

FLOOD RISK MANAGEMENT REPORT

On site at

***21 Knightsbridge Avenue,
Belrose.***

Reference Number:	<i>MJD:2022/54- FLOOD RPT-2</i>
Date Prepared:	<i>16th July 2022</i>
Prepared for:	<i>18th July 2022</i>
Prepared by:	<i>Law & Dawson Pty Ltd Consulting Structural & Civil Engineers</i>
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1.0 INTRODUCTION

Law & Dawson Pty. Ltd. has prepared this flood risk management report for James MacMahon & Nicole Davis, who are the owners of the property at 21 Knightsbridge Avenue, Belrose, for which a development application has been submitted.

2.0 EXISTING SITE

The existing site consists of a single-storey dwelling set back from Knightsbridge Avenue, with driveway access from Knightsbridge Avenue.

The site is a rectangular shaped block, with power lines traversing the middle of the site in an east-west direction.



Figure 2.1 - Site Location

3.0 PROPOSED DEVELOPMENT

The proposed development consists of the following:

- Swimming pool and landscaping works.

Information was obtained from architectural documentation prepared by Pirrello Design Associates for the proposed location of the swimming pool.

Survey information was obtained from the survey plan prepared by Waterview Surveying Services.

Refer to Appendix A for relevant floor plans & sections.

4.0 FLOOD INFORMATION

Information was obtained from Northern Beaches Council's comprehensive flood information report.

The following information was extracted from the flood report:

- | | |
|------------------------------|----------------------|
| • Flood risk precinct | LOW |
| • 1% AEP Extent | N/A |
| • PMF Extent | as identified on map |
| • Flood life hazard category | H1 |

Refer to Appendix B for complete report.

5.0 FLOOD RISK MANAGEMENT

5.1 FLOOD MITIGATION WORKS

I refer to the Hornsby Development Control Plan, specifically Part E11 - Flood prone land, for the relevant flood control measures to be provided as part of the development of the site.

5.1.1 Risk Matrix

I refer to the Low Flood Risk Matrix, as attached.

		Low Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
B	Building Components & Structural	B1 B2 B3				
C	Floor Levels	C2 C3				C5
D	Car Parking	D2 D7				
E	Emergency Response	E1 E2				E3

Figure 5.1 - Flood risk matrix – Low flood risk precinct

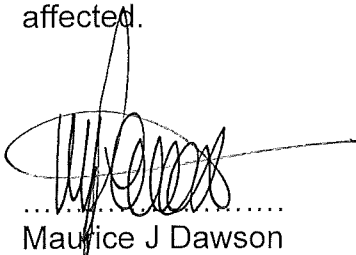
5.1.2 Flood Controls

On the basis that council has determined that the site is a low flood risk, no controls are relevant to this proposed development.

I note, however, that council refers to the preparation of the Middle Harbour Flood Study, which may provide additional data, or, vary the data currently provided by council. A draft report is currently not complete, and therefore, cannot be reviewed.

