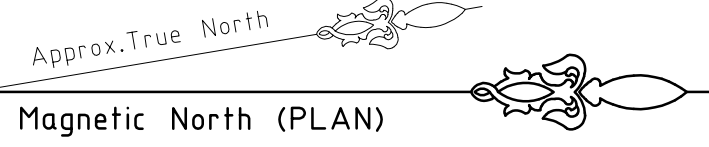
<https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land>

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

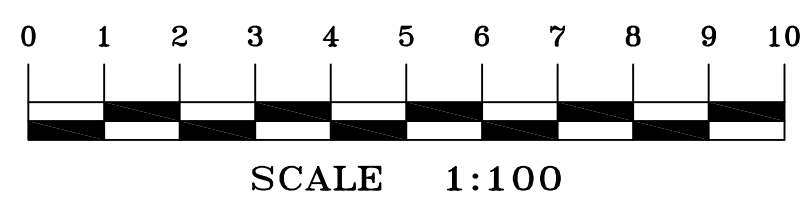


APPENDIX C

Proposed Development Plans & Survey



TITLE INDICATES THAT LOT 24 IN D.P.8394 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S).



- NOTES**
- A FIELD SURVEY OF THE BOUNDARIES HAS BEEN CONDUCTED FOR CONSTRUCTION.
 - WALL TO BOUNDARY DIMENSIONS SHOWN HEREON MUST NOT BE USED FOR CONSTRUCTION.
 - IF CONSTRUCTION IS INTENDED TO BE UNDERTAKEN ON OR ADJACENT TO PROPERTY BOUNDARIES THE BOUNDARIES OF THE LAND MUST BE MARKED ON THE BUILDING SETOUT.
 - THIS SURVEY IS FOR DESIGN PURPOSES OF THE SUBJECT LAND ONLY. THIS PLAN MUST NOT BE USED FOR ANY OTHER MATTER, PURPOSE OR CONSTRUCTION SETOUT.
 - TREE SIZES ARE ESTIMATES ONLY.
 - THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF KORARM PTY LTD.
 - RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY. WHERE OFFSETS ARE CRITICAL, THEY SHOULD BE CONFIRMED BY FURTHER SURVEY.
 - EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
 - ONLY VISIBLE SERVICES HAVE BEEN LOCATED. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED DIAL BEFORE YOU DO SERVICES (UNLESS SHOWN) SHOULD BE USED AND A FULL UTILITY INVESTIGATION INCLUDING A UTILITY LOCATION SURVEY, SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.
 - SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
 - CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
 - CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
 - CONTOUR INTERVAL - 0.5 metre - SPOT LEVELS SHOULD BE ADOPTED.
 - POSITION OF RIDGE LINES ARE DIAGRAMMATIC ONLY (NOT TO SCALE).
 - THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:100.
 - DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
 - COPYRIGHT © CMS SURVEYORS 2021.
 - NO PART OF THIS SURVEY MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1969.
 - ANY PERMITTED DOWNLOADING, ELECTRONIC STORAGE, DISPLAY, PRINT, COPY OR REPRODUCTION OF THIS SURVEY SHOULD CONTAIN NO ALTERATION OR ADDITION TO THE ORIGINAL SURVEY.
 - THIS NOTICE MUST NOT BE ERASED.

STEPHEN EMERY
REGISTERED SURVEYOR - 80553 NUMBER 1665

LEGEND:

