FLOOD MANAGEMENT REPORT
11 CATALINA CRESCENT AVALON BEACH NSW 2017

Date:
27 July 2023

Prepared For:
Charlie Mort

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Signed:

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1. Description of Development

The subject site is 11 Catalina Crescent Avalon Beach NSW 2107. (Lot 5 DP 26744)

A site survey by Adam Clerke Surveyors (Registered Surveyor 8490) was completed on 23/5/23 and a survey plan showing contours and site levels (Datum AHD), site features and structures, and site boundaries prepared. Refer to Appendix D for a copy of the Survey Plan.

The site area is 1160m2. The site falls by around 3.5m from east to west (Catalina Crescent site boundary to Careel Creek site boundary) with site levels ranging between 1.75m AHD and 5.30m AHD. The site contains an existing 2 story house with ground floor level at 4.50m AHD and two small cabins sited to west of the main house with floor levels at 3.63 AHD (Cabin 1) and 3.79m AHD (Cabin 2).

The proposed development is to raise the existing cabins to above the FPL (Flood Planning Level) of 4.03m AHD to 4.09m AHD and enclose the area between the cabin structures to form a single building structure separate to the main house structure (eg. pavilion). This building structure will contain an office, storage room and bathroom which will form ancillary space to the main building residence and be used for residential purposes (eg. home office, storage etc). Refer to Appendix E for drawings which show the proposed development.

2. Flood Analysis

A Flood Information Report (Comprehensive) was issued by Northern Beaches Council on 29/05/2023. A copy of this report is included in Appendix F. The following hydraulic information as relevant to the proposed development was extracted from the Flood Information Report.

- Maximum Flood Planning Level (FPL) = 4.02m AHD
- 1% Maximum AEP Water Level = 3.52m AHD
- 1% Maximum AEP Velocity = 0.61 m/s
- Probable Maximum Flood Level (PMF) = 5.56m AHD
- 1% Maximum AEP Water Level with Climate Change = 3.94m AHD

As shown on MAP A (Page 3) of the Flood Information Report, the site area includes areas of Low Flood Risk, Medium Flood Risk and High Flood Risk precincts, noting that the Medium and High Flood Risk areas are defined by the 1% AEP Water Level contour or 3.52m AHD. (i.e. Site area where the existing ground levels are less than 3.52m AHD). A Flood Management Report is required to be prepared for all development proposals within the Medium or High Flood Risk precincts (i.e. flood prone land). The proposed development is within the Medium Flood Risk precinct area of the site.

As shown on MAP F (Page 3) of the Flood Information Report, the site area includes areas of Flood Life Hazard Category H2, H3, H4 and H5. The proposed development is within the H5 Flood Life Hazard Category area of the site.

As shown on the drawings included in Appendix E the proposed floor level of the proposed building structure is the 4.09m AHD or 70mm higher than the FPL (4.02m AHD) or the 1% AEP water level plus 0.570m freeboard. The Site Plan in Appendix D shows existing ground levels directly adjacent to the proposed development as varying between 3.07m AHD and 3.64m AHD.

3. Assessment of Impacts

Development on flood prone land must comply with relevant clauses within the Pittwater Local Environmental Plan (LEP) and Pittwater Development Control Plan (DCP) as follows.

- Pittwater 21 DCP (2014) – Cl. B3.11 Flood Prone Land
- Pittwater 21 DCP (2014) – Cl. B3.12 Climate Change
- Pittwater LEP (2014) – Cl. 7.3 Flood Planning
- Pittwater LEP (2014) – Cl. 7.4 Flood Risk Management

a) Refer Pittwater 21 DCP (2014) – Cl. B3.11 Flood Prone Land

Residential use in the Medium Flood Risk precinct is proposed. The applicable controls are defined in the Medium Flood Risk Precinct matrix in Cl. B3.11 of the Pittwater 21 DCP (2014). An assessment of compliance of the proposed development against each of these controls has been undertaken and is reported in Appendix A. In summary, the proposed development complies with Cl. B3.11 of the Pittwater 21 DCP (2014) with some qualifications as described in Appendix A.

b) Refer Pittwater 21 DCP (2014) – B3.12 Climate Change

The 1% Maximum AEP Water Level with Climate Change is 3.94m AHD which is 0.42m higher than the 1% Maximum AEP Water Level of 3.52m AHD. The proposed development will adopt 4.09m AHD as the floor level which is higher (0.150m) than the 1% Maximum AEP Water Level with Climate Change. The freeboard allowance (0.570m) is an effective buffer and will help mitigate the risk of increases to the 1% AEP flood level due to climate change.

c) Refer Pittwater LEP (2014) – Cl. 7.3 Flood Planning

This clause has been repealed and is therefore not applicable.

d) Refer Pittwater LEP (2014) – Cl. 7.4 Flood Risk Management

This clause applies to land between the FPL and the probable maximum flood level. The objectives of this clause includes to ensure the safe evacuation of the proposed development is provided for flood events exceeding the FPL. Refer to Control E1 of the compliance matrix in Appendix A for an explanation regarding how this requirement is achieved.

APPENDIX A

Pittwater 21 DCP (2014) Cl. B3.11 Compliance Summary

	Controls	Applies? (Y/N)	Complies? (Y/N)	Justification
A	**Flood effects caused by Development**			
A1	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	The proposed development has a footprint of 45m2 (3.6m x 12.0m) and is sited at 4.09m AHD floor level on an elevated area of the site with minimal exposure to the flood hazard. The 1% AEP event flood level is 3.52m AHD. The existing ground level varies between 3.07m AHD and 3.64m AHD (maximum flood depth = 0.45m). The proposed development displaces 5.3m3 of flood water during the 1% AEP event flood (refer Calculation Appendix G). This volume of displaced water is small in comparison to the vast quantity of flood water which would occupy the catchment during the 1% AEP event flood and will not have a consequential effect on flood levels and velocities on site as reported in the Flood Information Report. The proposed development will therefore not have an adverse impact on surrounding properties or on flood levels and velocities.

A2	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	As per the calculation in Appendix G, the net loss of flood storage is minimal (5.3m3) for the 1% AEP event flood). If necessary, an equivalent volume (5.3m3) of the existing ground westwards of Cabin 1 can be removed to compensate for the net loss of flood storage.
B	**Building Components & Structures**			
B1	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	The existing cabin 1 & 2 building sub-floor structure is concrete slab supported on perimeter brick walls. (Refer to photos in Appendix C) This construction type is resilient to flood damage. The existing slab levels are above the 1% AEP flood event water level of 3.52m AHD (Cabin 1 - 3.63m AHD and Cabin 2 - 3.79m AHD). The existing Cabins 1 and 2 timber frame structures will be raised above the slabs and a new timber framed floor constructed at 4.09m AHD and supported on the existing slabs. Additional framing will be constructed to enclose the centre space between the cabins and form a single building structure spanning across the cabins 1 and 2 substructures. All timber framed construction is fully above the 1% AEP event flood level and therefore not exposed to flood damage up to the 1% AEP event flood.

B2	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	As described in B1 above the proposed development is supported on existing concrete slab over perimeter brick walls that will sit above the 1% AEP event flood level. The structural integrity will be maintained during the 1% AEP event flood with minor inundation only of the footing structure and brick walls below the cabins 1 and 2 slab level.
B3	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	All electrical equipment, power points and wiring are to be located in the timber framing of the building structure and above the FPL.
C	**Floor Levels**			
C1	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	The proposed floor level of the building structure is 4.09m AHD. This is 70mm higher than the FPL.
C3	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	It is not feasible to construct the building structure at the level of the Probable Maximum Flood (5.56m AHD). At this level the main house and all properties on the western side of Catalina Crescent would be inundated. As discussed with Council, FPL is the minimum acceptable level for new building structures, and it is not required to adopt the Probable Maximum Flood level as the minimum floor level for residential developments.
C4	Refer Pittwater 21 DCP (2014)-B3.11	N		
C6	Refer Pittwater 21 DCP (2014)-B3.11	N		
D	**Car Parking**			
D1	Refer Pittwater 21 DCP (2014)-B3.11	N		
D2	Refer Pittwater 21 DCP (2014)-B3.11	N		
D3	Refer Pittwater 21 DCP (2014)-B3.11	N		
D4	Refer Pittwater 21 DCP (2014)-B3.11	N		
D5	Refer Pittwater 21 DCP (2014)-B3.11	N		
D6	Refer Pittwater 21 DCP (2014)-B3.11	N		
E	**Emergency Response**			

E1	Refer Pittwater 21 DCP (2014)-B3.11	Y	Y	The proposed development is within the H5 Flood Life Hazard Category area of the site. Parts of Catalina Crescent are above the level of the Probable Maximum Flood (5.56m). Catalina Crescent is accessible from the property and will provide a safe refuge in the event of the highest floodwater that can be envisaged. Unimpeded access to Catalina Crescent from the proposed development is provided via the route as indicated on the Site Plan markup included in Appendix H. For the 1% AEP flood event, the floor of the proposed development will be 0.57m above the flood water. The safe evacuation from the property will therefore not be limited by this flood event, or present a life safety risk. Safe evacuation to Catalina Crescent or the main house adjacent is possible during the 1% AEP flood event.
F	**Fencing**			
F1	Refer Pittwater 21 DCP (2014)-B3.11	N		
G	**Storage of Goods**			
G1	Refer Pittwater 21 DCP (2014)-B3.11	N		
H	**Pools**			
H1	Refer Pittwater 21 DCP (2014)-B3.11	N		

APPENDIX B

Relevant Extracts from Pittwater 21 DCP (2014) Cl. B3.11

		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

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

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.
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.

B. 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).
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.
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.

C. FLOOR LEVELS

C1	New floor levels within the development shall be at or above the Flood Planning Level.
C2	All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level, whichever is higher.

Icon

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
C4	A one-off addition or alteration below the Flood Planning Level of less than 30 square metres (in total, including walls) may be considered only where: (a) it is an extension to an existing room; and (b) the Flood Planning Level is incompatible with the floor levels of the existing room; and (c) out of the 30 square metres, not more than 10 square metres is below the 1% AEP flood level. This control will not be permitted if this provision has previously been utilised since the making of this Plan. The structure must be floodproofed to the Flood Planning Level, and the Flood Management Report must demonstrate that there is no net loss of flood storage in all events up to the 1% AEP event.
C5	The applicant must demonstrate that future development following a subdivision proposal can be undertaken in accordance with this Development Control Plan.
C6	Consideration may be given to the retention of an existing floor level below the Flood Planning Level when undertaking a first floor addition provided that: (a) it is not located within a floodway; and (b) the original foundations are sufficient to support the proposed final structure above them. The Flood Management Report must include photos and the structural certification required as per Control B2 must consider whether the existing foundations are adequate or should be replaced; and (c) none of the structural supports/framing of existing external walls of are to be removed unless the building is to be extended in that location; and (d) the ground floor is floodproofed.
C7	Consideration may be given to a floor level below the Flood Planning Level within the

M Icon

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. If the property is affected by a Flood Life Hazard Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the risk level on the property is or can be reduced to a level below H6 or its equivalent. If the property is flood affected but the Flood Life Hazard Category has not been mapped by Council, then calculations for its determination must be shown in the Flood Management Report, in accordance with the "Technical Flood Risk Management Guideline: Flood Hazard", Australian Institute for Disaster Resilience (2012). 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 Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control. In the case of change of use or internal alterations to an existing building, a variation to this control may be considered if justified appropriately by a suitably qualified professional. Note that 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.