6.0 CONCLUSION

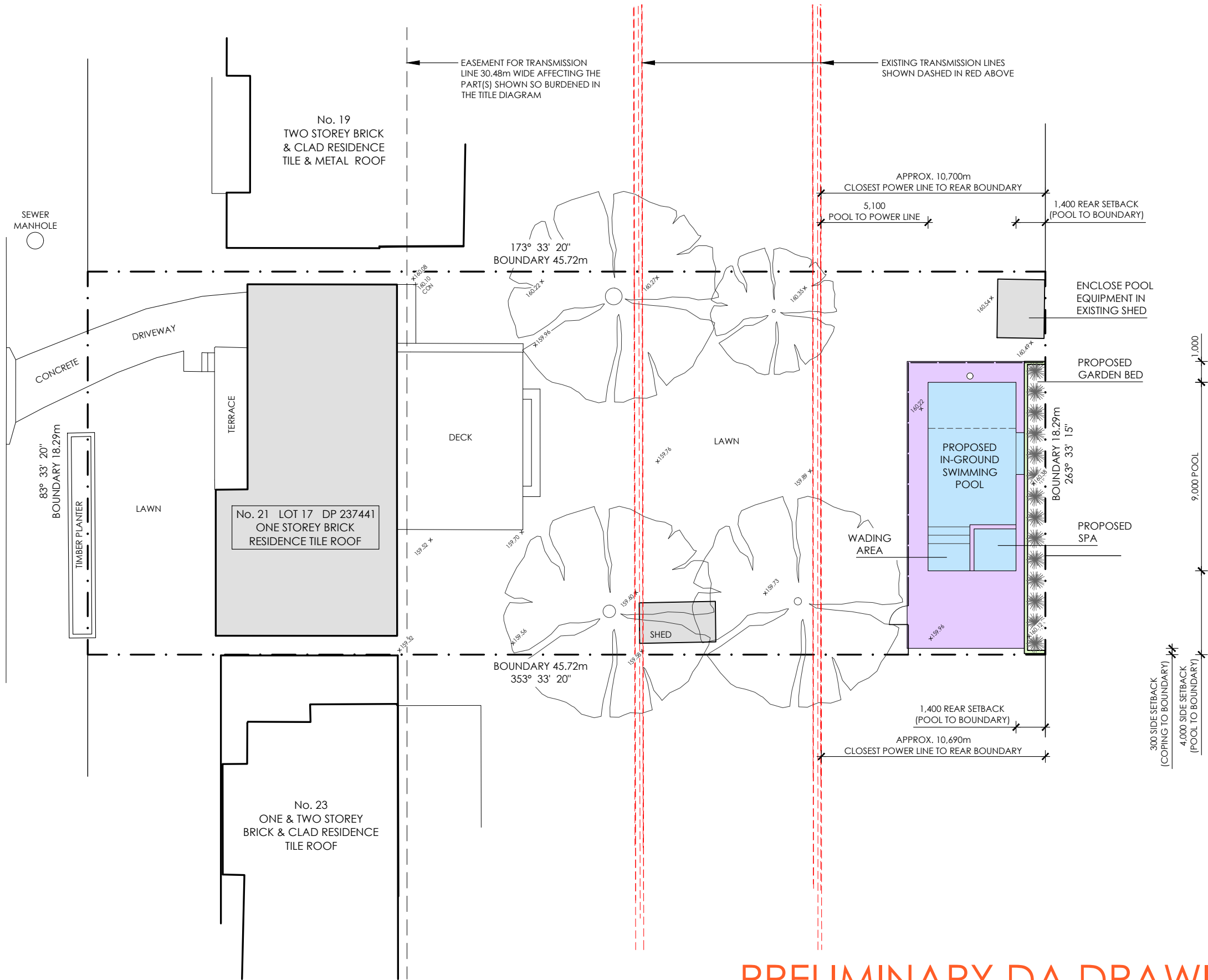
The site has been classified as being within a low flood risk precinct. The proposed development does not have flood affectation such that the proposed development will be affected.



Maurice J Dawson
Director
Chartered Professional Engineer
MIEAust, CPEng, NER, APEC Engineer, IntPE(Aus)
Law & Dawson Pty Ltd

APPENDIX A - Architectural & Survey Plans

KNIGHTSBRIDGE AVENUE



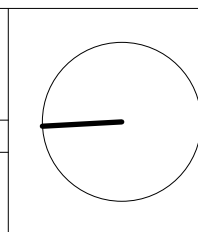
SITE PLAN

GENERAL NOTES:

