



**JCO CONSULTANTS**

PREPARED FOR:

Mr. Minh

# PROPOSED GRANNY FLAT

No.6 Alfred Road, Brookvale  
Flood Risk Management Report



PREPARED BY

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## 1 INTRODUCTION

JCO Consultants has been engaged to prepare a Flood Risk Management Report for the Proposed Granny Flat on the existing dwelling at No.6 Alfred Road, Brookvale in accordance with the requirements of Northern Beaches Council.

The following documents have been referred in this report:

1. Site Survey Plan prepared by 'United Surveyors' dated 26<sup>th</sup> March 2024
2. Architectural Plans prepared by 'Bryan Design Architectural Solutions'
3. Councils Flood Information Report – Comprehensive dated 7<sup>th</sup> February 2024
4. Warringah LEP (2011)– 5.21 Flood Planning
5. Warringah LEP (2011)– 5.22 Special Flood Considerations
6. Warringah DCP (2011)– E11 Flood Prone Land
7. NSW Government Flood risk Management Manual – The Management of Flood Liable Land (2023)
8. Australian Rainfall and Runoff (AR&R 2019).

## 2 DESCRIPTIONS OF THE DEVELOPMENT

It is proposed to construct a detached Granny Flat to next to the existing detached garage at the rear of the property. The proposed development does not alter any of the existing buildings.

Area	Existing Floor Level	Flood Planning Level (RL m AHD)	Design Floor Level (RL m AHD)
Existing Carport	23.97	-	-
<b>Proposed Granny Flat</b>	<b>24.30-23.90</b>	<b>24.79</b>	<b>24.79</b>
<b>Proposed Patio Level</b>	<b>23.90-23.85</b>	<b>24.29</b>	<b>24.75</b>

**Table 2: Proposed and Existing Floor Levels**

The Site Plan and proposed Ground Floor Granny Flat are presented as below:

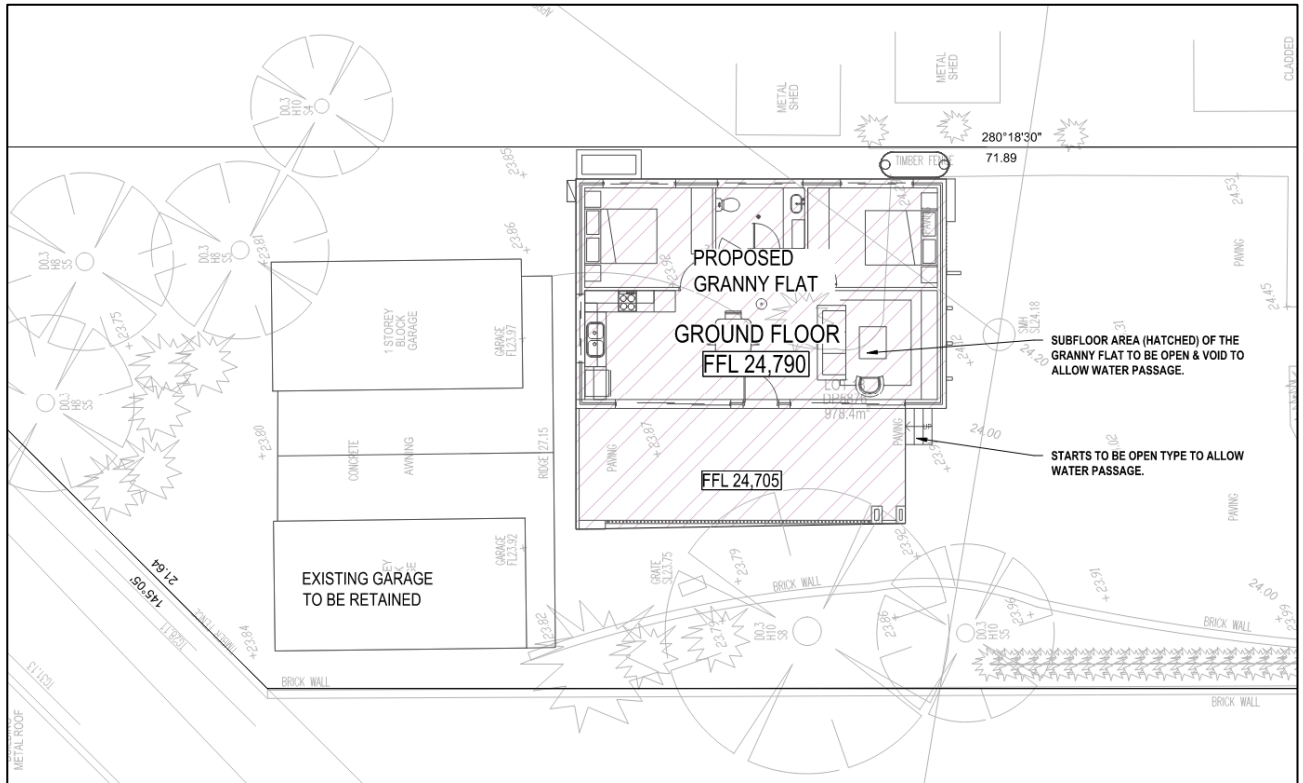


Figure 2 – Site Analysis Plan.

### 3 FLOOD ANALYSIS

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Flood information as provided by Council, See Appendix C.

- 1% AEP Flood Level (MAX): 24.29 m AHD
- 1% AEP Maximum Depth from natural ground level: 0.42 m
- 1% AEP Maximum Velocity: 1.02 m/s
  
- PMF Maximum Water Level: 24.80 m AHD
- PMF Maximum Depth from natural ground level: 1.25 m
- PMF Maximum Velocity: N/A
  
- 1% AEP Hydraulic Categorization: Flood Storage, Floodway and Flood Fringe
- 1% AEP Risk Precinct: Low - Medium Risk Precinct on Ground Floor

Specific Flood Information at **Granny Flat (Point 3 on Councils Flood Information):**

- 1% AEP Flood Level: 24.09 m AHD
- 1% AEP Maximum Depth from natural ground level: 0.18 m
- 1% AEP Maximum Velocity: 0.53 m/s
  
- PMF Maximum Water Level: 24.75 m AHD
- PMF Maximum Depth from natural ground level: 0.84m
- PMF Maximum Velocity: N/A
- 1% AEP Risk Precinct: Medium Risk Precinct