AW	= AWNING
BLD	= EXTERNAL BUILDING
CHI	= CHIMNEY
CL	= CENTRELINE
CLEAT	= TOP OF CLEAT
CON	= CONCRETE
CUB	= CUBBY HOUSE
DK	= DECK
DRN	= DRAIN
DS	= DOOR SILL LEVEL
FL	= FLOOR LEVEL
GAF	= GARAGE FLOOR LEVEL
GDN	= GARDEN
GP	= GUTTER LEVEL
GM	= GAS METER
GRT	= GRATE
HL	= HEAD LEVEL
LAN	= LANDING
NS	= NATURAL SURFACE
PAV	= PAVING
PP	= POWER POLE
RF	= TOP OF ROOF
RR	= ROOF RIDGE
SIP	= SEWER INSPECTION PIT
SL	= SILL LEVEL
SMH	= SEWER MAN HOLE
STR	= STAIRS
TFCE	= TOP OF FENCE
TG	= TOP OF GUTTER
TMB	= TOP OF KERB
TLE	= TREE LINE
TPIT	= TELSTRA PIT
TR	= TREE
TW	= TOP OF WALL
WM	= WATER METER
10	= ELECTRICITY OVERHEAD
10	= SEWER UNDERGROUND

TREE
SPREAD-DIAMETER-HEIGHT

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: ASSUMED
MARKS ADOPTED: N/A

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: 55M (H2)
R.L. 21/36 (CLASS LB)
SOURCE: S.C.I.M.S. (07/05/2020)

