



Consulting Engineers

STRUCTURAL - CIVIL - STORMWATER - REMEDIAL

... STRUCTURALLY SOUND

Flood Risk Management Report

120 Garden Street, North Narrabeen

ISSUE B

2 July 2021

Prepared for: Ben & Prue Scully

Prepared by: Christian Ferry

Flood Risk Management Report

Project no: 181237

Issue: B

Date: 02.07.2021

Client: Ben & Prue Scully

Engineer: Christian Ferry

Principal review: Rick Wray

Council: Northern Beaches Council

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Document History

Issue	Engineer	Checked	Description	Date
A	C. Ferry	C. Haack	Final Report	25.01.2019
B	C.Ferry	M.Wachjo	Report to address proposed pool	02.07.2021



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1. Introduction

At the request of Ryan Alper of Action Plans on behalf of Ben & Prue Scully, Northern Beaches Consulting Engineers (NBCE) have undertaken a flood risk assessment at 120 Garden Street in North Narrabeen in relation to the proposed additions to determine any impacts on the existing floodplain.

For the undertaking of this report, NBCE analysed the development plans prepared by *Action Plans (Drawing No's: DA01-DA05, dated 25 May 2021)* in reference to potential flooding issues. This report has been prepared in accordance with:

- *Narrabeen Lagoon Flood Study (2013)*
- *Pittwater 21 Development Control Plan (DCP) 2015*
- *NSW Government Floodplain Management Manual (2005)*
- Councils Flood Advice information provided

1.1 Site Description

This study explores the risk of mainstream flooding envisaged to occur at the subject site during the 1% AEP storm event. The site is located on Garden Street in North Narrabeen and natural falls to the north-east towards Garden Street. The development site is located within the vicinity of the flow extents (for the 1 in 100-year peak storm event) of the flood as predicted in the *Narrabeen Lagoon Flood Study (2013)* and is predicted to experience mainstream flooding during heavy rainfall events.

It should be noted that the *Narrabeen Lagoon Flood Study (2013)* predicts the 1% AEP flood depth extends to a level of RL 3.03m AHD and will partially inundate the site.

1.2 Development Description

The most recent development proposal at the subject site proposes to demolish an existing granny flat in the rear yard of the subject site and construct a new pool and retaining walls.

1.3 Site Conditions

The 696m² site is located within the Northern Beaches Council (Pittwater area) LGA and situated within the floodplain of the Mullet Creek which connects to South Creek further downstream. The property falls toward Garden street in a north-easterly direction.



Figure 1 - Site Location. Source: SIX Maps (NSW)

1.4 Flood Behaviour

The flood behaviour for the subject site is primarily a flood storage area within a mainstream flooding zone. Mainstream flooding events are envisaged to occur during large storm events when the capacity of Mullet Creek is exceeded.

The Mullet Creek channel conveys runoff flows through the South Creek which acts similarly to a detention basin whereby water is temporarily stored prior to discharge to the ocean. The creek slowly releases water to the sea during the latter part of the flood. The flood level at the site would closely correspond with the extreme flood levels.

2. Flood Analysis

2.1 Site Flooding Extent

Below is a summary of flood information in reference to Northern Beaches Council (Pittwater) Flood Assessment report requirements and the *NSW Government Floodplain Management Manual* with reference to the 1 in 100-year peak storm event.

- | | |
|-----------------------------------|---------------|
| • 1% AEP Provisional Flood Hazard | High |
| • 1% AEP Hydraulic Categorisation | Flood Storage |
| • 1% AEP Maximum Water Level | 3.03m AHD |
| • 1% AEP Maximum Flood Depth | 0.41m |
| • 1% AEP Maximum Velocity | 0.24m/s |
| • PMF Maximum Water Level | 4.87m AHD |
| • PMF Maximum Flood Depth | 2.25m |
| • Flood Planning Level (FPL) | 3.53m AHD |
| • Degree of inundation | 13% |
| • Proposed Pool Level | 5.710m AHD |
| • Proposed Lawn Level | 5.710m AHD |

3. Assessment of Impacts

3.1 Development Matrix

The subject site is classified under the residential category in figure 2 below.

		High Flood Risk						
		Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional
A	Flood effects caused by Development	A1 A3 A4	A1 A3 A4	A1 A3	A1 A3	A1 A3	A2 A3	A2 A3
B	Drainage Infrastructure & Creek Works	B1 B2	B1 B2	B1 B2	B1 B2	B1 B2	B1 B2	
C	Building Components & Structural	C1 C2 C3	C1 C2 C3		C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3
D	Storage of Goods	D1 D2	D1 D2		D1 D2	D1 D2	D1 D2	D1 D2
E	Flood Emergency Response	E1 E2 E3	E1 E2 E3	E1 E4	E1 E2	E1 E2 E3	E1	E1
F	Floor Levels	F2 F3 F7	F2 F3 F7	F5	F1 F2 F3 F6 F8	F2 F2 F3 F6 F8 F10	F2	F2 F3 F6
G	Car Parking	G1 G4 G6 G7 G9 G10	G1 G4 G6 G7 G9 G10	G1	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7
H	Fencing	H1	H1	H1	H1	H1	H1	H1
I	Pools	I1	I1	I1	I1	I1	I1	I1

Figure 2 - Development Matrix. Source: Northern Beaches (Pittwater) Council Website Information

Table 1 - Assessment of Impacts Table

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

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

4. Recommendations

4.1 Flood Storage

The proposed works in the rear yard are located outside of the flooding extent up to both the 1% AEP & PMF flood event. Therefore, it is not envisaged that the proposed pool and retaining wall structures will be affected by flooding or cause further flooding to neighboring properties up to the PMF storm event.

4.2 Structural Design

No specific flood related structural loads require consideration for the proposed works in the rear yard since the works are located outside the flooding extent up to both the 1% AEP & PMF flood event.

4.4 Types of materials to be used

Any new structures are to be constructed of standard building materials of concrete, steel, timber and/or brickwork above the flood levels. Any proposed fencing along the boundaries, alternative to pool type fencing, shall be designed by a structural / civil engineer so as not to impede the flow of floodwaters up to and including the 1% AEP peak storm event. Openings are to be provided to ensure the 1% AEP floodwaters remains unimpeded.

4.5 Onsite Stormwater Management

Site stormwater management and discharge is recommended to be designed by a civil / hydraulic engineer with relevant experience. The site stormwater disposal method is recommended to be in general accordance with *AS3500.3 – Stormwater Drainage* and Northern Beaches Council (Pittwater) DCP requirements. Additional council approval / review of alternative disposal methods may be required.

4.6 Waterproofing methods

All electrical equipment is to be fitted with circuit breakers. Switchboard and main circuit unit to be fitted above the FPL flood level of 3.53m AHD. Other valuable materials or possessions are to be stored as above and should be acknowledged by the owner and occupant that a reasonable extent of damage to fittings below the FPL is to be expected during the 1 in 100-year peak storm event.



4.7 Evacuation strategy and onsite response plan

Should floodwaters begin to inundate the street kerb and gutter adjacent the property residents are recommended to remain indoors for the duration of the storm event.