APPENDIX C

Site Photographs

PHOTO 1 – EXISTING CABIN 2 WEST WALL

PHOTO 2 – EXISTING CABIN 1 SOUTH WALL

APPENDIX D

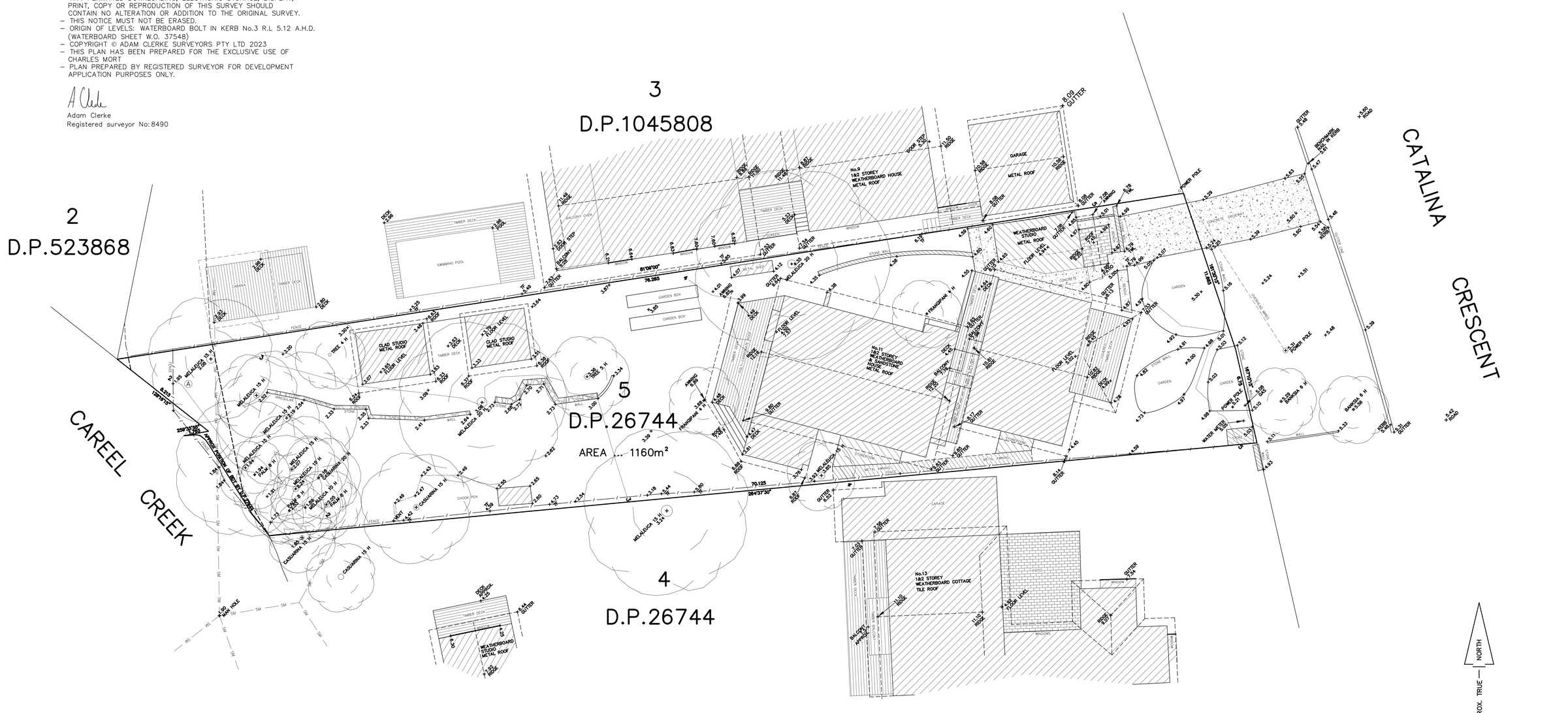
Site Survey Plan – Adam Clerk Surveyors Pty Ltd (26/05/23)

NOTES:

- BOUNDARY SURVEY HAS BEEN UNDERTAKEN. SURVEY MARKS SHOULD BE PLACED IF EXCAVATION, CONSTRUCTION OR STRUCTURES ARE TO BE ERECTED ON OR NEAR THE BOUNDARIES.
- EXCEPT WHERE SHOWN BY DIMENSIONS LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- TREE SPREADS & HEIGHTS ARE INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN SHOWN. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. NOTIFICATION OF ALL RELEVANT AUTHORITIES SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA. DIAL BEFORE YOU DIG SERVICES (ph1100) SHOULD BE CONTACTED.
- CONTOUR INTERVAL – 1 METRE. CONTOURS ARE INDICATIVE ONLY. SPOT LEVELS SHOULD BE ADOPTED FOR DESIGN AND CALCULATION PURPOSES. CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- DO NOT SCALE FROM THIS PLAN. DIMENSIONS SHOULD BE USED.
-
- 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.
- ORIGIN OF LEVELS: WATERBOARD BOLT IN KERB No.3 R.L 5.12 A.H.D. (WATERBOARD SHEET W.O. 37548)
-
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF CHARLES MORT
- PLAN PREPARED BY REGISTERED SURVEYOR FOR DEVELOPMENT APPLICATION PURPOSES ONLY.

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND:

- TWL .. TOP OF WALL
- TF .. TOP OF FENCE
- ——/—— FENCE
- —— SM —— INDICATIVE POSITION OF SEWER MAIN (NOT VISIBLE). POSITION TO BE CONFIRMED BY SYDNEY WATER.
- WINDOW, RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

- SUBJECT LAND AFFECTED BY COVENANT (G313797) & VARIATION (G441453)
- Ⓐ .. DENOTES EASEMENT TO DRAIN SEWAGE, 6 WIDE & VARIABLE WIDTH (S774486)

TRUNK DIA. — INDICATIVE TREE SPREAD AND TRUNK DIAMETERS
SPREAD

ADAM CLERKE SURVEYORS PTY LTD
Incorporating PAUL KEEN & COMPANY
LAND & ENGINEERING SURVEYORS
P.O. BOX 175 NEWPORT NSW 2106
TEL..9918 4111 E..adam@adamclerkesurvey.com.au

DETAILS AND LEVELS OVER
LOT 5 IN D.P.26744

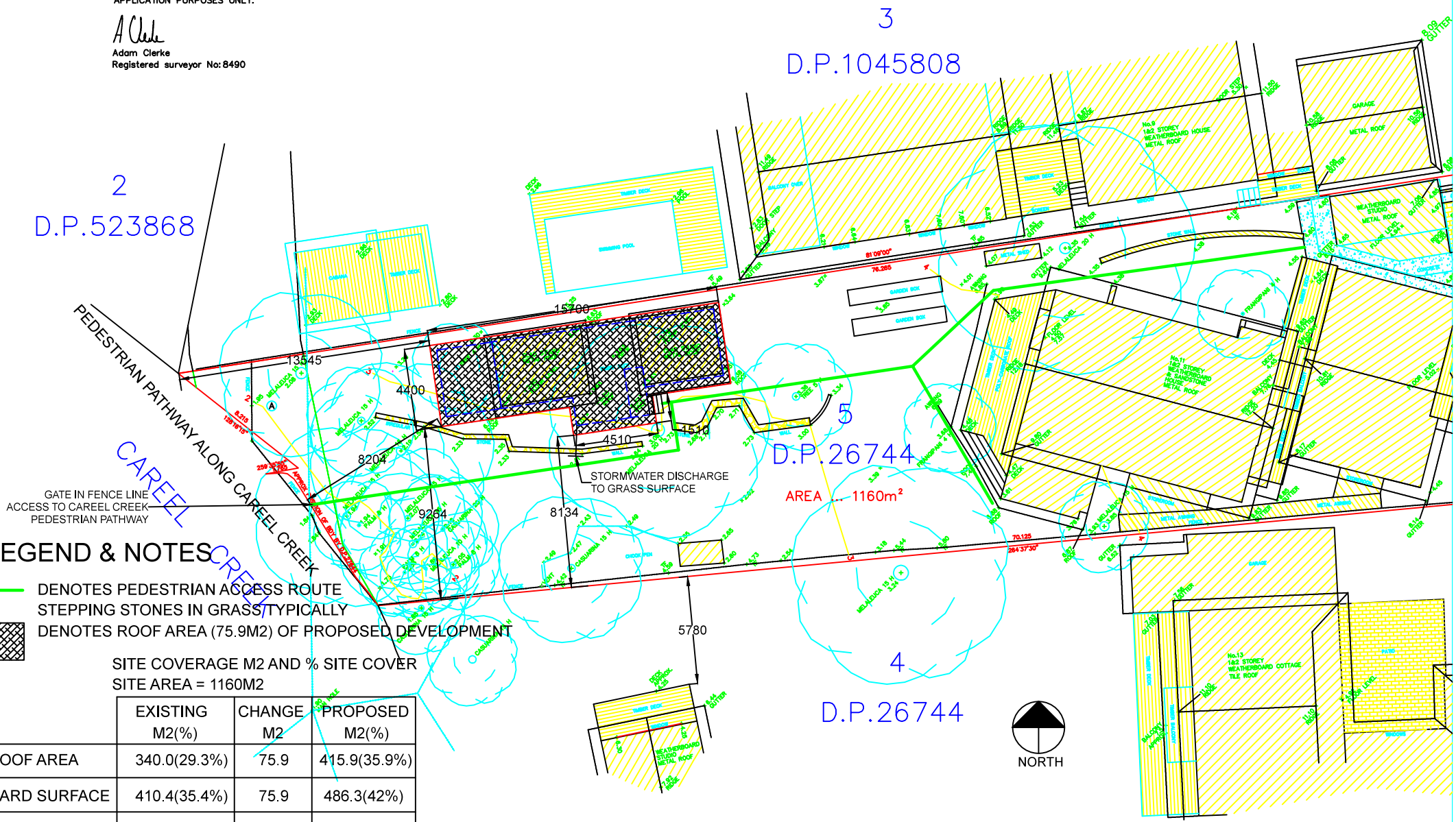
11 CATALINA CRESCENT, AVALON

DATE... 26/05/23 REF... 21085D
SCALE...1:100(A0) DATUM...A.H.D

APPENDIX E – Proposed Development Drawings

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND & NOTES

DENOTES PEDESTRIAN ACCESS ROUTE
STEPPING STONES IN GRASS/TYPICALLY
DENOTES ROOF AREA (75.9M2) OF PROPOSED DEVELOPMENT

SITE COVERAGE M2 AND % SITE COVER
SITE AREA = 1160M2

	EXISTING M2(%)	CHANGE M2	PROPOSED M2(%)
ROOF AREA	340.0(29.3%)	75.9	415.9(35.9%)
HARD SURFACE	410.4(35.4%)	75.9	486.3(42%)
LANDSCAPE	749.6(64.6%)	-75.9	673.7(58%)