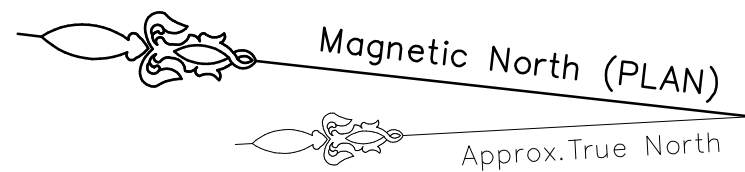
- REFER TO DETAILED SURVEY DIAGRAM PREPARED BY WATERVIEW SURVEYING SERVICES.
- REFER TO STATEMENT OF ENVIRONMENTAL EFFECTS PREPARED BY PRECISE PLANNING.
- REFER TO BASIX CERTIFICATE No. 2209000000 PREPARED BY CHAPMAN ENVIRONMENTAL SERVICES.
- REFER TO OTHER SUPPORTING DOCUMENTATION ATTACHED TO THIS DEVELOPMENT APPLICATION.
- ENCLOSE POOL TO AS 1926 - SAFETY BARRIERS FOR SWIMMING POOL.

PRELIMINARY DA DRAWINGS
FOR DISCUSSION PURPOSES ONLY

B	18 MAY 22	PRELIMINARY SKETCH TO AUSGRID
A	13 APR 22	PRELIMINARY SKETCH TO PCA
issue	date	reason for issue
This design and documentation is the property of Pirrello Design Associates. The design is copyright and cannot be used without prior written permission. Figures dimensions take preference to scale readings. Verify all dimensions on site and report any discrepancies to Pirrello Design Associates before proceeding with the works. All works to comply with the BCA Volume 2 of the NCC Series and all relevant Australian Standards and Codes.		

