

RF91202

Flood Assessment Report For Proposed Swimming Pool & Landscape Developments

Development Site at:
25 Worrobil Street,
North Balgowlah, NSW 2093
LOT 142 DP 11936

11 December 2019

Prepared by:



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Flood Assessment Report for Proposed Swimming Pool & Landscape Developments

at

25 Worrobyl Street, North Balgowlah, NSW 2093

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1. INTRODUCTION

1.1 Background

ACCON Engineers was commissioned by Mr. Cameron Laird to assess the impact of flooding associated with the proposed swimming pool and landscape developments at 25 Worrobil Street, North Balgowlah, NSW 2093 to accompany the DA at Council.

This report describes the existing characteristics of the area, proposed development and quantifies the impact of the proposed development. According to the flood information provided by Northern Beaches Council, the subject site is affected by flooding during major storm events with low to medium risk precincts. The subject site lies in flood fringe and floodway hydraulic category at 1% AEP. The work in this study draws upon the results of Manly Lagoon Flood Study 2013.

1.2 Objectives

The main objective of this study is to carry out a detail site-specific flood assessment report for proposed swimming pool and landscape developments at 25 Worrobil Street, North Balgowlah, NSW 2093. In order to achieve this goal, the following specific objectives are proposed:

- Northern Beaches Council (Warringah Council LEP 2011)
- Review on Manly Lagoon Flood Study 2013
- Section E11 of the Warringah Development Control Plan 2011
- NSW Government Floodplain Management Manual 2005
- Analysis of the existing flood category
- Identification and recommendation of relevant floodplain controls

1.3 Methodology

This flood assessment report is prepared based on the hydrological analysis of the development site using the information on the several documents such as survey plan of the development site, proposed development plan provided by the client, Warringah Development Control Plan, Flood Information from Council. In addition to this, some

relevant information about the development site and the surrounding are collected using Land and Property Information (LPI) web services and by visiting the site by our drainage engineer.

2. SITE DESCRIPTION

2.1 Land Details

The site is located on the Southern side of Worrobil Street as shown in Figure 2.1. The land is identified as Lot 142 DP 11936. The site has an overall area of 516.21 Sq. M as per title and survey plan provided by client.



Figure 2.1 Location of Site (Source: Department of Lands- Six Maps)

The site has a single storey dwelling. There is existing concrete driveway from Worrobil Street, which provides vehicular access to the existing garage.

2.2 Topography

The site is sloping from front to rear of the property. The survey plan prepared by Landscape Surveys is presented in Figure 2.2. There is natural watercourse at the rear of the property. The full detail survey plan is provided in Appendix A.

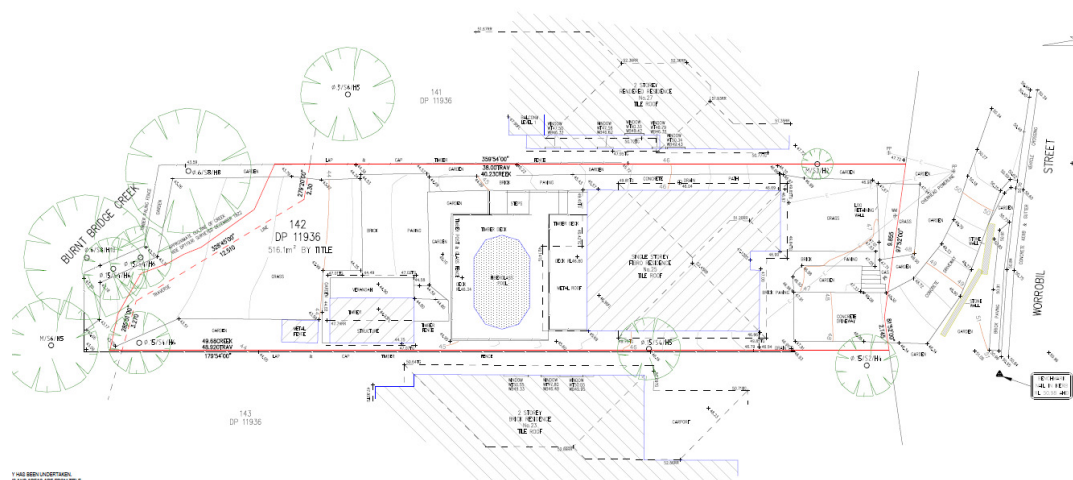


Figure 2.2 Survey Plan (Source: Total Surveying Solutions)

3. EXISTING FLOOD CHARACTERISTICS

3.1 Flood Behaviour

The site is located at Worrobil Street in North Balgowlah and extends onto Burnt Bridge Creek. According to the flood information provided by Northern Beaches Council, the subject site is affected during major storm events with low to medium risk precincts. The subject site lies in flood fringe and floodway hydraulic category during 1% AEP. Hence, it is advised that the flood related development controls apply to the development purposes.