LEGEND:
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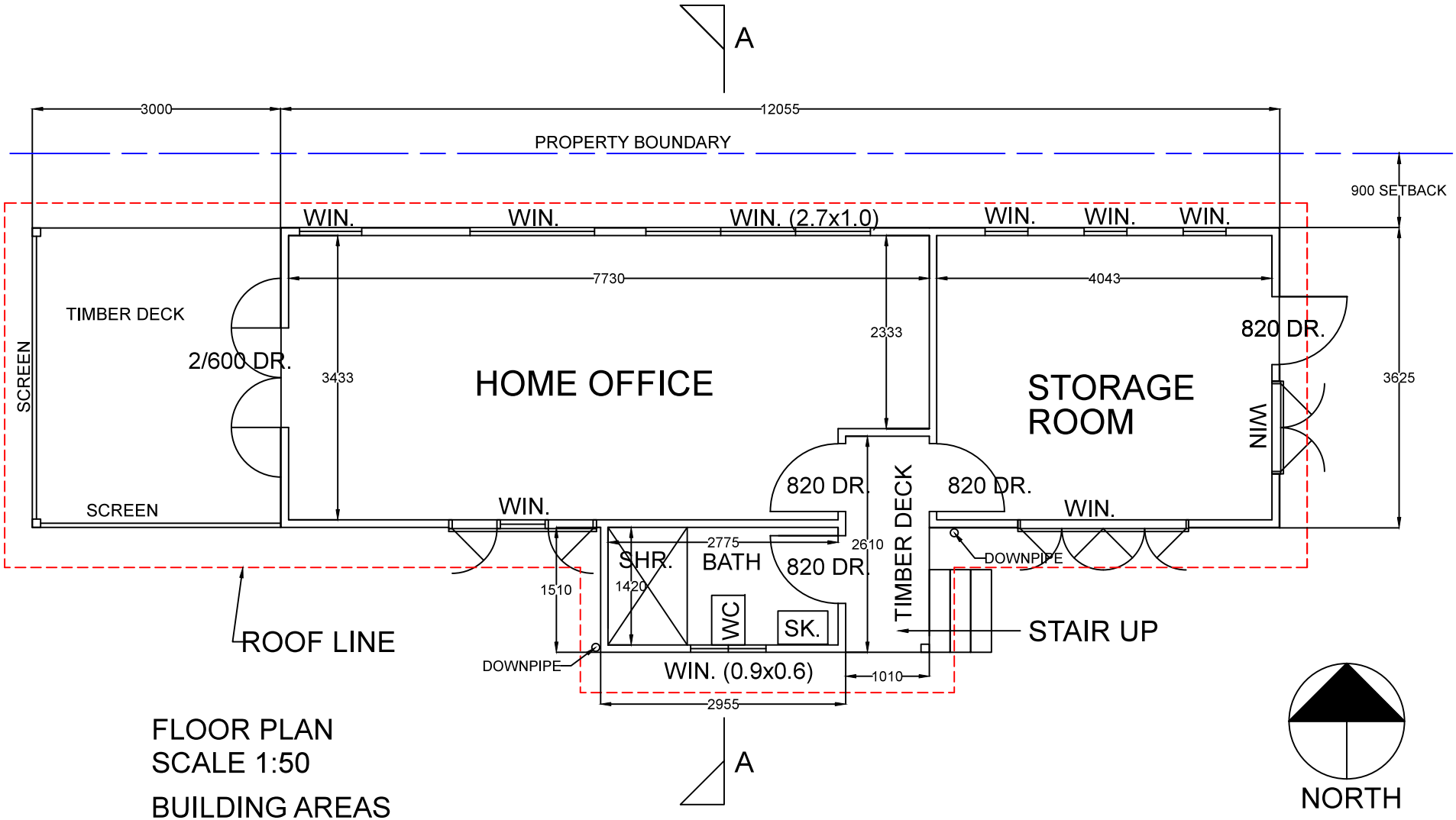
Revisions		
No.	Description	Date
A	Original Issue	20 /11/23

PROPOSED DEVELOPMENT
PROPERTY: 11 CATALINA CRESCENT AVALON BEACH NSW 2017
LOT DP: LOT 5 DP 26744
CLIENT: CHARLES MORT
DESIGNER: PHILIP LOW (PH: 0410 542466 E: philip.low@app.com.au)

SITE PLAN
SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 01	



FLOOR PLAN
SCALE 1:50

BUILDING AREAS
1) ROOF AREA = 75.9M2
2) ENCLOSED BUILDING = 48.2M2
3) DECKS = 13.4M2

Revisions		
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FLOOR PLAN

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Drawn	PL	Check	PL
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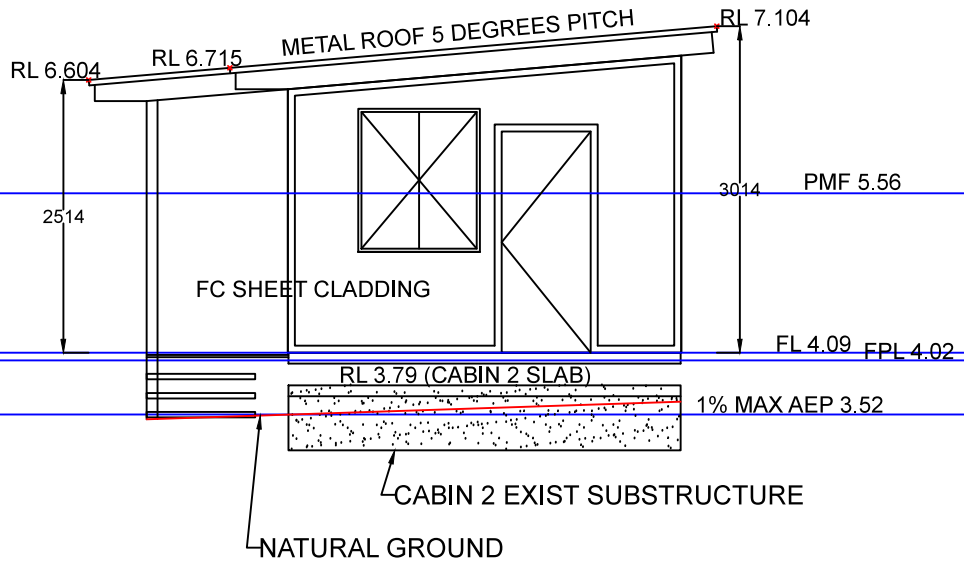
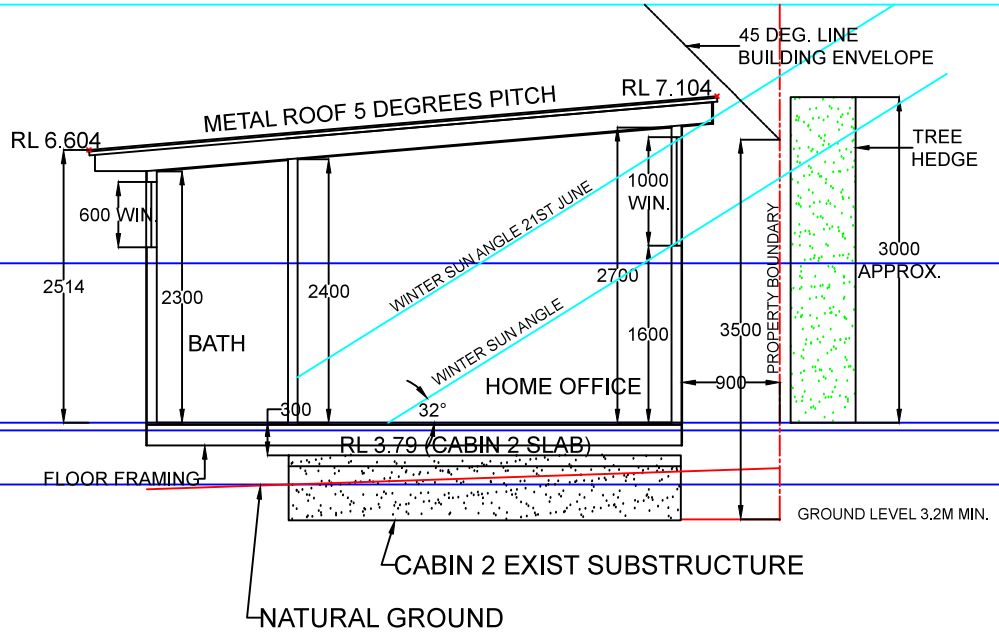
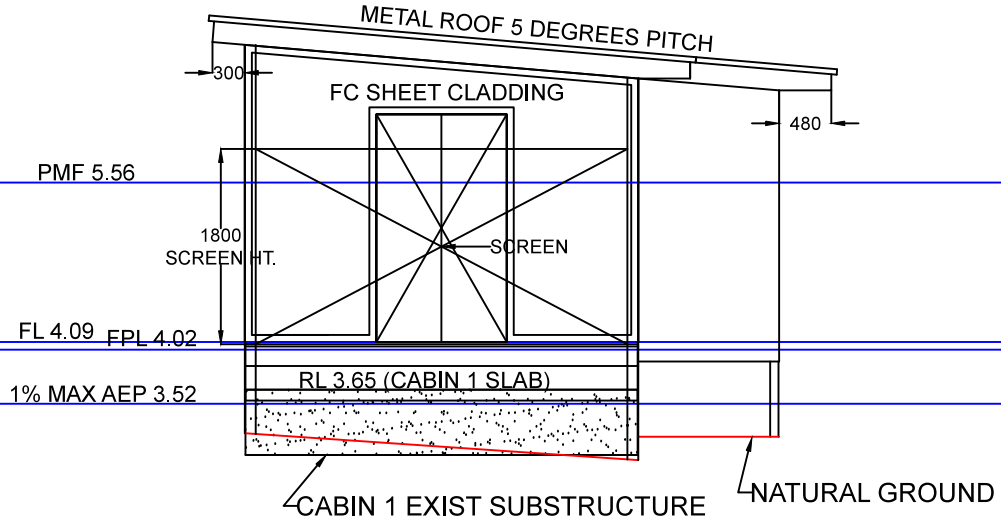


EAST ELEVATION (SCALE 1:50)



SECTION AA (SCALE 1:50)



WEST ELEVATION (SCALE 1:50)

Revisions		
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ELEVATIONS

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Drawn	PL	Check	PL
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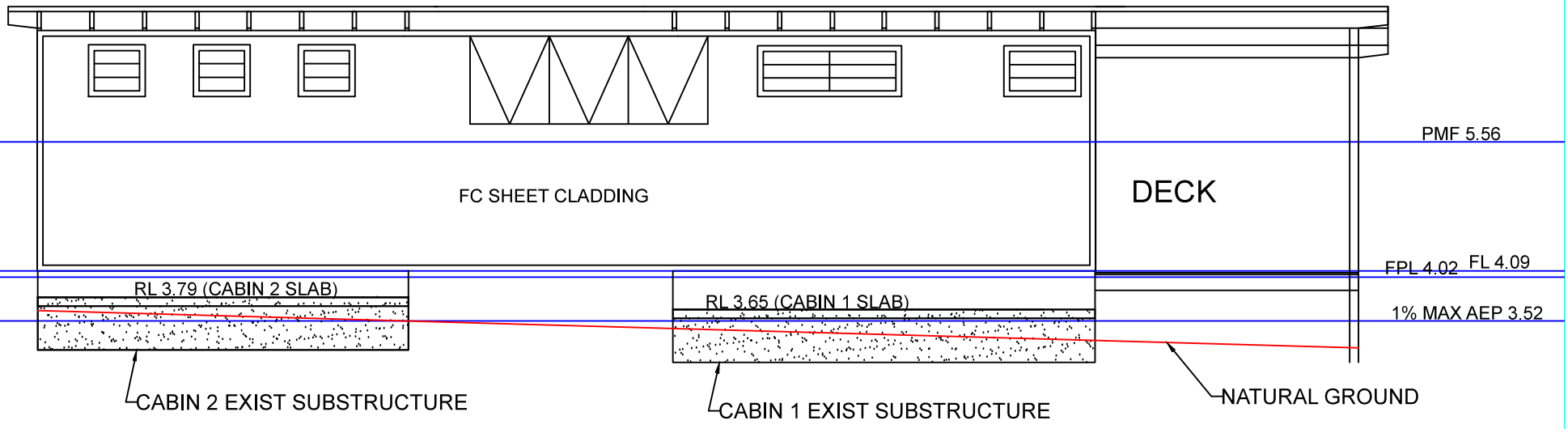
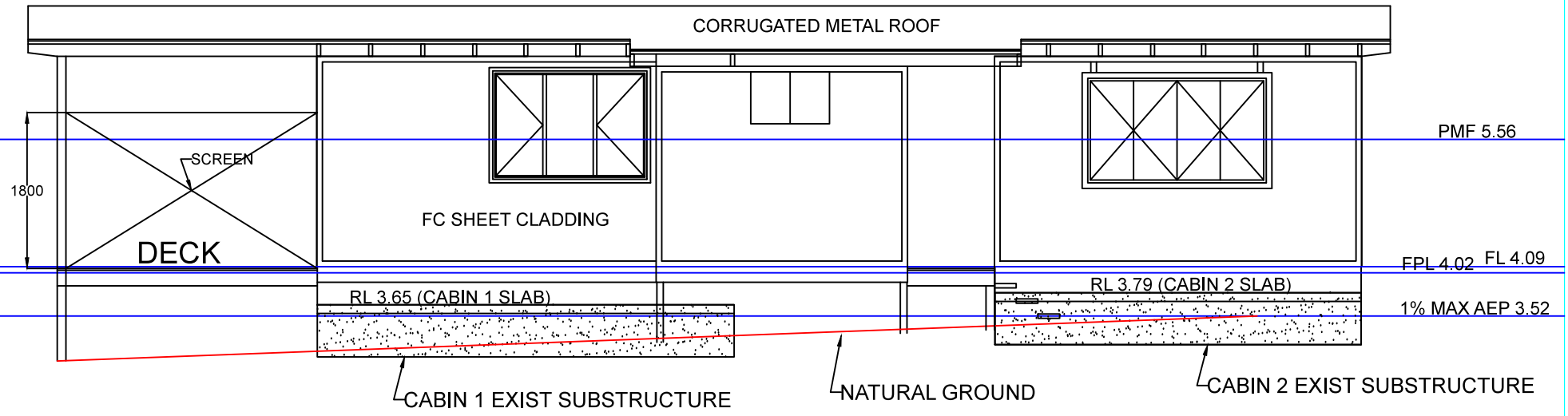


