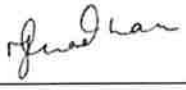
FLOOD RISK MANAGEMENT REPORT

12 Whale Beach Road, Avalon Beach

February 2020

Geostar Australia Pty Ltd T/A BMB Engineers; ABN 72 154 094 041; Phone 02 9836 1373;
info@bmbengineers.com.au; www.bmbengineers.com.au

Report Description

Report Name	**Flood Risk Management Report**	
Address	**12 Whale Beach Road, Avalon Beach**	
Client	**David Mower**	
Our Reference	**FAR1813/20**	
Prepared By	**Muna Pradhan** **Flood and Drainage Engineer** **MIEAust CPEng NER**	

Revision History

Date	Version	Author	Comments
27.02.2020	V_1	MP	First Edition

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1 Executive Summary

The impacts of proposed development at No. 12 Whale Beach Road, Avalon Beach to the existing flooding characteristics at the site and surroundings have been assessed in this study. This flood management report is primarily based upon the Avalon to Palm Beach Floodplain Risk Management Study and Plan (2017) and other relevant documents.

The development proposal comprises alterations and additions to the existing residential dwelling (addition of second storey) and addition of a new carport as shown in Figure 3. The proposed development can be considered as a concessional development.

The flood level information, provided by council suggested that the development site is affected by a local overland flooding. The maximum 1% AEP flood level, depth and velocity at the site is 11.53 m AHD, 0.2 m and 0.58 m/s respectively. The site is located at flood fringe, low hazard and low to medium flood risk precinct. During flooding event, floodwater from upstream catchment enters the site via neighbouring property around the middle of the eastern boundary and leaves the site via western boundary. As the flow increases, more and more part of the site will be inundated with the flood water.

The foot print of the proposed alterations and addition is same as the existing dwelling except the carport which is located in the flood free zone. In such a case, the proposed redevelopment does not have any adverse effects to the existing flooding behaviours at the site and surroundings. The site is located in low hydraulic hazard, low to medium flood risk precincts and H2 Flood Life Hazard Category. In such a case, flood emergency response planning policy does not apply. The proposed development is compliance with the requirements for a flood control lot.

2 Introduction

BMB Engineers was commissioned in order to assess the impact of flooding due to the proposed development at 12 Whale Beach Road, Avalon Beach.

This report has been prepared to accompany a Development Application for the proposed development that will address Northern Beaches Council's requirements for a flood controlled lot. This report describes the existing characteristics of the area, proposed development and quantifies the impact of flooding due to the proposed development.

3 Site Description

The site is located to the northern side of Whale Beach Road near the junction of Burrawong Road and Whale Beach Road. A locality plan of the site is provided in Figure 1 below.

Figure 1 Location of Site (Source: SIX Maps)

The site is currently developed with a brick cottage with tile roof, a timber deck, a concrete driveway, a carport and a shed. The site slopes towards rear (northern) and left (western) boundary. The Survey plan of the development site is provided in Figure 2. Few trees also exist on the site.

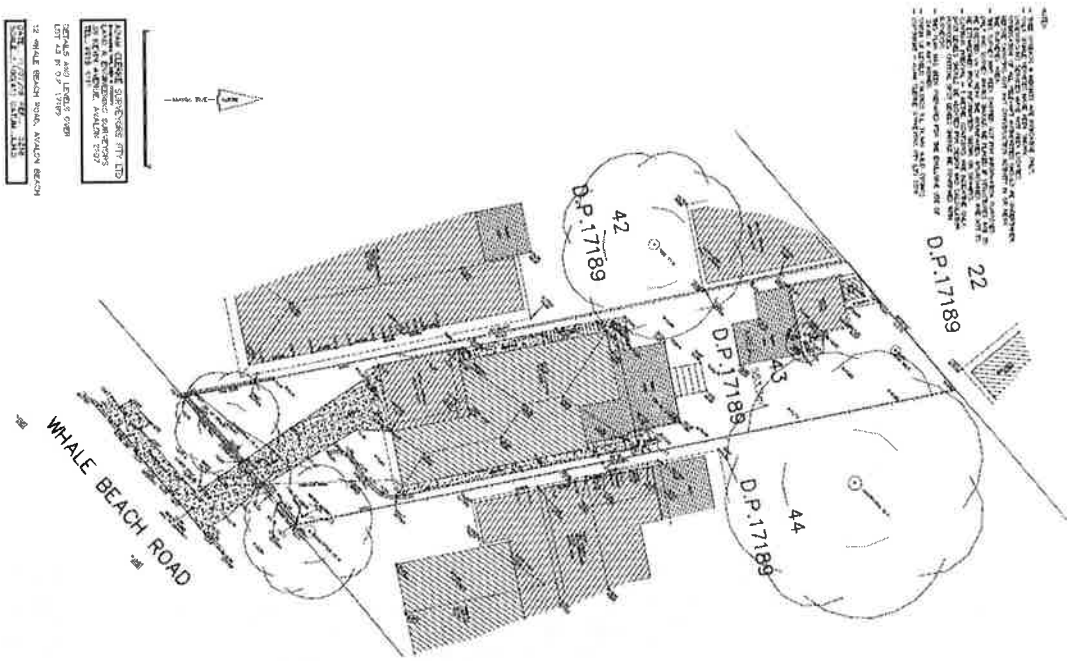

Figure 2 Survey Plan of Development Site

4 Proposed Development

The proposed development comprises alterations and additions to the existing residential dwelling and a removal of existing carport. The construction of the second storey is proposed to the existing single storey dwelling and addition of a new covered deck at front of the dwelling and a new roof is proposed to the existing timber deck at back of the existing dwelling. In addition, a double carport is proposed at the front of the property. The site plan of the proposed development is presented in Figure 3. The proposed development can be considered as a concessional development.

