NB Consulting Engineers

03 May 2024

Address: 1015 Barrenjoey Road, Palm Beach

NBCE Project No. 2206058

Re: Development application for pool and associated landscaping works

To Whom It May Concern:

My name is Michael Wachjo, Civil Engineer B.E. (Civil), MIEAust. I am a Director of NB Consulting Engineers Pty Ltd located in Dee Why.

In September 2022, NB Consulting Engineers P/L prepared a Flood Management Report for the proposed development at 1015 Barrenjoey Road, Palm Beach (Project No: 2206058, dated 14 September 2022) which was submitted and approved by Northern Beaches Council (DA 2022/1732).

This letter is to confirm that the alterations and additions proposed in the architectural plans by Walta Barda Design (sheets A-100A, A-130A, dated March 2024), for a development application, remain outside the predicted 1% AEP flood storage hydraulic category extent and are located within the 1% AEP flood fringe hydraulic category extent. The recommendations made within the above-mentioned Flood Management Report prepared by Northern Beaches Consulting Engineers are still relevant. The proposed alterations and additions will not have detrimental effects on neighbouring properties.

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

If you have any queries, please contact me on 02 9984 7000.

Yours faithfully

NB CONSULTING ENGINEERS P/L

Michael Wachjo
Senior Engineer | B.E. (Civil) MIEAust Director
NB Consulting Engineers Structural, Civil, Stormwater & Remedial Engineers | Email: admin@nbconsulting.com.au
Sydney: Suite 207, 30 Fisher Rd Dee Why NSW 2099 Ph: (02) 9984 7000 ABN: 24 076 121 616
Gold Coast: Suite 1, 30B Griffith Street, Coolangatta QLD 4225 Ph: (07) 5631 4744 ABN: 26 161 755 273

Consulting Engineers

STRUCTURAL - CIVIL - STORMWATER - REMEDIAL

... STRUCTURALLY SOUND

Flood Management Report

1015 BARRENJOEY ROAD, PALM BEACH

Issue A

14.09.2022

Prepared for: John Boyd

Prepared by: Samuel Ruskin

Flood Management Report

Project no: 2206058

Issue: A

Date: 14.09.2022

Client: John Boyd

Engineer: Samuel Ruskin

Principal review: Michael Wachjo

Council: Northern Beaches Council (Region 1)

Northern Beaches Consulting Engineers Pty Ltd
ABN 076 121 616

Suite 207, 30 Fisher Road, Dee Why NSW 2099
SYDNEY Tel: (02) 9984 7000
Email: nb@nbconsulting.com.au
Web: www.nbconsulting.com.au

Document History

Revision	Engineer	Peer Review	Principal Review	Description	Date
A	S.Ruskin	H.Stubley	M.Wachjo	Director review	14/09/2022

CONTENTS

1. INTRODUCTION

At the request of John Boyd, Northern Beaches Consulting Engineers have undertaken a hydrologic and hydraulic investigation at 1015 Barrenjoey Road, Palm Beach to determine the effect of the proposed alterations and additions 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 mainstream flooding as determined in the *Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017* with respect to the proposed development. This report has been prepared in accordance with:

- *Australian Rainfall and Runoff 2019*
- *Pittwater Local Environmental Plan 2014 (LEP)*
- *Pittwater 21 Development Control Plan (DCP) – Section B3.11*
- *NSW Government Floodplain Management Manual (2005)*
- *Council supplied flood information and advice*

1.1 Aim

The development under consideration is located at 1015 Barrenjoey Road, Palm Beach. This property experiences overland flow from nearby McKay reserve, as well as the potential for upwelling of floodwaters from Pittwater estuary during king tides. The anticipated flood behaviour within the contributing catchment up to the 1% AEP flood event has been assessed in relation to the proposed alterations and additions at the subject site.

1.2 Description of Development

The proposed alterations and additions at the residential property at 1015 Barrenjoey Road consist of a first-floor extension over the existing garage at the front of the property, installation of an in-ground pool and additional landscaping works (refer Appendix B).

1.3 Site Conditions

The subject site at 1015 Barrenjoey Road, Palm Beach is approximately 1119m^2 and located within the Northern Beaches Council (Region 1) LGA. The property is located within the catchment overland flow path and is subject to flooding due to increased rainfall and runoff passing through the property.

1.4 Flood Behaviour

The flood behaviour for the subject site is predominately flood fringe and the proposed development is not located within a floodway or the flood storage area. Flooding occurs during large storm events when the capacity of Council stormwater infrastructure and water courses are exceeded, and excess water travels overland and inundates adjacent properties and roadways. Refer Appendix C for Council supplied flood information indicating the predicted flooding extent at the subject site.

2. FLOOD ANALYSIS

2.1 Site Flooding Extent

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

Maximum Flood Planning Level (FPL):	2.58 m AHD

1% AEP Flood

1% AEP Maximum Water Level:	2.08 m AHD
1% AEP Maximum Flood Depth from natural ground level:	0.63 m
1% AEP Maximum Velocity:	0.24 m/s
1% AEP Hydraulic Categorisation:	Flood fringe/flood storage

Probable Maximum Flood (PMF)

PMF Maximum Water Level:	2.32 m AHD
PMF Maximum Flood Depth from natural ground level:	0.63 m
PMF Maximum Velocity:	0.58 m/s
PMF Flood Hazard:	Low - Medium
Flood Life Hazard Category:	H1 - H3

Flood characteristics (subject site)

Degree of Inundation:	85%
Proposed Upper Living Terrace Floor Level:	5.065 m AHD
Flood Emergency Response Strategy	Shelter in place

3. ASSESSMENT OF IMPACTS

3.1 Development Matrix

The subject site is classified under the residential category in figure 1 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 D6 D6	D1 D2 D3 D4 D6 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 (Region 1) 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 Car Parking		x*	
E 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. RECOMMENDATIONS

4.1 Flood Effects Caused by the Development

The extent of the proposed development is located within the flood fringe area. The proposed first-floor extension is located above the Maximum Flood Planning Level (2.58 m AHD) and the landscaping works are proposed to be at the same height as the existing RLs. Therefore, no net loss of flood storage, adverse impacts on surrounding properties or flood levels and velocities are envisaged to occur in all flood events up to the 1% AEP event.

4.2 Building Components and Structural Soundness

Any new structures are to be constructed of fit for purpose building 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).Timber framed construction for any new structures below the PMF (2.32 m AHD) and any construction which results in voids that are difficult to clean out after a flooding event are not to be used. New structures are to be designed and certified by a structural engineer prior to CC to ensure structural integrity up to the FPL (2.58 m AHD), taking into account the forces of floodwater, wave action, flowing water with debris and buoyancy and immersion.

The required on-site refuge (see: *"Evacuation Strategy and Onsite Response Plan")* is proposed to be located within the proposed first-floor extension. The on-site refuge is to be structurally isolated from the rest of the existing dwelling so that in the event of flood, any damage to the main dwelling won't affect the shelter-in-place. The on-site refuge is to be designed and certified by a structural engineer prior to CC to ensure structural integrity up to the PMF (2.32 m AHD), taking into account the forces of floodwater, wave action, flowing water with debris and buoyancy and immersion (refer Appendix 1 for On-Site refuge location plan).

At the completion of construction, the structural engineer is to certify that the development has been constructed as per the above-mentioned design requirements.

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.

The switchboard and main circuit unit must be fitted above the FPL. All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be above the FPL and conduits must be laid such that they are free draining. All existing electrical equipment and power points located below the FPL 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. New structures located below the FPL are to be adequately flood proofed.

4.3 Floor Levels

The architectural plans prepared by Walta Barda Design, dated 12 May 2022, show a first floor extension over the existing garage and driveway at the front of the property and various landscaping works. The proposed floor level of the first-floor extension is above the Flood Planning Level (FPL) and the landscaping works are envisaged to retain the RLs of the existing landscaping.

4.4 Car Parking

The garage is existing and has a roller door at the entry, therefore vehicle barriers or restraints are not necessary for this development.

4.5 Emergency Response

The proposed development must provide an onsite refuge above the Probable Maximum Flood (PMF) level (2.32 m AHD) which is to have appropriate access points installed to enable access from all areas within the development. As such, the development must meet the following *shelter-in-place* requirements:

- The proposed upper living terrace (first-floor extension) floor level (RL 5.065 m AHD) for the development is located above the PMF level.
- The first-floor area for the development, which does not include balconies or hallways, must cater for the proposed number of occupants ($2m^2$ per person)
- The designated area must be intrinsically accessible to all people on the site through plainly evident and self-directing means with sufficient capacity on access routes for all occupants without reliance on an elevator.

The shelter-in-place refuge must provide:

- Sufficient clean water for all occupants
- Portable radio with spare batteries
- Torch with spare batteries
- First aid kit

Note: In the event of a flood, occupants would be required to evacuate if ordered by Emergency Services Personnel regardless of the availability of a shelter-in-place refuge.

4.7 Fencing

Fencing, including pool fencing, 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 any proposed fences must be of an open design from the natural ground level up to the 1% AEP flood level. Openings should be a minimum of 75 mm x 75mm.

4.6 Storage of Goods

Any hazardous or potentially polluting material must be stored above the Flood Planning Level (2.58 m AHD) to ensure adequate protection from floodwaters.

4.7 Pools

Pools located within the extent of the 1% AEP flood event are to be in-ground. Pool is to be located within the flood fringe area and will not result in any loss of flood storage nor impact flood conveyance on or from the site.