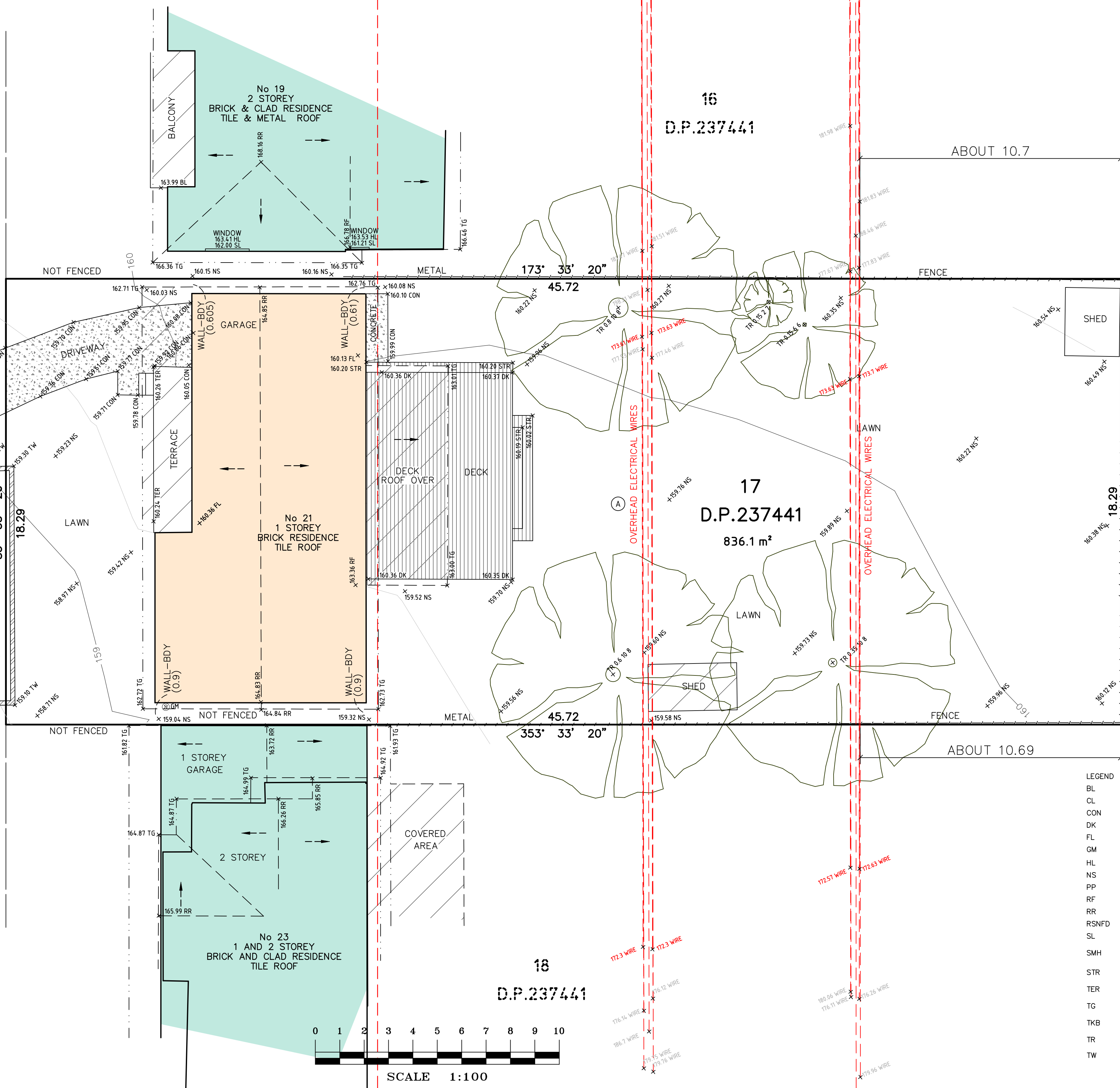


client	JAMES MACMAHON & NICOLE DAVIS	project no.	22.09	drawing no.	
project	PROPOSED SWIMMING POOL, SPA & ASSOCIATED SITE WORKS AT 21 KNIGHTSBRIDGE AVENUE, BELROSE	scale	1:200(A3)		
drawing	SITE PLAN	drawn	AP		
		design	AP		
		date	18/05/22	issue	B

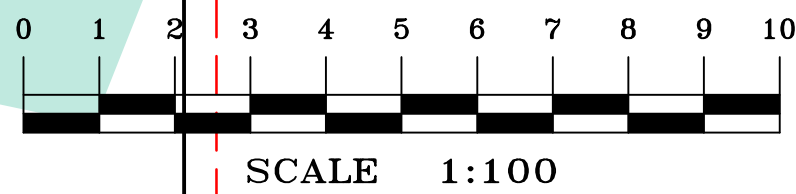


AVENUE

KNIGHTSBRIDGE



TITLE INDICATES THAT LOT 17 IN D.P.237441 IS SUBJECT TO:
- LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)
- K351262 EASEMENT FOR TRANSMISSION LINE 30.48 WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
Z944756 TRANSFER OF EASEMENT TO SYDNEY ELECTRICITY
- DP237441 RESTRICTION(S) ON THE USE OF LAND (NOT INVESTIGATED)



- LEGEND
- BL BALCONY
 - CL CENTERLINE
 - CON CONCRETE
 - DK DECK
 - FL FLOOR LEVEL
 - GM GAS METER
 - HL HOOD LEVEL
 - NS NATURAL SURFACE
 - PP POWER POLE NETWORK
 - RF ROOF
 - RR ROOF RIDGE
 - RSNFD RAMSET NAIL FOUND
 - SL SILL LEVEL
 - SMH SEWER MAN HOLE
 - STR STAIRS
 - TER TERRACE
 - TG TOP OF GUTTER
 - TKB TOP OF KERB
 - TR TREE DIA SPREAD HEIGHT
 - TW TOP OF WALL

E	OVERHEAD POWERLINE LEVELS AMENDED	23/05/22
D	OVERHEAD POWERLINE LOCATED	17/05/22
C	ADJOINING PROPERTIES REAR?	02/05/22
B	TREES REMOVED	19/04/22
A	FIRST ISSUE	14/12/21

- A FIELD SURVEY OF THE BOUNDARIES HAS BEEN UNDERTAKEN, OFFSETS FROM STRUCTURES TO BOUNDARY SHOULD NOT BE USED FOR CONSTRUCTION SETOUT.
- IF CONSTRUCTION ON OR NEAR BOUNDARIES IS UNDERTAKEN THE BOUNDARIES OF THE LAND SHOULD BE MARKED OR THE WORKS SETOUT BY A REGISTERED SURVEYOR.