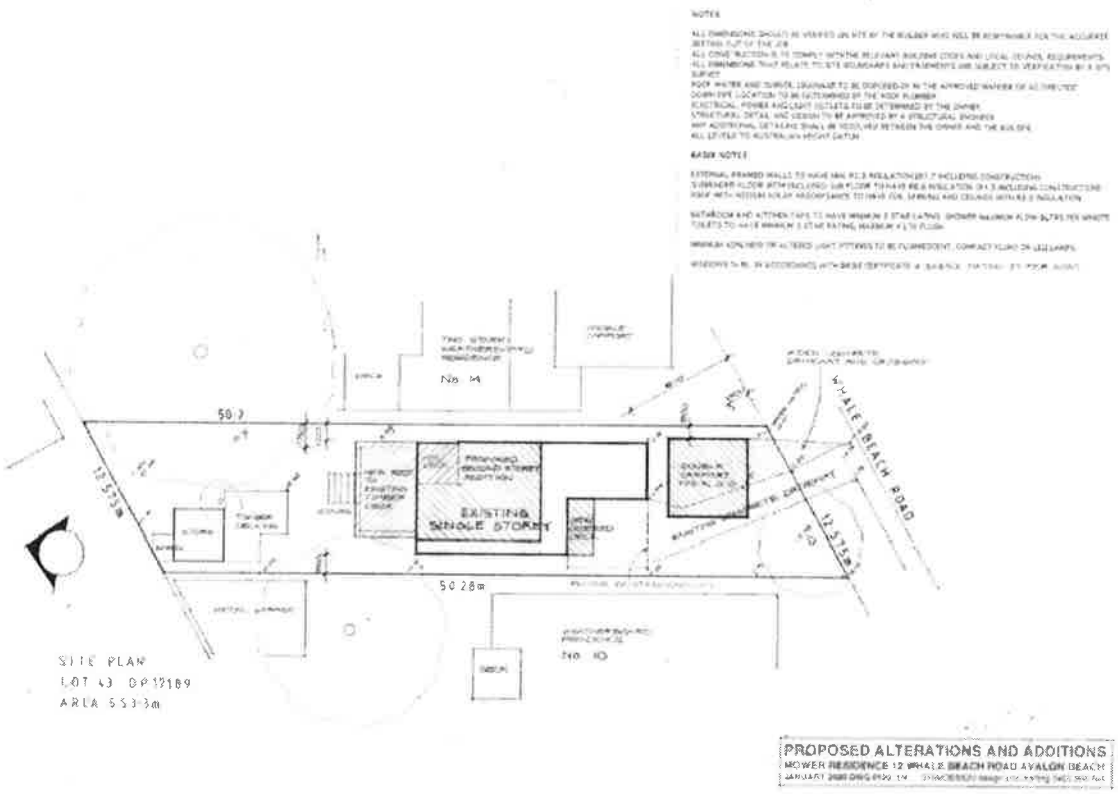

Figure 3 Proposed Development

5 Flood Characteristics

Council has advised that the proposed development site is affected by the flooding. Flood information around the development site provided by Northern Beaches Council is presented in Table 1 and Appendix A. This flood level information is based on Avalon to Palm Beach Floodplain Risk Management Study and Plan (2017) prepared by NSW Public Works Manly Hydraulics Laboratory. Based on this information, the development site is affected by a local overland flooding. The maximum 1% AEP flood level, depth and velocity at the site is 11.53 m AHD, 0.2 m and 0.58 m/s. The site is located at flood fringe, low hazard and low to medium flood risk precinct.

Table 1 Flood Information at the Development Site (Source: Northern Beaches Council)

Flood Characteristics	1% AEP	PMF
Maximum Flood Level, m AHD	11.53	11.85
Maximum Flood Depth, m	0.20	0.31
Maximum Velocity, m/s	0.58	0.97

The Flood Life Hazard Category of the site falls to H1 (no restriction) for 1% AEP and H2 (unsafe for small vehicles) for PMF. In such a case, the flood life hazard is considered acceptable in regards to Emergency Response Planning. Therefore, flood emergency response planning policy does not apply. The council has advised that the flood planning level for the subject site is **11.83m AHD**.

6 Flood Related Development Control

The Proposed development of additions and alterations at No. 12 Whale Beach road, Avalon Beach has been assessed against Pittwater 21 Development Control Plan 2014. A compliance table is shown in Table 2. The assessments for the flood controls are presented below.