NORTH ELEVATION (SCALE 1:50)



SOUTH ELEVATION (SCALE 1:50)

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ELEVATIONS

Design	PL	Check	PL
Drawn	PL	Check	PL
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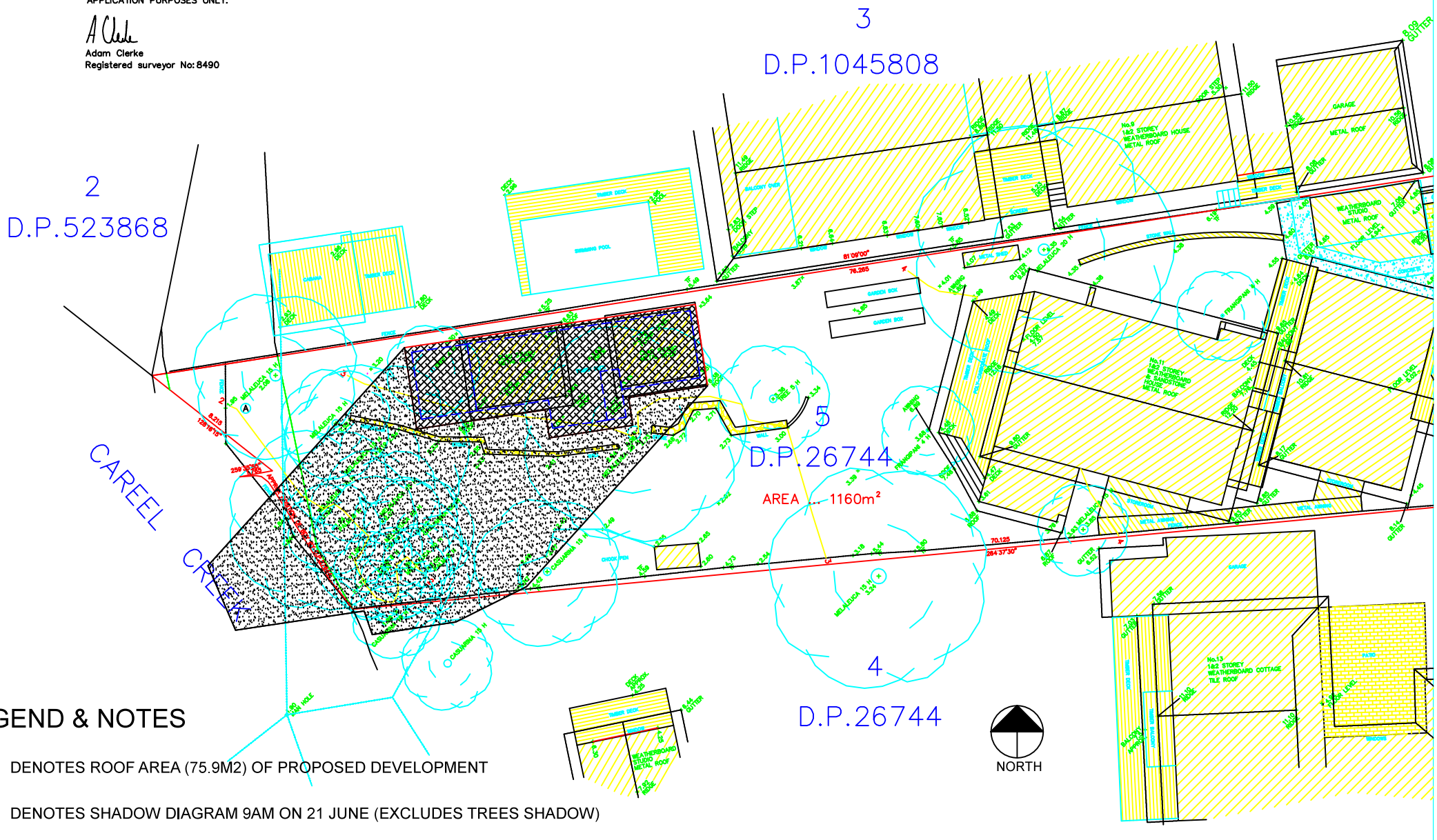
Drawing No.		CATALINA 04	

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND & NOTES

DENOTES ROOF AREA (75.9M2) OF PROPOSED DEVELOPMENT

DENOTES SHADOW DIAGRAM 9AM ON 21 JUNE (EXCLUDES TREES SHADOW)

LEGEND:
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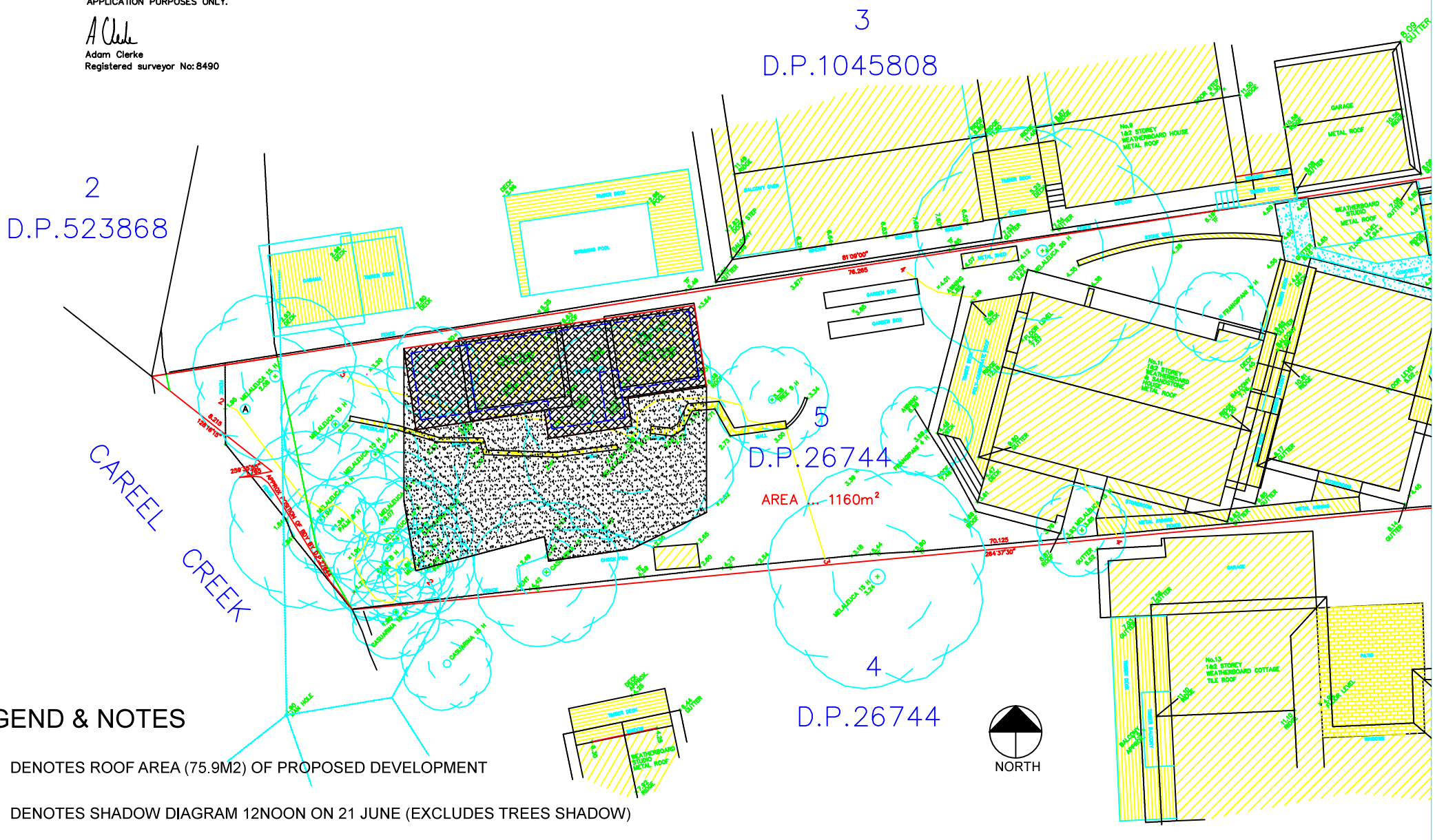
SHADOW DIAGRAM 9AM ON 21 JUNE SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 05	

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND & NOTES

DENOTES ROOF AREA (75.9M2) OF PROPOSED DEVELOPMENT

DENOTES SHADOW DIAGRAM 12NOON ON 21 JUNE (EXCLUDES TREES SHADOW)

LEGEND:
– TWL .. TOP OF WALL
– TF .. TOP OF FENCE
– ———— FENCE
– ———— INDICATIVE POSITION OF SEWER MAIN (NOT VISIBLE). POSITION TO BE CONFIRMED BY SYDNEY WATER.
– WINDOW, RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