2	DETAIL IN REAR YARD UPDATED	04/06/2021
1	FIRST ISSUE	20/05/2020

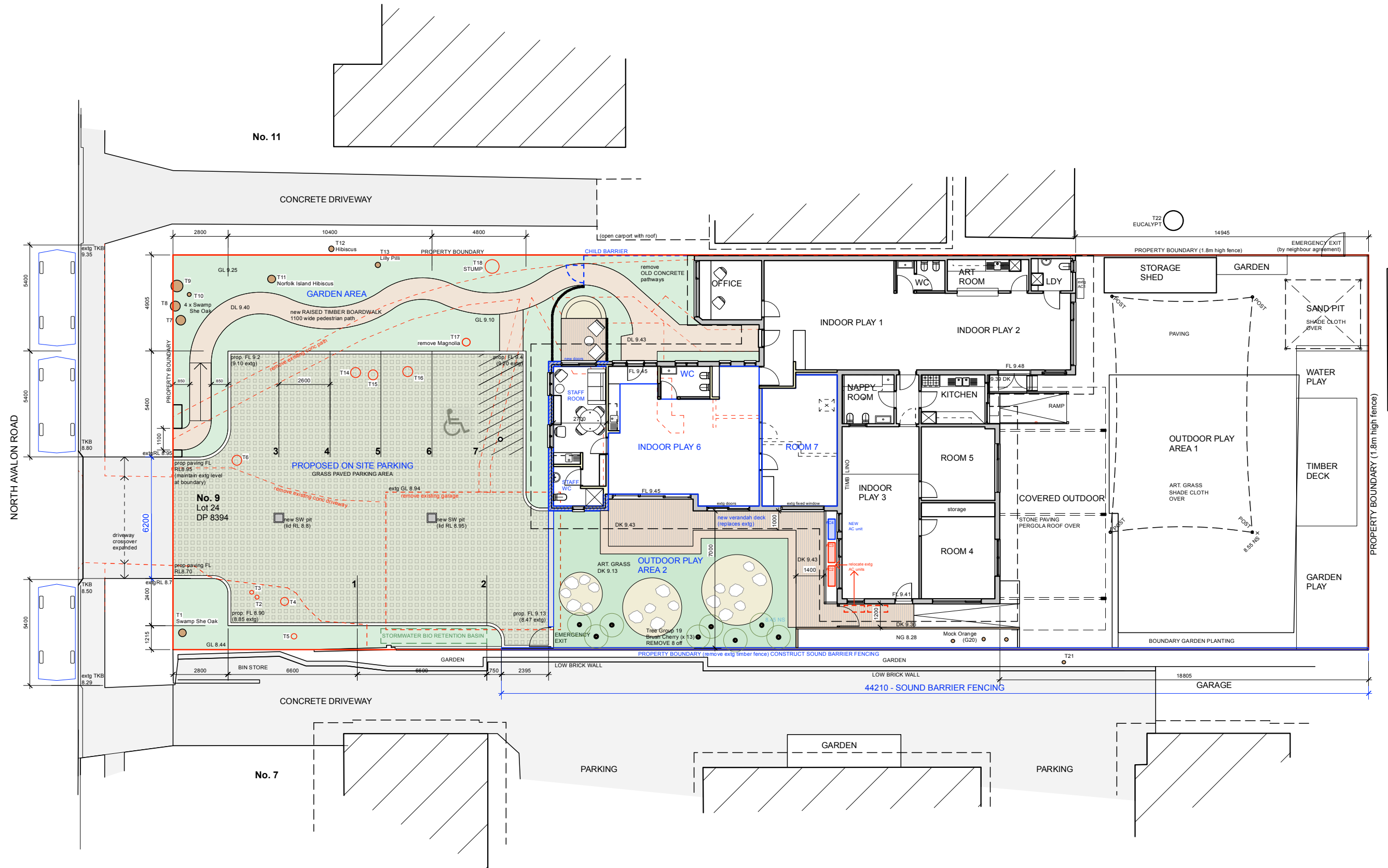
CLIENT:
KORARM PTY LTD
24 CHISHOLM AVENUE
AVONDALE BEACH, NSW, 2107

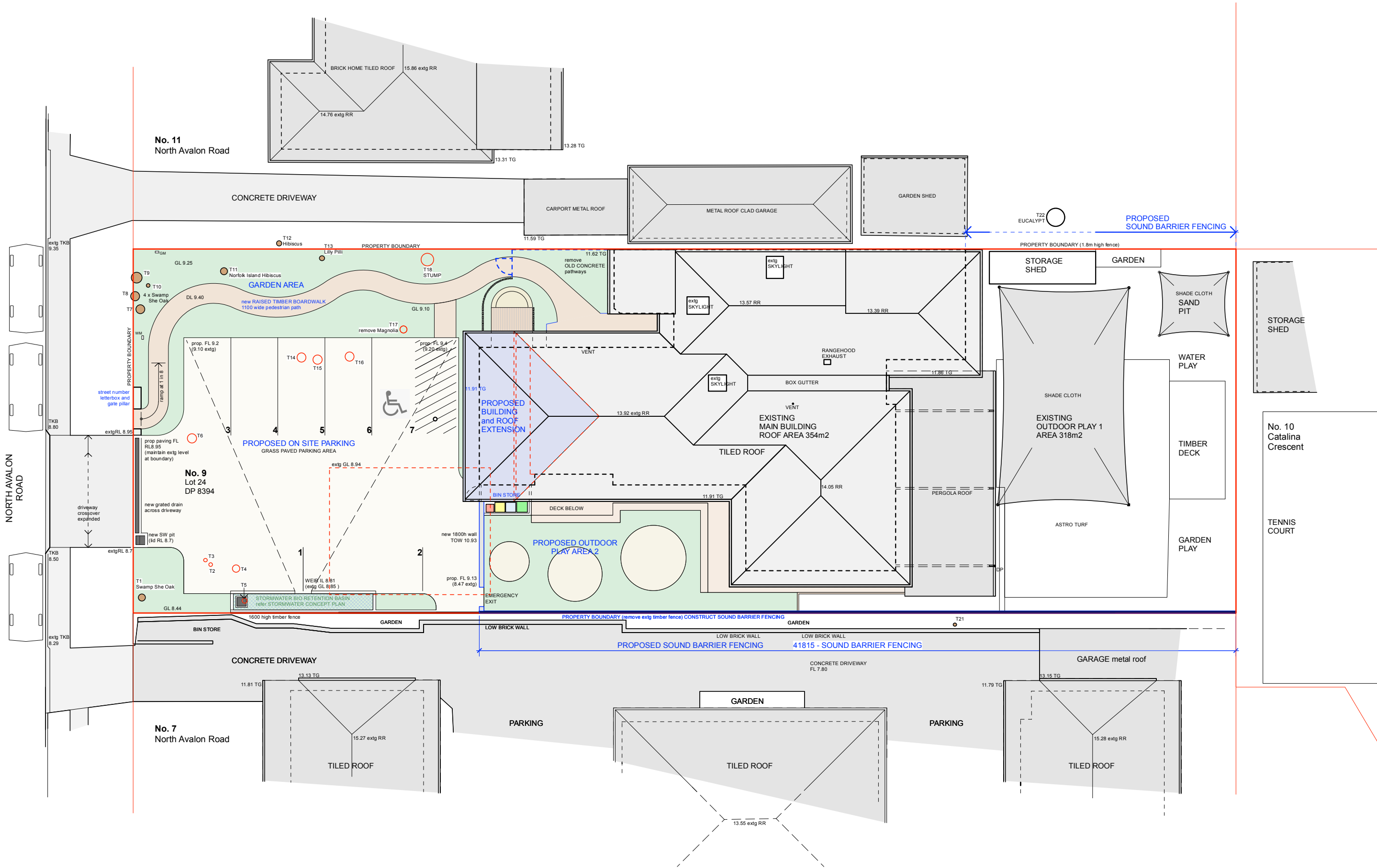
**BOUNDARY IDENTIFICATION
AND DETAIL & LEVEL SURVEY
OVER LOT 24 IN DP8394
9 NORTH AVONDALE ROAD
AVONDALE BEACH, NSW, 2107**