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

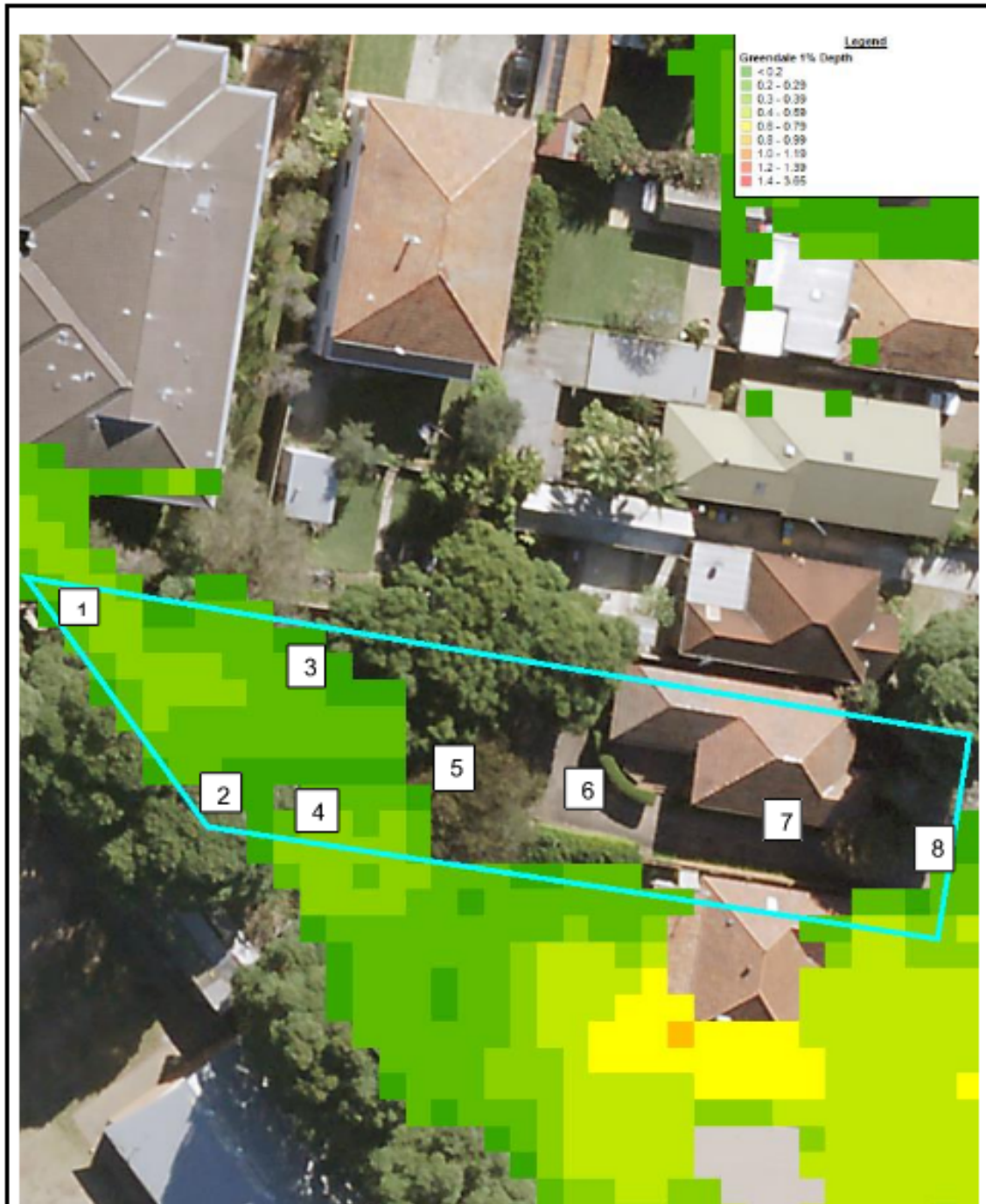


Figure 3.1 – Flood Levels Key Points

**Flood Levels**

ID	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	24.27	0.35	1.02	24.77	24.79	0.87	N/A
2	24.07	0.16	0.94	24.57	24.69	0.78	N/A
3	24.09	0.18	0.53	24.59	24.75	0.84	N/A
4	23.88	0.34	0.65	24.38	24.72	1.18	N/A
5	N/A	N/A	N/A	N/A	24.71	0.72	N/A
6	N/A	N/A	N/A	N/A	24.64	0.58	N/A
7	N/A	N/A	N/A	N/A	24.31	0.49	N/A
8	23.65	0.17	0.70	24.15	24.17	0.70	N/A

**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	24.31	0.39
2	24.10	0.19
3	24.12	0.21
4	23.93	0.39
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	23.67	0.19

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<sup>2</sup>/s, a freeboard of 0.3m may be able to be justified for development.

**Figure 3.2 – Flood Levels**

## 4 ASSESSMENT OF IMPACTS

We have used the High Flood Risk Planning Precinct matrix in Council's Warringah DCP (2011) E11 Flood Prone Land for this part of the assessment. See Appendix B.

### **Land Use: Residential Use**

<b>Residential</b>		
Dwelling house	Secondary dwelling	Dual occupancy
Residential apartment building	Multi dwelling housing	Hostel or Boarding House
Attached dwelling	Semi-detached dwelling	Shop top housing
Exhibition home or village	Additions/alterations to residential dwelling	Development ancillary to residential development

**Table 4.1 - Summary of Compliance**

			<b>Compliance</b>		
			<b>Not Applicable</b>	<b>Yes</b>	<b>No</b>
<b>A</b>	<b>Flood effects caused by Development</b>	<b>A1</b>		<b>X</b>	
		<b>A2</b>		<b>X</b>	
<b>B</b>	<b>Building Components &amp; Structural</b>	<b>B1</b>		<b>X</b>	
		<b>B2</b>		<b>X</b>	
		<b>B3</b>		<b>X</b>	
<b>C</b>	<b>Floor Levels</b>	<b>C1</b>		<b>X</b>	
		<b>C3</b>		<b>X</b>	
		<b>C4</b>	<b>X</b>		
		<b>C6</b>	<b>X</b>		
<b>D</b>	<b>Car Parking</b>	<b>D1</b>	<b>X</b>		
		<b>D2</b>	<b>X</b>		
		<b>D3</b>	<b>X</b>		

		<b>D4</b>	<b>X</b>		
		<b>D5</b>		<b>X</b>	
		<b>D6</b>	<b>X</b>		
<b>E</b>	<b>Flood Emergency Response</b>	<b>E1</b>		<b>X</b>	
<b>F</b>	<b>Fencing</b>	<b>F1</b>		<b>X</b>	
<b>G</b>	<b>Storage of Goods</b>	<b>G1</b>		<b>X</b>	
<b>H</b>	<b>Pools</b>	<b>H1</b>	<b>X</b>		

**Table 4.2: Flood Matrix Justifications**

<b>A Flood effects caused by Development</b>	
A1	Proposed Granny Flat on Ground Floor are located in the 1% AEP event levels. The subfloor area of the proposed granny flat will be open and supported by piers to allow water passage. It can be concluded that the development will have no impact to neighbouring properties and the existing flood conditions (flood storage, velocity & flood level).
A2	Same as above. The reduction of building obstruction will be achieved by subfloor opening. Flood Storage at the development area will not be reduced in the post-development scenario.
<b>B Building Components &amp; Structural</b>	
B1	It is recommended that the proposed Granny Flat up to the finished floor level is to be 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).  Some flood compatible materials are given in Appendix A.
B2	It is recommended that the proposed Granny Flat to be designed to comply. The <u>proposed</u> structures must be designed and constructed to ensure structural integrity up to max flood planning level (RL24.79mAHD), taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. The proposed finished floor level (RL24.79mAHD) is also above the corresponding PMF flood level (RL 24.75mAHD) at the Granny Flat location.  Structural certification shall be provided confirming the above.

B3	It is recommended that, for the proposed Grann Flat, 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 of 24.79m AHD (maximum 1%AEP Flood Level + 0.5m freeboard). 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.
<b>C Floor Levels</b>	
C1	New floor levels within the development shall be at or above the Flood Planning Level. The FFL of the proposed Granny Flat is set to RL24.79m AHD, above the Flood Planning Level.
C3	The subfloor area will be open and void and supported by piers. 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. 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; No solid areas of the perimeter of the underfloor area would be permitted in a floodway.
C4	Not applicable.
C6	Not applicable.
<b>D CAR PARKING</b>	
D1	No new car parking is proposed. This section is not applicable.
D2	Not applicable
D3	Not applicable
D4	Not applicable
D5	Not applicable
D6	Not applicable
<b>E Flood Emergency Response</b>	
	The proposed development areas are mapped as Low-Medium Risk at the development footprint. Off-site evacuation is required at early stage or SES warning. If the access to the frontage road is not available during flooding events, 'Shelter in place' maybe necessary. The finished floor level (RL 24.79m AHD) of the Granny Flat is above the corresponding PMF flood level (RL 24.75m AHD).
<b>F Fencing</b>	
	No applicable as no new fencing is proposed.
<b>G Storage of Goods</b>	
G1	Hazardous or potentially polluting materials are to be stored above the Flood Planning Level of 24.79m AHD. Goods, materials or other products which may be highly susceptible to water damage to be located/stored above the Flood Planning Level of 24.79m AHD.

## 5 BUILDING COMPONENT & STRUCTURE SOUNDNESS

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**Warringah DCP (2011)– E11 Flood Prone Land** outlined the flood related controls, with the objective of these controls being to: “incorporates appropriate measures to manage risk to life in the event of a flood”. As such, new structures subject to flooding and overland must be designed and constructed to withstand the anticipated hydrostatic forces.

For all parts of the development potentially exposed to floodwater (below the minimum Freeboard requirement), the development structure **must**:

- i. be constructed of flood compatible building components in accordance with “Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas”, Hawkesbury-Nepean Floodplain Management Steering Committee (2006)..