Table 2 Prescriptive Controls Compliance Table

SN	Performance Criteria	Compliance		
		Not Applicable	Yes	No
A	Flood effects caused by Development		√	
B	Drainage Infrastructure & Creek Works	√		
C	Building Components and Structural		√	
D	Storage of Goods		√	
E	Flood Emergency Response	√		
F	Floor Levels		√	
G	Carparking	√		
H	Fencing	√		
I	Pools	√		

6.1 Flood Effects caused by Development

The foot print of the proposed alterations and additions is the same as the existing dwelling except a new double garage which is located in flood free zone. Therefore, there will be no flood storage loss. In such a case there will not be any significant flooding impact due to the proposed development.

6.2 Building Components and Materials

All structural components will be constructed with flood compatible materials up to the flood planning level. All electrical equipment and wiring will be water proofed or installed above the flood planning level. Table 3 presents the flood compatible materials that can be used for the proposed building.

Table 3 Flood Compatible Materials

Building Component	Flood Compatible Materials	Building Component	Flood Compatible Materials
Flooring and Sub-floor Structure	- Concrete slab-on ground - Monolith construction - Suspended reinforced concrete slab	**Doors**	- Solid panel with water proof adhesives - Flush door with marine ply filled with closed cell foam - Painted metal construction - Aluminium or galvanised steel frame

Floor Covering	- Clay tiles - Concrete, precast or in situ - Concrete tiles - Epoxy, form in place - Mastic flooring, formed in-place - Rubber sheets or tiles with chemical-set adhesives - Silicone floors formed in-place - Vinyl sheets or tiles with chemical-set adhesive - Ceramic tiles, fixed with mortar or chemical-set adhesive - Asphalt tiles, fixed with water resistant adhesive	**Wall and Ceiling Linings**	- Fibro-cement board - Brick, face or glazed - Clay tile, glazed in waterproof mortar - Concrete - Concrete block - Steel with waterproof applications - Stone, natural solid or veneer, waterproof grout - Glass blocks - Glass - Plastic sheeting or wall with waterproof adhesive
Wall Structure	- Solid brickwork, blockwork, reinforced concrete or mass concrete	**Insulation Windows**	- Foam (closed cell types) - Aluminium frame with stainless steel - Rollers or similar corrosion and water resistant material
Roofing Structure (for Situations where the Relevant Flood Level is Above the Ceiling)	- Reinforced concrete construction - Galvanised metal construction	**Nails, Bolts, Hinges and Fittings**	- Brass, nylon or stainless steel - Removable pin hinges - Hot dipped galvanised steel wire, nails or similar
Electrical and Mechanical Equipment For dwellings constructed on land, where this plan applies, mechanical and electrical materials, equipment and installation should conform to the following requirements.		**Heating and Air Conditioning Systems** Heating and air conditioning systems should be installed at levels above the relevant flood level, to the maximum height possible. If this is not feasible, care should be taken to minimise the potential damage caused by submersion according to the following guidelines.	
Main power supply The main commercial power service equipment, including metering equipment, shall be located above the relevant flood level, subject to the approval of the relevant authority. A provision for easily disconnecting the dwelling from the main power supply shall be supplied.		**Fuel** Gas or oil fuelled heating systems should have a manually operated valve, which is to be located in the fuel supply line, to enable fuel cut-off.	

Wiring All wiring, switches and power outlets should be located above the relevant flood level, to the maximum height possible. All electrical wiring, which is installed below the relevant flood level, should be suitable for continuous submergence in water, containing no fibrous components. Earth core linkage systems (or safety switches) are to be installed. Only submersible-type splices are to be used below the relevant flood level. All conducts, located below the relevant flood level, should be self draining in the event of flooding.	**Installation** Heating equipment and fuel storage tanks should be mounted on and securely anchored to a footing of sufficient size, in order to withstand buoyancy and to prevent movement capable of damaging the fuel supply line. All storage tanks should be vented to a level 600 millimetres above the relevant flood level.
Equipment Equipment installed below/partially below the relevant flood level should contain a method of disconnection, by a single plug and socket assembly.	**Ducting** All ductwork, located below the relevant flood level, should have openings for drainage and cleaning. A grade may be introduced within ductwork in order to facilitate self draining. In the case where ductwork passes through a water tight wall or a floor below the flood level, the ductwork should be covered by a closure assembly which is to be operated from above the flood level.
Reconnection In the event that an electrical device and/or part of the wiring is flooded, it should be thoroughly cleaned or replaced and checked by an approved electrician before reconnecting.	**Ancillary Structures (steps, pergolas, etc)** Suitable water tolerant materials, such as masonry sealed hardwood and corrosive resistant metals, should be used. Copper Chrome Arsenate (CCA) treated timber is not a suitable material.

6.3 Structural Soundness

All structures to be designed and constructed to ensure structural integrity up to the flood planning level. Structural certification from the qualified engineer shall be provided confirming that the structure can withstand the forces of floodwater debris, wave action, buoyancy and immersion up to the flood planning level.

6.4 Storage of Goods

No hazardous or potentially polluting materials are proposed to store below the Flood Planning Level. Highly water susceptible goods, materials and other products to be located above the Flood Planning Level.

6.5 Flood Emergency Response

The Flood Life Hazard Category of the site falls to H1 for 1% AEP and H2 for PMF, which is considered acceptable in regards to Emergency Response Planning. Therefore, flood emergency response planning policy does not apply for the proposed development.