All electrical equipment and chemicals associated with the pool, including pool pumps, are to be waterproofed and stored or located at or above the FPL (2.58 m AHD).

5. CONCLUSION

In accordance with accepted engineering practice, NBCE have undertaken a flood study at the above-mentioned site. No anticipated increase in flooding is envisaged to occur at the subject site due to the proposed alterations and additions 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 Beaches Council's *Water Management for Development Policy.* Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L

Author:

Samuel Ruskin
Junior Engineer

Reviewed By:

Michael Wachjo
Director |B.E. (Civil) MIEAust

W:\NBC PROJECTS\2206058 1015 BARRENJOEY ROAD, PALM BEACH\ENG Design\Flood\2206058 - Flood Report - 2022-09-14.docx

APPENDIX A

Sketches of 1% AEP Flooding Extent and On-site Refuge

Consulting Engineers
STRUCTURAL - CIVIL - STORMWATER - REMEDIAL
Suite 207 / 30 Fisher Road, Dee Why NSW 2099
Ph: (02) 9984 7000
Email: nb@nbconsulting.com.au

Job #: 2206058 DWG#: SK01

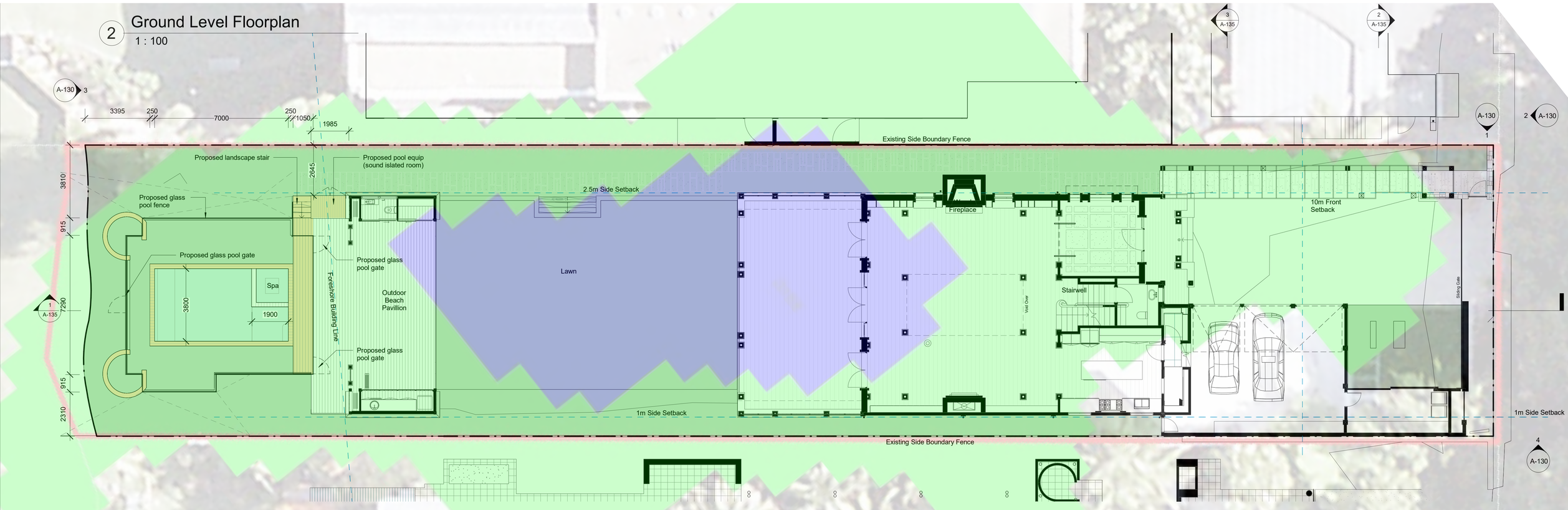
Date: 07-09-2022 Engineer: SR

LEGEND

DENOTES EXTENT OF 1% AEP FLOOD FRINGE HYDRAULIC CATEGORISATION

DENOTES EXTENT OF 1% AEP FLOOD STORAGE HYDRAULIC CATEGORISATION

EXTENT OF FLOOD OVERLAY SKETCH



Walter Barda Design
architecture
landscape
interiors
2:04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

Boyd Palm Beach House

John & Marly Boyd

This Drawing must not be used for Construction unless signed as Approved

Project Number 2010_16 Boyd

1015 Barrenjoey Road Palm Beach NSW

Project Status -

Sheet Proposed Floorplans

Print Date & Time 12/05/2022 3:59:04 PM

File Path Z:\2022_04_Boyd Palm Beach\00 - Architectural Plans\01 SK Sketch Design\SK E_1015 Barrenjoey\Sk1.rvt

Drawn By MM | Checked By WB | Approved By WB

Scale @ A1 1 : 100

Drawing Number A-111 | Issue A

Consulting Engineers
STRUCTURAL - CIVIL - STORMWATER - REMEDIAL
Suite 207 / 30 Fisher Road, Dee Why NSW 2099
Ph: (02) 9984 7000
Email: nb@nbconsulting.com.au

Job #: 2206058 DWG#: SK02

Date: 14-09-2022 Engineer: SR

LEGEND

DENOTES EXTENT OF 1% AEP FLOOD FRINGE HYDRAULIC CATEGORISATION

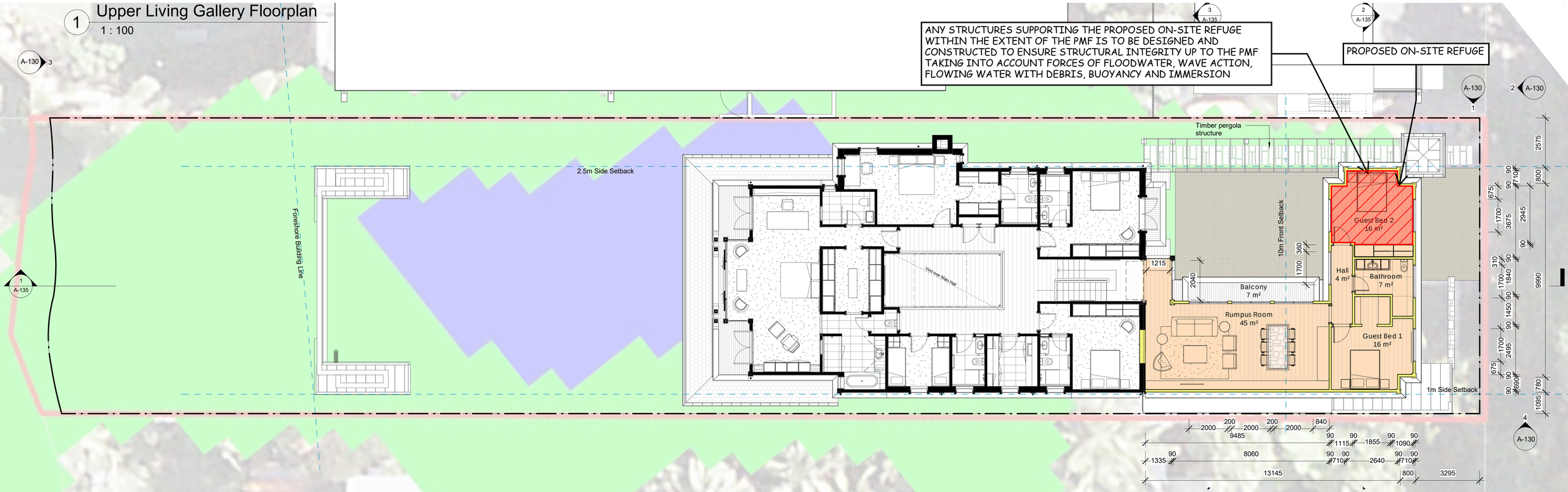
DENOTES EXTENT OF 1% AEP FLOOD STORAGE HYDRAULIC CATEGORISATION

PROPOSED ON-SITE REFUGE SKETCH

1 Upper Living Gallery Floorplan
1 : 100

ANY STRUCTURES SUPPORTING THE PROPOSED ON-SITE REFUGE WITHIN THE EXTENT OF THE PMF IS TO BE DESIGNED AND CONSTRUCTED TO ENSURE STRUCTURAL INTEGRITY UP TO THE PMF TAKING INTO ACCOUNT FORCES OF FLOODWATER, WAVE ACTION, FLOWING WATER WITH DEBRIS, BUOYANCY AND IMMERSION