- TREE SIZES ARE ESTIMATES ONLY.

- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF NICOLE & JAMES McMAHON

- 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 (db 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.

- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.

- THIS PLAN IS ONLY TO BE USED FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS.

- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. EXCEPT AT SPOT LEVELS SHOWN, 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.

- IF ACCURATE TRUE NORTH IS REQUIRED A FURTHER SURVEY WOULD BE NECESSARY.

- COPYRIGHT WATERVIEW SURVEYING SERVICES

- 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.

MICHAEL K JOYCE
REGISTERED SURVEYOR I.D. 8268



1A Mona Street Mona Vale NSW 2103
ACN 610 583 572
michael@wvsurveying.com.au
0474 843 180

Vertical Datum
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. SSM101519
R.L. 136.822
SOURCE:

Client Details NICOLE & JAMES McMAHON
21 KNIGHTSBRIDGE
BELROSE NSW 2085

Drawing Title
DETAIL AND LEVELS OVER
21 KNIGHTSBRIDGE
BELROSE NSW 2085
BEING LOT 17 IN DP.237441

PROJECT: 1475	PAGE 1 OF 1
Date of survey 03/12/2021	Drawing No. 1475detail 1
Scale 1:100 @ A1	Rev. E

APPENDIX B - Correspondence from Council

FLOOD INFORMATION REPORT – COMPREHENSIVE

Property: 21 Knightsbridge Avenue BELROSE NSW 2085

Lot DP: Lot 17 DP 237441

Issue Date: 12/05/2022

Flood Study Reference: Frenchs Creek Flood Study 2010, DHI

Flood Information for lot ¹:

Flood Risk Precinct – See Map A

Low Flood Risk Precinct

Flood Planning Area – See Map A

No Flood Planning Area for the site

1% AEP Flood – See Flood Map B

The site is not affected by the 1% AEP flood.

Probable Maximum Flood (PMF) – See Flood Map C

The PMF level is 0.3m above the natural ground level within the PMF extent shown on Map C.

Flood Life Hazard Category – See Map D

Indicative Ground Surface Spot Heights – 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.

Property Notes:

- The Frenchs Creek Flood Study is one of Council's oldest current flood studies, and the flood information available from it is not as comprehensive as for the newer studies.
- Council is currently undertaking the Middle Harbour Flood Study, the results from which will supersede the flood information in this certificate some time during 2022. If a DA is to be submitted in 2022 or later, Council should be consulted to check whether the flood information in this report has been updated.