A copy of this report is to be kept on the premises at all times. This should be executed, on individual assessment, during high intensity rainfalls within the first 5–10 minutes of a storm and monitored accordingly. Refer to the local Northern Beaches flood warning website for updates:

<http://new.mhl.nsw.gov.au/users/NBFloodWarning/>

4.8 Hazardous Material Storage

Hazardous chemicals are not to be stored in areas under the Flood Planning Level of 3.53m AHD and should be acknowledged by the owner and occupant.

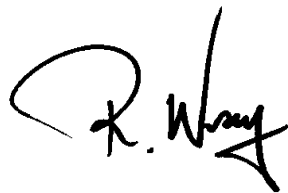
5. Conclusion

The proposed alterations and additions are not envisaged to influence the flood levels. The property owner however is to acknowledge the proposed carport level is below the FPL and a level of inundation may occur in the event of the 1% AEP rainfall event.

Further, the proposed development is not envisaged to have an adverse effect on surrounding properties. The flood levels provided from council flood information have been adopted for this assessment. The proposed development generally meets the requirements of *Northern Beaches Council (Pittwater) DCP* provided the recommendations within this report are implemented. A development application is recommended.

We trust that this certificate meets with your requirements. Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L



Rick Wray

Director
BE(Civil) MIEAust CPEng NER

\\NBADS\Company\Synergy\Projects\181237 120 GARDEN STREET, NORTH NARRABEEN\ENG
Design\Flood\181237 - 120 Garden Street, North Narrabeen - Flood Risk Report Issue B 2021-07-
02.docx



Appendix A

Proposed Development Plans & Survey Plan

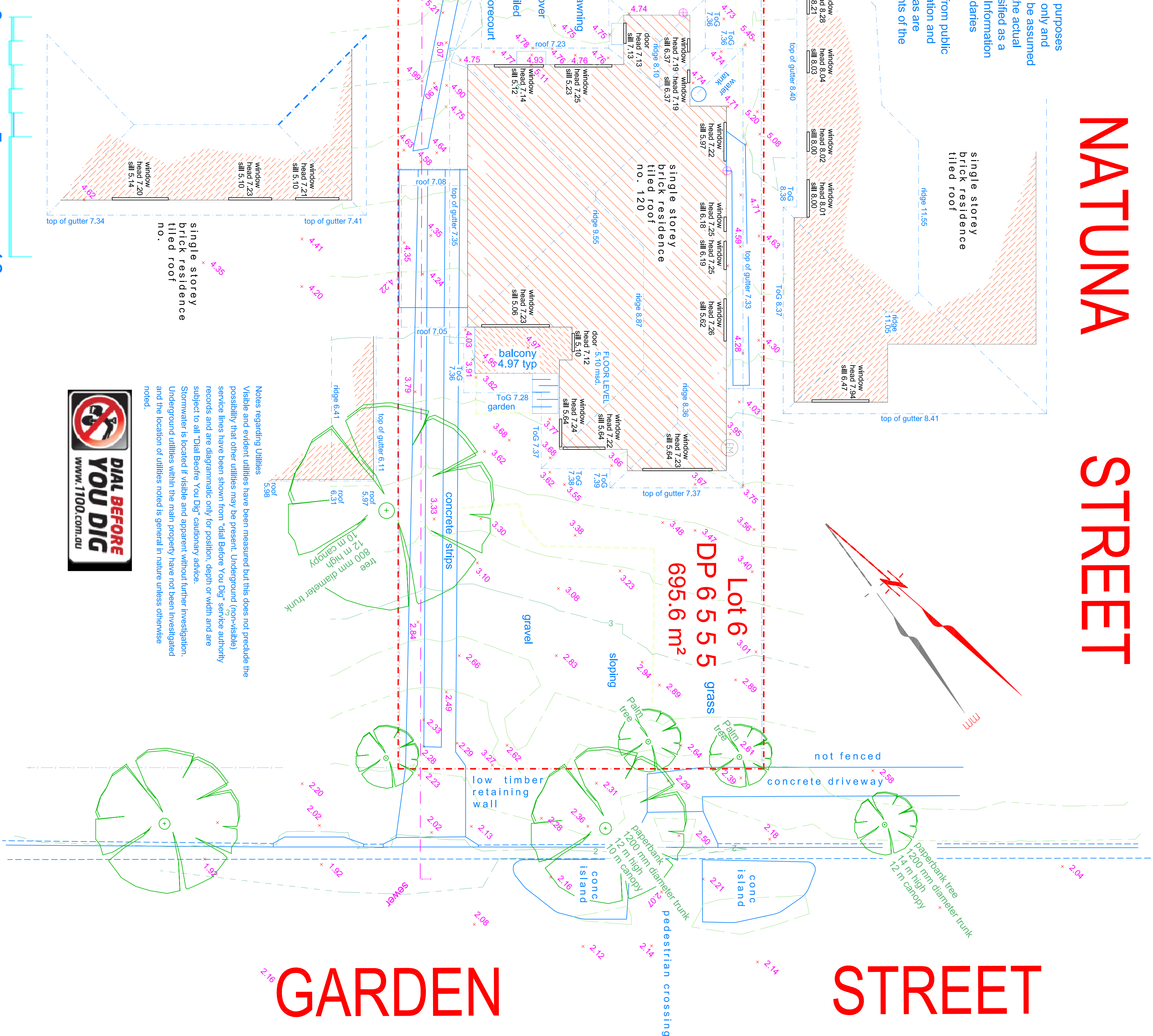
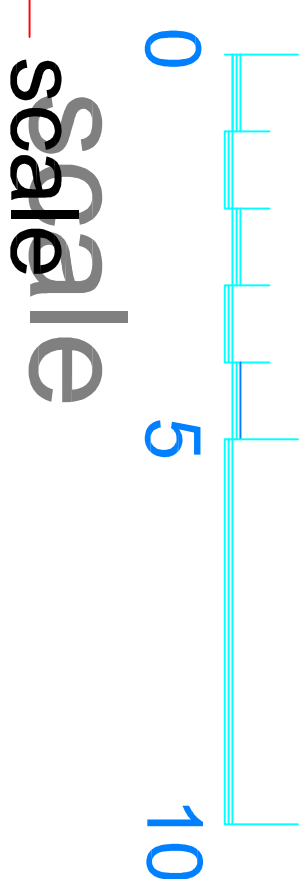
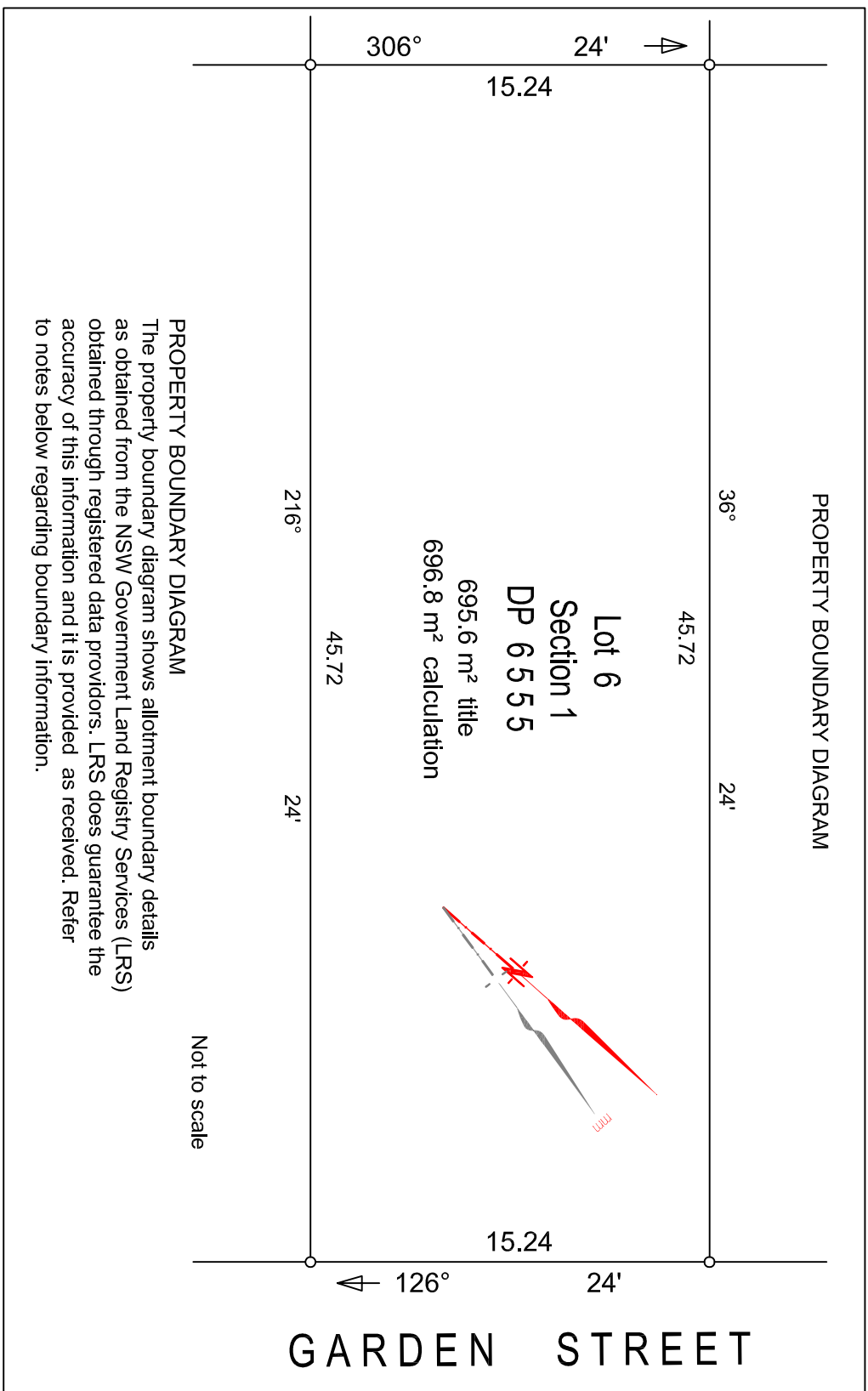
NATUNA STREET