3.2 Flood Level and Hazard Category

Flood level information at the development site for the various flood event is provided in Table 3.1 as per council flood level information.

Table 3.1 Flood Levels

Flood Event (ARI)	Flood Level (m AHD)
1% AEP	44.10
PMF	45.07

The most part of subject property does not lie in 1% AEP flood event. Some part of subject property lies in flood fringe area and very negligible area lies in flood way during 1% AEP flood event. The flood planning level (FPL) of this property is 44.7 m. The flood control matrix obtained from Warringah Development Control Plan 2011 is presented in Appendix D. The flood level information obtained from Council is presented in Appendix E.

4. PROPOSED DEVELOPMENT

The proposed developments include construction of swimming pool, landscape works and deck extending from main dwelling at the rear of proposed dwelling. The majority of proposed swimming pool does not lie in 1% AEP flood extent area. However, very negligible swimming pool deck lies in 1% AEP flood extent area. The proposal is assessed against Warringah Development Control Plan 2011. The site plan that includes the proposed development is shown in Figure 4.1. The full detail site plan of this block is provided in Appendix B. The approximate location of swimming pool at 1% AEP flood extent map is presented in Appendix C.

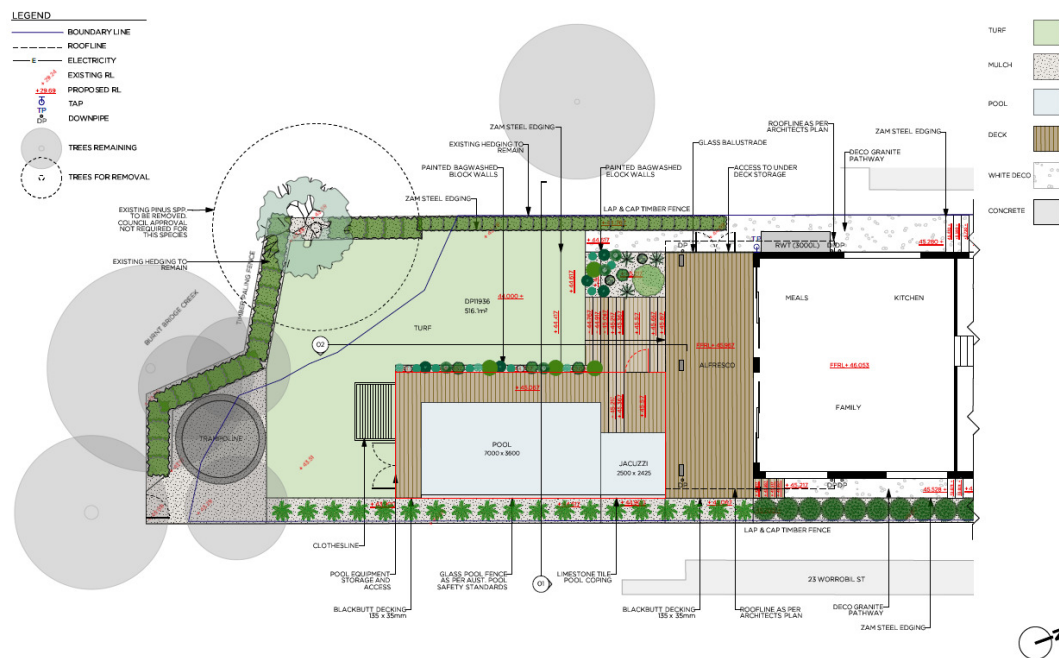


Figure 4.1 Site plan (Source: Urban Garden Co.)

4.1 Floor Level

The coping level of the proposed swimming pool is proposed 45.067 m, which is above the FPL.

4.2 Building Component and Method

All structural components below FPL (44.70 m) should be constructed of flood compatible materials.

4.3 Structural Soundness

Engineer's report is required certifying that the structure can withstand the forces of floodwater debris and buoyancy up to and including FPL (44.70 m).