FLOOD MAP A: FLOOD RISK PRECINCT MAP

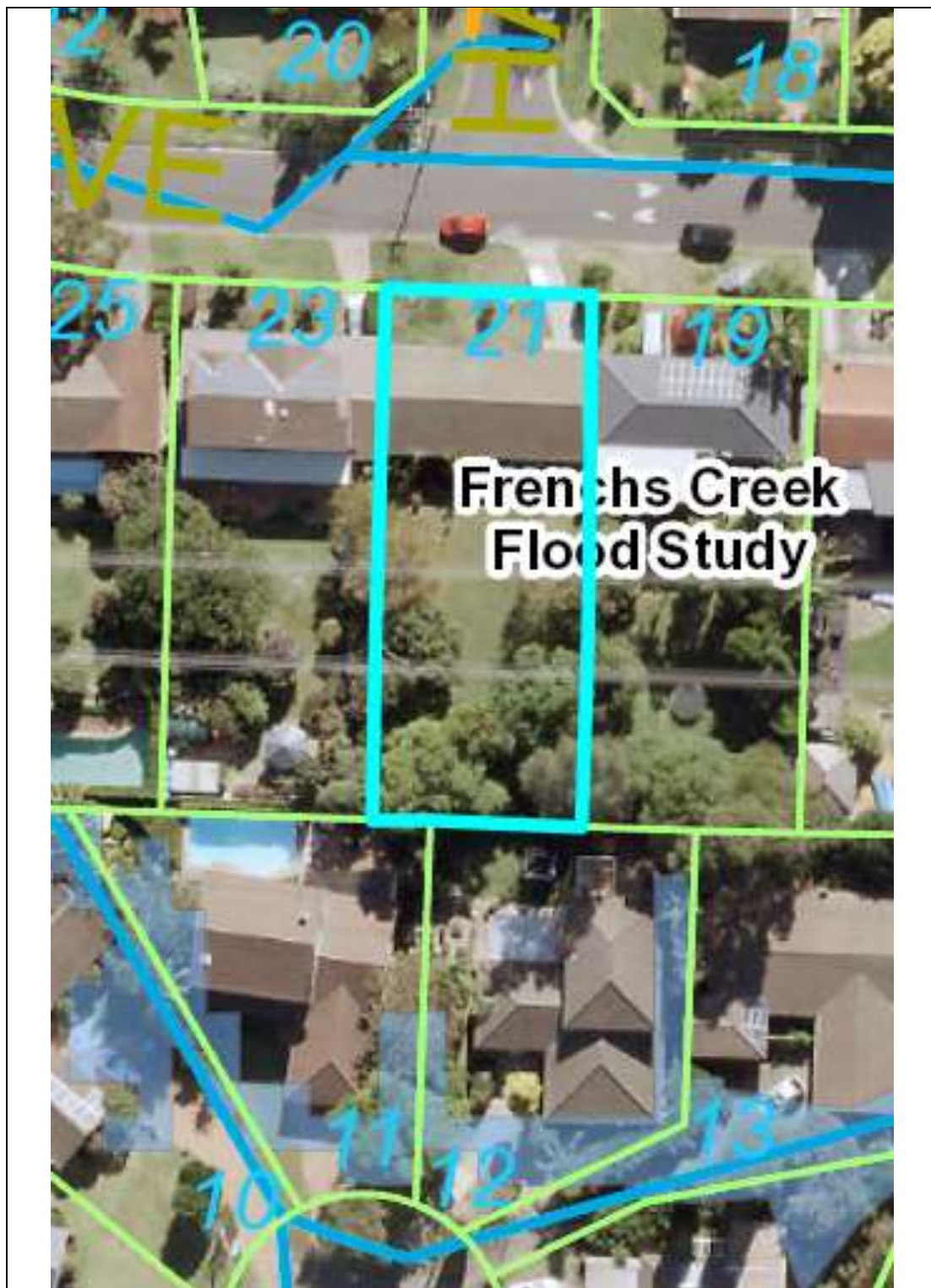


Pink = Low Flood Risk Precinct

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.