UTILITIES SEARCH		
WATER		
SEWER		
GAS		
TELSTRA		
OTHER		
CHECKED		
Boundary Misclose	PN	
Easements		
Office Audit	NA	
Drafting	CC	
Field Audit	PN	

NOTES REGARDING BOUNDARY

The information shown on this plan is for design purposes only. The position of boundary lines is indicative only and these lines, the distances and bearings may not be assumed or implied to represent the definitive position of the actual boundary. The survey is not intended to be classified as a land survey under the NSW Survey and Spatial Information Act 2002 for the purpose of identifying any boundaries or their relation to features and improvements.

The property information displayed is compiled from public records held at NSW Land and Property Information and the property details, the dimensions and the areas are subject to formal definition under the requirements of the NSW Survey and Spatial Information Act 2002.



Notes regarding Utilities

Visible and evident utilities have been measured but this does not preclude the possibility that other utilities may be present. Underground (non-visible) service lines have been shown from 'dial Before You Dig'® service authority records and are disgrammatic only for position, depth or width and are subject to all 'Dial Before You Dig' cautionary advice.

Stormwater is located if visible and apparent without further investigation. Underground utilities within the main property have not been investigated and the location of utilities noted is general in nature unless otherwise noted.



PLAN REVISIONS

DATUM: AHD ORIGIN: AHD/
AZIMUTH: N/A

dasurveys

1300 dasurveys
27 Chiltern Road, Ingleside, NSW, 2101
www.dasurveys.com.au

CLIENT: BEN SCULLY
TITLE: LEVEL & DETAIL SURVEY
120 GARDEN STREET
NARABEEN

SCALE: 1:100 @ A1 1:200 @ A3DT

FILE:: 4730
ACAD: P473002.DWG GC:
DRN: CC CHKD: PN

SHEET...1.....of 1.....SHEETS

LEGEND	
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2	Survey Bench Mark
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NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 6/1/6555