4.4 Flood Affection

The proposed development is a small development and does not involve substantial change on existing topography of the development site. The majority of proposed swimming pool does not lie in 1% AEP flood extent area. However, very negligible swimming pool deck area lies in 1% AEP flood extent area. Some part of the swimming pool deck lies in flood fringe hydraulic category during 1% AEP. There will be negligible loss in flood storage area and the proposed development will not affect surrounding area.

4.5 Car Parking and Driveway Access

Car park and driveway access will be submitted through separate DA. The car park and driveway does not lie in 1% AEP and PMF flood event.

4.6 Fence

The majority of the swimming pool does not lie in 1% AEP flood event. Very small swimming pool deck area lies in 1% AEP flood extent area. The swimming pool deck area that lies in 1% AEP flood extent area should be constructed in such a manner, which does not affect the flow of floods, so as detrimentally increase flood affection on surrounding land. The deck and swimming pool material below FPL 44.70 m should be constructed of flood compatible materials.

4.7 Evacuation

According to the flood information provided by Northern Beaches Council, the subject site is affected during major storm events with low to medium risk precincts. The subject site lies in flood fringe and floodway hydraulic category during 1% AEP. Some part of the subject property at the rear lies in PMF flood event. Separate DA will be lodged at Council for proposed two-storey dwelling. The floor finish level is 45.967 m at Alfresco at the ground floor, which is higher than PMF flood level. The onsite refuge as a primary evacuation option at ground floor or first floor is recommended for

evacuation during these flood events provided that proposed dwelling is structurally sound enough to withstand the forces of floodwater debris and buoyancy forces.

In addition, it is strongly recommended that the owners should be aware of the flood situation at this property as in the flood certificate issued from the council. The certificate would contain vital information such as the expected flood levels in a range of design floods. It would also provide information on ground and floor levels, which would allow an assessment of the depths of flooding over the property and building. This awareness will give timely and safe evacuation from the expected high flood event.

Refer to Northern Beaches Council and SES flood warning website for update.

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

<https://www.ses.nsw.gov.au/disaster-tabs-header/flood/>

4.8 Surface Drainage

The site has falls towards Burnt Bridge Creek. It is recommended to provide minimum 1% grade towards the creek to achieve surface flow during storm events.

4.9 Management and Design

No storage of materials would be expected to be stored below the FPL (44.70 m), which would cause pollution or would be likely to be potentially hazardous during flood. It must be demonstrated that goods, materials and other products that may be potentially hazardous and/or pollute floodwaters, including pool chemicals, should be stored above the FPL.

All the new electrical services, fixtures and fittings must be located above the FPL. No electrical equipment or electrical motors (including pool pumps and equipment) are to be located below FPL.