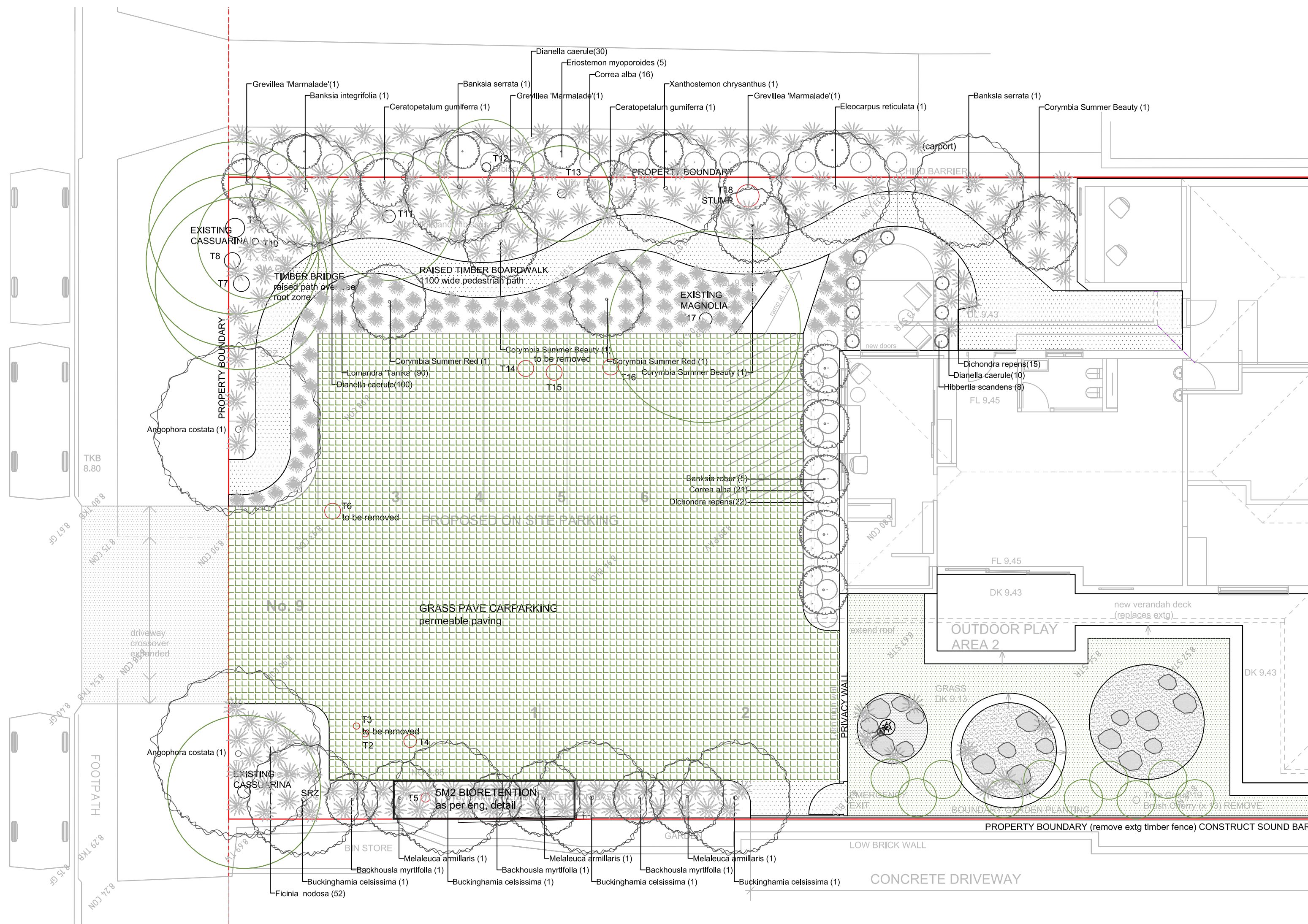
C.M.S. Surveyors Pty Limited
ACN: 096 240 201
PO Box 463 Dee Why
NSW 2099
2/99A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4800
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: NORTHERN BEACHES SHEET 1 OF 1