Structural Engineer must design & Certify that the structure is designed and capable of withstanding forces subject to forces of floodwater, debris, buoyancy forces anticipated up to **PMF level RL24.75mAHD**.

## 6 FLOOD EVACUATION STRATEGY

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To minimise risk to personal safety of occupants, evacuation strategies shall be prepared and implemented in order to mitigate the flood water impacts due to the land use nature of the proposed addition.

This section of the report identifies and discusses the strategies applicable to the subject site in accordance with **Northern Beaches Councils DCP/LEP** and **Local Floodplain Risk Management Plan**.

In reference to Council's Flood Information Report (**Refer to Appendix C**), the 1% AEP (100YR ARI) & PMF flood extent is present throughout the property. As such, we concluded that early evacuation is necessary and Off-Site Evacuation **must** be executed when flood waters are evident along & through site frontage along Alfred Road – which would be during storm events greater than 1% AEP flood event.

Access for leaving the site is via Alfred Road which is located at the frontage of the subject site. **Flood Plain Management Guidelines** suggest that persons evacuating a flood affected area should be moving away from the flood affected area. The maximum PMF Flood Level at the Granny Flat location according to Councils Flood Information Report is RL24.75mAHD.

**The most appropriate evacuation route is:**

1. Exit the property and walk towards the site frontage (No. 6 Alfred Road);
2. Once at site frontage, turn left and head north until reach the intersection of Gulliver Street and Alfred Road;
3. Walk across Gulliver Street and head north on Alfred Road to the frontage of No. 16 Alfred Road, Brookvale;
4. The frontage of No. 16 Alfred Road, Brookvale has been identified as an area located outside of the PMF flood extents (**Refer to Figure 6.3**).

If off site evacuation route is not possible, occupants must access the ground floor of Granny Flat which is above the PMF flood level at that location, and wait for the flooding to subside.

The Off-site Evacuation Route has been represented on Figure 6.1.

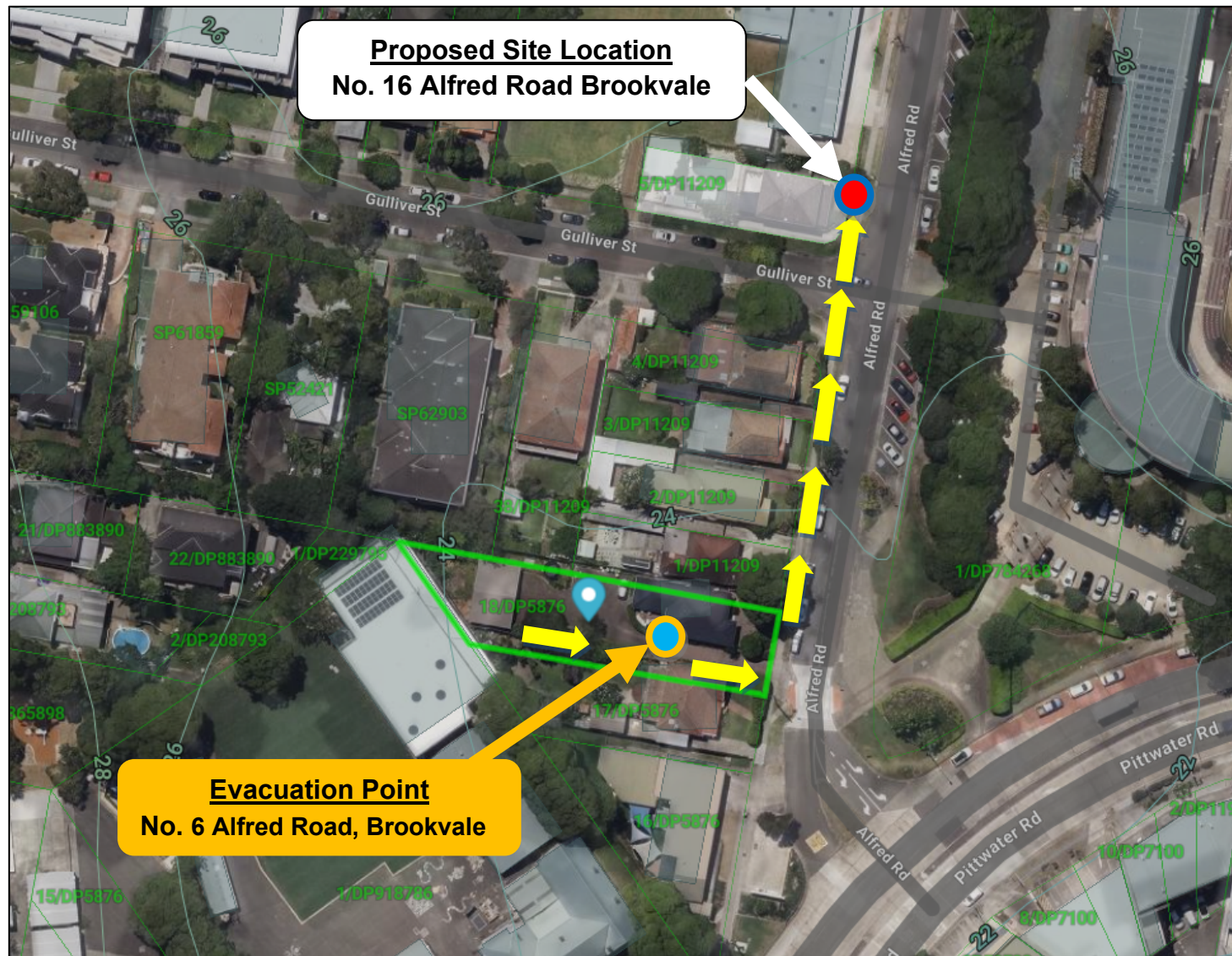


Figure 6.1 - Proposed Evacuation Route

## **PROCEDURE IN CASE OF FLOODING**

1. During floods, many local and major streets/ roads will be cut off by floodwaters that may make the escape by vehicle extremely difficult. Travelling through floodwaters on foot or in a vehicle can be very dangerous as obstructions can be hidden under the floodwaters, or you could be swept away, even if in a car, or the water may be polluted.
  2. **During PMF storm event, the external ground area will be inundated by 0.84m depth of flood water. The flood depth will make it unsafe to evacuate the site.**
  3. Develop your own family flood plan and be prepared if flooding should occur while the kids are coming home from school, or when you are returning from work. Make arrangements with neighbours or family members to look after children if there are no adults at home.
  4. **When flood water commences to pond in the road reserve immediately in front of the site, occupants are to stay within the building and walk up the stairs to the First Floor Level which provides on-site refuge.** It is recommended to stay within the building (First Floor Level). If you urgently need to leave the building, do so early in the flood event and before the flood level reaches the top of kerb of the road frontage.
  5. As flood levels commence to pond within the road reserve immediately fronting the site:
    - (a) *Move important documents, personal effects, precious photographs and vital medical supplies to a safe and easily accessible place with your emergency flood kit.*
    - (b) *Gather medicines, special requirements for babies or the elderly, mobile phones, first aid kit, special papers, battery operated torch and radio, fresh water, canned food and opener, water proof clothing and small valuables into a backpack or bag in one location.*
    - (c) *Locate your pets and gather any special requirements for them.*
    - (d) *Put on strong shoes, raise any items within the home that may be damaged by water to as high a level as possible, with electrical items on top.*
    - (e) *Turn off any large electrical items at the power point such as a TV that cannot be raised.*
- Note: Suitable storage areas will be first floor.**
6. In the rare event that flood waters appear that they may enter the dwelling:
    - (a) *Switch off electricity at switchboard.*
    - (b) *Turn off gas at the meter.*
    - (c) *Turn off water at the meter.*
    - (d) *Block toilet bowls with a strong plastic bag filled with earth or sand.*
    - (e) *Cover drains in showers, baths, laundries etc with a strong plastic bag filled with earth or sand.*

7. In the event that flood waters have risen up to the building, do not evacuate the building at this time unless instructed to do so by the SES or the Police. Floodwaters are much deeper, run much faster and are more dangerous outside. Evacuate to Ground Floor of the Granny Flat as this is above the PMF flood extent.
8. Continue to monitor Bureau of Meteorology forecasts and warnings, listen to **ABC 702 radio**.
9. In the case of a medical or life threatening emergency, **PHONE 000** as normal, but explain about the flooding.
10. A laminated copy of this flood plan should be permanently attached to an inside cupboard door in the kitchen and/or laundry of the Granny Flat and to the inside of the electrical meter box.
11. This flood management plan should be reviewed every 5 years, particularly with the potential sea level rise due to the greenhouse effect.