5. CONCLUSION

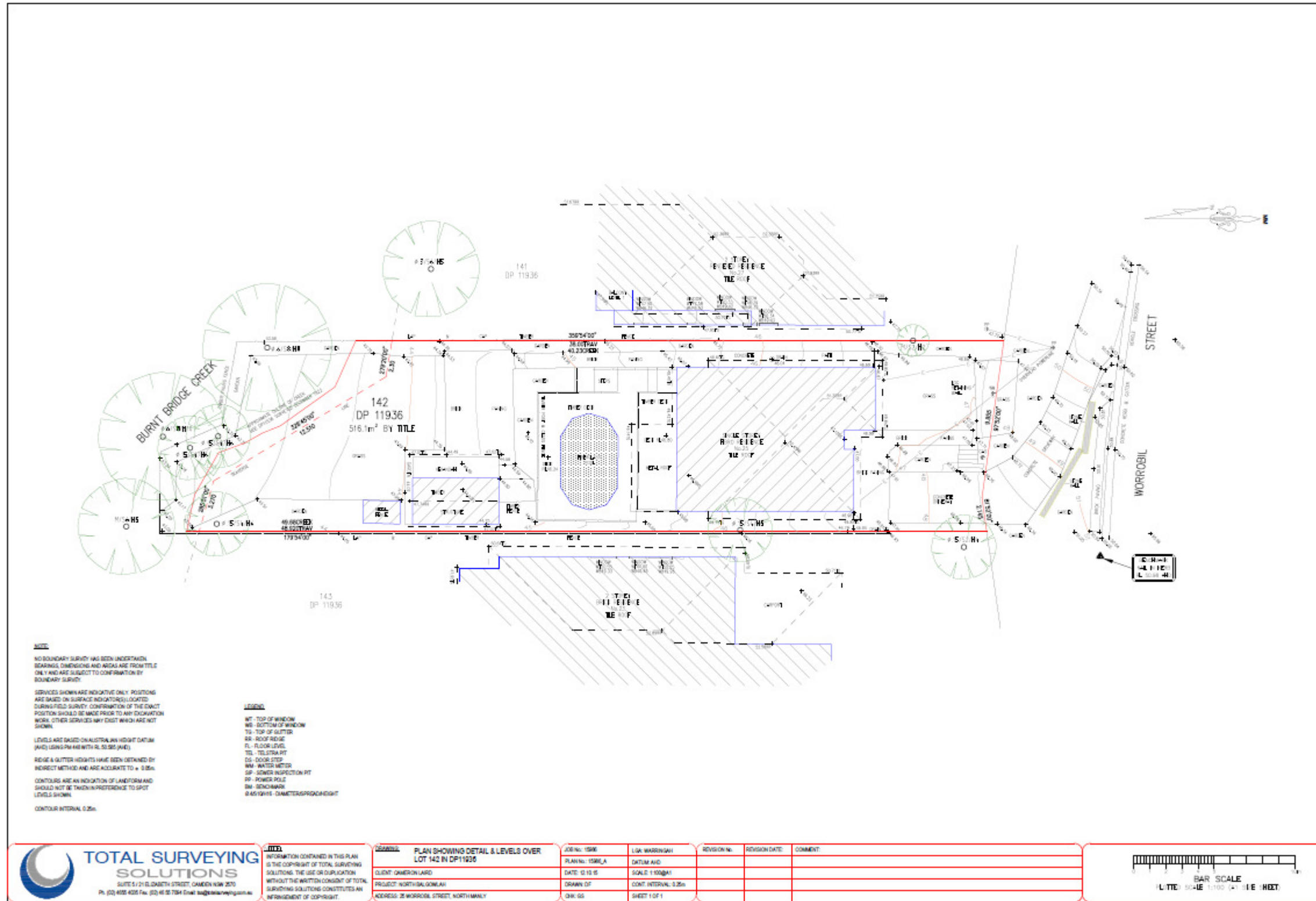
This study considered the impacts of proposed swimming pool and landscape work at 25 Worrobil Street, North Balgowlah, NSW 2093 to the flooding characteristics of the surrounding area.

According to the flood information provided by Northern Beaches Council, the subject site is affected during major storm events with low to medium risk precincts. The subject site lies in flood fringe and floodway hydraulic category during 1% AEP. The followings are the conclusion of this study:

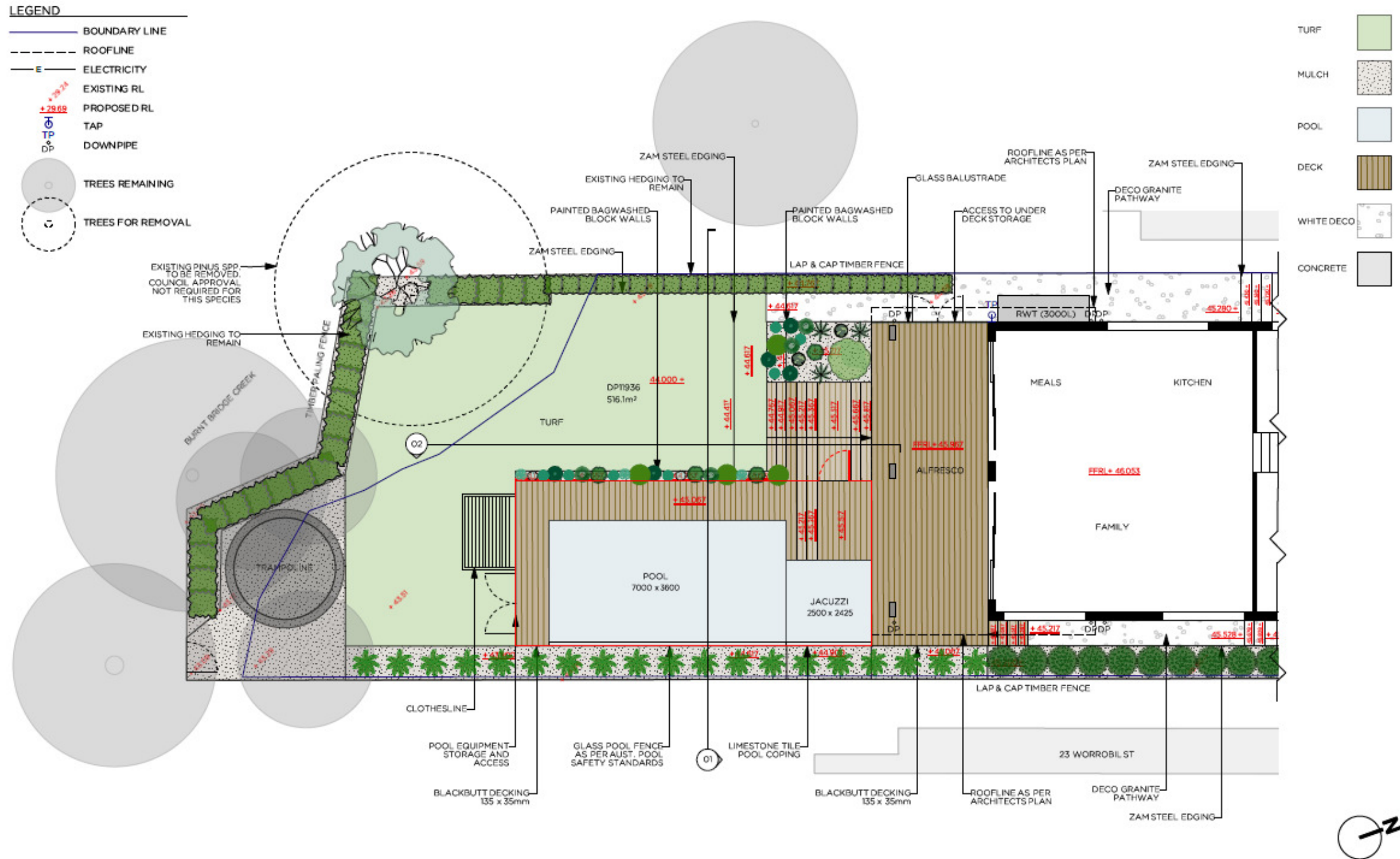
- The coping level of the proposed swimming pool is proposed at 45.607 m, which is which is above the FPL (44.70 m).
- The floor finish level is 45.967 m at Alfresco at the ground floor, which is higher than PMF flood level. The onsite refuge as a primary option at ground floor or first floor is recommended for evacuation during these flood events provided that proposed dwelling is structurally sound enough to withstand the forces of floodwater debris and buoyancy forces.
- The proposed development is a small development and does not involve substantial change on existing topography of the development site. The majority of proposed swimming pool does not lie in 1% AEP flood extent area. However, very negligible swimming pool deck area lies in 1% AEP flood extent area. Some part of the swimming pool deck lies in flood fringe hydraulic category during 1% AEP. There will be negligible loss in flood storage area and the proposed development will not affect surrounding area.
- All structural components below FPL (44.70 m) should be constructed of flood compatible materials.
- Engineer's report is required certifying that the structure can withstand the forces of floodwater debris and buoyancy up to and including FPL 44.70 m.
- Car park and driveway access will be submitted through separate DA. The car park and driveway does not lie in 1% AEP and PMF flood event.


- The majority of the swimming pool does not lie in 1% AEP flood event. Very small swimming pool deck area lies in 1% AEP flood extent area. The swimming pool deck area that lies in 1% AEP flood extent area should be constructed in such a manner, which does not affect the flow of floods, so as detrimentally increase flood affection on surrounding land. The deck and swimming pool materials below FPL 44.70 m should be constructed of flood compatible materials.
- No storage of materials would be expected to be stored below the FPL (44.70 m), which would cause pollution or would be likely to be potentially hazardous during a flood.
- All the new electrical services, fixtures and fittings must be located above the FPL. No electrical equipment or electrical motors (including pool pumps and equipment) are to be located below FPL.
- The site has falls towards Burnt Bridge Creek. It is recommended to provide minimum 1% grade towards the creek to achieve surface flow during storm events.