SURVEYED MB/H/C	DRAWN GP/H/C	CHECKED MB/H/C	APPROVED AF
SURVEY INSTRUCTION 19347	SCALE 1:100 @ AD	DATE OF SURVEY 08/05/2020	ISSUE 2
DRAWING NAME 19347detail	CAD FILE 19347detail_2.dwg		







PLANTS

ALL PLANTS ARE NATIVE TO AUSTRALIA
AND MOST ARE LOCAL TO THE AREA



Angophora costata



Backhousia myrtifolia



Banksia integrifolia



Banksia serrata



Buckinghamia celssissima



Corymbia Summer Beauty



Corymbia Summer Red



Eleocarpus reticulata



Melaleuca armillaris



Xanthostemon chrysanthus



Banksia robur



Ceratopetalum gumiferra



Correa alba



Eriostemon myoporoides



Grevillea 'Marmalade'



Ficinia nodosa



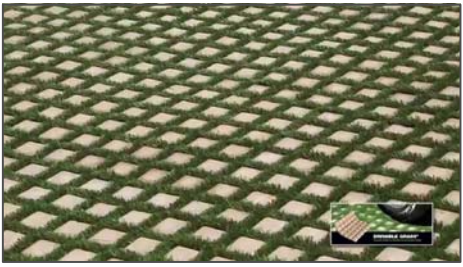
Lomandra 'Tanika'



Dianella caerulea



Dichondra repens



Grass Pave - Permeable Paving

NOTES

ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ARCHITECT & ENGINEER DRAWINGS.

BEFORE FILLING WITH PLANTER BOX MIX, ALL PLANTER BOXES ARE TO BE PAINTED WITH WATER PROOFING MEMBRANE AND BE LINED WITH 30MM THICK DRAINAGE CELL COVERED WITH GEOTECH FILTER FABRIC.

ALL PLANTERBOXES ARE TO HAVE DRAINAGE CONNECTED TO STORM WATER SYSTEMS.

ALL GARDEN AREAS ARE TO BE CLEARED OF WEEDS & UNWANTED VEGETATION

ALL EXISTING TREES SHOWN ON THIS PLAN ARE TO REMAIN & BE PROTECTED.

ALL GARDEN & LAWN AREAS ARE TO HAVE 50MM COMPOST INSTALLED AND BE CULTIVATED TO A DEPTH OF 250MM .

ALL GARDEN AREAS ARE TO BE EVENLY GRADED AND RAKED AFTER PLANTING

ALL GARDEN AREAS ARE TO BE MULCHED AFTER PLANTING WITH 70MM OF COMPOSTED HORTICULTURAL FINE MULCH.