PROPOSED ON-SITE REFUGE

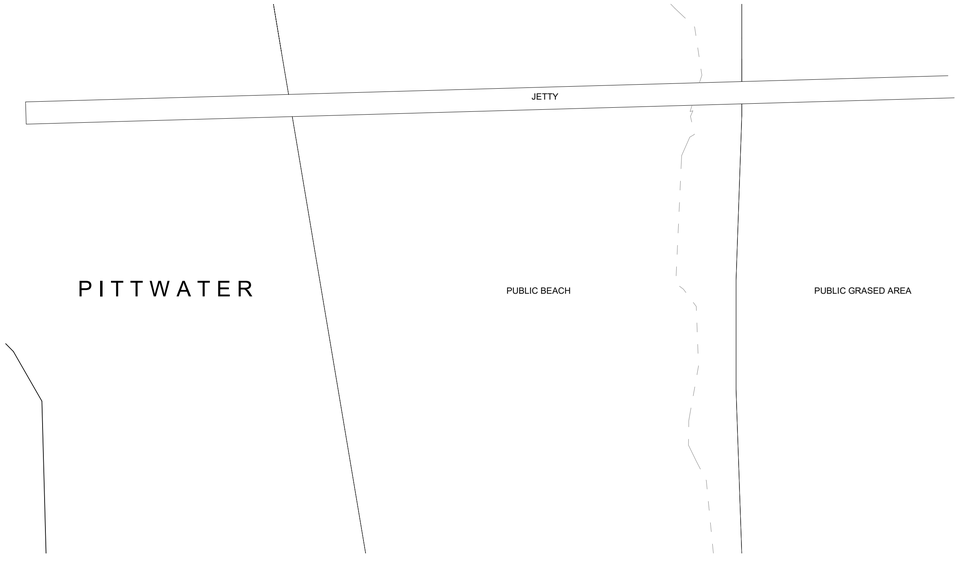


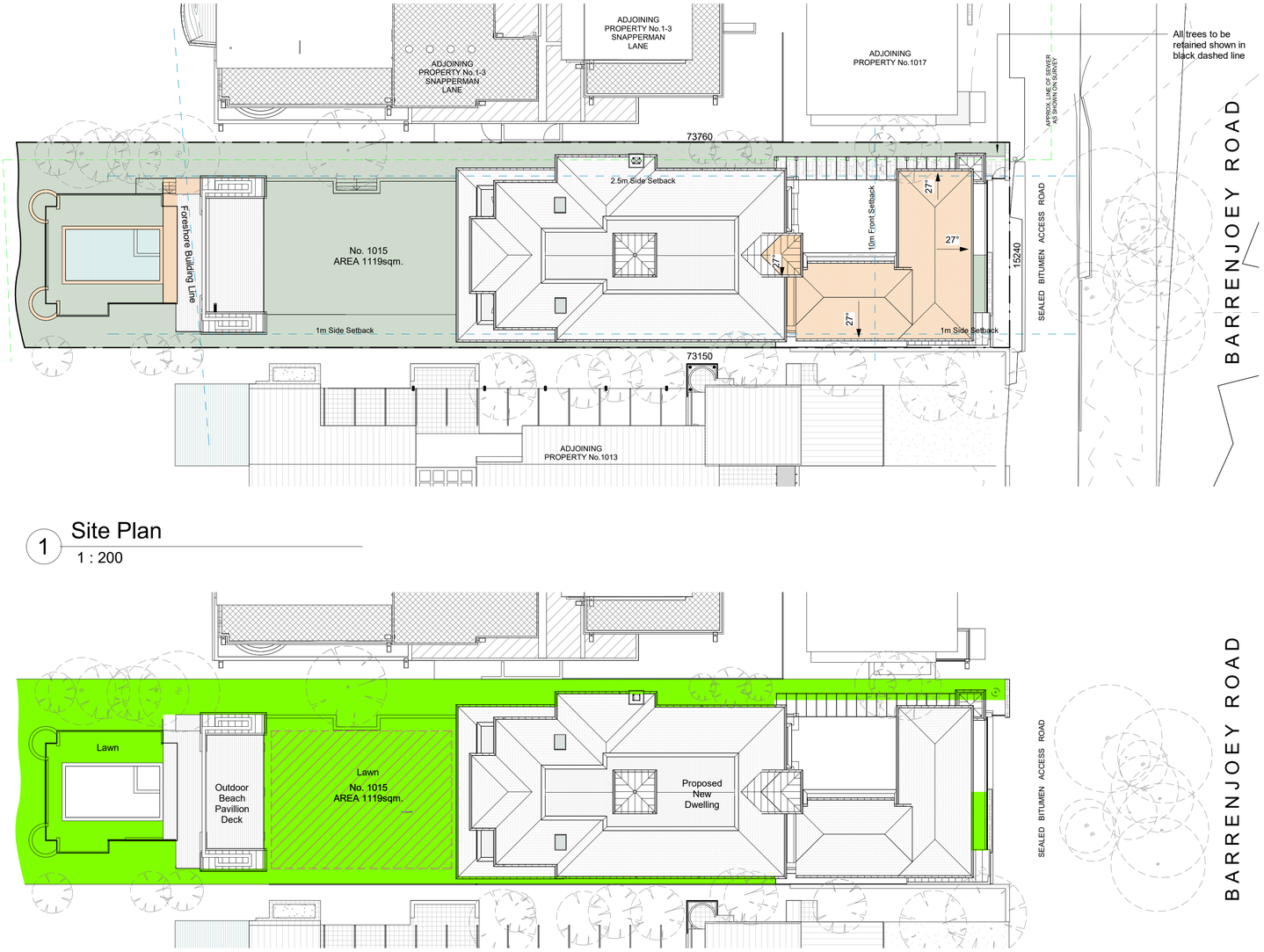
APPENDIX B

Proposed Development Plans and Survey

DEVELOPMENT APPLICATION
TO NORTHERN BEACHES COUNCIL

Additions & New Swimming Pool
1015 BARRENJOEY ROAD
PALM BEACH, NSW





1 Site Plan
1 : 200

2 Landscape Plan
1 : 200

SITE CALCULATIONS:

SITE AREA:		1119 m2
LANDSCAPE AREA REQ [MIN 60% OF SITE AREA]:		671 m2
landscaped area means a part of a site used for growing plants, grasses and trees, but does not include any building, structure or hard paved area. Pittwater LEP 2014		
PROPOSED TOTAL LANDSCAPE AREA:	**48%**	**537m2**
PROPOSED SOFT LANDSCAPE AREA:		470m2
PROPOSED 6% HARD LANDSCAPE AREA EXEMPTION:		67m2
PRIVATE OPEN SPACE REQ [MIN 80m2 OF SITE AREA]:		>80 m2

PLANT LIST & LANDSCAPE NOTES

	SPECIES	QUANTITY	CONTAINER SIZE
	TREES		
BI	Banksia integrifolia	6	150mm
BS	Banksia serrata	8	150mm
LL	Leptospermum laevigatum	8	150mm
	DELETED		
BC	Backhousia citriodora	16	200mm
	SHRUBS		
SA	Syzigium australe "aussie southern"	24	200mm
WR	Westringia rosmarinifolia	20	150mm
MC	Macrozamia communis	6	200mm
	Lomandra hystrix	20	150mm
	GROUNDCOVERS AND VINES		
CS	Carpobrutus sp.	20	150mm
	Buffalo turf "Sir Walter"		

NOTE: All planted areas to be mulched with 150mm shredded sugar cane, with drip irrigation connected to water storage tanks. Driveway to be pebbled gravel over compacted roadbase.

Walter Barda Design
architecture
landscape
interiors
2.04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

Boyd Palm Beach House

John & Marly Boyd

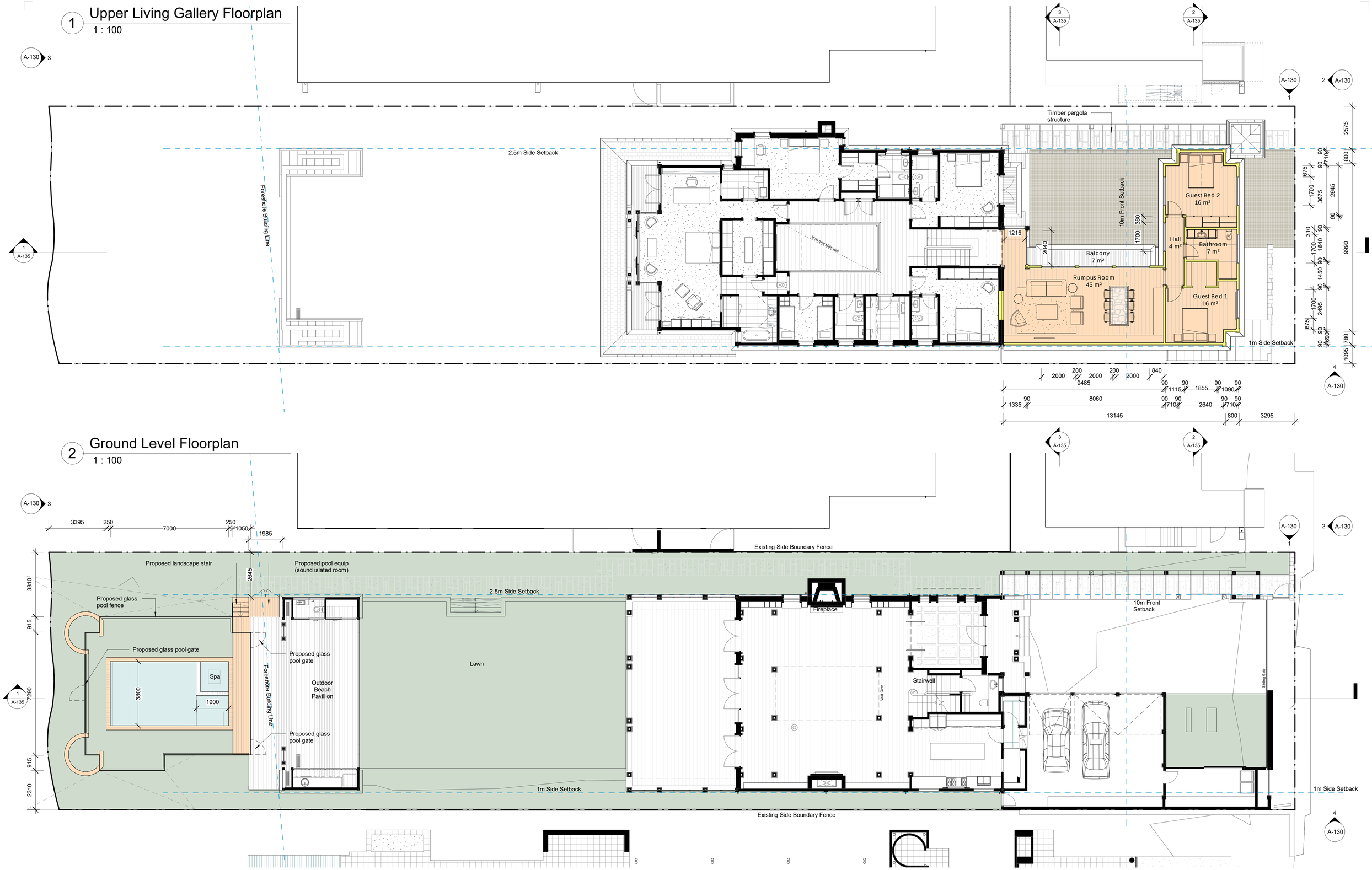
This Drawing must not be used for Construction unless signed as Approved