APPENDIX – A: DETAIL SURVEY PLAN



APPENDIX – B: DETAIL SITE PLAN NEAR SWIMMING POOL



 <p>URBAN GARDEN CO</p>	<p>PO BOX 3209 NORTH TURRAMURRA 2074</p> <p>P. 0421 686 304 E. hello@theurbangardenco.com.au W. theurbangardenco.com.au</p>	<p>LANDSCAPE PLAN - BACK</p>	CLIENT: J & C LAIRD	<p>SCALE: 1:100 @ A3</p>	DATE: 25.10.19	<p><small>GENERAL NOTES: DO NOT SCALE FROM THIS DRAWING. ALL MEASUREMENTS ARE TO BE VERIFIED ON SITE. ALL WORK TO BE CARRIED OUT BY LICENSED CONTRACTOR AND COMPLY WITH THE BUILDING CODE OF AUSTRALIA AND APPLICABLE AUSTRALIAN STANDARDS. LIGHTING TO BE INSTALLED BY A QUALIFIED ELECTRICIAN. DRAWINGS TO BE READ IN CONJUNCTION WITH ENGINEER'S DETAILS WHEN AVAILABLE. INSTALLATION OF DRAIN IRRIGATION IS RECOMMENDED. THESE DRAWINGS ARE COPYRIGHT © OF THE URBAN GARDEN CO.</small></p>
			PROJECT: 25 WORROBIL ST NTH BALGOWLAH		DESIGNER: AS	
			PROJECT#: LAI1954		REV: A	
					PAGE#: 2	

APPENDIX – C: APPROXIMATE SWIMMING POOL LOCATION AT 1% AEP FLOOD EXTENT MAP

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: Manly Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

APPENDIX – D: FLOOD CONTROL MATRIX

		MATRIX : Flood Risk Precincts																				
		High Flood Risk							Medium Flood Risk							Low Flood Risk						
		Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional	Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional	Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional
G. Car Parking	G1	G1 G4 G6 G7 G9 G10	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G4 G6 G7 G9 G10	G1 G2 G3 G4 G5 G6 G7 G8	G1 G4 G6 G7 G9 G10	G1 G2 G3 G4 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7 G8	G2 G6 G7 G9 G10	G2 G6 G7 G9 G10						
H. Fencing	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1					
I. Pools	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1					

APPENDIX – E: FLOOD INFORMATION LEVEL



FLOOD INFORMATION REQUEST - BASIC

Property: 25 Worrobil Street, North Balgowlah

Issue Date: 25/11/2019

Flood Study Reference: Manly Lagoon Flood Study 2013, BMT WBM

Flood Information for lot:

Flood Life Hazard Category – See Map A – N/A

1% AEP – See Flood Map B

1% AEP Maximum Water Level³: 44.1 m AHD

1% AEP Maximum Peak Depth from natural ground level³: 0.32 m

1% AEP Maximum Velocity: 0.83 m/s

1% AEP Hydraulic Categorisation: Floodway See Flood Map E

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) ^{1, 2, 3 & 4}: 44.7 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level²: 45.07 m AHD

PMF Maximum Depth from natural ground level: 1.45 m

PMF Maximum Velocity: 2.21 m/s

Flood Risk Precinct – See Map F

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

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

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

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

General Notes:

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

FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY

****No data available for this property.**

Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy' for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.12.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

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: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

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FLOOD MAP C: FLOOD PLANNING AREA EXTENT



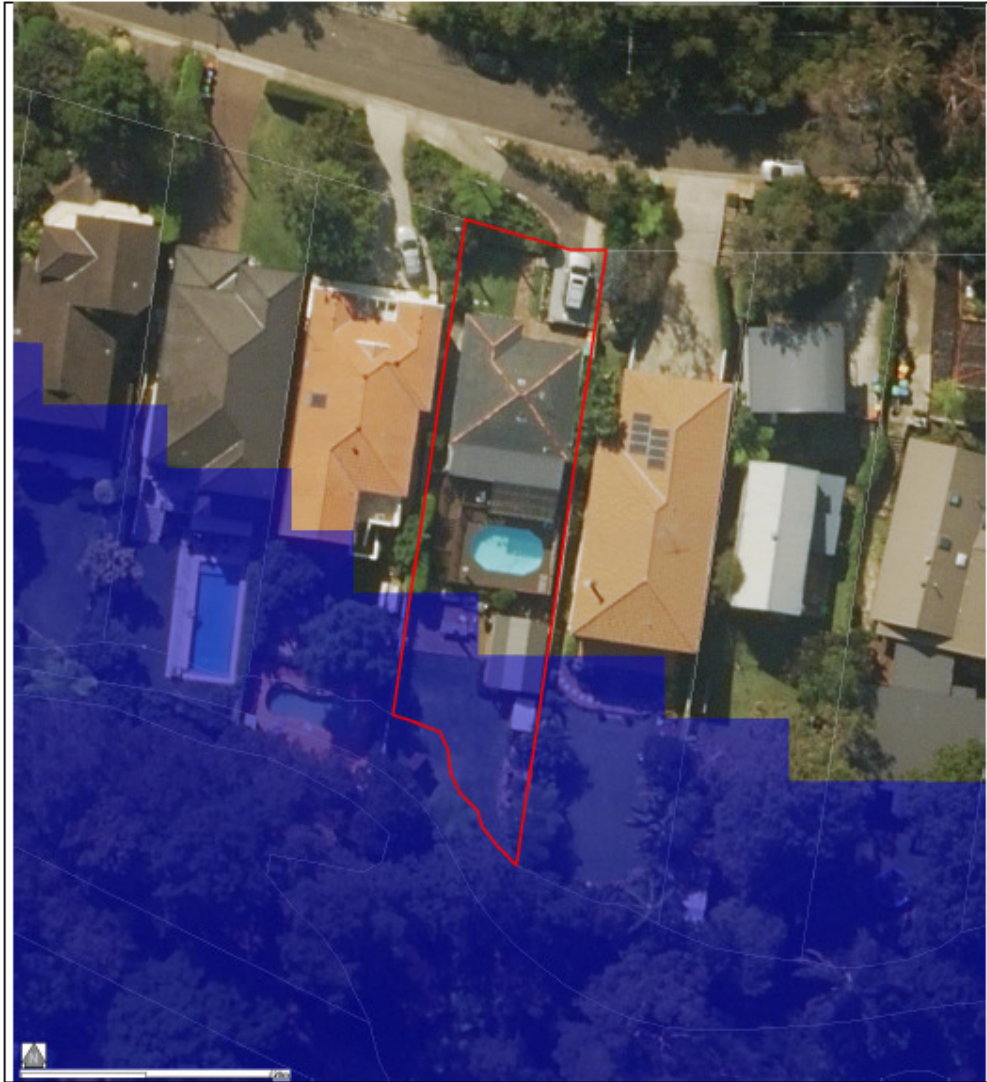
Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