Revisions		
No.	Description	Date
A	Original Issue	20 /11/23

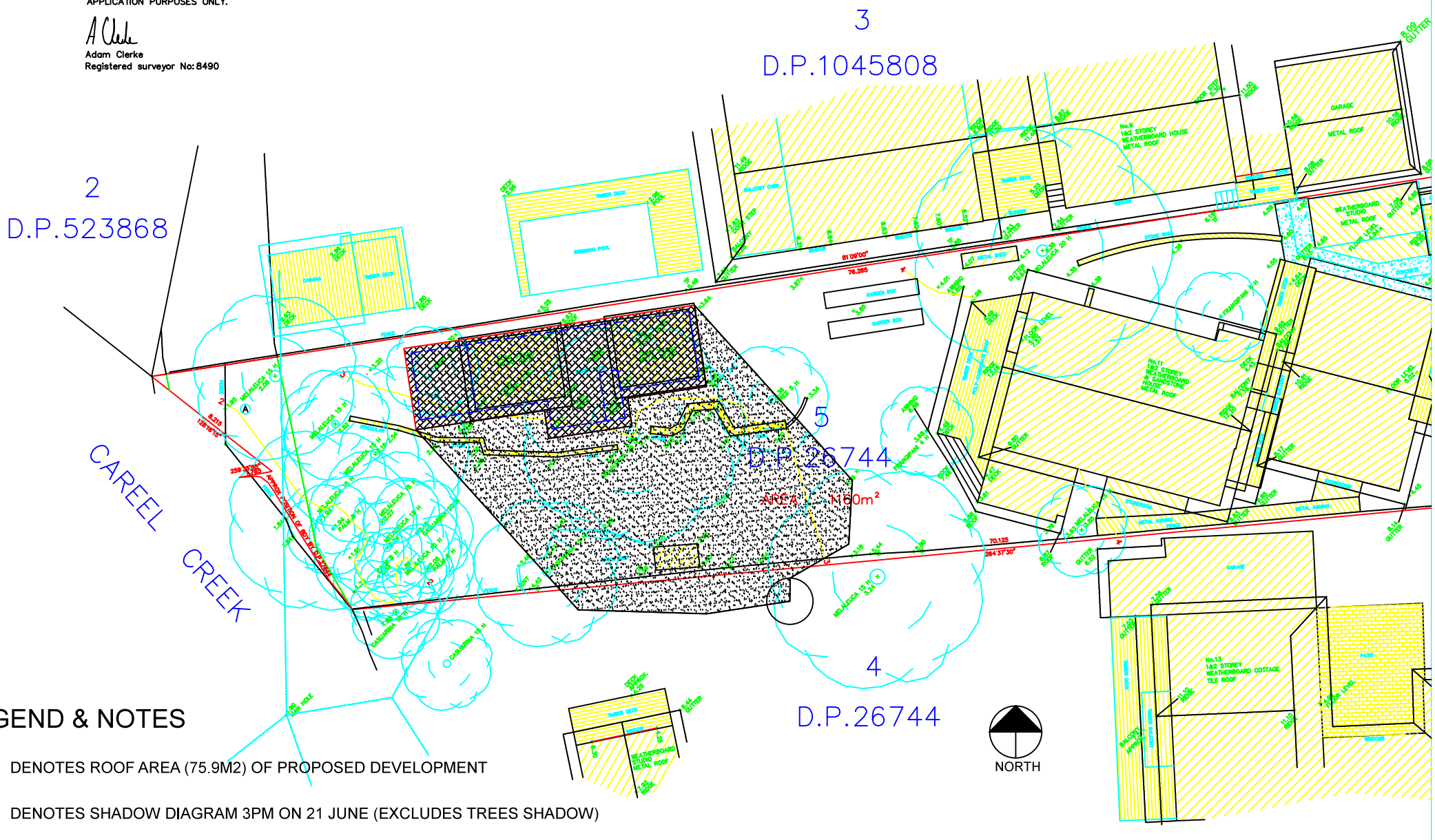
PROPOSED DEVELOPMENT
PROPERTY: 11 CATALINA CRESCENT AVALON BEACH NSW 2017
LOT DP: LOT 5 DP 26744
FOR: CHARLES MORT
PHILIP LOW (PH: 0410 542466 E: philip.low@app.com.au)

SHADOW DIAGRAM 12NOON ON 21 JUNE SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 06	

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND & NOTES

DENOTES ROOF AREA (75.9M2) OF PROPOSED DEVELOPMENT

DENOTES SHADOW DIAGRAM 3PM ON 21 JUNE (EXCLUDES TREES SHADOW)

LEGEND:
– TWL .. TOP OF WALL
– TF .. TOP OF FENCE
– ———— FENCE
– ———— INDICATIVE POSITION OF SEWER MAIN (NOT VISIBLE). POSITION TO BE CONFIRMED BY SYDNEY WATER.
– WINDOW, RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

Revisions		
No.	Description	Date
A	Original Issue	20 /11/23

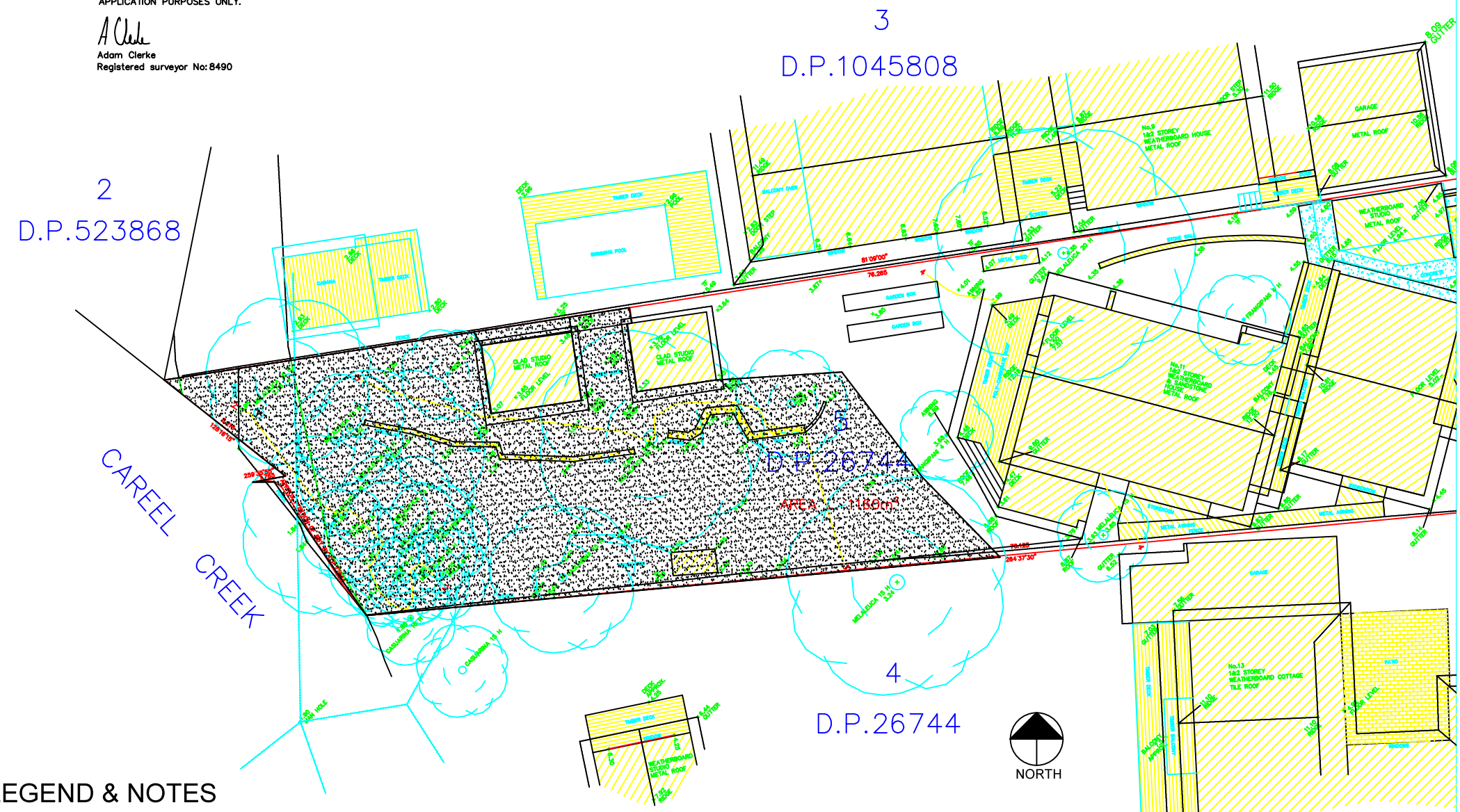
PROPOSED DEVELOPMENT
PROPERTY: 11 CATALINA CRESCENT AVALON BEACH NSW 2017
LOT DP: LOT 5 DP 26744
FOR CHARLES MORT
PHILIP LOW (PH: 0410 542466 E: philip.low@app.com.au)

SHADOW DIAGRAM 3PM ON 21 JUNE SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 07	

A Clerke

Adam Clerke
Registered surveyor No: 8490



LEGEND & NOTES

DENOTES LAND ON SITE INUNDATED BY 1% AEP FLOOD EVENT (1% MAX. AEP WATER LVL. 3.52mAHD.

LEGEND:
– TWL .. TOP OF WALL
– TF .. TOP OF FENCE
– ———— FENCE
– ———— INDICATIVE POSITION OF SEWER MAIN (NOT VISIBLE). POSITION TO BE CONFIRMED BY SYDNEY WATER.
– WINDOW, RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

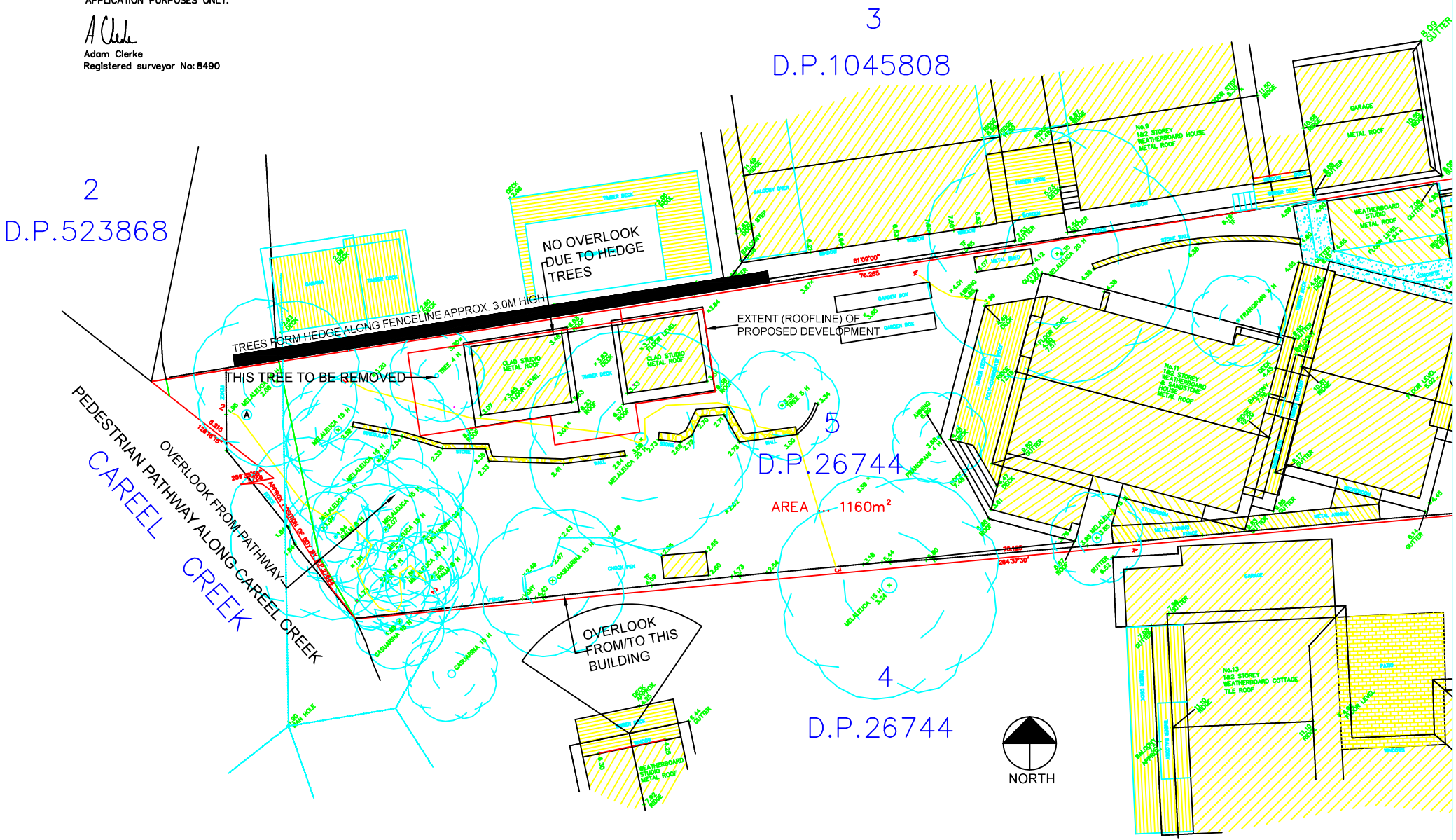
Revisions		
No.	Description	Date
A	Original Issue	20 /11/23

PROPOSED DEVELOPMENT
PROPERTY: 11 CATALINA CRESCENT AVALON BEACH NSW 2017
LOT DP: LOT 5 DP 26744
FOR CHARLES MORT
PHILIP LOW (PH: 0410 542466 E: philip.low@app.com.au)

SITE ANALYSIS PLAN 1
1% AEP FLOOD ZONE
MEDIUM FLOOD RISK
SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 08	

A Clerke
Adam Clerke
Registered surveyor No: 8490



LEGEND:
– TWL .. TOP OF WALL
– TF .. TOP OF FENCE
– ———— FENCE
– ———— INDICATIVE POSITION OF SEWER MAIN (NOT VISIBLE). POSITION TO BE CONFIRMED BY SYDNEY WATER.
– WINDOW, RIDGE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ± 0.05m.