Project Number	2010_16 Boyd
Project Status	-
	1015 Barrenjoey Road Palm Beach NSW
Sheet	Site Plan, Landscape Plan & Site Coverage

Print Date & Time	12/05/2022 3:58:57 PM
File Path	Z:\2022_04_Boyd Palm Beach\00 - Architectural Plans\01 SK Sketch Design\SK_C_1015 Barrenjoey.Rvt
Drawn By	MM
Checked By	WB
Approved By	WB
Scale @ A1	As indicated
Drawing Number	A-100
Issue	A

1 Upper Living Gallery Floorplan

1 : 100



2 Ground Level Floorplan

1 : 100

Walter Barda Design

Pty Ltd
architecture
landscape
interiors

2.04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

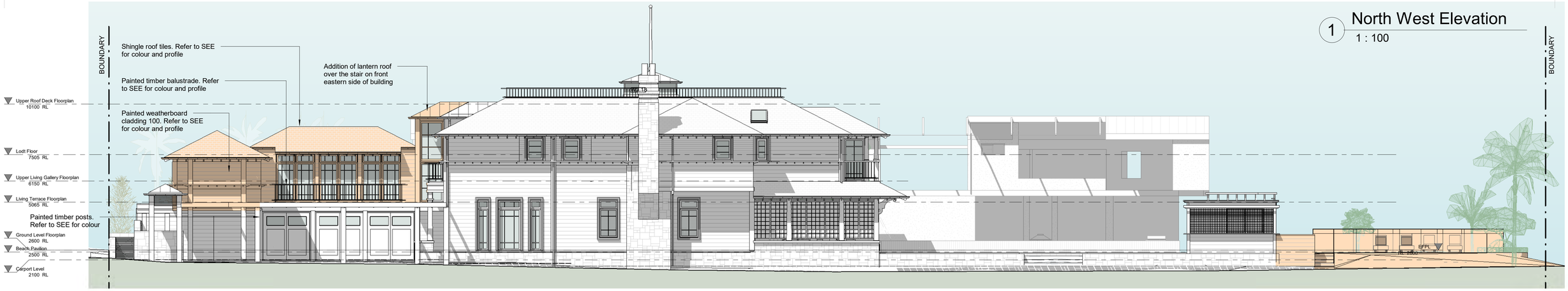
Boyd Palm Beach House

John & Marly Boyd

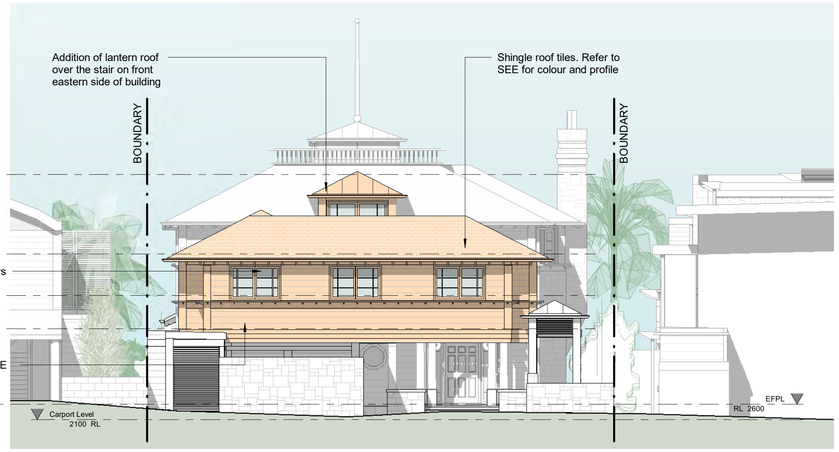
This Drawing must not be used for Construction unless signed as Approved

Project Number	2010_16 Boyd
Project Status	-
	1015 Barrenjoey Road Palm Beach NSW
Sheet	Proposed Floorplans

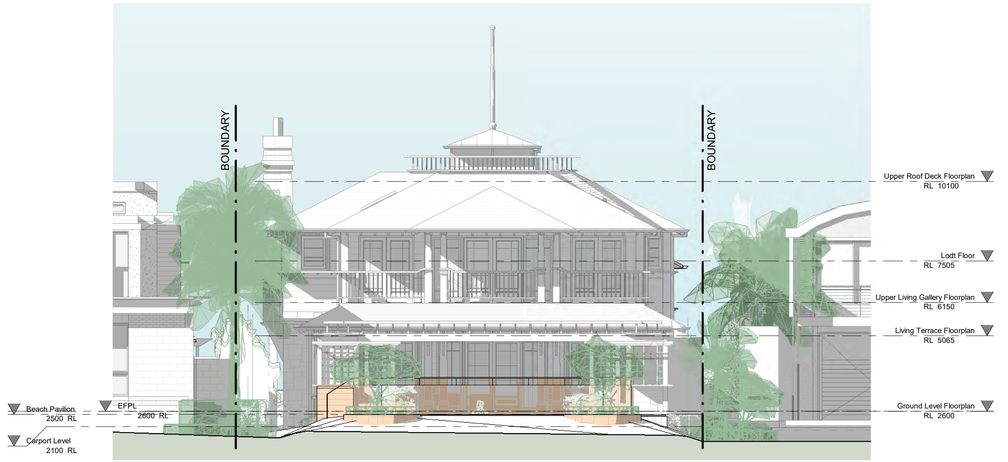
Print Date & Time	12/05/2022 3:59:04 PM		
File Path	Z:\2022_04_Boyd Palm Beach\00 - Architectural Planst\01 SK Sketch Design\SK E_1015 Barrenjoey Rd.rvt		
Drawn By	MM	Checked By	WB
		Approved By	WB
Scale @ A1	1 : 100		
Drawing Number	A-111	Issue	A



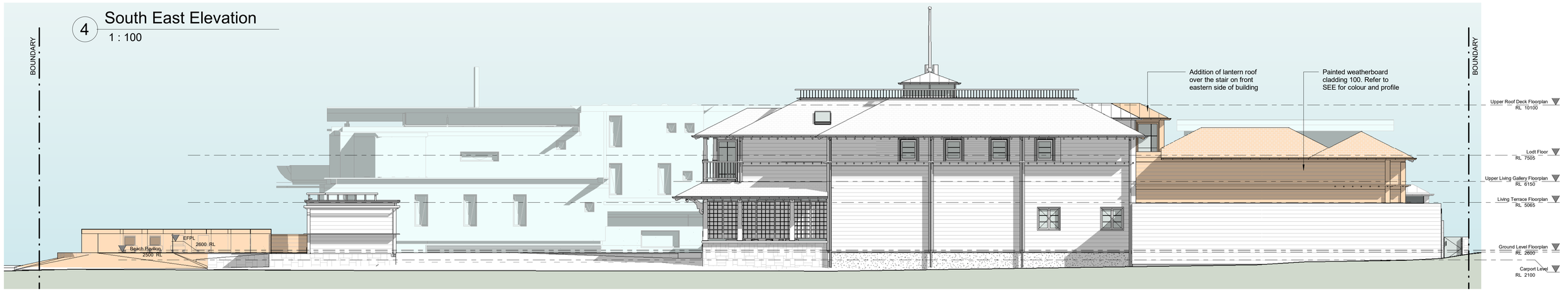
1 North West Elevation
1 : 100



2 North East Elevation
1 : 100



3 South West Elevation
1 : 100



4 South East Elevation
1 : 100

Walter Barda Design
architecture
landscape
interiors
2.04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