**Important Phone Numbers**

State Emergency Service: Emergency Phone - 132 500

Police, Fire, Ambulance: Emergency Phone - 000

Bureau of Meteorology (Website): <http://www.bom.gov.au/weather>

Land, Weather & Flood Warnings: Phone - 1300 659 218

DR/Hospital: .....

Family: .....

Friends:  
.....

Other: .....

## 9 CONCLUSION & RECOMMENDATIONS

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To meet Councils DCP and LEP, the following mitigation measures must be considered as part of the development:

- ***The Granny Flat finished floor levels to be RL24.79m AHD above the maximum Flood Planning Level;***
- ***The subfloor area under the Granny Flat must remain open and void;***
- ***No new fence is installed without authorization from Council;***
- ***For proposed Granny Flat, new electrical services must be waterproofed and/or located above the Flood Planning Level of 24.79m AHD (max 1%AEP Flood Level + 0.5m freeboard). 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.***
- ***The new building structure to be constructed with flood compatible material upto RL24.79m AHD. A suitably qualified structural engineer is to certify that the structures up to RL24.79m AHD can withstand the forces of floodwater, debris and buoyancy forces;***
- ***A laminated copy of the Flood Evacuation Strategy should be permanently attached on the inside door in the kitchen and laundry and to the inside of electrical meter box.***

In our opinion the proposed Granny Flat will not adversely affect the existing flood regime as long as the recommendations of this report are carried out.

**APPENDIX A****Building Component Flood Compatible Material**

<b>BUILDING COMPONENT</b>	<b>FLOOD COMPATIBLE MATERIAL</b>	<b>BUILDING COMPONENT</b>	<b>FLOOD COMPATIBLE MATERIAL</b>
<b>Flooring and Sub-floor Structure</b>	<ul style="list-style-type: none"> <li>Concrete slab-on-ground monolith construction</li> <li>Suspension reinforced concrete slab</li> <li>Steel Piers/Columns</li> </ul>	<b>Doors</b>	<ul style="list-style-type: none"> <li>Solid panel with water proof adhesives</li> <li>Flush door with marine ply filled with closed cell foam</li> <li>Painted metal construction</li> <li>Aluminium or galvanised steel frame</li> </ul>
<b>Floor Covering</b>	<ul style="list-style-type: none"> <li>Clay tiles</li> <li>Concrete precast or in situ</li> <li>Concrete tiles</li> <li>Epoxy, formed-in-place</li> <li>Mastic flooring, formed-in-place</li> <li>Rubber sheets or tiles with chemical-set adhesives</li> <li>Silicone floors formed-in-place</li> <li>Vinyl sheets or tiles with chemical-set adhesive</li> <li>Ceramic tiles, fixed with mortar or chemical –set adhesive</li> <li>Asphalt tiles, fixed with water resistant adhesive</li> </ul>	<b>Wall and Ceiling Linings</b>	<ul style="list-style-type: none"> <li>Fibro-cement board</li> <li>Brick, face or glazed</li> <li>Clay tile glazed in waterproof mortar</li> <li>Concrete</li> <li>Concrete block</li> <li>Steel with waterproof applications</li> <li>Stone, Natural solid or veneer, waterproof grout</li> <li>Glass blocks</li> <li>Glass</li> <li>Plastic sheeting or wall with waterproof adhesive</li> </ul>
<b>Wall Structure</b>	<ul style="list-style-type: none"> <li>Solid brickwork, blockwork, reinforced, concrete or mass concrete</li> </ul>	<b>Insulation Windows</b>	<ul style="list-style-type: none"> <li>Foam (closed cell types)</li> <li>Aluminium frame with stainless steel rollers or similar corrosion and water resistant material</li> </ul>
<b>Roofing Structure (for Situations Where the Relevant Flood Level is Above the Ceiling)</b>	<ul style="list-style-type: none"> <li>Reinforced concrete construction</li> <li>Galvanised metal construction</li> </ul>	<b>Nails, Bolts, Hinges and Fittings</b>	<ul style="list-style-type: none"> <li>Brass, nylon or stainless steel</li> <li>Removable pin hinges</li> <li>Hot dipped galvanised steel wire, nails or similar</li> </ul>

**Electrical and Mechanical Equipment**

For dwelling constructed on land to which this Plan applies, the electrical and mechanical materials, equipment and installation should conform to the following requirements.

**Heating and Air Conditioning Systems**

Heating and air conditioning systems should, to the maximum extent possible, be installed in areas and spaces of the house above the relevant flood level. When this is not feasible every precaution should be taken to minimise the damage caused by submersion according to the following guidelines.

<b>Main Power Supply –</b>  Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, shall be located above the relevant flood level. Means shall be available to easily disconnect the dwelling from the main power supply.	<b>Fuel –</b>  Heating systems using gas or oil as a fuel should have a manually operated valve located in the fuel supply line to enable fuel cut-off.
<b>Wiring –</b>  All wiring, power outlets, switches, etc., should, to the maximum extent possible, be located above the relevant flood level. All electrical wiring installed below the relevant flood level should be suitable for continuous submergence in water and should contain no fibrous components. Earth core linkage systems (or safety switches) are to be installed. Only submersible-type splices should be used below relevant flood level. All conduits located below the relevant designated flood level should be so installed that they will be self-draining if subjected to flooding.	<b>Installation –</b>  The heating equipment and fuel storage tanks should be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks should be vented to an elevation of 600 millimetres above the relevant flood level.
<b>Equipment –</b>  All equipment installed below or partially below the relevant flood level should be capable of disconnection by a single plug and socket assembly.	<b>Ducting –</b>  All ductwork located below the relevant flood level should be provided with opening for drainage and cleaning. Self draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, the ductwork should be protected by a closure assembly operated from above relevant flood level.
<b>Reconnection –</b>  Should any electrical device and/or part of the wiring be flooded it should be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.	<b>Ancillary Structures (Steps, pergolas, etc.) –</b>  Suitable water tolerant materials should be used such as masonry sealed hardwood and corrosive resistant metals. Copper Chrome Arsenate (CCA) treated timber is <u>not</u> a suitable material.

**Note: A document for reducing vulnerability of buildings to flood damage, “Guidance on Building in Flood Prone Areas” is a comprehensive document that anyone building or renovating a property in a flood affected area should consult. The link below will take you directly to the document.**

[https://www.ses.nsw.gov.au/media/2247/building\\_guidelines.pdf](https://www.ses.nsw.gov.au/media/2247/building_guidelines.pdf)

## APPENDIX B

### Councils Flood Planning Matrix

#### ***Pittwater 21 Development Control Plan » Section B General Controls » B3 Hazard Controls***

		High Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
<b>A</b>	<b>Flood effects caused by Development</b>	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
<b>B</b>	<b>Building Components &amp; Structural</b>	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
<b>C</b>	<b>Floor Levels</b>	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
<b>D</b>	<b>Car Parking</b>	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
<b>E</b>	<b>Emergency Response</b>	E1 E2	E1	E1	E1	E3
<b>F</b>	<b>Fencing</b>	F1	F1	F1	F1	F1
<b>G</b>	<b>Storage of Goods</b>	G1	G1	G1	G1	
<b>H</b>	<b>Pools</b>	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 SOUNDNES**

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.
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 first 5 metres from the street front in an existing business zone provided it can be demonstrated that: (a) The minimum floor level is no lower than the adjacent footpath level, and (b) The maximum internal distance from the front of the building is 5 metres, which can only apply to one side of an individual premises, and (c) The maximum area for the floor area to be below the Flood Planning Level for an individual premises is 30 square metres, and (d) There is direct internal access between areas above and below the Flood Planning Level for each individual premises