Revisions		
No.	Description	Date
A	Original Issue	20 /11/23

PROPOSED DEVELOPMENT
PROPERTY: 11 CATALINA CRESCENT AVALON BEACH NSW 2017
LOT DP: LOT 5 DP 26744
FOR CHARLES MORT
PHILIP LOW (PH: 0410 542466 E: philip.low@app.com.au)

SITE ANALYSIS PLAN 2
VIEWS, VEGETATION
SCALE 1:200

Design	PL	Check	PL
Drawn	PL	Check	PL
Scale (Orig. A3)		As Shown	
File Name			
Drawing No.		CATALINA 09	

APPENDIX F – Flood Information Report

FLOOD INFORMATION REPORT (COMPREHENSIVE)

Property: 11 Catalina Crescent AVALON BEACH NSW 2107
Lot DP: Lot 5 DP 26744
Issue Date: 29/05/2023
Flood Study Reference: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory

Flood Information[1]:

Map A - Flood Risk Precincts
Maximum Flood Planning Level (FPL) [2, 3, 4]: 4.02 m AHD

Map B - 1% AEP Flood & Key points
1% AEP Maximum Water Level [2, 3]: 3.52 m AHD
1% AEP Maximum Depth from natural ground level[3]: 1.55 m
1% AEP Maximum Velocity: 0.61 m/s

Map C - 1% AEP Hydraulic Categorisation
1% AEP Hydraulic Categorisation: Floodway, Flood Storage, Flood Fringe

Map D - Probable Maximum Flood
PMF Maximum Water Level (PMF) [4]: 5.56 m AHD
PMF Maximum Depth from natural ground level: 3.64 m
PMF Maximum Velocity: 1.08 m/s

Map E - Flooding with Climate Change
1% AEP Maximum Water Level with Climate change [3]: 3.94 m AHD
1% AEP Maximum Depth with Climate Change[3]: 1.97 m

Map F - Flood Life Hazard Category in PMF

Map G - Indicative Ground Surface Spot Heights

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

Notes

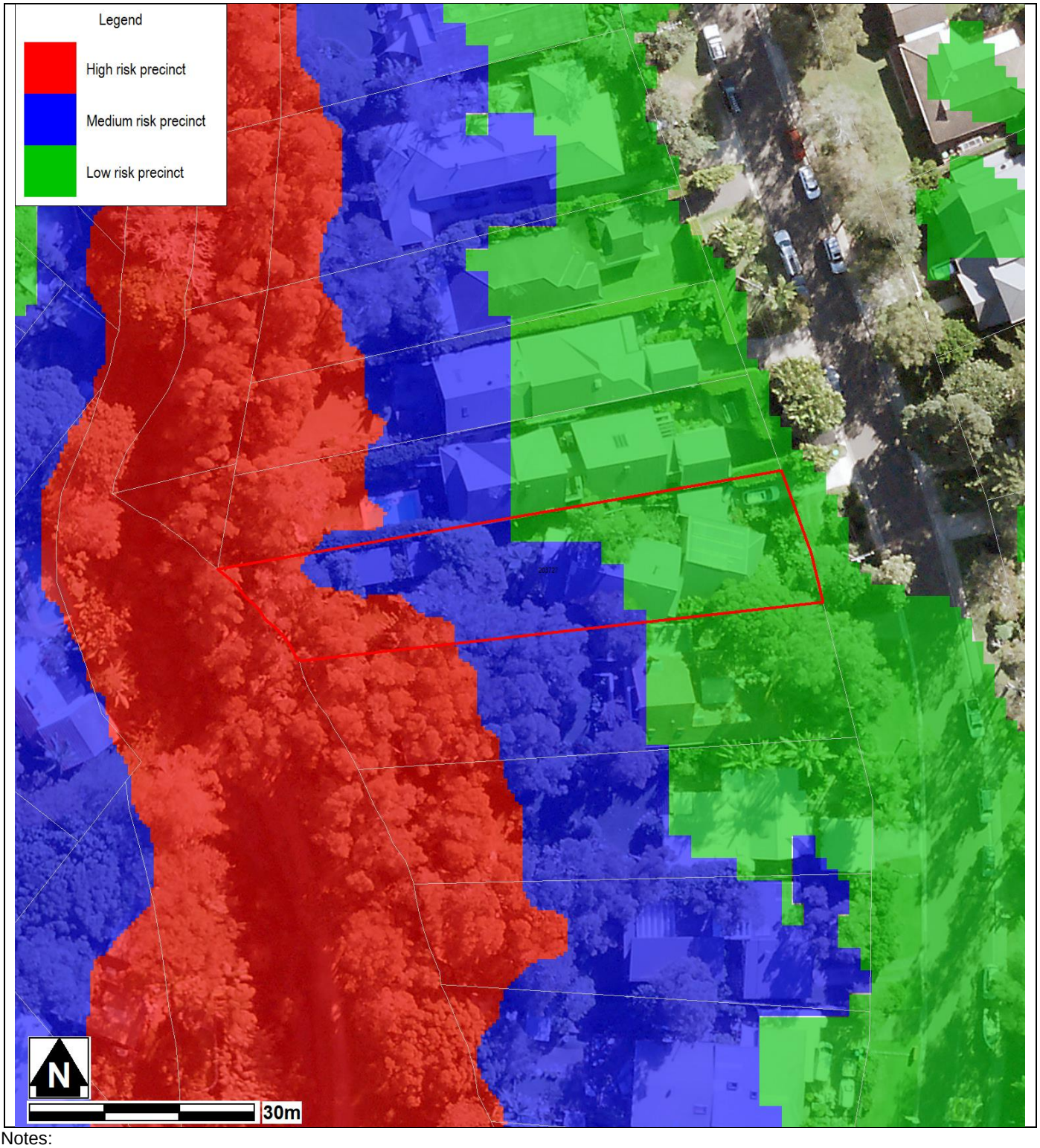
General

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's online Flood Study Reports webpage.
- If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.
- If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL.
- Areas affected by an EPL in the former Pittwater LGA are mapped on Council's online Estuarine Hazard Map. Note that areas in the former Manly LGA affected by an EPL have been identified and will be soon added to this map.
- Council's drainage infrastructure is mapped on Council's Stormwater Map. Note that locations are indicative only and may not be exactly as shown.

Property

- Please note that if a development on the property is proposed completely outside of the Food Planning Area (Medium Flood Risk Precinct), a formal Flood Management Report would not need to be submitted to council with a DA for Residential Development.

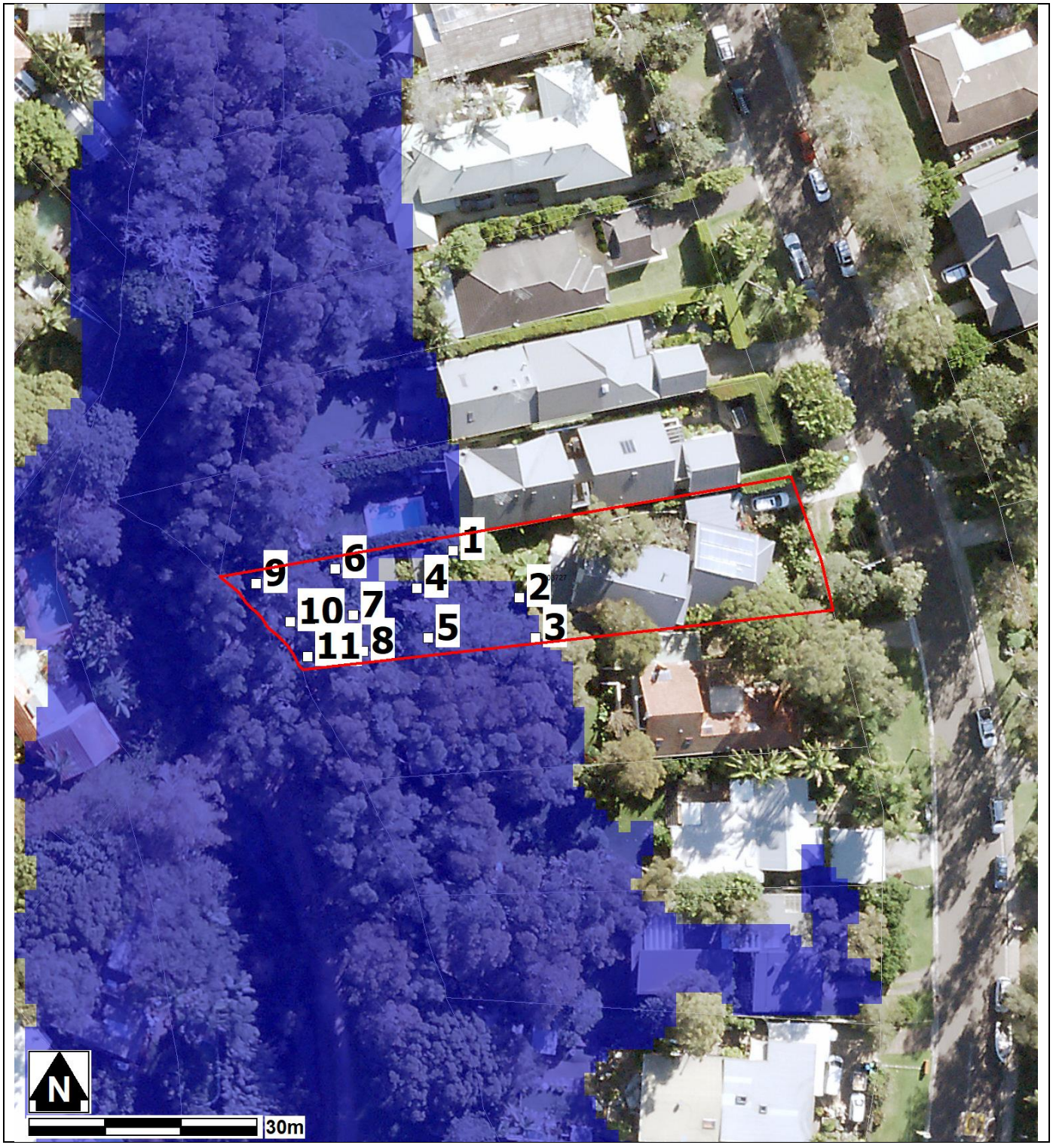
MAP A: FLOOD RISK PRECINCTS



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

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



Notes:

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

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	3.50	0.14	0.04	4.00	5.53	2.14	0.73
2	N/A	N/A	3.50	0.13	0.12	4.00	5.55	2.18	0.45
3	N/A	N/A	3.49	0.18	0.13	3.99	5.55	2.25	0.43
4	N/A	N/A	3.48	0.30	0.07	3.98	5.53	2.31	0.72
5	3.12	0.51	3.47	0.85	0.11	3.97	5.55	2.93	0.55
6	N/A	N/A	3.44	0.28	0.14	3.94	5.53	2.37	0.78
7	3.15	0.42	3.46	0.73	0.28	3.96	5.54	2.81	0.68
8	3.12	0.75	3.47	1.10	0.25	3.97	5.55	3.18	0.61
9	3.11	0.99	3.45	1.34	0.53	3.95	5.54	3.43	0.94
10	3.11	0.96	3.45	1.30	0.47	3.95	5.54	3.39	0.82
11	3.12	1.17	3.46	1.51	0.43	3.96	5.55	3.60	0.80