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FLOOD MAP D: PROBABLE MAXIMUM FLOOD EXTENT



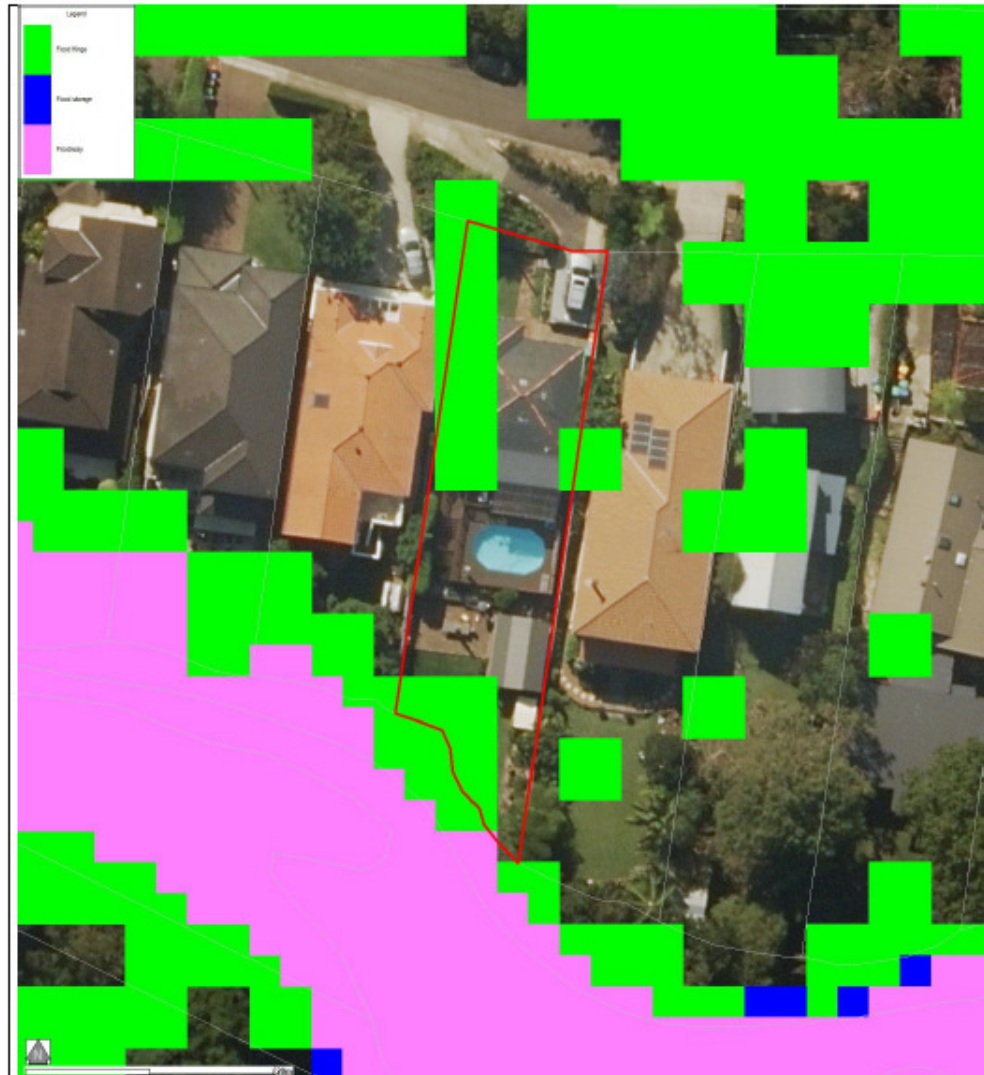
Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