SEARCH DATE TIME EDITION NO DATE

LAND 5 11/12/2015 1:10 PM

LOT 6 OF SECTION 1 IN DEPOSITED PLAN 6555

LOCAL GOVERNMENT AREA NORTHERN BEACHES
PARISH OF NARABEEN COUNTY OF CUMBERLAND

TITLE DIAGRAM DP6555

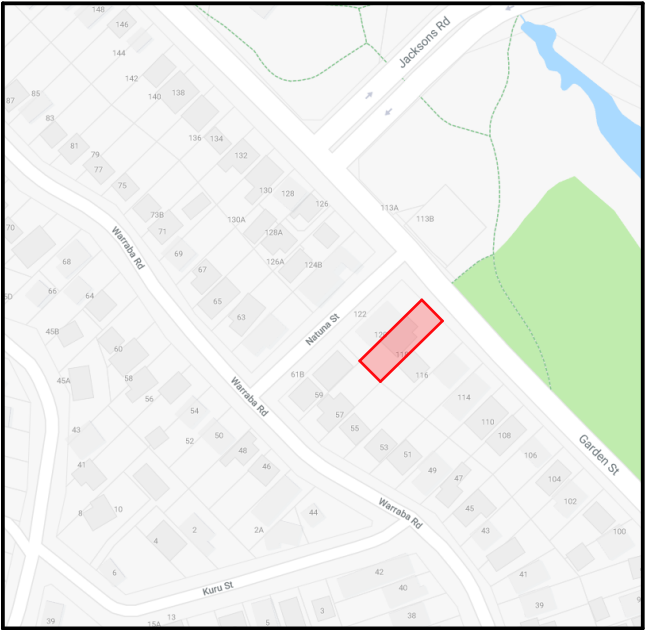
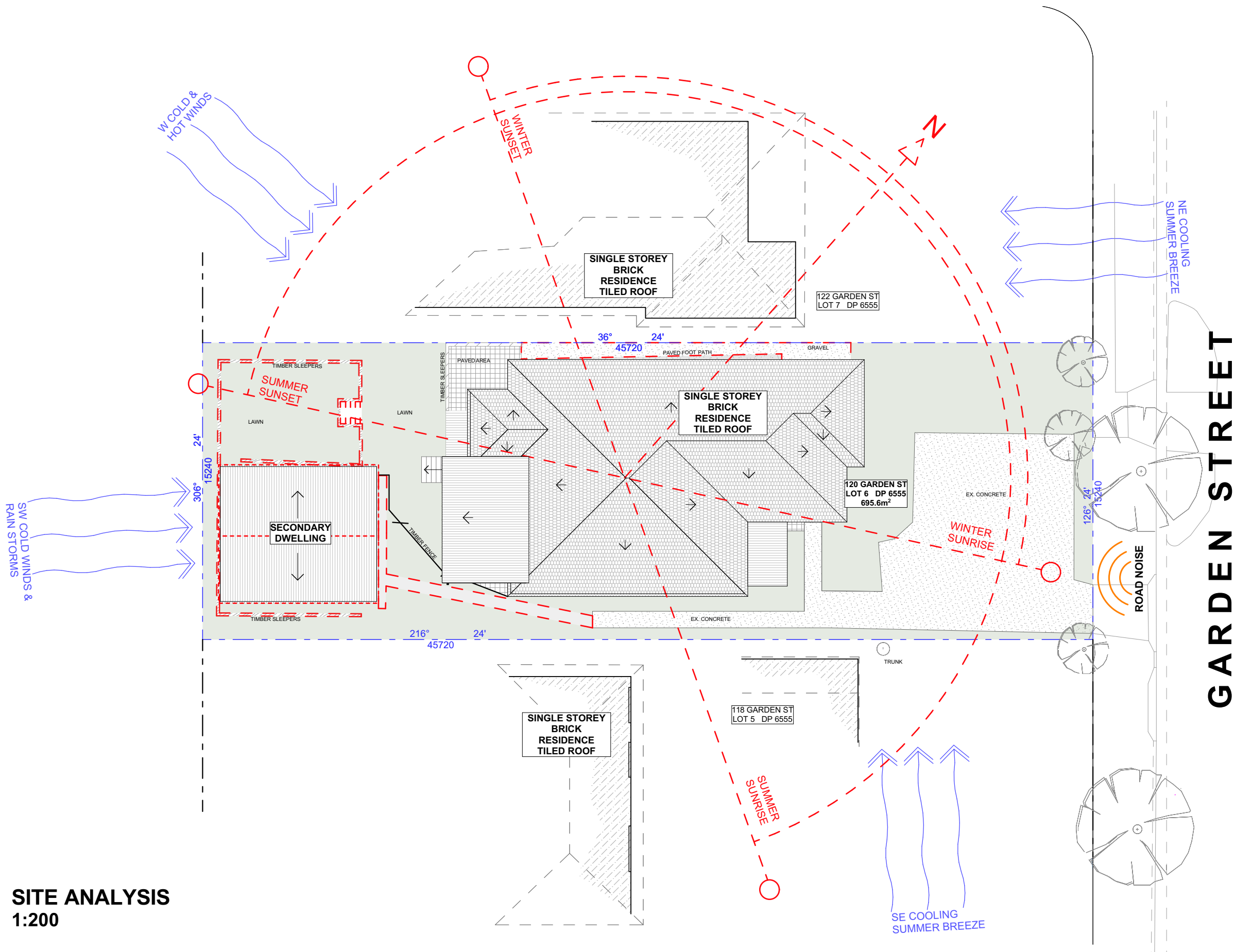
FIRST SCHEDULE

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



SITE ANALYSIS
1:200

NOTE: ALL DEMOLISHED ELEMENTS TO ENG. SPECIFICATIONS AND AS. 2601 - 2001

ACTION PLANS

m: 0426 957 518
e: operations@actionplans.com.au
w: www.actionplans.com.au

REV.	DATE	COMMENTS	DRWN
A	25.05.2021	DA	RNA

NOTES

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All levels and dimensions are to be checked and verified on site prior to commencement of any work, making of shop drawings or fabrication of components.

Do no scale on drawings. Use figured dimensions.

LEGEND

	NEW FLOOR AREA		CONCRETE
	NEW WET FLOOR AREA		BRICKWORK
	METAL ROOFING		METAL
	TILED ROOFING		EXISTING
	TIMBER		DEMOLISHED

CLIENT
Ben & Prue Scully

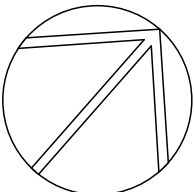
PROJECT ADDRESS
No. 120 Garden Street,
North Narrabeen NSW
2101