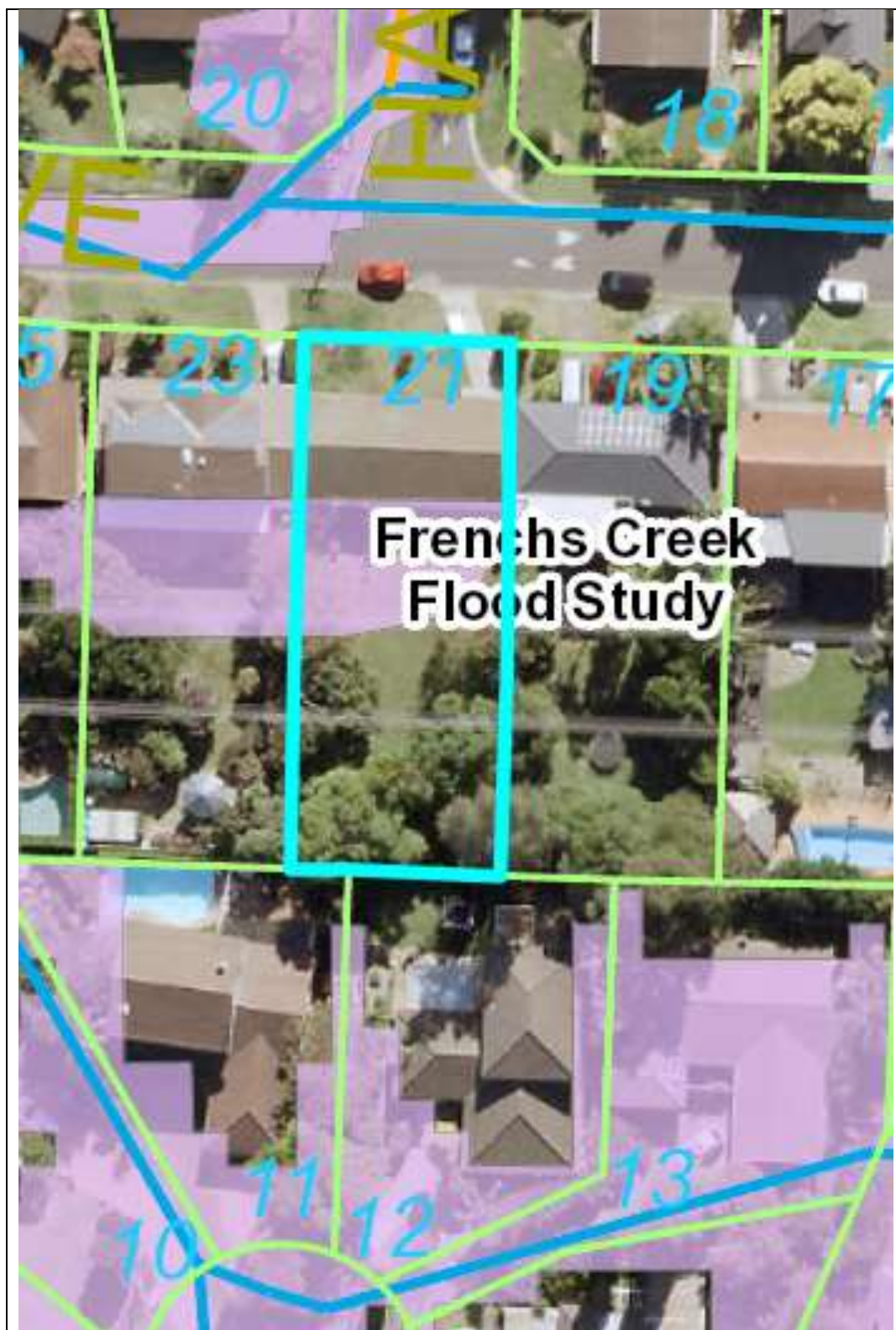
FLOOD MAP B: FLOODING - 1% AEP EXTENT



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: Frenchs Creek Flood Study 2010, DHI) and aerial photography (Source: Near Map 2014) are indicative only.