## D. CAR PARKING

D1	Open carpark areas and carports shall not be located within a floodway.
D2	The lowest floor level of open carparks and carports shall be constructed no lower than the natural ground levels, unless it can be shown that the carpark or carport is free draining with a grade greater than 1% and that flood depths are not increased.
D3	Carports must be of open design, with at least 2 sides completely open such that flow is not obstructed up to the 1% AEP flood level. Otherwise it will be considered to be enclosed. When undertaking a like-for-like replacement and the existing garage/carport is located on the street boundary and ramping is infeasible, consideration may be given for dry floodproofing up to the 1% AEP flood level.
D4	Where there is more than 300mm depth of flooding in a car park or carport during a 1% AEP flood event, vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site. Protection must be provided for all events up to the 1% AEP flood event
D5	Enclosed Garages must be located at or above the 1% AEP level
D6	All enclosed car parks (including basement carparks) must be protected from inundation up to the Flood Planning Level. All access, ventilation, driveway crests and any other potential water entry points to any enclosed car parking shall be above the Flood Planning Level. Where a driveway is required to be raised it must be demonstrated that there is no net loss to available flood storage in any event up to the 1% AEP flood event and no impact on flood conveyance through the site. Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark
D7	All enclosed car parks must be protected from inundation up to the Probable Maximum Flood level or Flood Planning Level whichever is higher. For example, basement carpark driveways must be provided with a crest at or above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher. All access, ventilation and any other potential water entry points to any enclosed car parking shall be at or above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher.

## E. EMERGENCY RESPONSE

E1	<p>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.</p> <p>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.</p> <p>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).</p> <p>Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where:</p> <ol style="list-style-type: none"> <li>The floor level is at or above the Probable Maximum Flood level; and</li> <li>The floor space provides at least 2m<sup>2</sup> per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m<sup>2</sup> per person for less than 6 hours;</li> <li>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</li> <li>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</li> </ol> <p>Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control.</p> <p>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.</p> <p>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.</p>
E2	<p>If a shelter-in-place refuge is required, it must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; a first aid kit; emergency power; and a practical means of medical evacuation.</p>
E3	<p>It must be demonstrated that evacuation or a shelter-in-place refuge in accordance with the requirements of this DCP will be available for any potential development arising from a Torrens title subdivision.</p>

## G. STORAGE OF GOODS

G1	<p>Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.</p>
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## APPENDIX C

### Councils Flood Information Report



## COMPREHENSIVE FLOOD INFORMATION REPORT

**Property:** 6 Alfred Road BROOKVALE NSW 2100

**Lot DP:** Lot 18 DP 5876

**Issue Date:** 07/02/2024

**Flood Study Reference:** Greendale Creek Flood Study 2023, WMAWater

### Flood Information<sup>1</sup>:

#### **Map A - Flood Risk Precincts**

Maximum Flood Planning Level (FPL) <sup>2, 3, 4</sup>: 24.79 m AHD

#### **Map B - 1% AEP Flood & Key points**

1% AEP Maximum Water Level <sup>2, 3</sup>: 24.29 m AHD

1% AEP Maximum Depth from natural ground level<sup>3</sup>: 0.42 m

1% AEP Maximum Velocity: 1.02 m/s

#### **Map C - 1% AEP Hydraulic Categorisation**

1% AEP Hydraulic Categorisation: Flood Storage, Floodway and Flood Fringe

#### **Map D - Probable Maximum Flood**

PMF Maximum Water Level (PMF) <sup>4</sup>: 24.80 m AHD

PMF Maximum Depth from natural ground level: 1.25 m

PMF Maximum Velocity: N/A m/s

#### **Map E - Flooding with Climate Change**

1% AEP Maximum Water Level with Climate change <sup>3</sup>: 24.32 m AHD

1% AEP Maximum Depth with Climate Change<sup>3</sup>: 0.45 m

#### **Map F - Flood Life Hazard Category in PMF**

#### **Map G - Indicative Ground Surface Spot Heights**

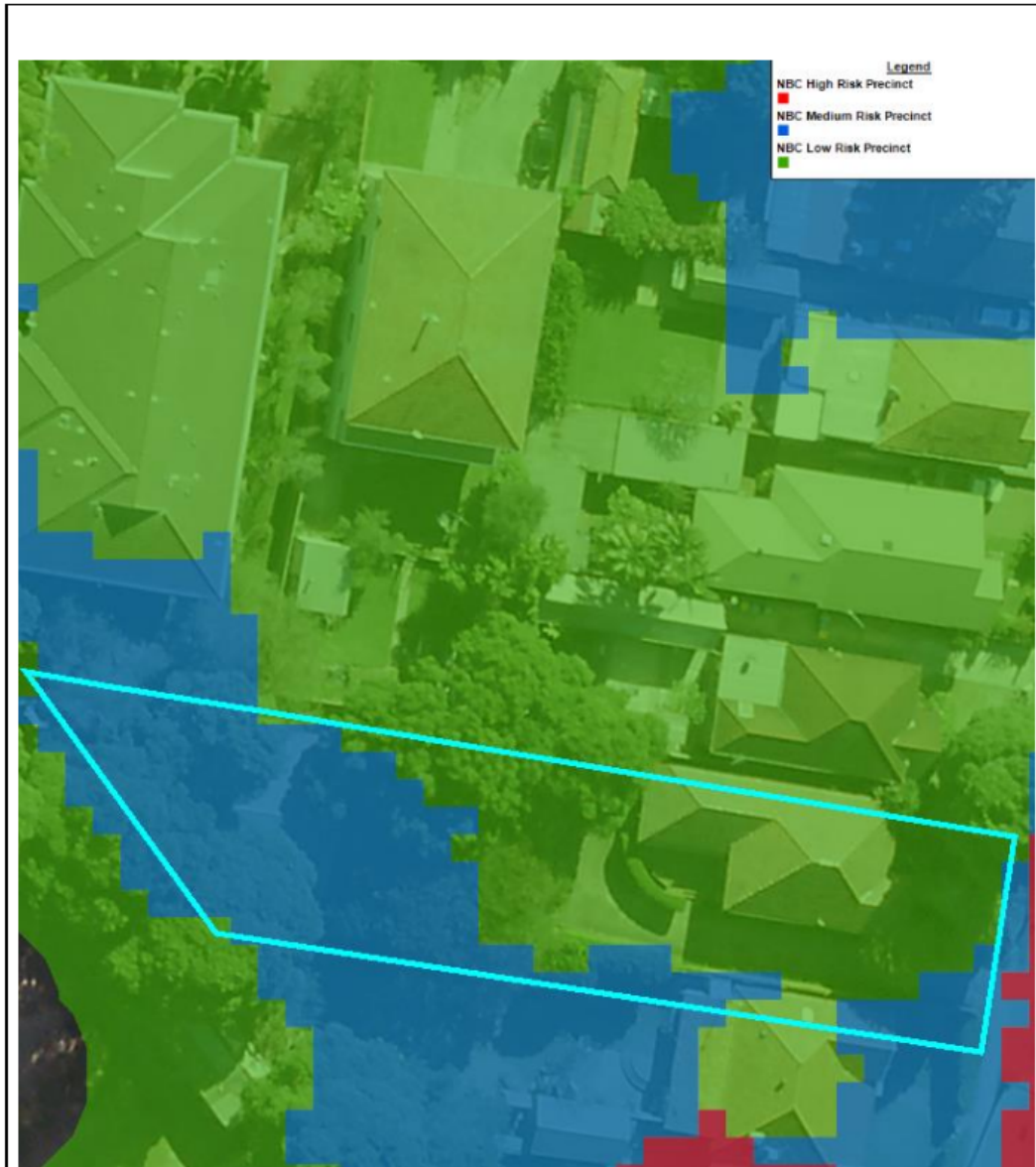
- (1) The provided flood information does not account for any local overland flow issues nor private stormwater drainage systems.
- (2) Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning 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.