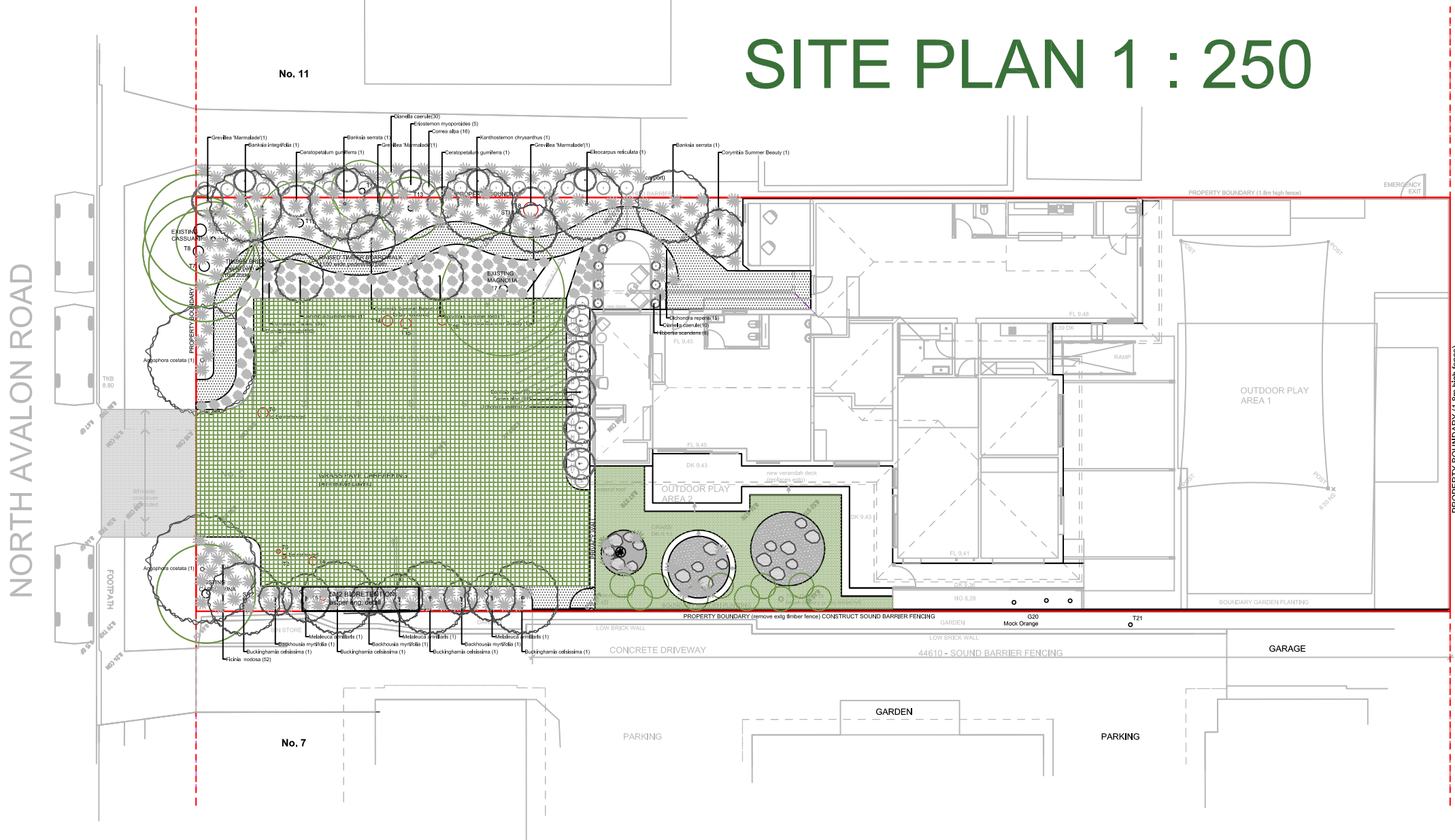
ALL PLANTS ARE TO BE SUPPLIED AS PER PLANTLIST AND INSPECTED BY LANDSCAPE DESIGNER AFTER SET OUT, PRIOR TO PLANTING.