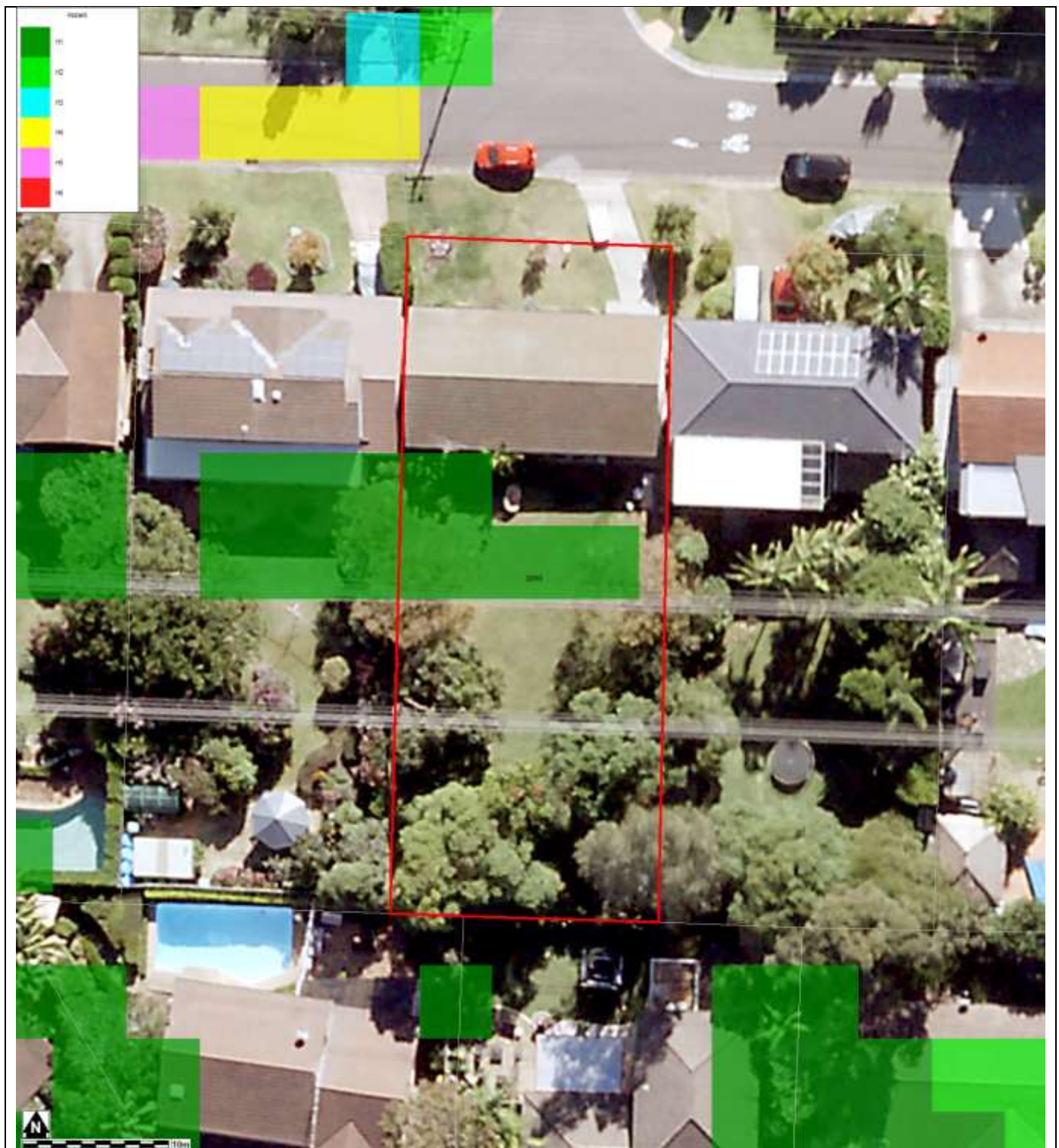
FLOOD MAP C: PMF EXTENT MAP



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: Frenchs Creek Flood Study 2010, DHI) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP G: FLOOD LIFE HAZARD CATEGORY



Notes:

- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Frenchs Creek Flood Study 2010, DHI) and aerial photography (Source Near Map 2014) are indicative only.

MAP H: INDICATIVE GROUND SURFACE SPOT HEIGHTS



Notes:

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

Preparation of a Flood Management Report

Introduction

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

Planning Requirements for Flood Prone Land

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

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

LEP Clauses	DCP Clauses
Manly LEP (2013) – 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 .