Boyd Palm Beach House

John & Marly Boyd

This Drawing must not be used for Construction unless signed as Approved

Project Number 2010_16 Boyd

1015 Barrenjoey Road Palm Beach NSW

Project Status -

Sheet Proposed Elevations

Print Date & Time 12/05/2022 3:59:13 PM

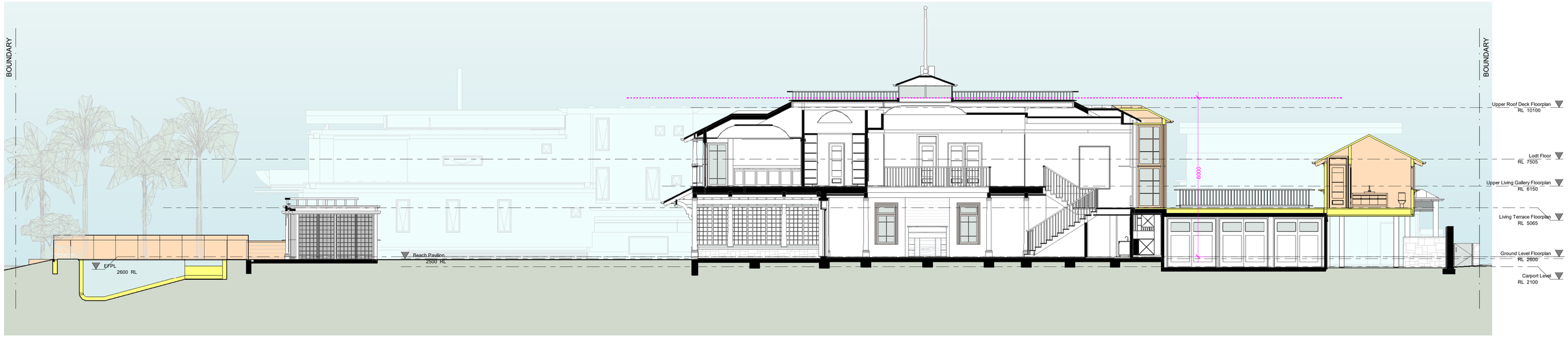
File Path Z:\2022_04_Boyd Palm Beach\00 - Architectural Plans\01 SK Sketch Design\SK E_1015 Barrenjoey Rd.rvt

Drawn By MM | Checked By WB | Approved By WB

Scale @ A1 1 : 100

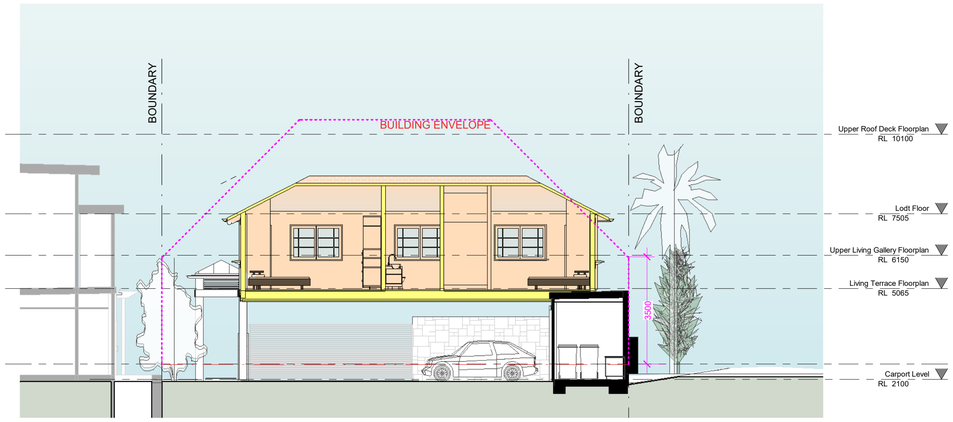
Drawing Number A-130

Issue A



1 Section 01

1 : 100



2 Section A

1 : 100

3 Section B

1 : 100

Walter Barda Design
architecture
landscape
interiors
2.04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

Boyd Palm Beach House

John & Marly Boyd

This Drawing must not be used for Construction unless signed as Approved

Project Number: 2010_16 Boyd

Project Status: -

1015 Barrenjoey Road
Palm Beach NSW

Sheet: Proposed Sections

Print Date & Time: 12/05/2022 3:59:15 PM

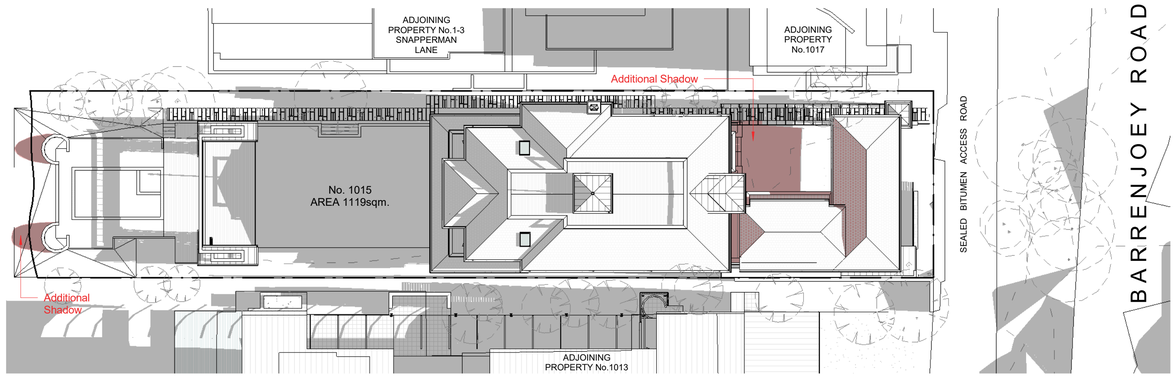
File Path: Z:\2022_04_Boyd Palm Beach\00 - Architectural Plans\01 SK Sketch Design\SK E_1015 Barrenjoey Rd.rvt