6.6 Floor Level

The flood planning level of the proposed development has been advised as 11.83 m AHD. The proposed habitable floor level (11.84 m AHD) is compliance with this requirement. The proposed alterations and additions will not impede the flood conveyance on the site. There will not be flood storage loss in a 1% AEP event.

6.7 Car Parking

Proposed garage is located in a flood free zone.

7 Conclusions and Recommendations

The impacts of proposed development at No. 12 Whale Beach Road, Avalon Beach to the existing flooding characteristics at the site and surroundings have been assessed in this study. This flood management report is primarily based upon the Avalon to Palm Beach Floodplain Risk Management Study and Plan (2017) and other relevant documents.

The proposed development site is slightly affected by an overland flooding. During flooding event, floodwater from upstream catchment enters the site via neighbouring property around the middle of the eastern boundary and leaves the site via western boundary. As the flow increases, more and more part of the site will be inundated with the flood water.

The foot print of the proposed alterations and addition is same as the existing dwelling except the carport which is located in the flood free zone. In such a case, the proposed redevelopment does not have any adverse effects to the existing flooding behaviours at the site and surroundings. The site is located in low hydraulic hazard, low to medium flood risk precincts and H2 Flood Life Hazard Category. In such a case, flood emergency response planning policy does not apply. The proposed development is compliance with the requirements for a flood control lot. The followings are the recommendations from this study.

- All structural components up to the flood planning level are to be constructed with flood compatible materials and should withstand the forces of floodwater debris, wave action, buoyancy and immersion;
- All external power points, air conditioning units, hot water system and any equipment are to be set above the minimum habitable floor level;
- All development controls mentioned in section 5 are to be implemented.

Appendix A: Flood Information (Source: Northern Beaches Council)

northern beaches council

FLOOD INFORMATION REQUEST - BASIC

Property: 12 Whale Beach Rd, Avalon Beach, NSW, 2107
Lot DP: 43//17189
Issue Date: 17/02/2020
Flood Study Reference: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory

Flood information for lot:

Flood Life Hazard Category – See Map A

1% AEP – See Flood Map B

1% AEP Maximum Water Level[3]: 11.53 m AHD

1% AEP Maximum Peak Depth from natural ground level[3]: 0.20 m

1% AEP Maximum Velocity: 0.58 m/s

1% AEP Hydraulic Categorisation: Flood fringe **See Flood Map E**

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) [1, 2, 3 & 4]: 11.83 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level[2]: 11.85 m AHD

PMF Maximum Depth from natural ground level: 0.31 m

PMF Maximum Velocity: 0.97 m/s

Flood Risk Precinct – See Map F

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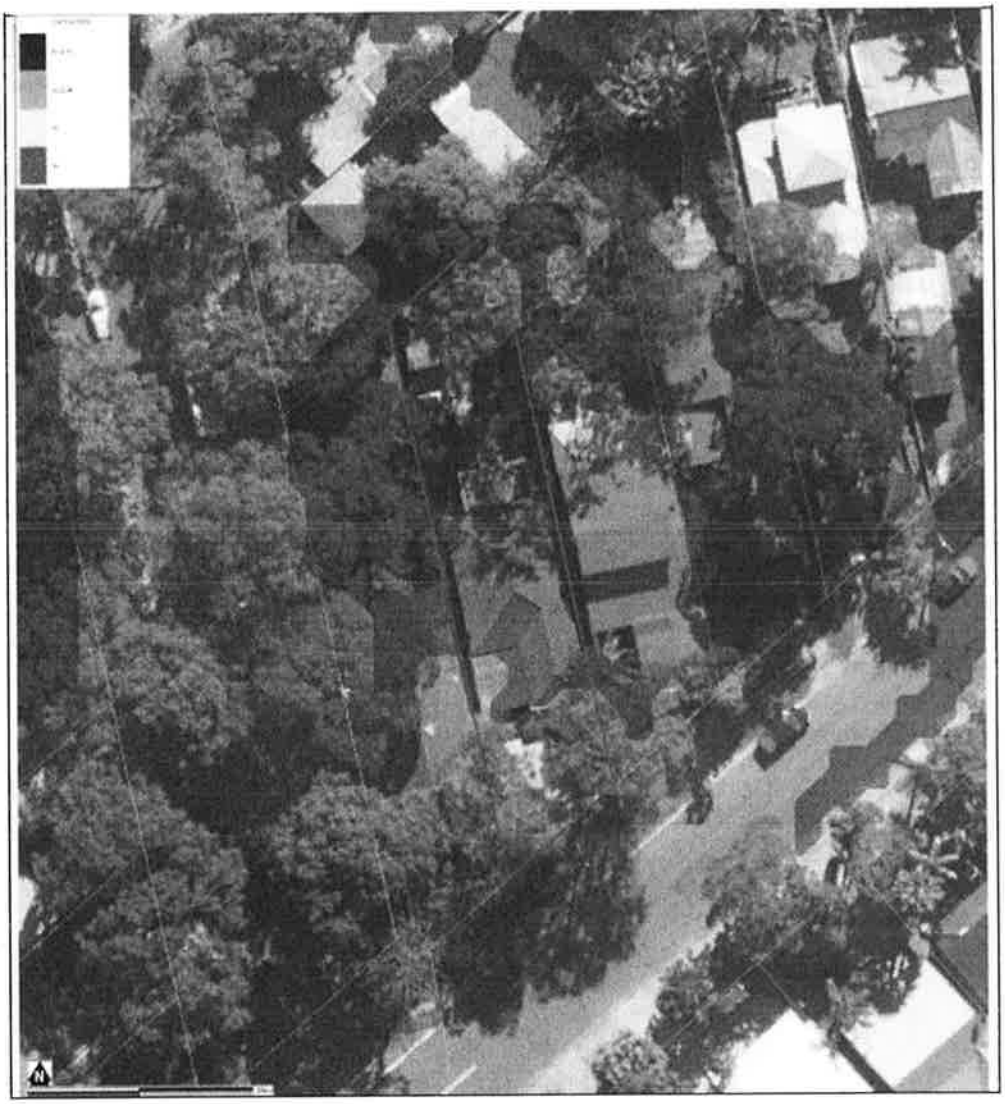
[1]The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.
[2]Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site.
[3]Intensification of development 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.
[4]Vulnerable/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