## MAP A: FLOOD RISK PRECINCTS



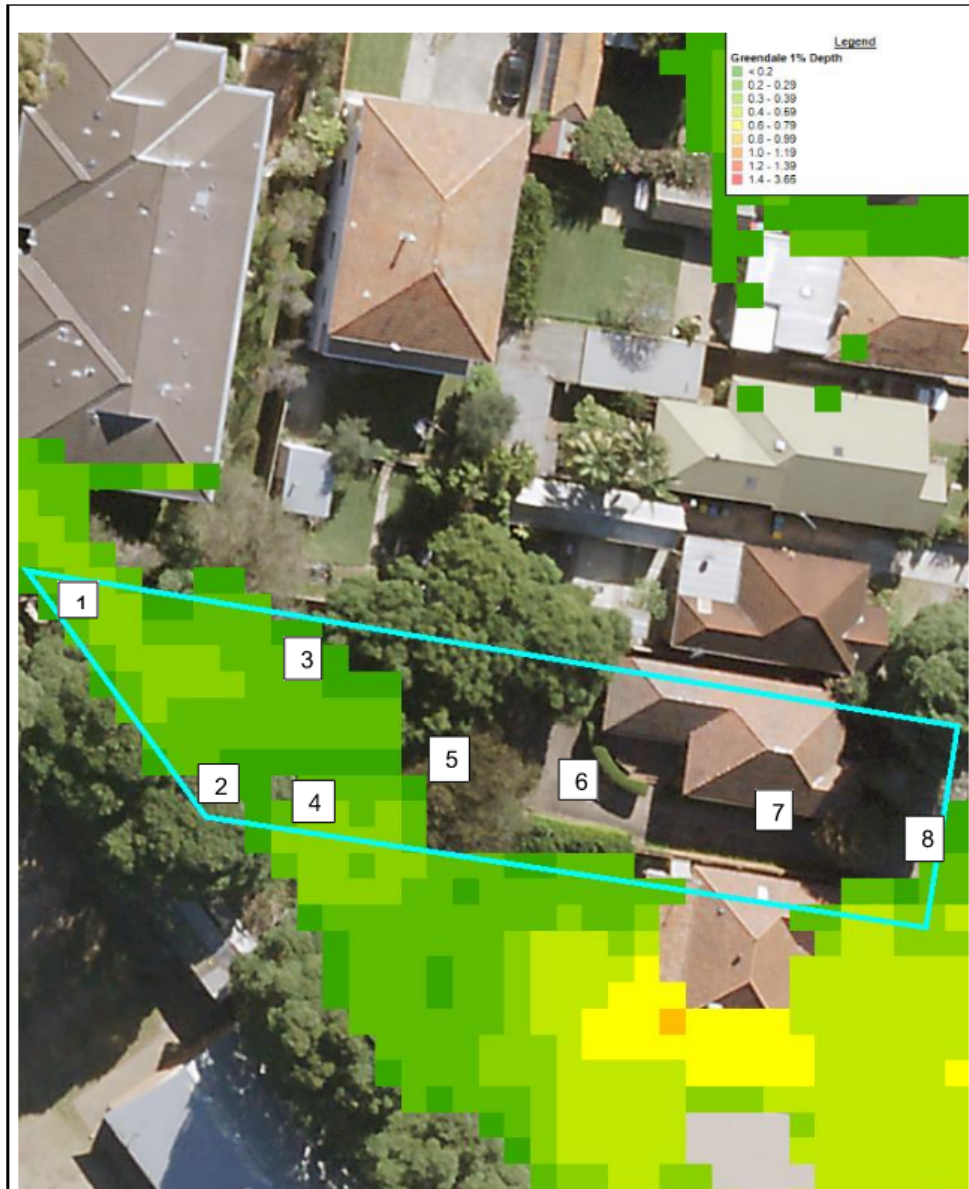
Notes:

- **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: Greendale Creek Flood Study 2023, WMAWater) and aerial photography (Source: NearMap 2014) are indicative only.

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## 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: Greendale Creek Flood Study 2023, WMAWater) and aerial photography (Source Near Map 2014) are indicative only.

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**Flood Levels**

ID	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	24.27	0.35	1.02	24.77	24.79	0.87	N/A
2	24.07	0.16	0.94	24.57	24.69	0.78	N/A
3	24.09	0.18	0.53	24.59	24.75	0.84	N/A
4	23.88	0.34	0.65	24.38	24.72	1.18	N/A
5	N/A	N/A	N/A	N/A	24.71	0.72	N/A
6	N/A	N/A	N/A	N/A	24.64	0.58	N/A
7	N/A	N/A	N/A	N/A	24.31	0.49	N/A
8	23.65	0.17	0.70	24.15	24.17	0.70	N/A

**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	24.31	0.39
2	24.10	0.19
3	24.12	0.21
4	23.93	0.39
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	23.67	0.19

WL – Water Level

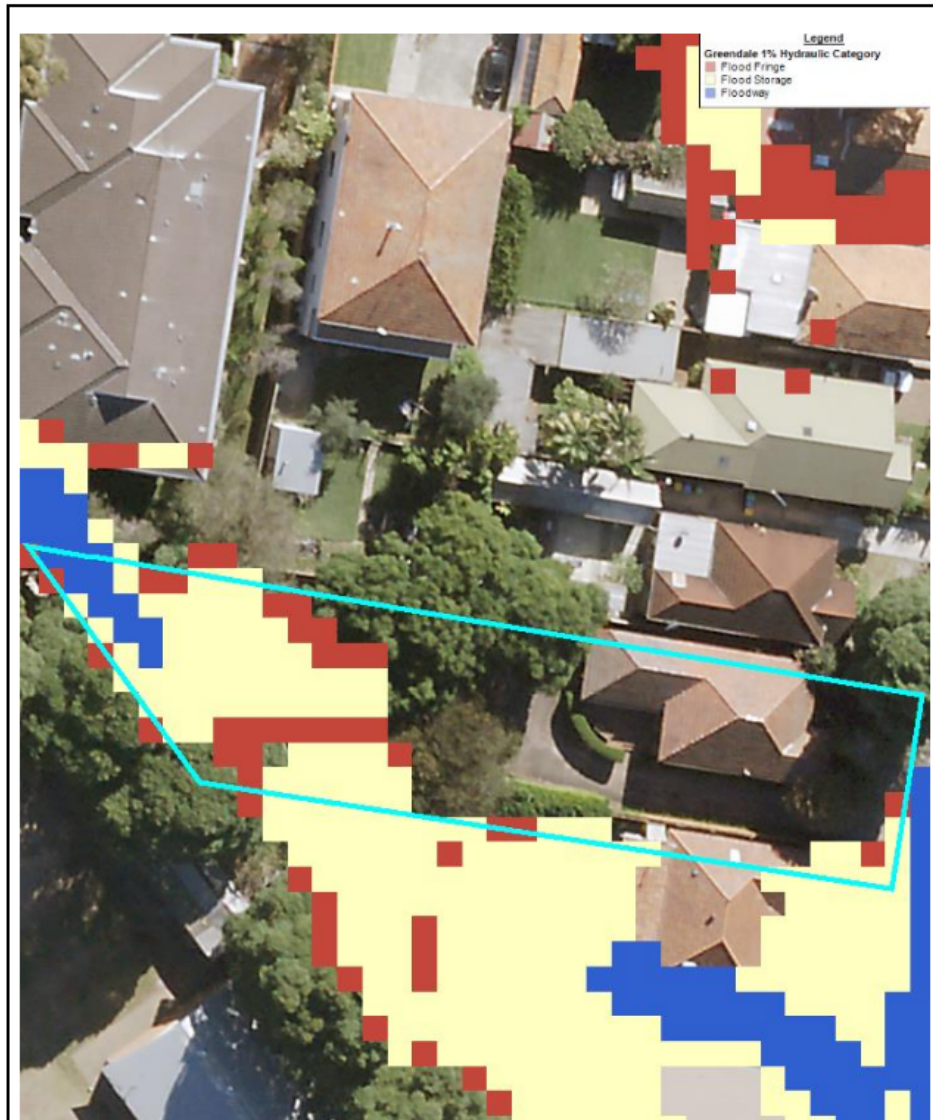
PMF – Probable Maximum Flood

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  $0.3\text{m}^2/\text{s}$ , a freeboard of 0.3m may be able to be justified for development.