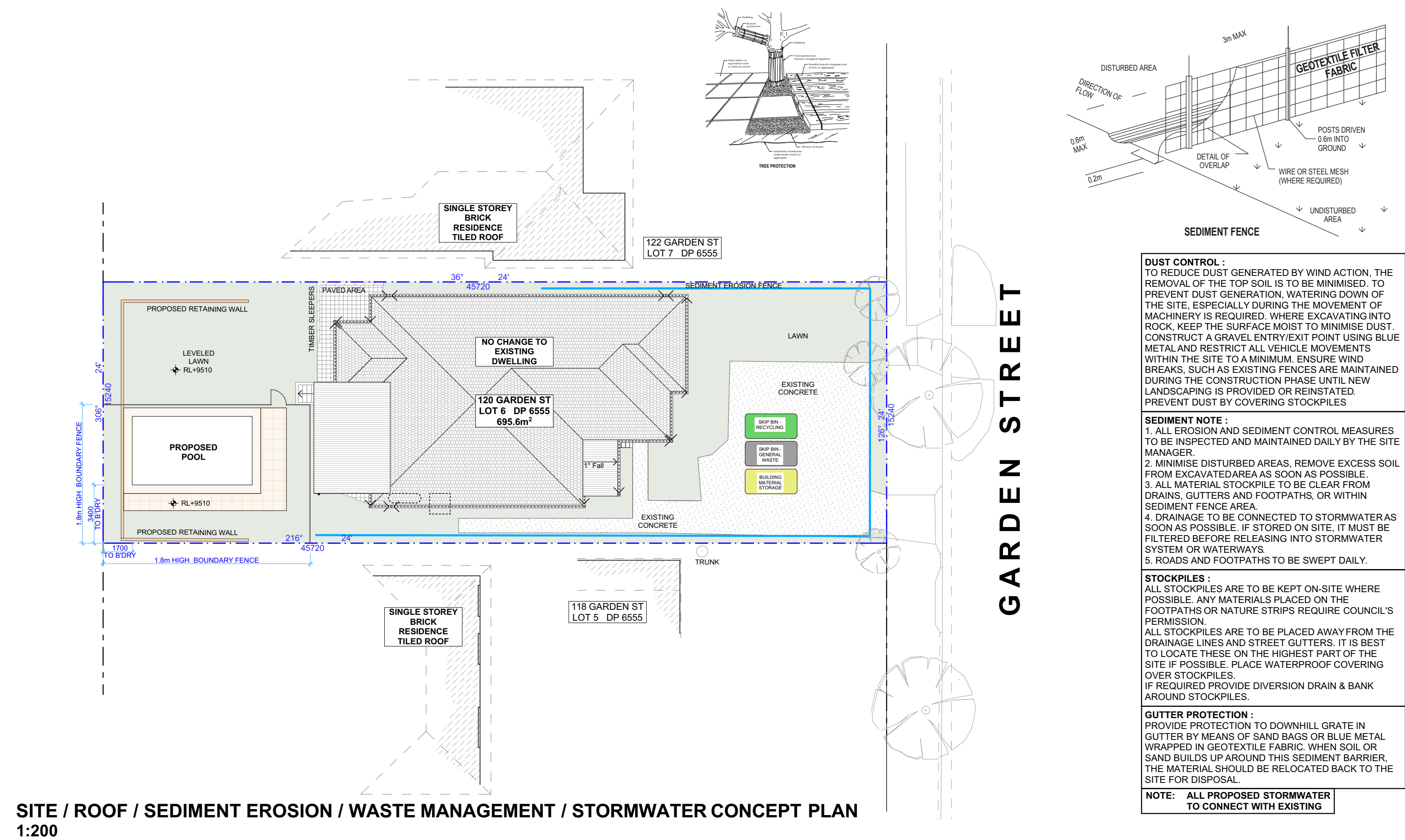
DRAWING NO.
DA01

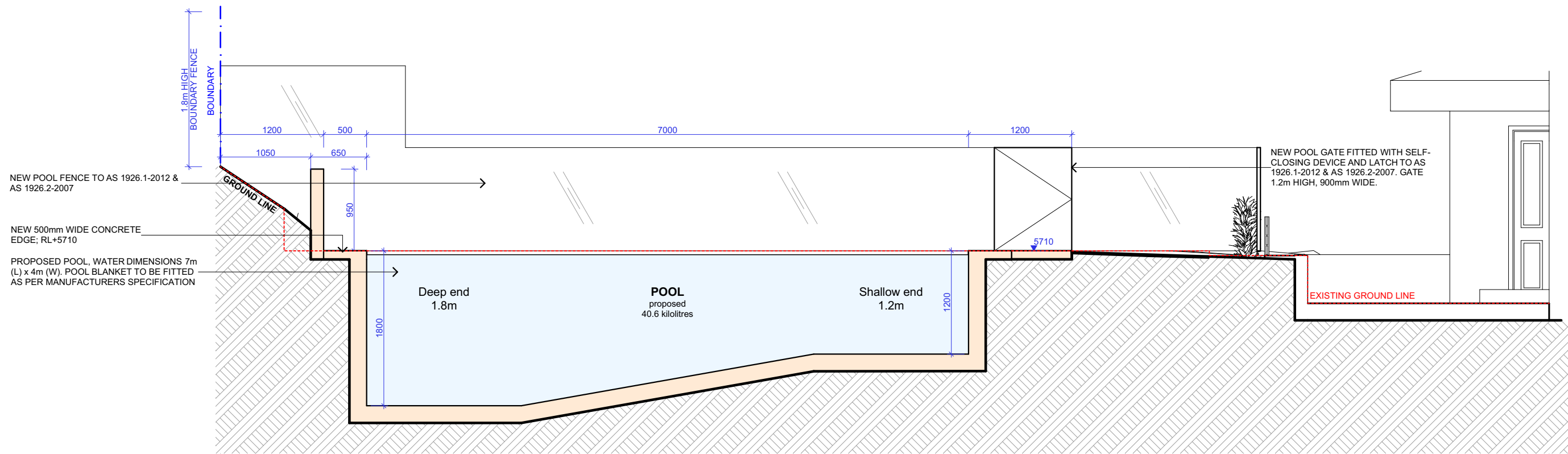
DATE
Tuesday, 25 May 2021

DRAWING NAME
SITE ANALYSIS

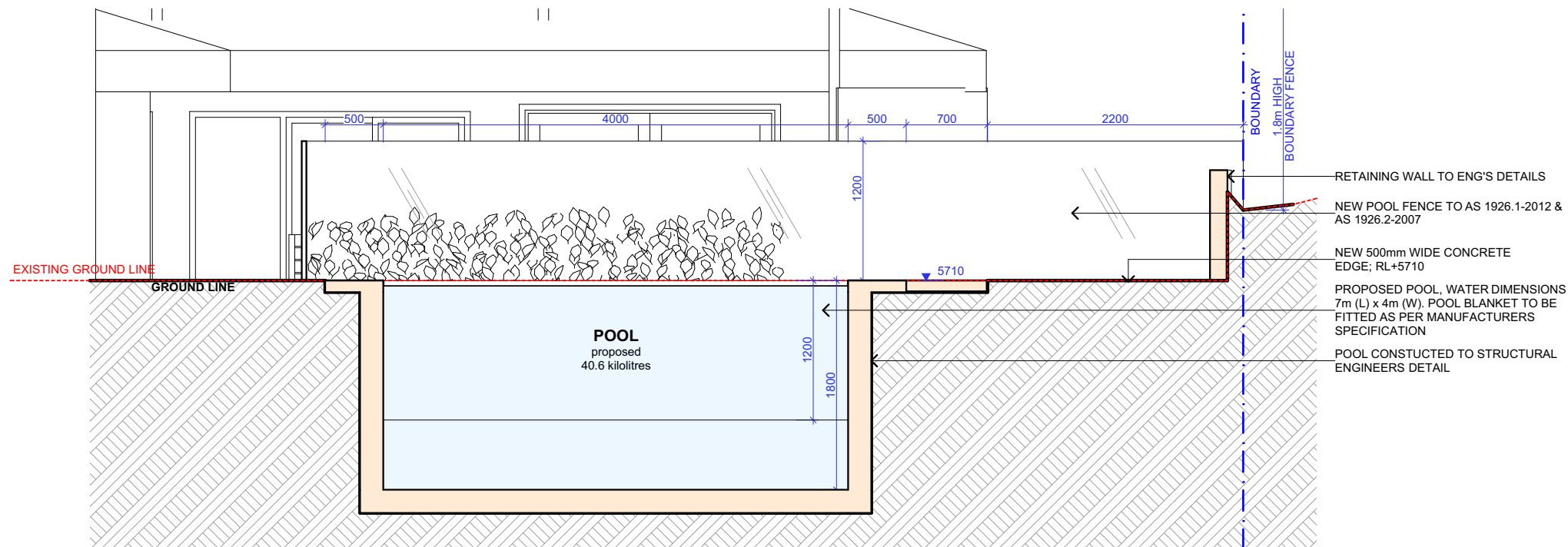
SCALE
1:200 @A3







PROPOSED POOL LONG SECTION
1:50



PROPOSED POOL CROSS SECTION
1:50



ACTION PLANS

m: 0426 957 518
e:operations@actionplans.com.au
w: www.actionplans.com.au

REV.	DATE	COMMENTS	DRWN
A	25.05.2021	DA	RNA

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Do no scale on drawings. Use figured dimensions.

LEGEND

TIMBER	METAL ROOFING
WEATHERBOARD	TILED ROOFING
FACE BRICKWORK	RENDER
METAL	EXISTING
CONCRETE	

CLIENT

Ben & Prue Scully

PROJECT ADDRESS

No. 120 Garden Street,
North Narrabeen NSW
2101

DRAWING NO.