Drawn By: MM | Checked By: WB | Approved By: WB

Scale @ A1 1 : 100

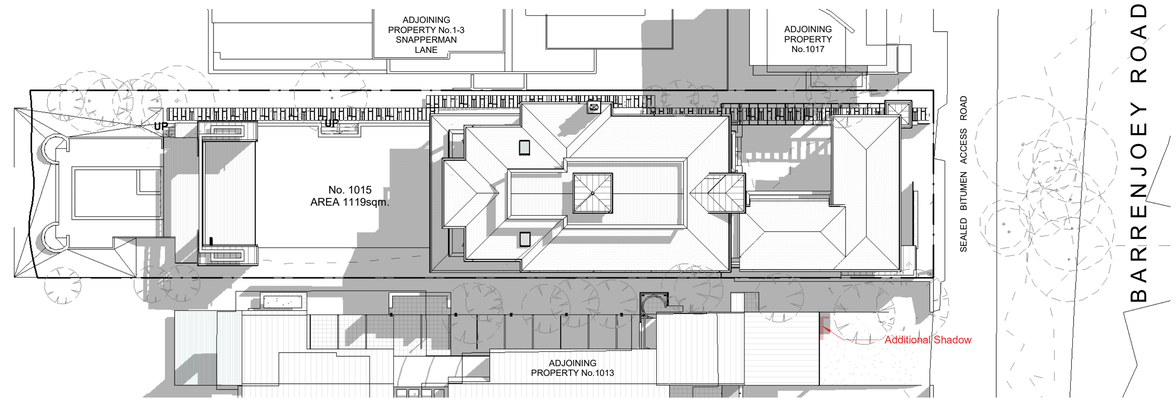
Drawing Number: A-135

Issue: A



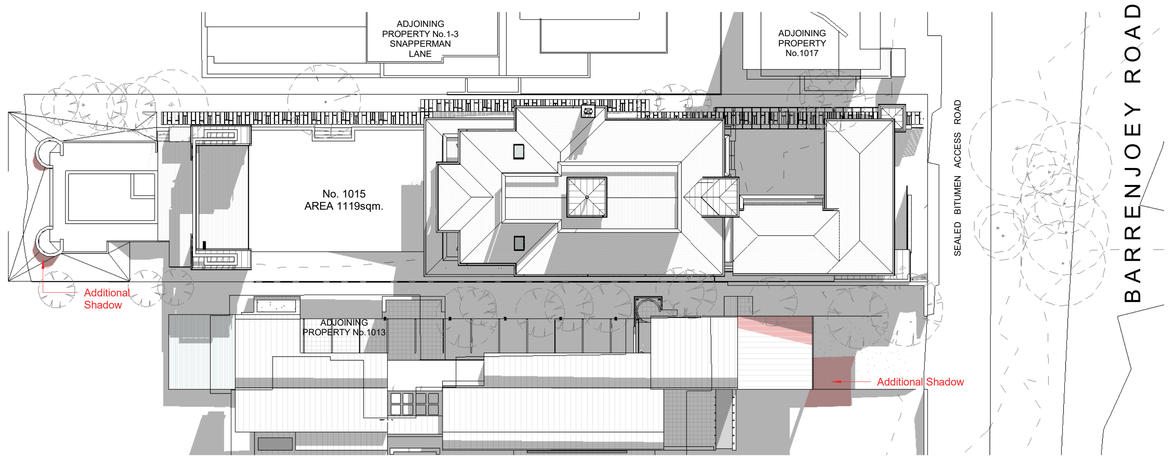
1 Shadow Diagram _Winter Solstice 9am

1 : 250



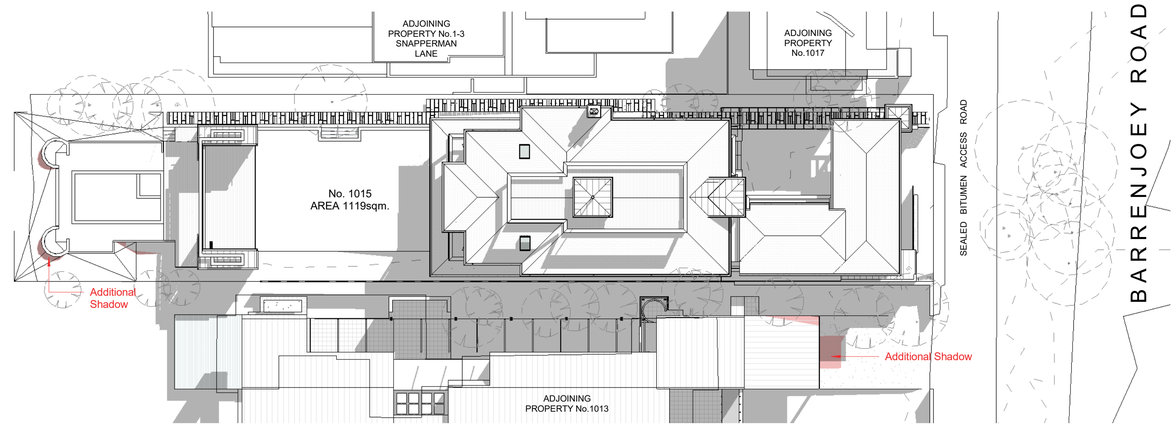
2 Shadow Diagram _Winter Solstice 12pm

1 : 250



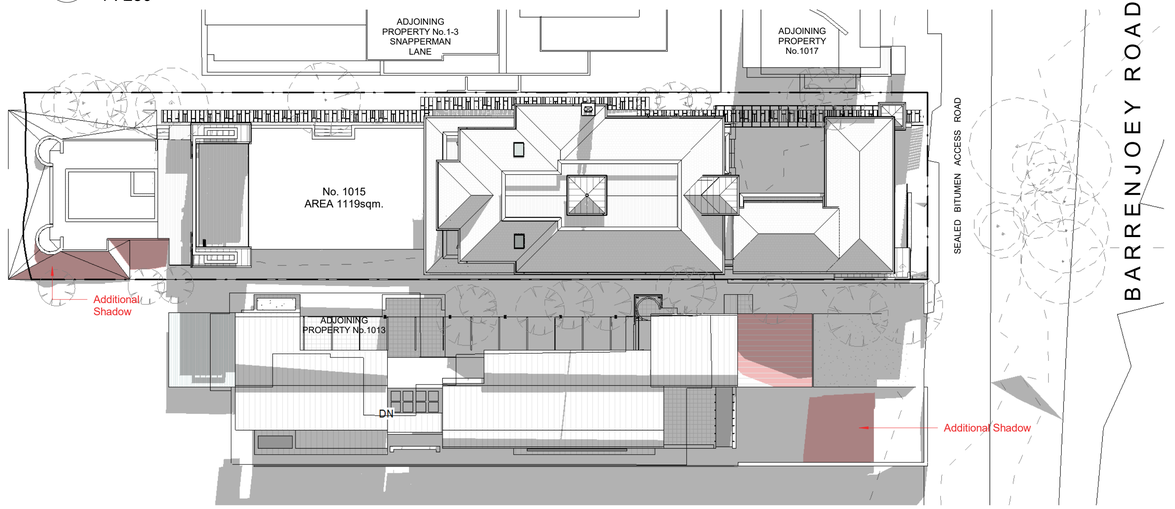
3 Shadow Diagram _Winter Solstice 2pm

1 : 250



4 Shadow Diagram _Winter Solstice 1pm

1 : 250



5 Shadow Diagram _Winter Solstice 3pm

1 : 250

Walter Barda Design
Architecture
landscape
interiors
2.04 13-15 Wentworth Avenue Sydney NSW 2000
www.walterbardadesign.com ABN: 48 072 136 513
Office: 02 9360 2340 Facsimilie: 02 9360 2324

No.	Description	Date
A	DA - DRAFT ISSUE	10.05.2022

Boyd Palm Beach House

John & Marly Boyd

This Drawing must not be used for Construction unless signed as Approved

Project Number 2010_16 Boyd

1015 Barrenjoey Road
Palm Beach NSW

Project Status -

Sheet **Shadow Diagrams**

Print Date & Time 12/05/2022 3:59:21 PM

File Path Z:\2022_04_Boyd Palm Beach\00 - Architectural Planst\01 SK Sketch Design\SK E_1015 BarrenjoeyRd.rvt

Drawn By MM | Checked By WB | Approved By WB

Scale @ A1 1 : 250

Drawing Number **A-190** Issue **A**

A0

LEGEND:

AW = AWNING
BAL = BALCONY
BB = BOTTOM OF BANK
BLD = EXTERNAL BUILDING
CHI = CHIMNEY
CON = CONCRETE
DK = DECK
DS = DOOR SILL LEVEL
EB = EDGE OF BITUMEN
FCE = FENCE
FL = FLOOR LEVEL
GAFL = GARAGE FLOOR LEVEL
GF = GUTTER LEVEL
GRT = GRATE
HL = HOOD LEVEL
HYD = HYDRANT
NS = NATURAL SURFACE
PAR = PARAPET
PAV = PAVING
PER = PERGOLA
REND = RENDERED
RET = RETAINING
RF = TOP OF ROOF
RR = ROOF RIDGE
SIP = SEWER INSPECTION PIT
SL = SILL LEVEL
SMH = SEWER MAN HOLE
SVE = SEWER VENT
TAP = TAP
TB = TOP OF BANK
TER = TERRACE
TFCE = TOP OF FENCE
TG = TOP OF GUTTER
TIL = TILE
TKB = TOP OF KERB
TPIT = TELSTRA PIT
TR = TREE
TW = TOP OF WALL
EO = ELECTRICITY OVERHEAD
S = SEWER UNDERGROUND
TREE SPREAD-DIAMETER-HEIGHT

TITLE INDICATES THAT LOT 54 IN D.P.14682 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S).

0 1 2 3 4 5 6 7 8 9 10
SCALE 1:100

Notes:

- **BOUNDARY IDENTIFICATION HAS BEEN UNDERTAKEN.**
- **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 OR 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 JOHN BOYD.
- 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 DIG SERVICES (ph 1100) 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.

Notes:

- 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.

STEPHEN EMERY
REGISTERED SURVEYOR BOSSI NUMBER 1605

1	FIRST ISSUE	07/04/2022

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: ASSUMED
L.G.A. NORTHERN BEACHES

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: PM 16498
R.L. 2.002 (CLASS LC)
SOURCE: S.C.I.M.S. (11/05/2021)

CLIENT:
JOHN BOYD
C/- WALTER BARDA DESIGN
PO BOX 398
DARLINGHURST, NSW, 1300

BOUNDARY IDENTIFICATION AND DETAIL & LEVEL SURVEY
OVER LOT 54 IN DP14682
No.1015 BARRENJOEY ROAD
PALM BEACH, NSW, 2108

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 4802 Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED	DRAWN	CHECKED	APPROVED
JL	CJR	JL	LJ

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
21251	1:100 @ A0	29/03/2022

DRAWING NAME: 21251detail
CAD FILE: 21251detail 1.dwg
SHEET: 1 OF 1
ISSUE: 1

APPENDIX C

Council Supplied Stormwater Drainage & Flood Information

FLOOD INFORMATION REPORT - BASIC

Property: 1015 Barrenjoey Road PALM BEACH NSW 2108
Lot DP: Lot 54 DP 14682
Issue Date: 22/08/2022
Flood Study Reference: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory

Flood Information for lot [1]:

Flood Risk Precinct – See Map A

Flood Planning Area – See Map A

Maximum Flood Planning Level (FPL) [2, 3, 4]: 2.58 m AHD

1% AEP Flood – See Flood Map B

1% AEP Maximum Water Level [2, 3]: 2.08 m AHD

1% AEP Maximum Depth from natural ground level[3]: 0.63 m

1% AEP Maximum Velocity: 0.24 m/s

1% AEP Hydraulic Categorisation: N/A **See Flood Map D**

Probable Maximum Flood (PMF) – See Flood Map C

PMF Maximum Water Level [4]: 2.32 m AHD

PMF Maximum Depth from natural ground level: 0.84 m

PMF Maximum Velocity: 0.58 m/s

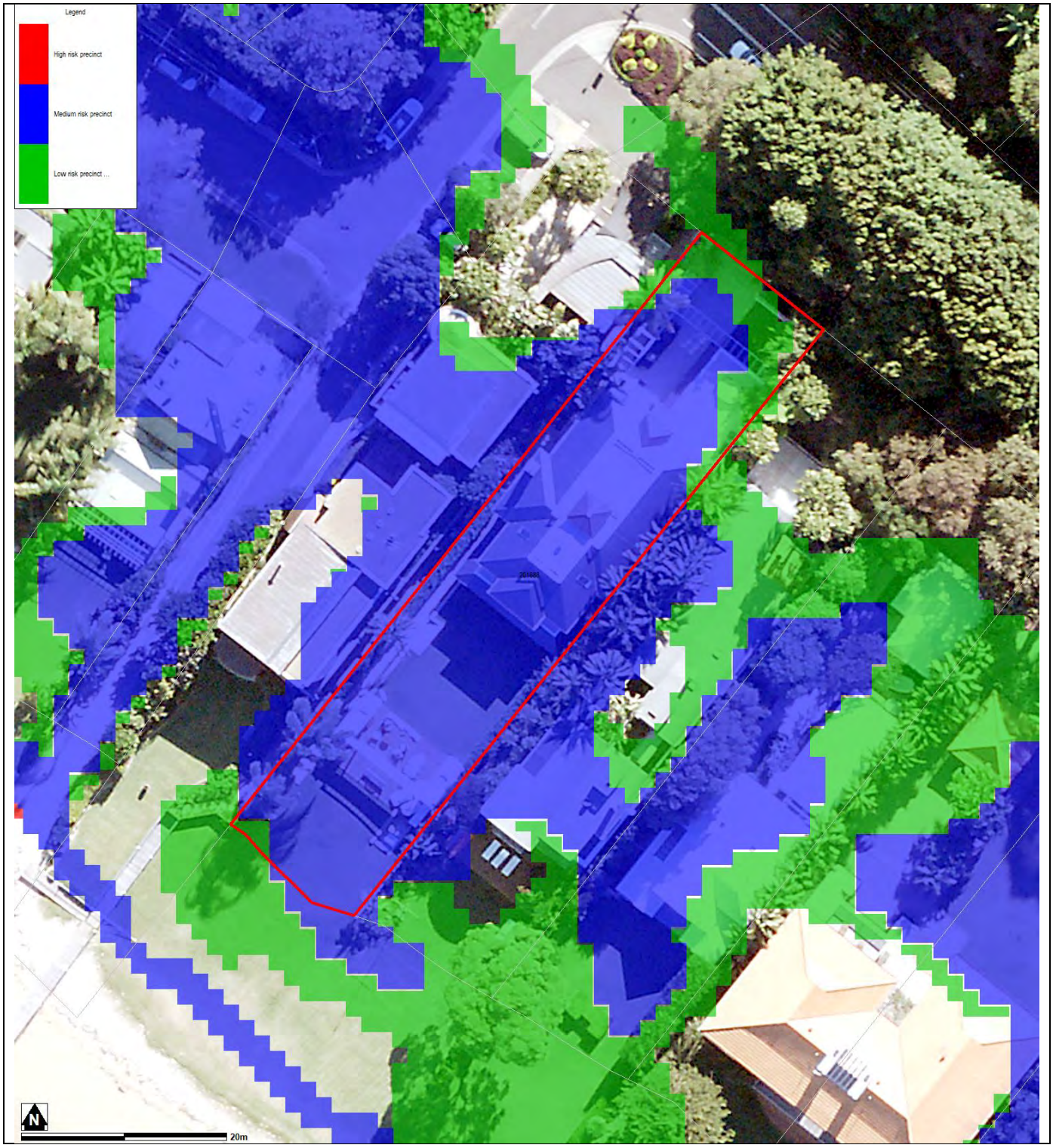
Flood Life Hazard Category – See Map E

[1] The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.
[2] Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning Level may be in a different location to the maximum 1% AEP flood level.
[3] Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels.
[4] Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or FPL.

General Notes:

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

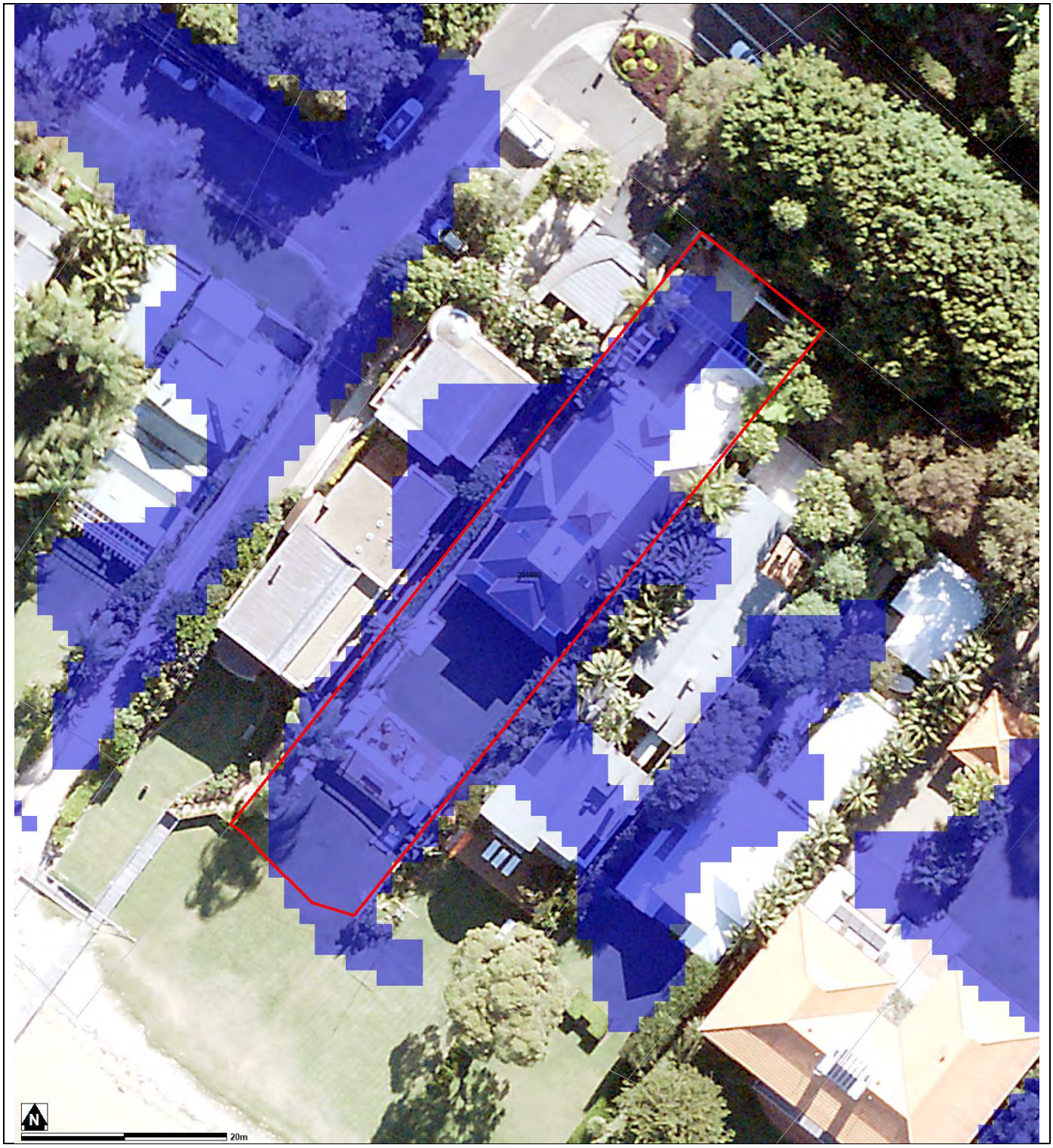
FLOOD MAP A: FLOOD RISK PRECINCT MAP



Notes:

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

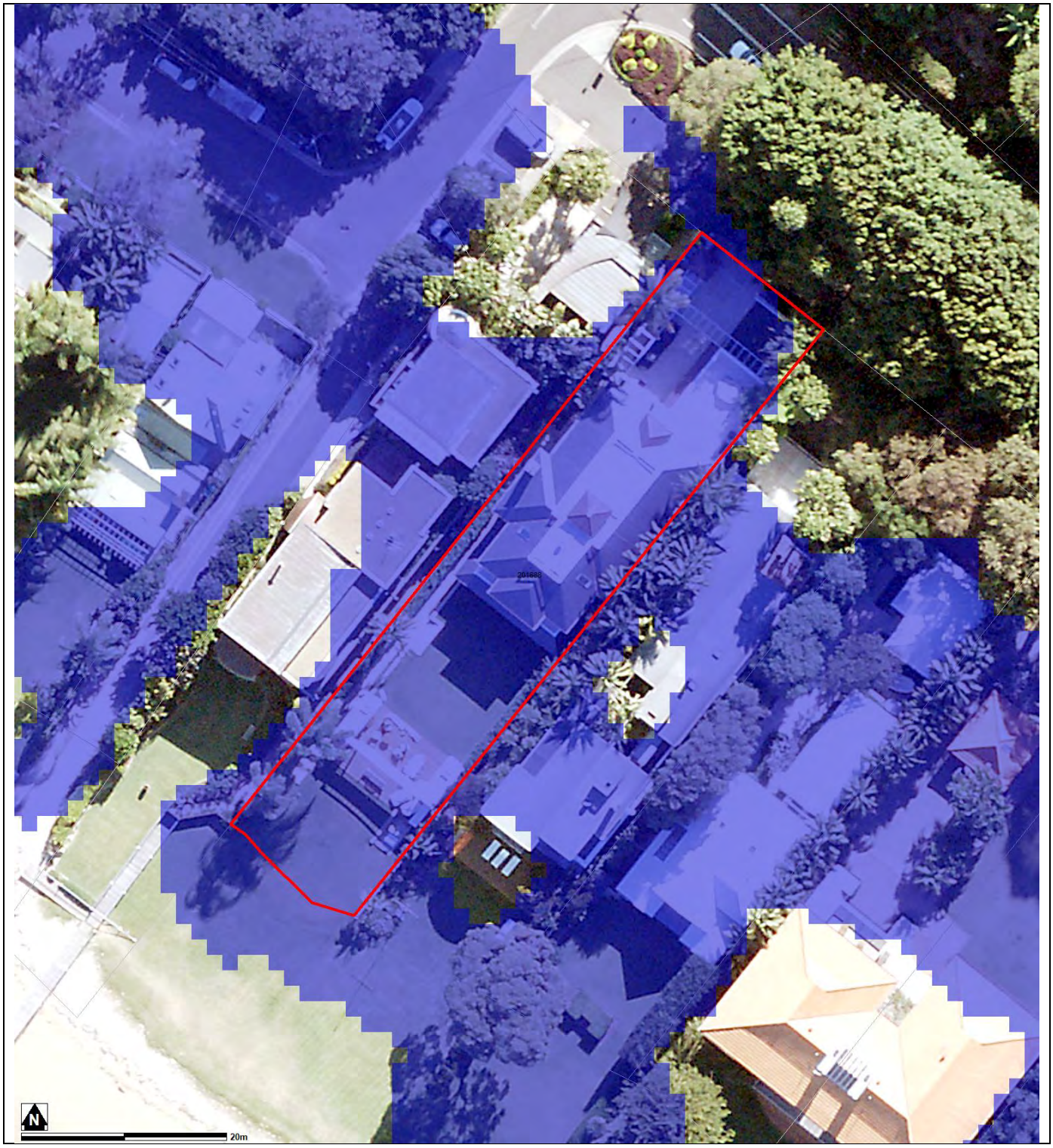
FLOOD MAP B: FLOODING - 1% AEP EXTENT



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.