## MAP C: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



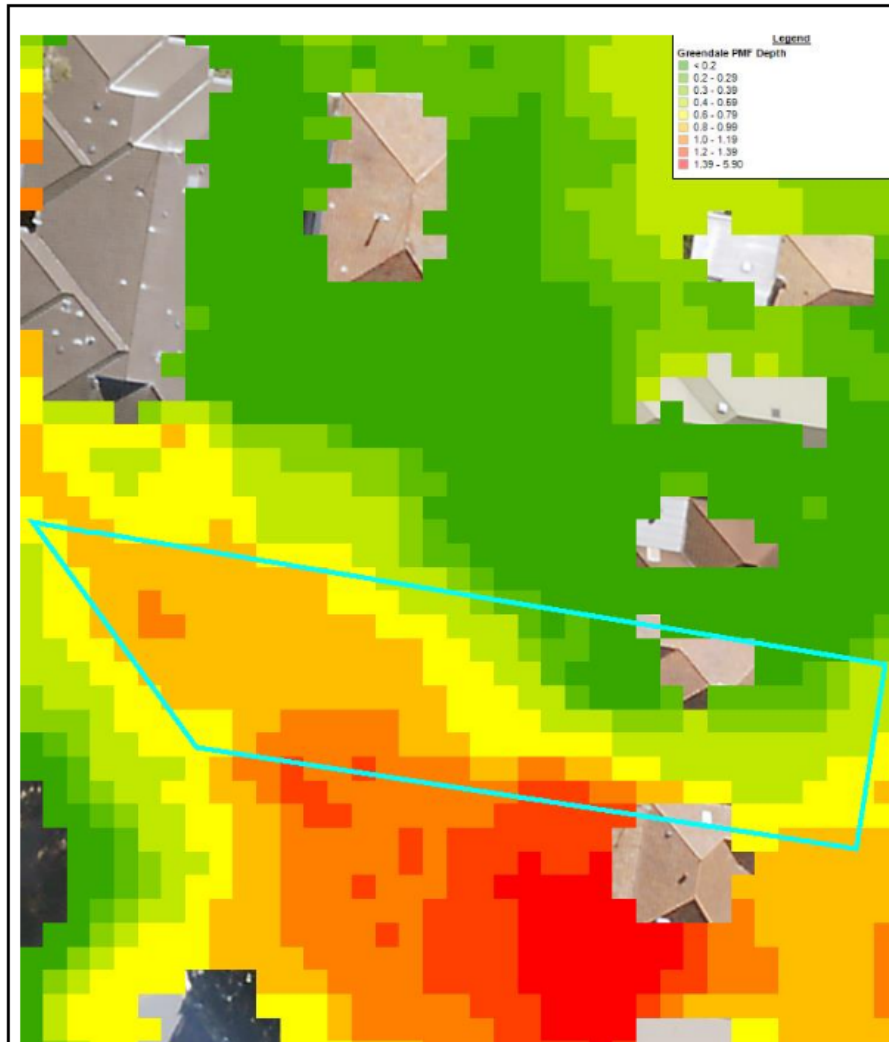
**Notes:**

- 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: Greendale Creek Flood Study 2023, WMAWater) and aerial photography (Source: NearMap 2014) are indicative only

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## MAP D: PMF EXTENT MAP

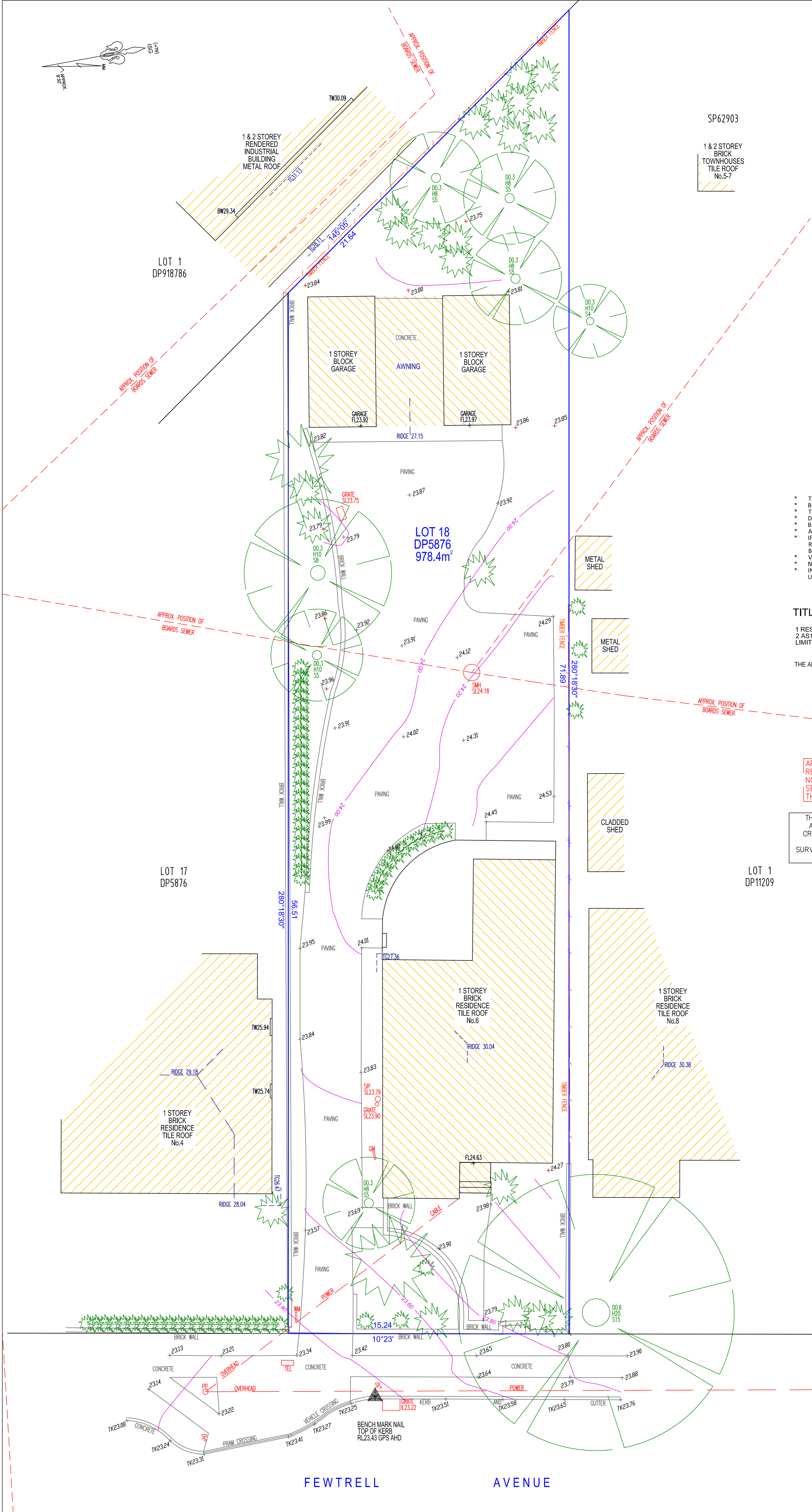


### Notes:

- 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: Greendale Creek Flood Study 2023, WMAWater) and aerial photography (Source: NearMap 2014) are indicative only

## **APPENDIX D**

### **Survey plan & Architectural Plans**



REVISION	DATE	DETAILS
A	26/03/2024	1ST ISSUE
© UNITED SURVEYORS 2022 REPRODUCTION WITHOUT WRITTEN APPROVAL IS STRICTLY PROHIBITED		
DATUM: AUSTRALIAN HEIGHT DATUM ORIGIN: GLOBAL POSITIONING SYSTEM DWG REF: 13500-1 REDUCTION RATIO: 1:400 SHEET SIZE: A1 DATE OF SURVEY: 20/03/2024 SURVEYOR: GS/JF SHEET 1 OF 1		<div></div>

LEGEND		
TEL - TELSTRA PIT	SMH - SEWER MANHOLE	D = DIAMETER
SP - SIGN POST	SIP - SEWER INSPECTION POINT	S = SPREAD
SL - SURFACE LEVEL	GM - GAS METER	H = HEIGHT
IL - INVERT LEVEL	WM - WATER METER	
PP - POWER POLE	BW - BOTTOM OF WINDOW	
TW - TOP OF WINDOW	TK - TOP OF KERB	
TG - TOP OF GUTTER		

\* AUSTRALIAN HEIGHT DATUM HAS BEEN DETERMINED USING GLOBAL POSITIONING SYSTEMS (GPS). THE ACCURACY OF THE LEVEL IS DEPENDANT ON THE NUMBER AND POSITION OF SATELLITES AT THE TIME OF SURVEY.