DA04

DATE

Tuesday, 25 May 2021

DRAWING NAME

POOL SECTIONS

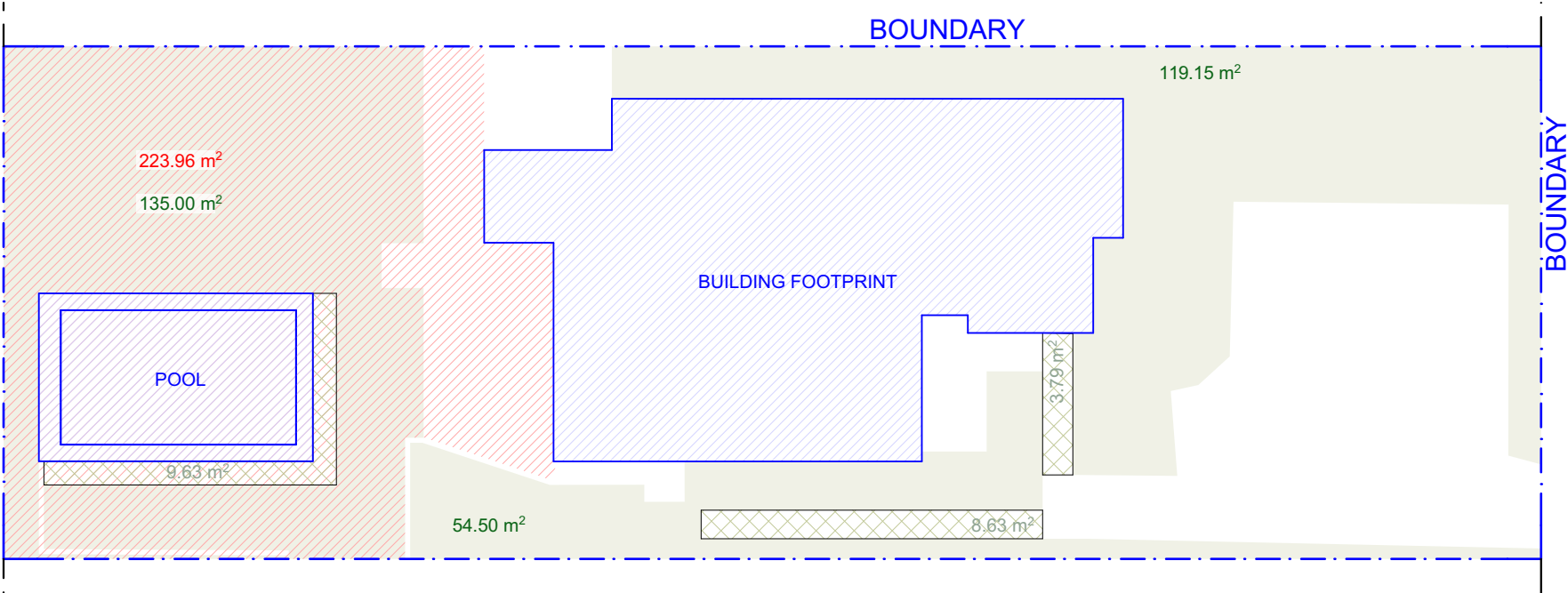
SCALE

1:50 @A3

LANDSCAPE REQUIREMENTS

SITE AREA: 695.6m²

- Landscaped Area - General: 50% (347.8m²)
Existing (survey): 49% (339.93m²)
Proposed:44% (308.65m²)
- 6% Landscaped Variations (41.74m²)
Proposed: 3% (22.05m²)
- Total Landscaped area
Proposed: 48% (330.7m²)
- Building/POOL Footprint
- Private Open Space: 80m²
Proposed Primary Dwelling: 80m² per dwelling (223.96m²)



AREA CALCULATIONS
1:200



Appendix B

Council Supplied Flood Information

FLOOD INFORMATION REQUEST – MULTI-PURPOSE

Property: 120 Garden Street, North Narrabeen

Lot DP: 6/1/6555

Issue Date: 09/08/2018

Flood Study Reference: Narrabeen Lagoon Flood Study, 2013

Flood Information for lot:

Flood Life Hazard Category – H6/H5

1% AEP – See Flood Map B

1% AEP Maximum Water Level³: 3.03 mAHD

1% AEP Maximum Peak Depth from natural ground level³: 0.41 m

1% AEP Maximum Velocity: 0.24 m/s

1% AEP Provisional Flood Hazard: Low See Flood Map E

1% AEP Hydraulic Categorisation: Flood storage See Flood Map F

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL)^{1,2, 3 &4}: 3.53 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level²: 4.87 m AHD

PMF Maximum Depth from natural ground level: 2.25 m

PMF Maximum Velocity: 0.90 m/s

PMF Flood Hazard: High See Flood Map G

PMF Hydraulic Categorisation: Floodway See Flood Map H

Flood Risk Precinct – See Map K

Flooding with Climate Change (See Flood Map I)

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

1% AEP Maximum Water Level with Climate change^{1&3}: 2.76 m AHD

1% AEP Maximum Depth with Climate Change³: 0.14 m

1% AEP Maximum Velocity with Climate Change³: 0.00 m/s

PMF Maximum Water Level from natural ground level with SLR³: 4.18 m

PMF Maximum Depth from natural ground level with SLR³: 4.18 m

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

²Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/flood planning levels across the site.

³Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels than those indicated on this flood advice.

⁴Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or Flood Planning Level

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 LEVEL POINTS



Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: N/A) 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	2.68	0.30	3.03	0.65	0.11	3.53	4.87	2.48	0.37
2	2.68	0.36	3.03	0.71	0.30	3.53	4.87	2.55	1.77
3	2.68	0.06	3.03	0.41	0.24	3.53	4.87	2.25	0.90
4	2.68	0.47	3.03	0.82	0.14	3.53	4.87	2.65	0.58

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)	CC1 % AEP Max Depth (m)
1	2.76	0.37
2	2.75	0.43
3	2.76	0.14
4	2.76	0.55

A variable Flood Planning Level might apply - 0.5m above 1% AEP max water level (for Mainstream flooding) or 0.5m above the 1% AEP max water level flow path extent with depth greater than 0.3m and 0.3m above the 1% AEP max water level flow path with depth 0.3m and less (for overland flow)

WL – Water Level

PMF – Probable Maximum Flood

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

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: N/A) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP C: FLOOD PLANNING AREA EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: N/A) and aerial photography (Source Near Map 2014) are indicative only.