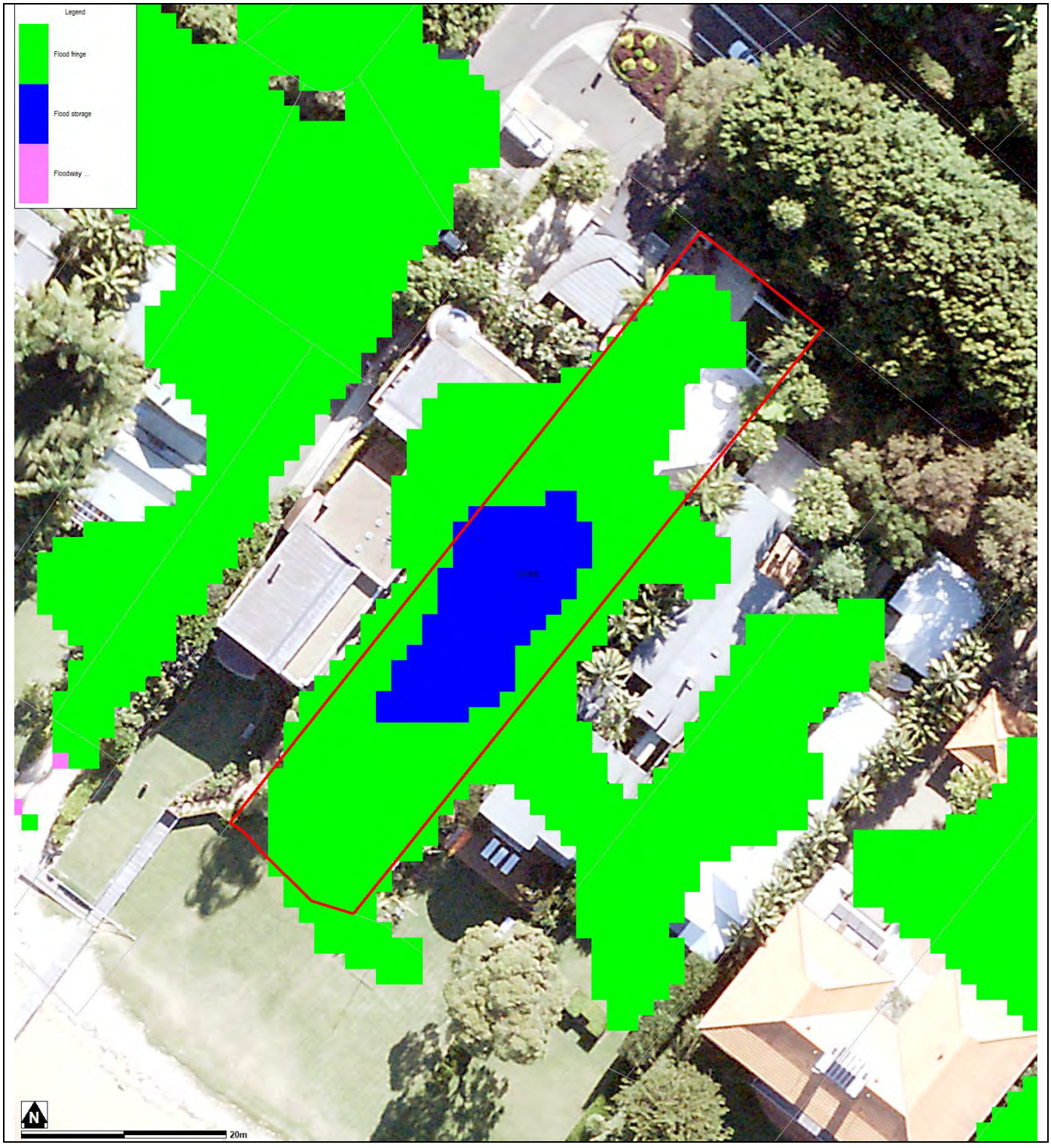
FLOOD MAP C: PROBABLE MAXIMUM FLOOD EXTENT



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.

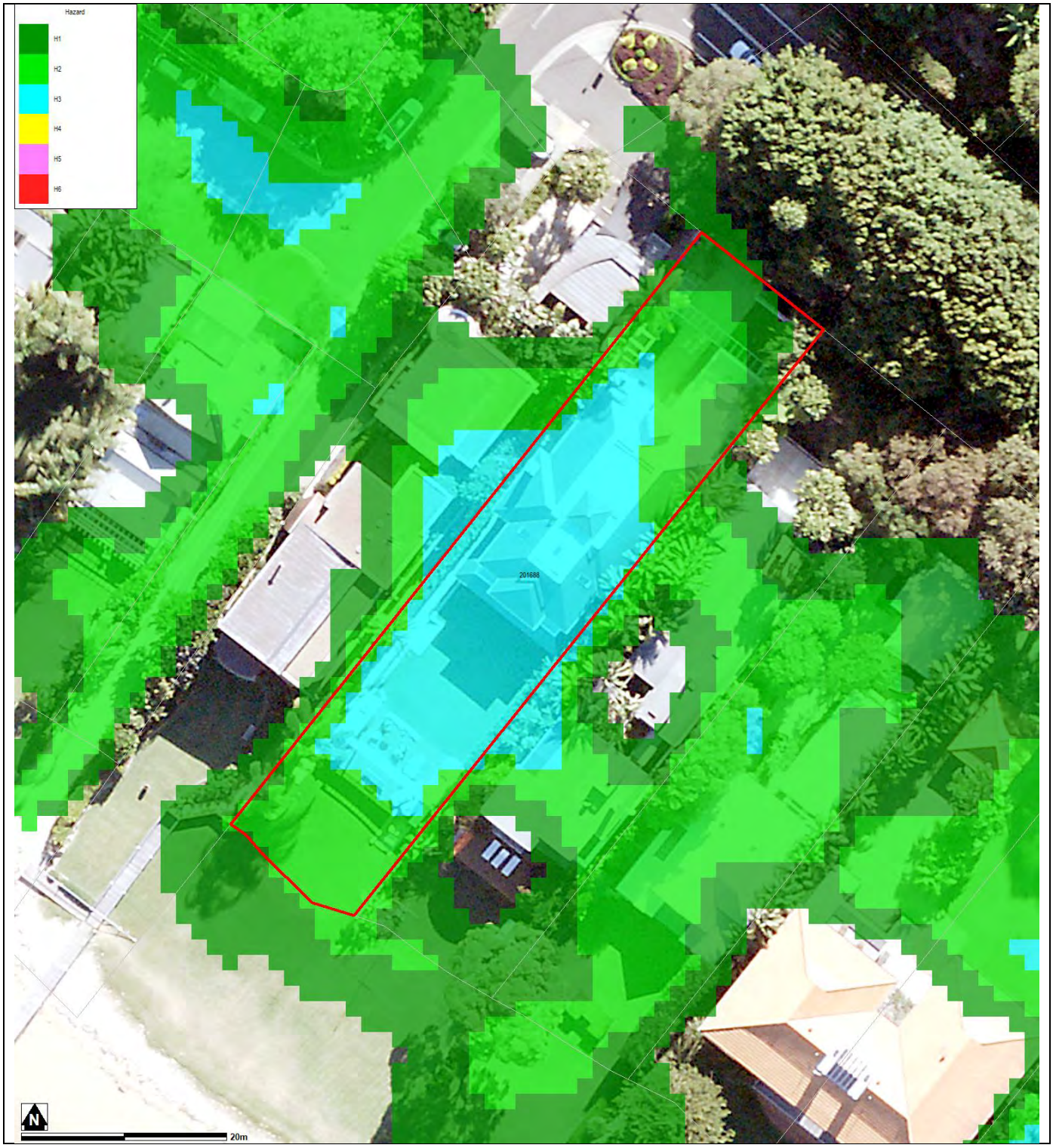
FLOOD MAP D: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

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

FLOOD MAP E: FLOOD LIFE HAZARD CATEGORY



Notes:

- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: 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) – 6.3 Flood Planning	Manly DCP (2013) – 5.4.3 Flood Prone Land
Warringah LEP (2011) – 6.3 Flood Planning Warringah LEP (2000) – 47 Flood Affected Land *	Warringah DCP (2011) – E11 Flood Prone Land
Pittwater LEP (2014) – 7.3 Flood Planning Pittwater LEP (2014) – 7.4 Flood Risk Management	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. 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 floor level is above the Probable Maximum Flood level
- 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.

- 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 .

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)