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 B3.13.
- 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.

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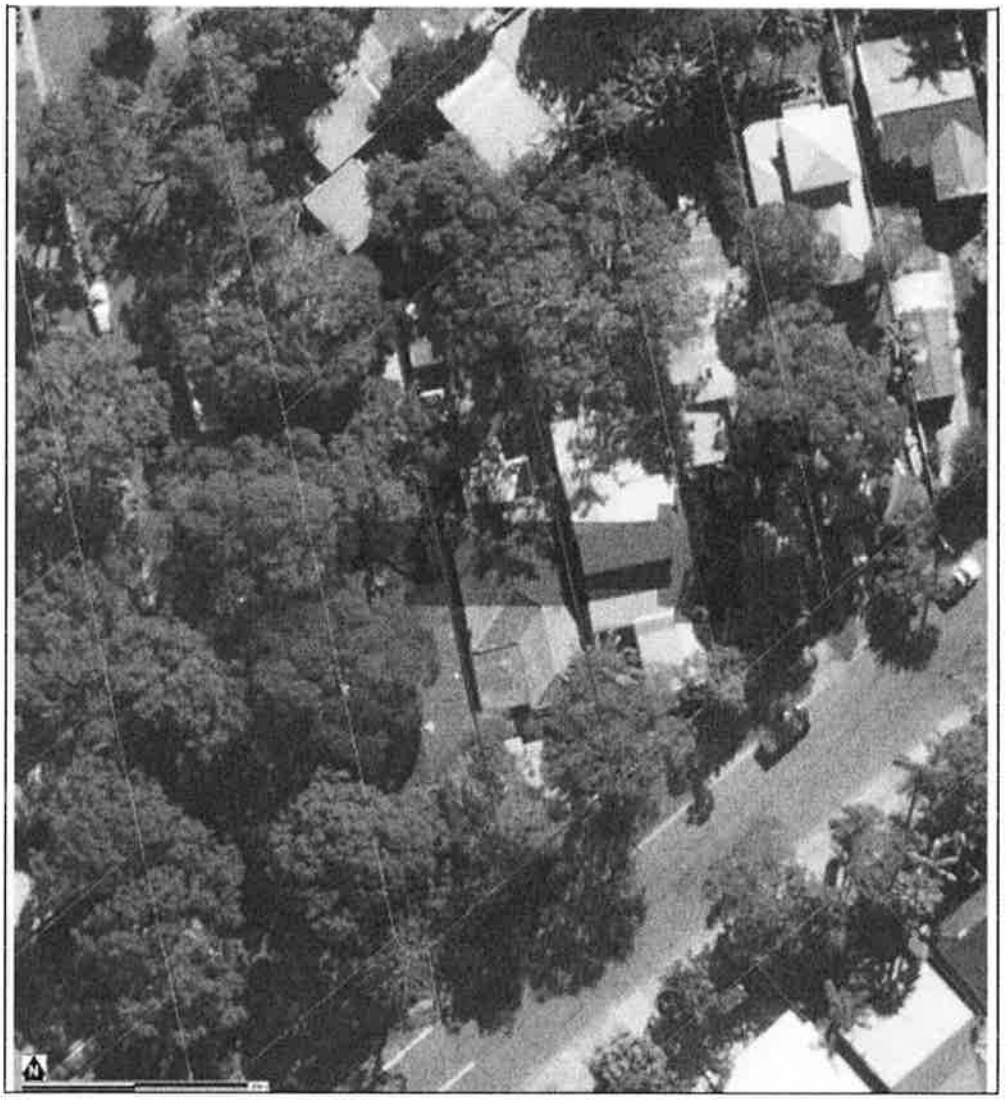
FLOOD MAP B: FLOODING - 1% AEP EXTENT



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.