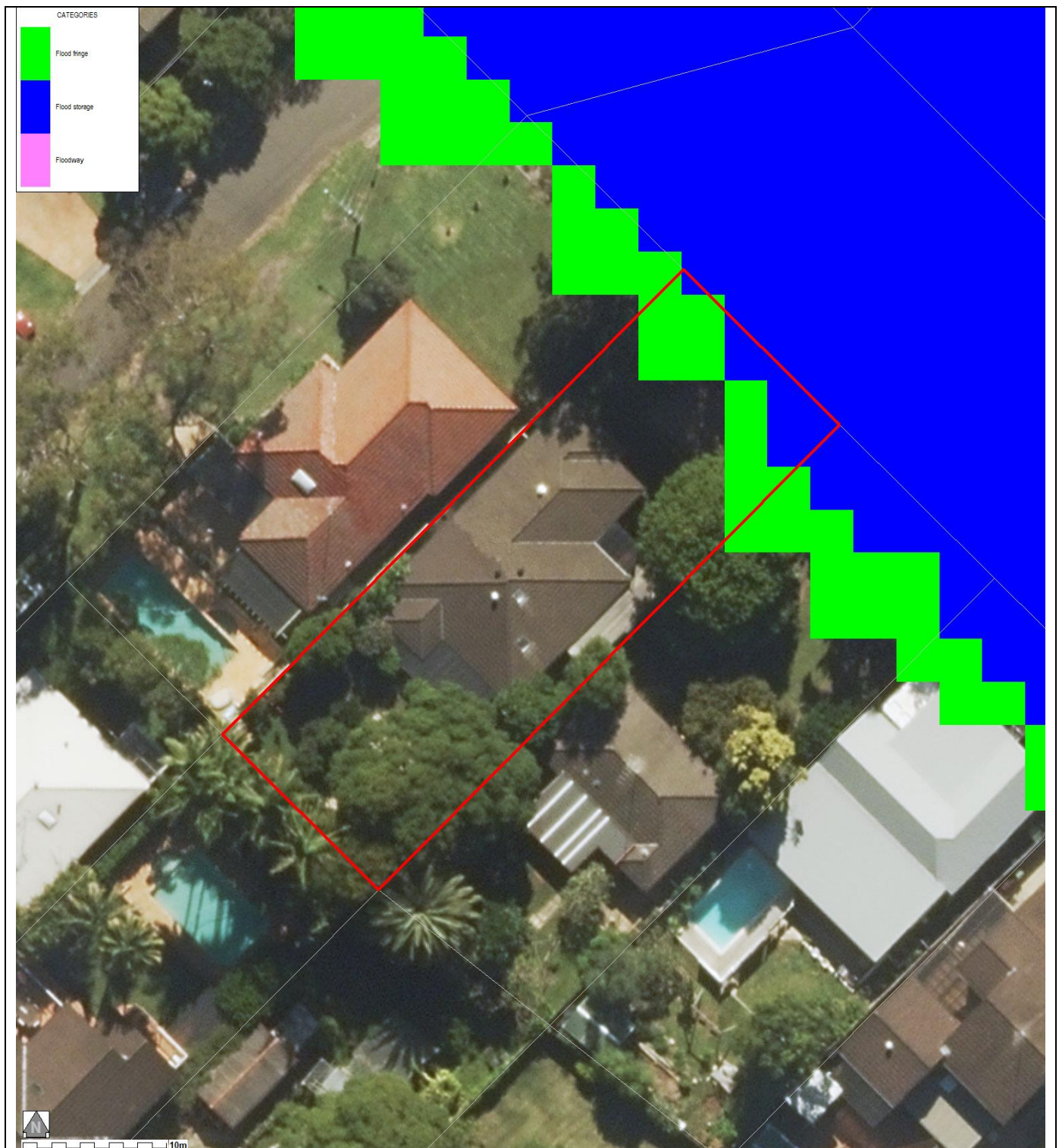
FLOOD MAP D - PMF EXTENT MAP



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: N/A) and aerial photography (Source: NearMap 2014) are indicative only

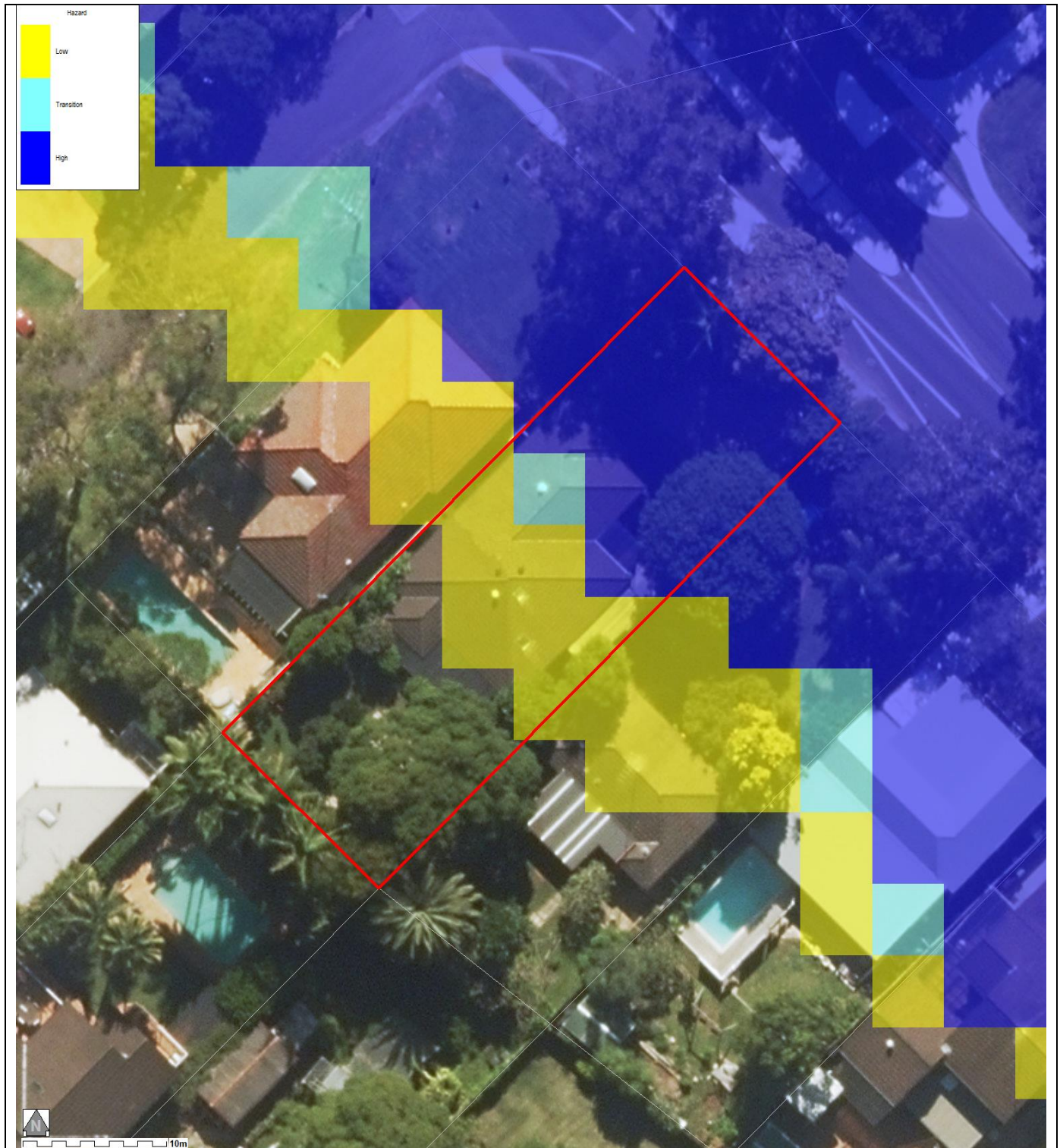
FLOOD MAP F – 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



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: N/A) and aerial photography (Source: NearMap 2014) are indicative only