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

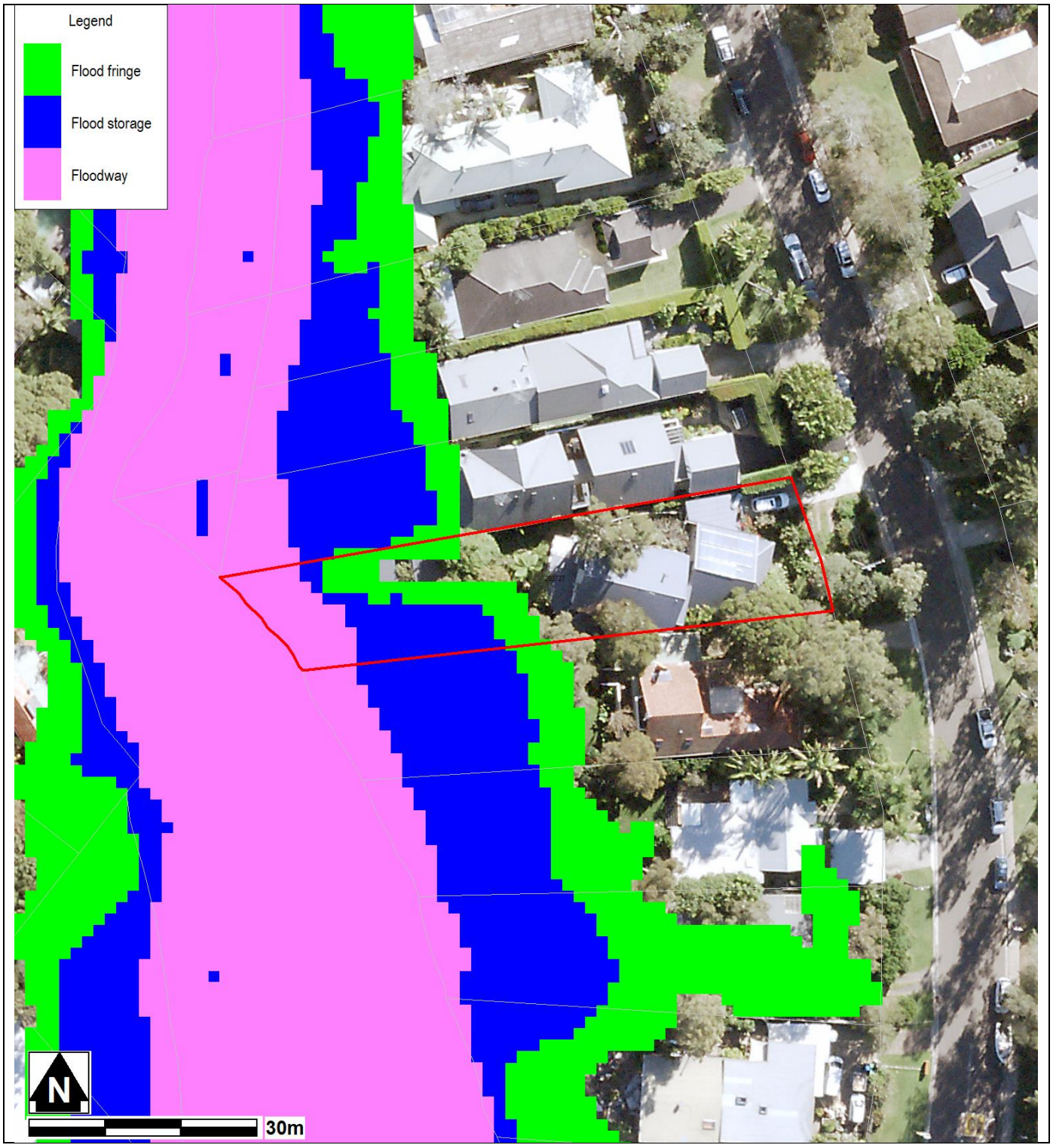
ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	3.87	0.49
2	3.89	0.52
3	3.89	0.59
4	3.88	0.66
5	3.89	1.27
6	3.86	0.70
7	3.88	1.15
8	3.89	1.52
9	3.87	1.76
10	3.88	1.73
11	3.88	1.94

WL – Water Level
PMF – Probable Maximum Flood
N/A - No Peak Water Level/Depth/Velocity Available.

Notes:

- The flood planning levels above are calculated by adding a 0.5m freeboard to the 1% AEP water level. However, if the depth of flow is less than 0.3m and a Velocity X Depth product is less than 0.3m^2/s, a freeboard of 0.3m may be able to be justified for development.

MAP C: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

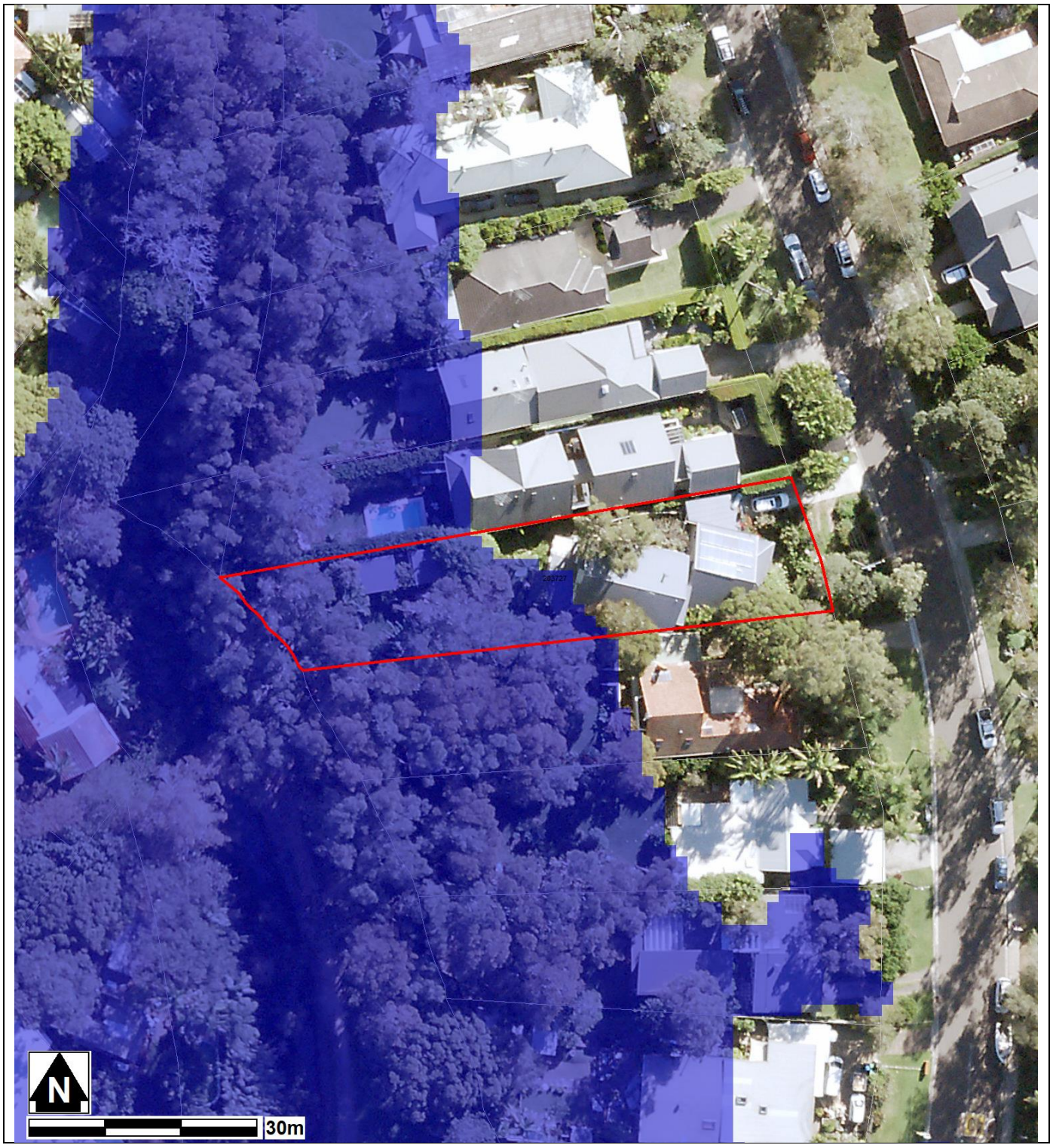
- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics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

MAP D: PMF EXTENT MAP

Notes:

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

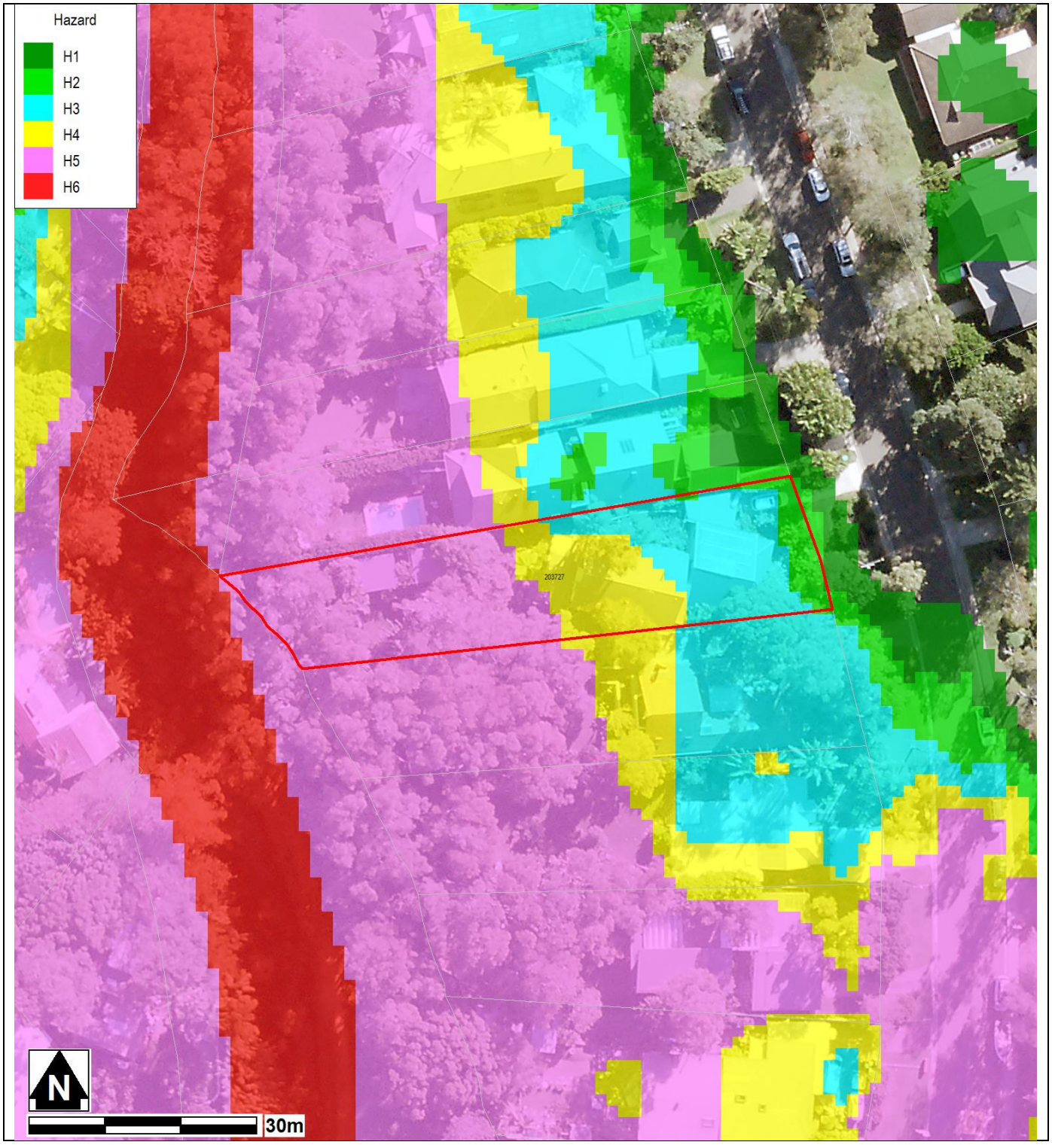
MAP E: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Notes:

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

MAP F: FLOOD LIFE HAZARD CATEGORY



Notes:

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

MAP G: INDICATIVE GROUND SURFACE SPOT HEIGHTS

Notes:

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

Preparation of a Flood Management Report

Introduction

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

Planning Requirements for Flood Prone Land

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

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

LEP Clauses	DCP Clauses
Manly LEP (2013) – 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.