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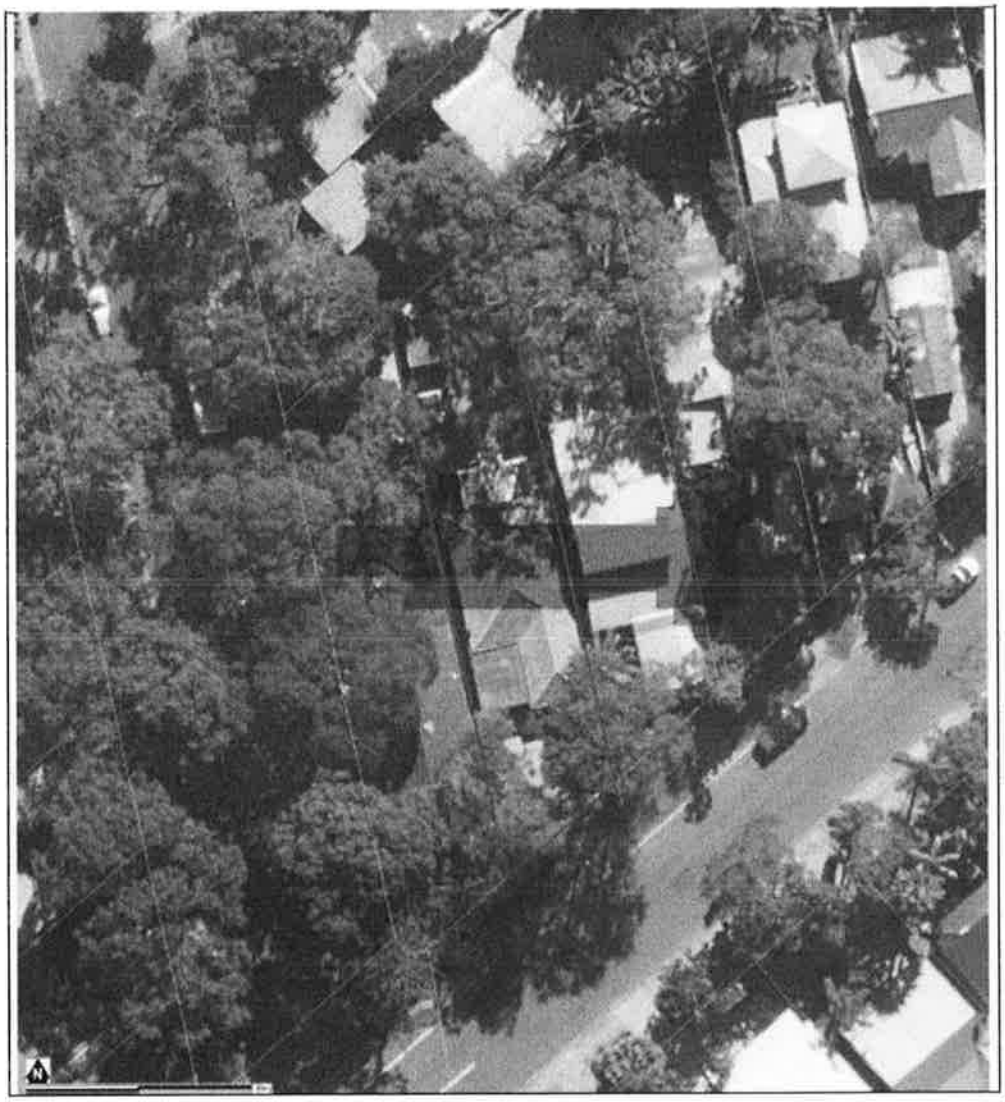
FLOOD MAP C: FLOOD PLANNING AREA EXTENT