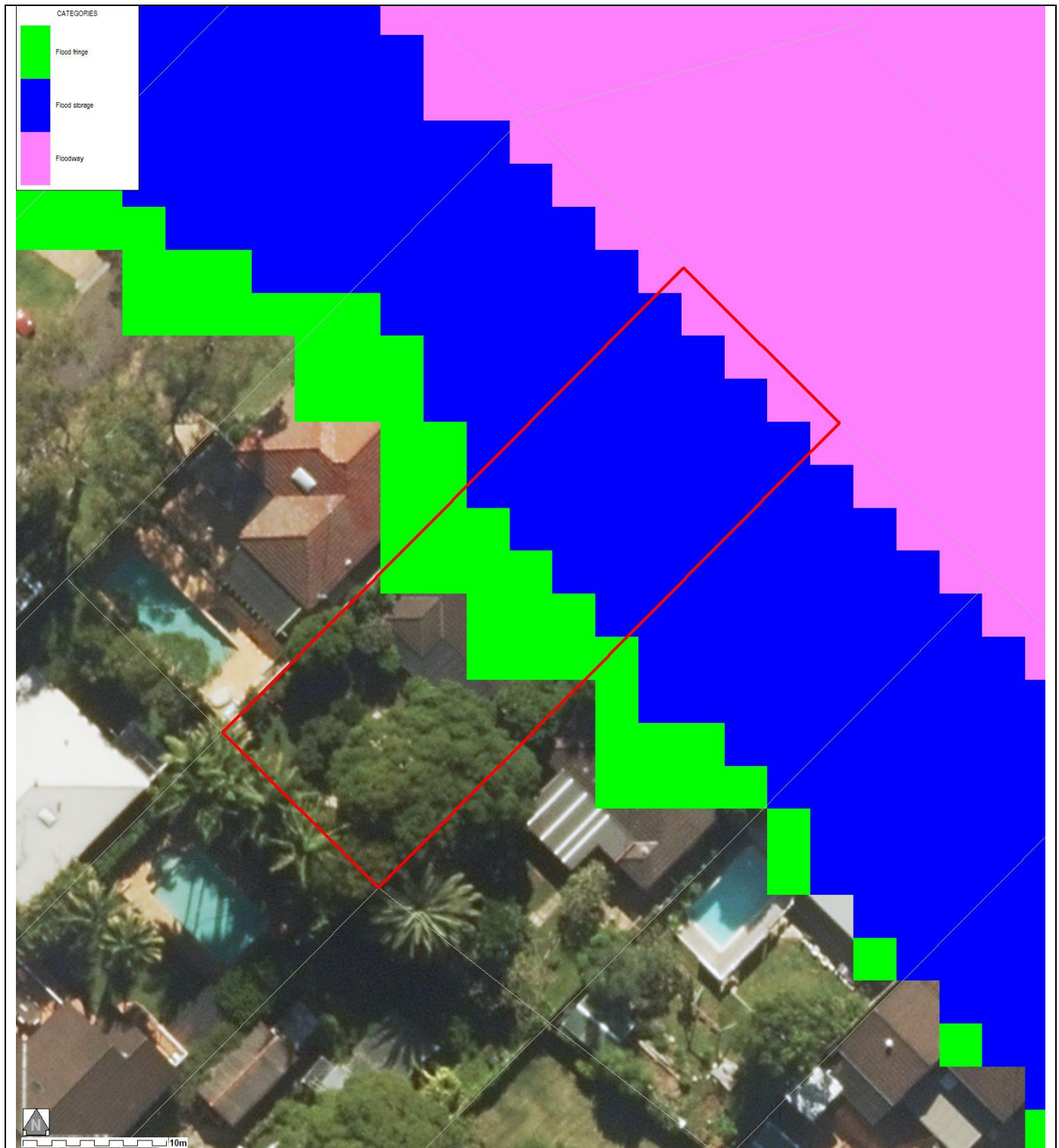
FLOOD MAP G – PMF FLOOD HAZARD EXTENT MAP



Notes:

- extent represents the 1% annual Exceedance Probability (AEP) flood event
- 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: N/A) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP H – 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: N/A) and aerial photography (Source: NearMap 2014) are indicative only

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



Note Notes:

- extent represents the 1% annual Exceedance Probability (AEP) flood event
- includes 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: N/A) and aerial photography (Source: NearMap 2014) are indicative only

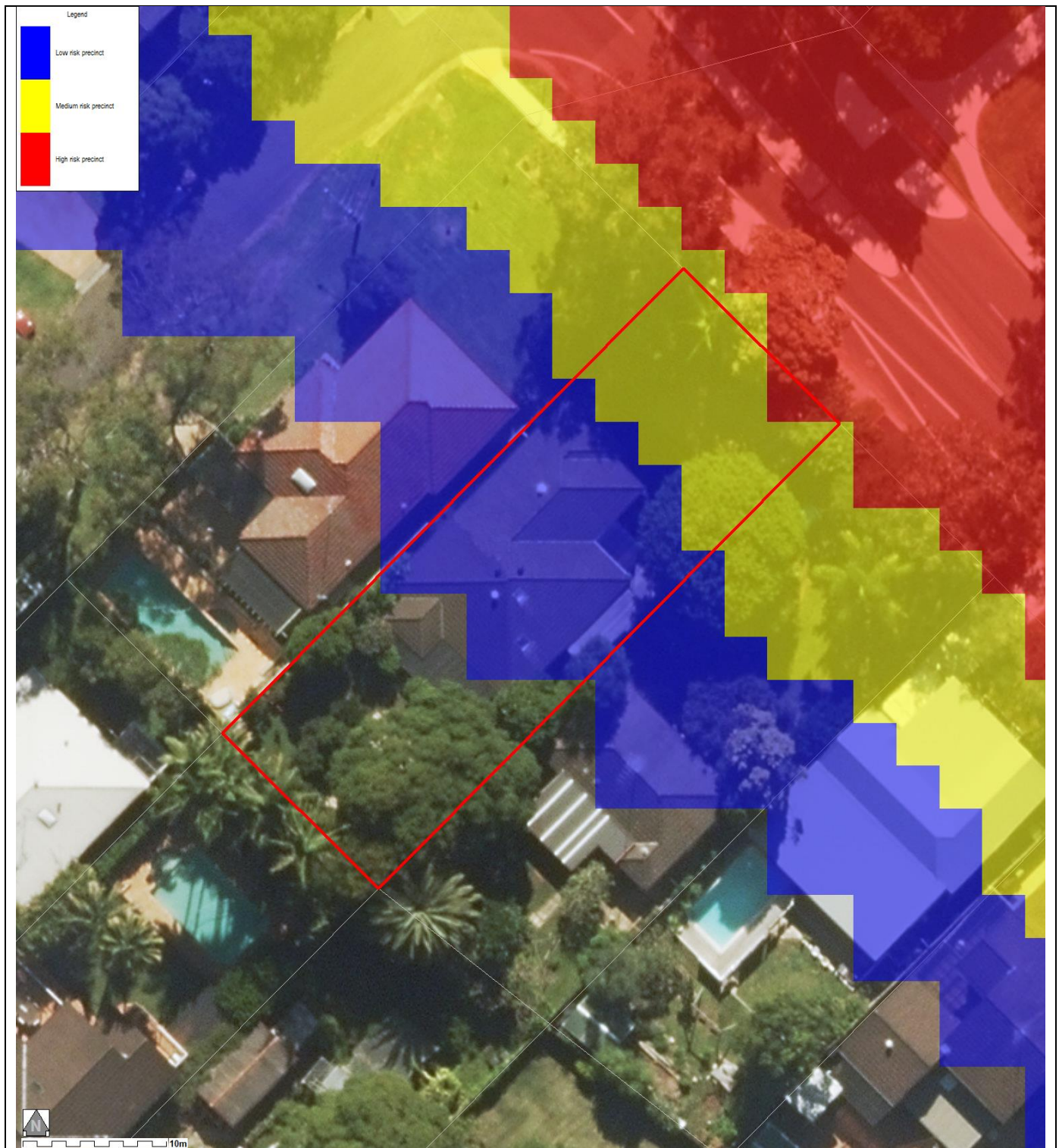
FLOOD MAP J: FLOODING – PMF EXTENT PLUS SEA LEVEL RISE



Note Notes:

- extent represents the PMF flood event
- includes 0.9m Sea Level Rise climate change scenario
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: N/A) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP K – 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 and or H6 Life Hazard Classification).
- Does not include climate change