ALL PLANTING AREAS AND PLANTER TROUGHS ARE TO BE IRRIGATED BY A FULLY AUTOMATED WATERING SYSTEM

THE CONTRACTOR IS TO HANDWATER ALL PLANTS AND LAWN DURING THE ESTABLISHMENT PERIOD OF THE PLANTS (13WEEKS)

IT IS EXPECTED THAT ALL WORKS WILL BE EXECUTED TO COMPLY WITH THE RELEVANT NATIONAL CONSTRUCTION CODE SERIES (NCC) BUILDING CODE OF AUSTRALIA (BCA) VOLUME 2 2022

SITE PLAN 1 : 250



WARNING
BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDERGROUND SERVICES SHOWN ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN. THE CONTRACTOR MUST VERIFY ALL SERVICES ON SITE PRIOR TO ANY EXCAVATION WORKS.

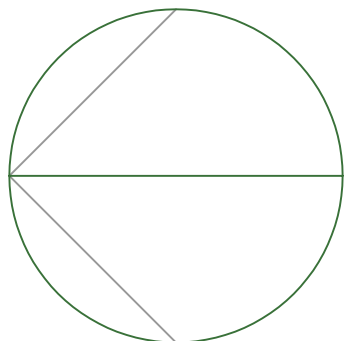
Notes:
BUILDERS/ CONTRACTORS ARE TO VERIFY ALL DIMENSIONS PRIOR TO COMMENCEMENT OF SITE WORK OR OFF-SITE FABRICATION.
ALL SHOP DRAWINGS ARE TO BE SUBMITTED TO THE PROJECT MANAGER, AND MANUFACTURE SHALL NOT COMMENCE UNTIL RETURN OF UNAMENDED SHOP DRAWINGS. FIGURED DIMENSIONS ARE TO BE READ IN PREFERENCE TO SCALED.

VOLKER KLEMM LANDSCAPE DESIGN

PO BOX 760 AVALON NSW 2107 TEL/FAX 02 9973 3797 MOBILE 0403 193 337

project

9 NORTH AVALON RD
AVALON BEACH



drawn

VK

Scale

DA LANDSCAPE PLAN

Scale

1 : 100 @ A1 02/25

date

02/25

Drawing No

DA 01

Revision

A

NOTE
ALL PLANTS ARE NATIVE TO AUSTRALIA AND MOST ARE NATIVE TO THE AREA

botanical name	common name	quantity	pot size
TREES			
Angophora costata	sydney red gum	2	25l
Backhousia myrtifolia	lemon scented myrtle	3	25l
Banksia integrifolia	coast banksia	1	25l
Banksia serrata	old man banksia	2	25l
Buckinghamia celssissima	ivory curl flower	4	25l
Corymbia Summer Baeuty	dwarf flowering eucalypt	3	25l
Corymbia Summer Red	dwarf flowering eucalypt	2	25l
Elaeocarpus reticulatus	blueberry ash	1	25l
Melaleuca armillaris	drooping melaleuca	3	25l
Xanthostemon chrysanthus	golden penda	1	25l

SHRUBS			
Banksia robur	swamp banksia	5	200mm
Ceratopetalum gummiferum	NSW Christmas bush	2	25l
Correa alba	white correa	37	150mm
Eriostemon myoporoides	wax flower	5	200mm
Grevillea 'Marmalade'	grevillea	3	200mm

GRASSES			
Ficinia nodosa	knobby club-rush	52	150mm
Lomandra 'Tanika'	mat rush	90	150mm

PERENNIALS			
Dianella caerulea	blue flax lily	140	150mm

GROUNDCOVERS			
Dichondra repens	native kidney weed	37	150mm