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: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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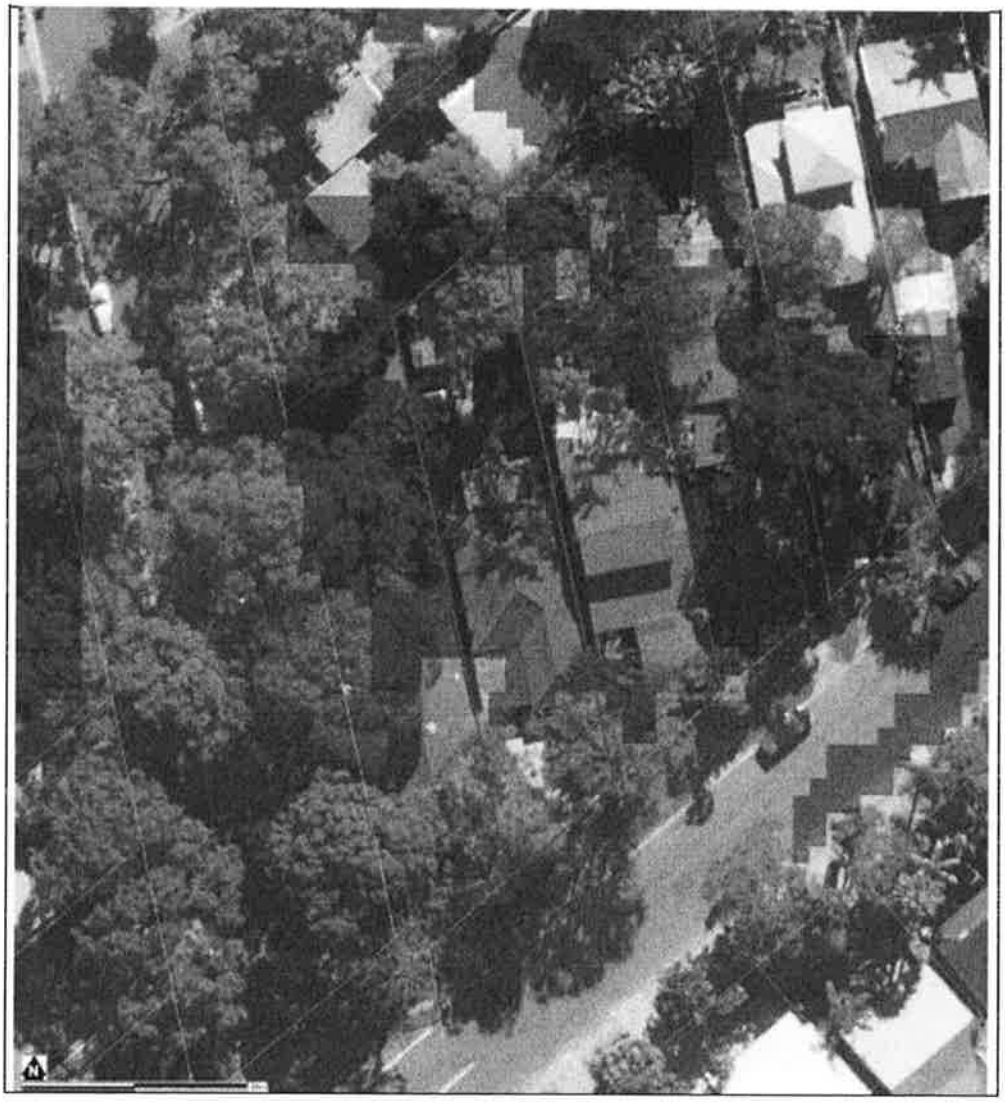
FLOOD MAP D: PROBABLE MAXIMUM FLOOD EXTENT



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: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) and aerial photography (Source: NearMap 2014) are indicative only.

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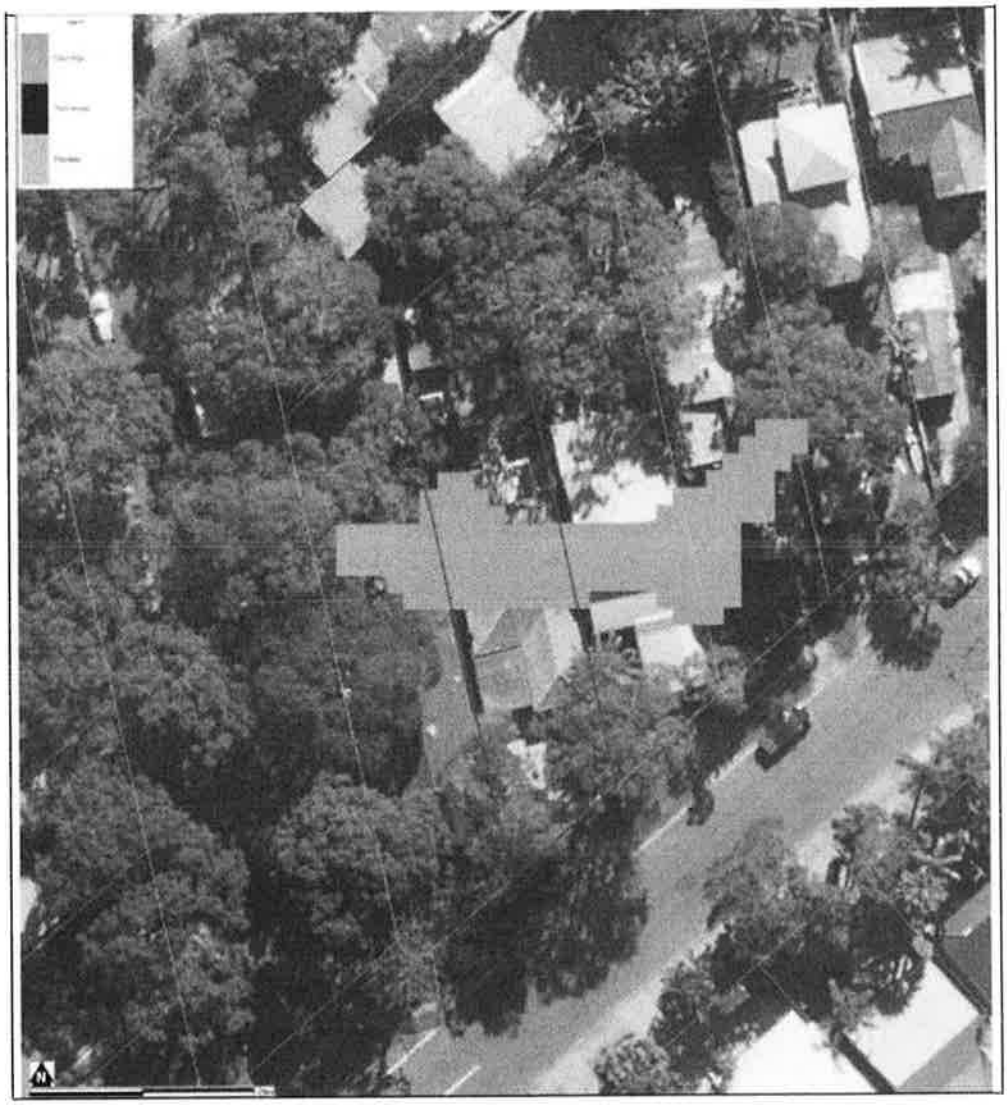
FLOOD MAP E: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- 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.