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

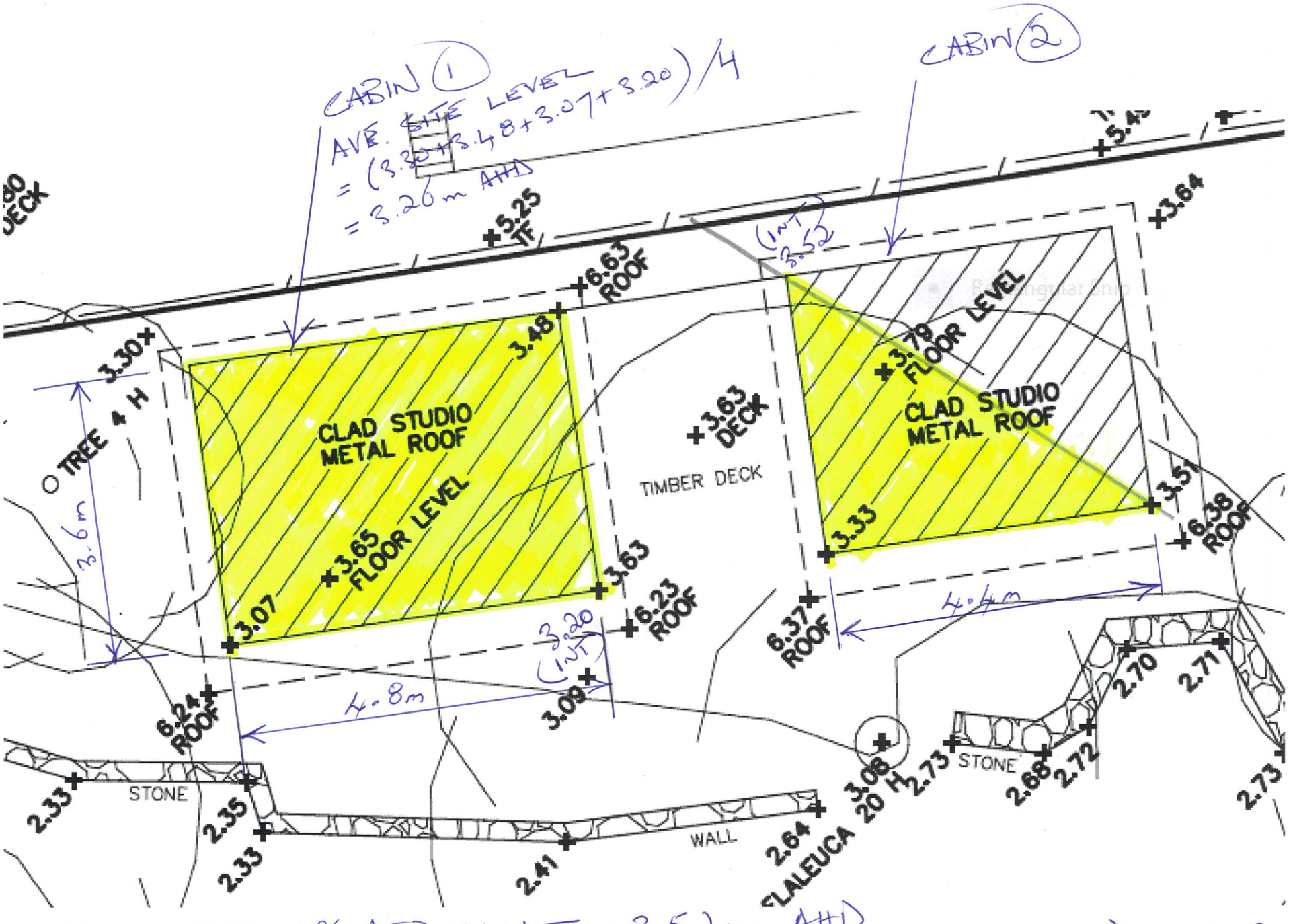
Further information and guidelines for development are available on Council's website at:

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 G

Net Flood Storage Loss Calculation



FLOOD LEVEL 1% AEP EVENT = 3.52m AHD

CABIN (1) FLOOD WATER DISPLACED VOL. = $(3.52m - 3.26m) \times 4.8 \times 3.6m$
= $4.5m^3$

CABIN (2) FLOOD WATER DISPLACED VOL. = $(3.52 - 3.33) \times 0.5 \times 0.5 \times 4.4 \times 3.6$
= $0.8m^3$

APPENDIX H

Flood Evacuation Route

NOTES:

- BOUNDARY SURVEY HAS BEEN UNDERTAKEN. SURVEY MARKS SHOULD BE PLACED IF EXCAVATION, CONSTRUCTION OR STRUCTURES ARE TO BE ERECTED ON OR NEAR THE BOUNDARIES.
- EXCEPT WHERE SHOWN BY DIMENSIONS LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- TREE SPREADS & HEIGHTS ARE INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN SHOWN. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. NOTIFICATION OF ALL RELEVANT AUTHORITIES SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA. DIAL BEFORE YOU DIG SERVICES (ph1100) SHOULD BE CONTACTED.
- CONTOUR INTERVAL – 1 METRE. CONTOURS ARE INDICATIVE ONLY. SPOT LEVELS SHOULD BE ADOPTED FOR DESIGN AND CALCULATION PURPOSES. CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- DO NOT SCALE FROM THIS PLAN. DIMENSIONS SHOULD BE USED.
- 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 1968.
- 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.
- ORIGIN OF LEVELS: WATERBOARD BOLT IN KERB No.3 R.L 5.12 A.H.D. (WATERBOARD SHEET W.O. 37548)
- COPYRIGHT © ADAM CLERKE SURVEYORS PTY LTD 2023
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF CHARLES MORT
- PLAN PREPARED BY REGISTERED SURVEYOR FOR DEVELOPMENT APPLICATION PURPOSES

Adam Clerke
Registered surveyor No:8490

PROPOSED DEVELOPMENT

EVACUATION ROUTE.

SAFE REFUGE ABOVE PROBABLE MAX. FLOOD LEVEL (5.56m AHD)

3
D.P.1045808

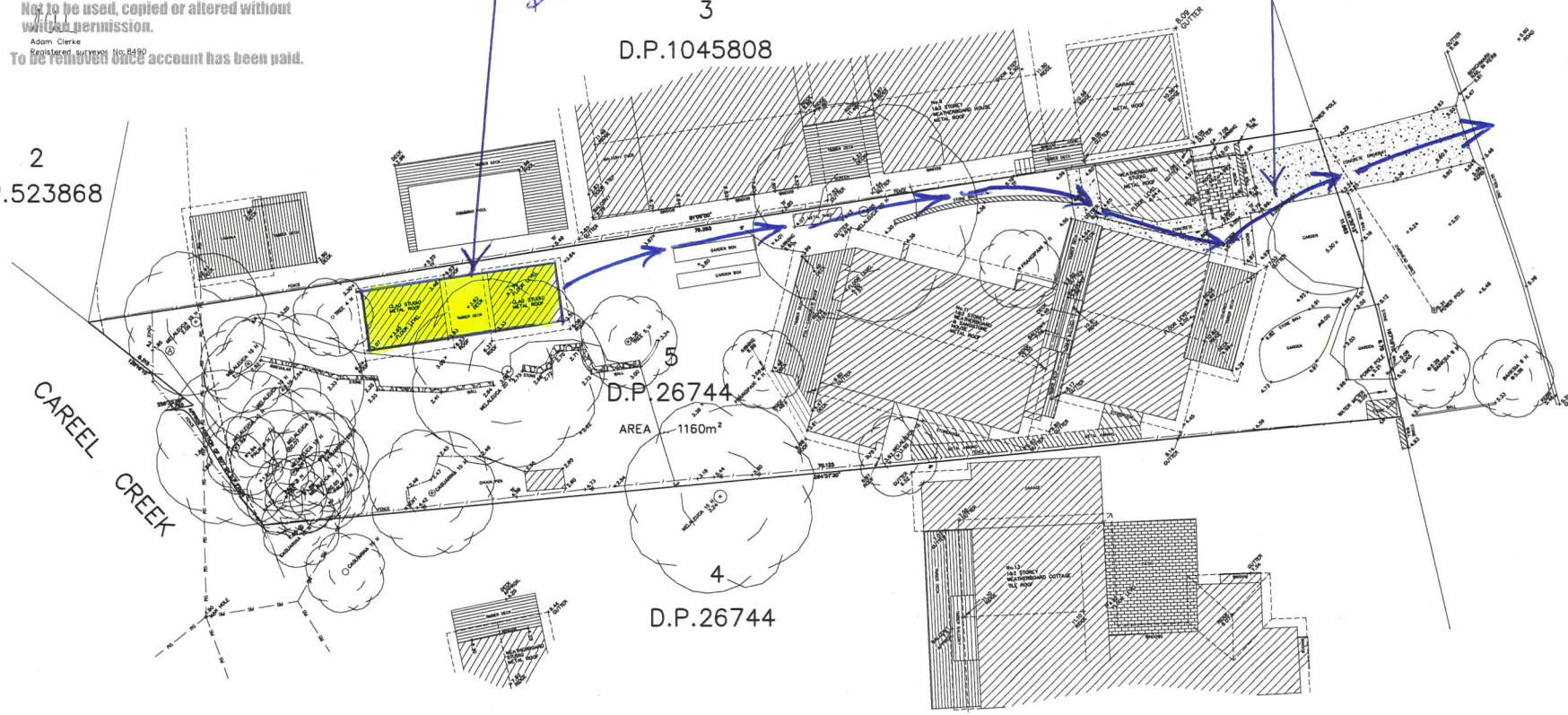
2
D.P.523868

5
D.P.26744
AREA 1160m²

4
D.P.26744

CATALINA CRESCENT

CAREEL CREEK



LEGEND:

- TWL .. TOP OF WALL
- TF .. TOP OF FENCE
- ——/—— FENCE
- ——U—— .. INDICATIVE POSITION OF SEWER MAIN (NOT TO SCALE). POSITION TO BE CONFIRMED BY SYDNEY WATER
- ——D—— .. INDICATIVE POSITION OF STORMWATER MAIN (NOT TO SCALE). POSITION HAS BEEN OBTAINED BY INDIRECT METHODS AND ARE ACCURATE TO ± 0.05m.
- SUBJECT LAND AFFECTED BY COVENANT (G313797) & VARIATION (G441453)
- (A) .. DENOTES EASEMENT TO DRAIN SEWAGE, 6 WIDE & VARIABLE WIDTH (S774486)

(TRUNK DIA. SPREAD) – INDICATIVE TREE SPREAD AND TRUNK DIAMETERS

— APPROX. TRUE — NORTH

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SCALE...1:100(A0) DATUM...A.H.D