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



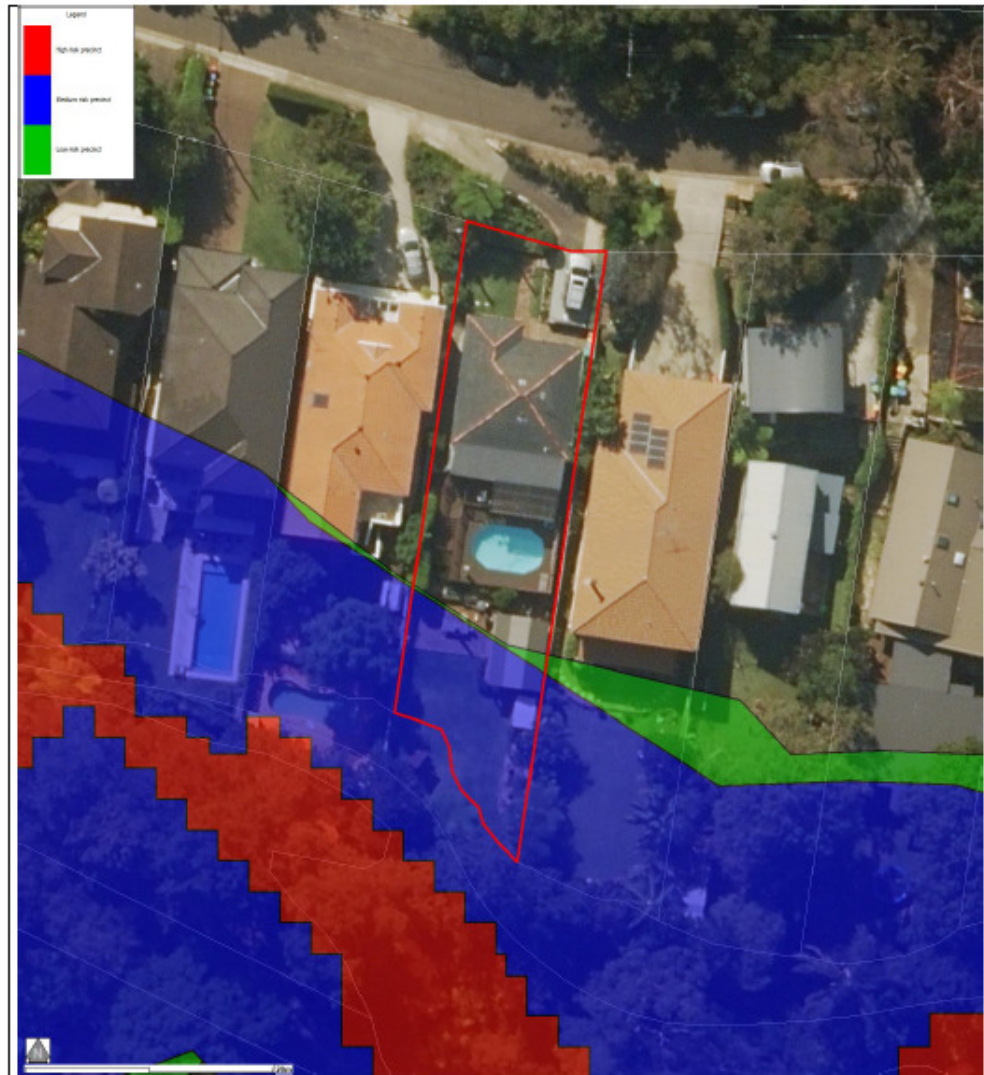
Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event. Please ignore overland flow as these results were not included in the study.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

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FLOOD MAP F: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 and or H6 Life Hazard Classification)

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