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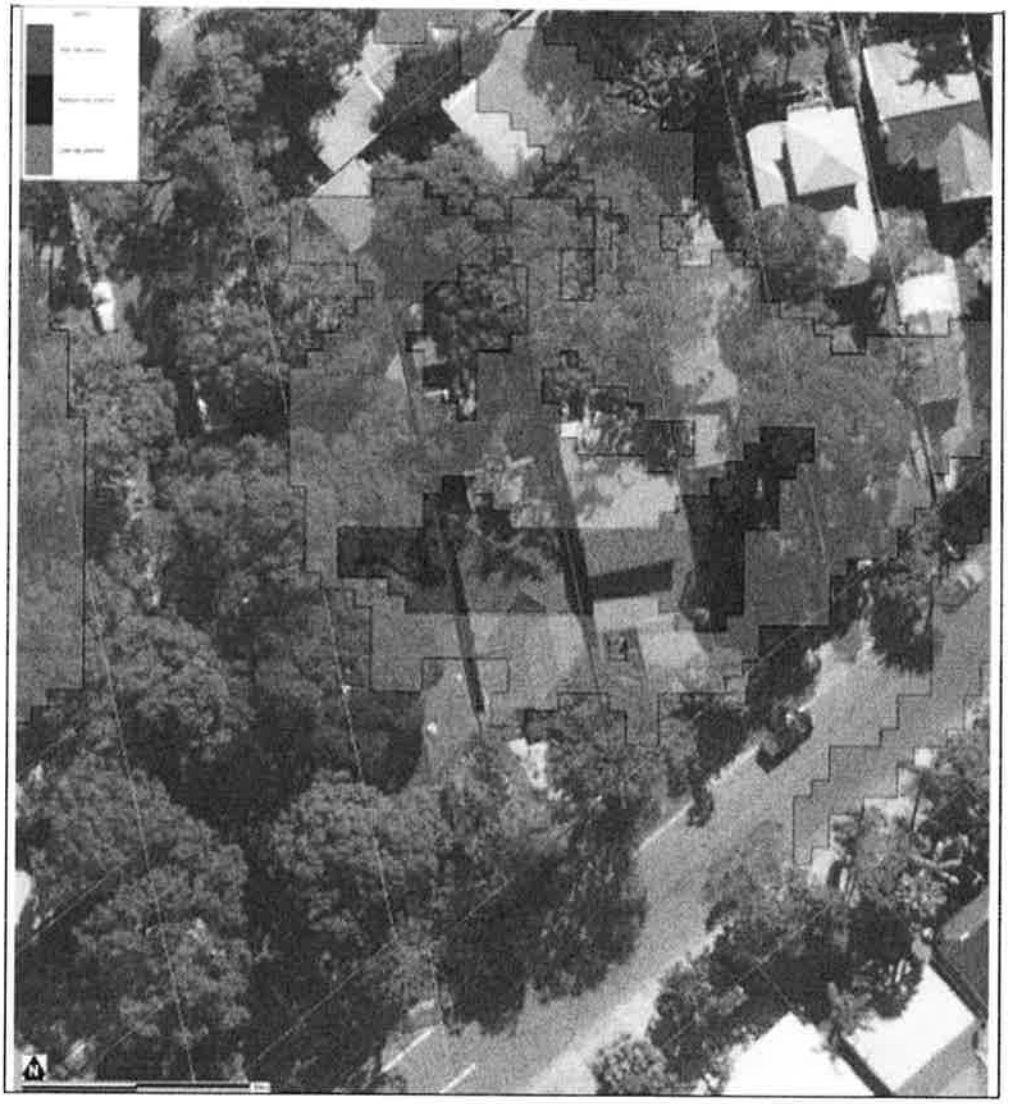
FLOOD MAP F: FLOOD RISK PRECINCT MAP



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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Appendix B: Standard Hydraulic Certification Form

Attachment A

NORTHERN BEACHES COUNCIL
STANDARD HYDRAULIC CERTIFICATION FORM
FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: 12 Whale Beach Road, Avalon Beach

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, Muna Pradhan (Insert Name) on behalf of BMB Engineers (Trading or Business/ Company Name)

on this the 27.02.2020 (Date) certify that I am engineer or a professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document, and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

***Flood Management Report* Details:**

Report Title: Flood Risk Management Report 12 Whale Beach Road Avalon Beach

Report Date: 27.02.2020

Author: Muna Pradhan

Author's Company/Organisation: BMB Engineers

I, Muna Pradhan (Insert Name)

Please tick all that are applicable (more than one box can be ticked)

☑ have obtained and included flood information from Council (must be less than 12 months old) **(This is mandatory)**

☑ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*

Signature

Name Muna Pradhan

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