PLAN OF DETAIL AND LEVELS

AT: 6 ALFRED ROAD

BROOKVALE

BEING: LOT 18 IN DP5876

CLIENT: BRYAN DESIGN

- \* THIS TITLEBLOCK IS AN INTEGRAL PART OF THIS DRAWING AND MUST NOT BE REMOVED
- \* BOUNDARIES HAVE NOT BEEN DEFINED BY SURVEY AND ARE DIAGRAMMATIC ONLY
- \* THE POSITION OF STRUCTURES IN RELATION TO THE BOUNDARIES IS DIAGRAMMATIC ONLY
- \* DO NOT SCALE OFF THIS PLAN
- \* BEARINGS AND DISTANCES HAVE BEEN COMPILED FROM PLANS OBTAINED FROM NSWLRS
- \* AREAS SHOWN HAVE BEEN CALCULATED FROM THE LAND DIMENSIONS
- \* IF IT IS PROPOSED TO UNDERTAKE ANY WORKS CLOSE TO BOUNDARIES, WE STRONGLY RECOMMEND THAT A PLAN OF SURVEY IS UNDERTAKEN TO DEFINE THE POSITION OF THE BOUNDARIES
- \* VISIBLE AND ACCESSIBLE SERVICES HAVE ONLY BEEN LOCATED.
- \* NO UNDERGROUND SERVICES HAVE BEEN INVESTIGATED
- \* INVESTIGATIONS WITH BEFORE YOU DIG AUSTRALIA AND SERVICE PROVIDORS MUST BE UNDERTAKEN PRIOR TO ANY DESIGN, EXCAVATION AND/OR CONSTRUCTION WORKS

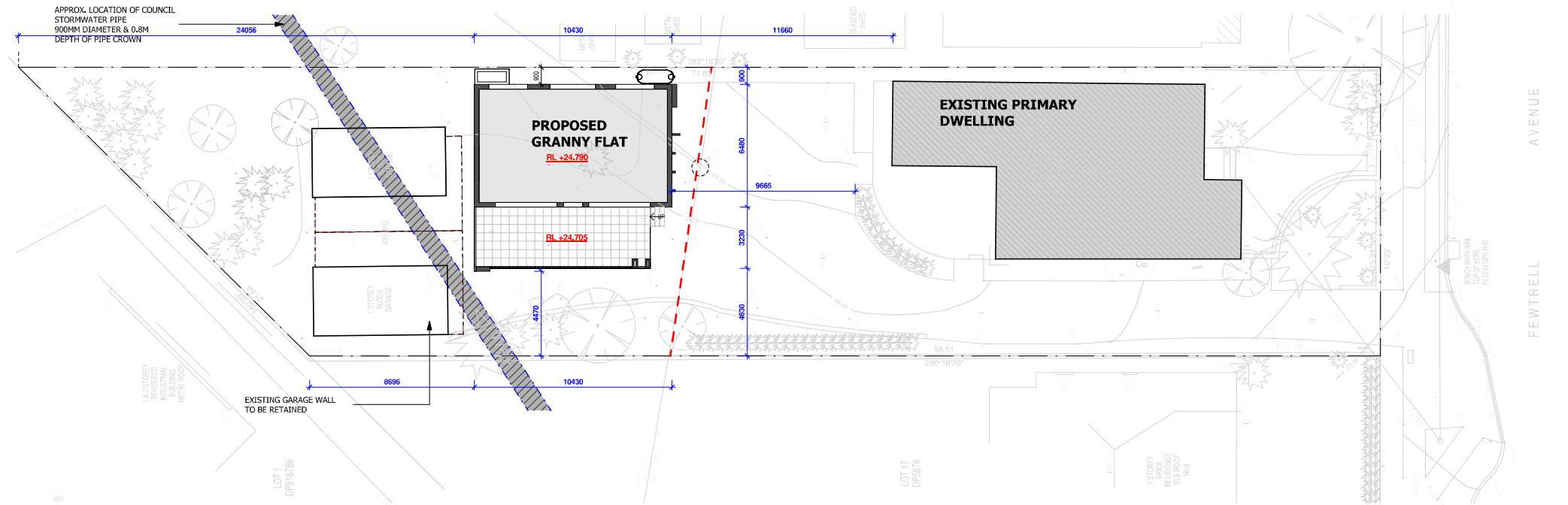
TITLE NOTES :

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)  
2 AS179994 MORTGAGE TO AUSTRALIA AND NEW ZEALAND BANKING GROUP LIMITED

THE ABOVE NOTIFICATIONS HAVE NOT BEEN INVESTIGATED.

APPROXIMATE POSITION OF SEWER MAIN BY SYDNEY WATER REFER TO THE DBYD DIAGRAM FOR DETAILS.  
NOTE: PRIOR TO ANY DESIGN AND CONSTRUCTION, A SEWER PEGOUT MUST BE UNDERTAKEN TO DETERMINE THE EXACT LOCATION OF THE SEWER LINE.

THE POSITION OF STRUCTURES AND IMPROVEMENTS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE VERIFIED PRIOR TO ANY CRITICAL DESIGN OR CONSTRUCTION WORKS. FOR ANY PROPOSED STRUCTURES IN RELATION TO A BOUNDARY, A REGISTERED SURVEYOR MUST CARRY OUT A BOUNDARY SURVEY, SETOUT SURVEY OR IDENTIFICATION SURVEY FOR THE PROPOSED WORKS.



## SITE PLAN

SCALE: 1 : 150

SITE DETAILS			
ADDRESS:	6 ALFRED ROAD, BROOKVALE		
LOT AREA	978.4 m <sup>2</sup>		
LOT FRONTAGE	15.24 m		
WARRINGAH DCP 2011			
	ALLOWED	PROVIDED	
GROSS FLOOR AREA	N/A	193.98 m <sup>2</sup>	TOTAL
		134.6m <sup>2</sup>	EXISTING PRIMARY DWELLING (AS EXISTING)
		59.38m <sup>2</sup>	PROPOSED GRANNY FLAT
MAX BUILDING HEIGHT	8.5m		
MAX WALL HEIGHT	7.2m		
SETBACK MIN.			
PRIMARY FRONT SETBACK	6.5 m	AS PER EXISTING	
SIDE SETBACK	Min.0.9 m	0.9 m	
REAR SETBACK	6 m	8.69 m	
LANDSCAPE AREA MIN.			
LANDSCAPE AREA (40% LOT AREA) WITH MIN. 1m	391.36 m <sup>2</sup>	395.74 m <sup>2</sup>	
PRIVATE OPEN SPACE			
	Min.60 m <sup>2</sup>		
	MIN. 5m DIMENSIONS		

LANDSCAPE AREA CALCULATION		
Name	Area	
EX. REAR LANDSCAPE	255.87 m <sup>2</sup>	
FRONT LANDSCAPE	64.37 m <sup>2</sup>	
PROPOSED REAR LANDSCAPE	75.50 m <sup>2</sup>	
	395.74 m <sup>2</sup>	

GROSS AREA CALCULATION		
Name	Area	
GRANNY FLAT AREA	59.38 m <sup>2</sup>	
EX. GARAGE AREA	Not Placed	
EXISTING PRIMARY DWELLING	134.60 m <sup>2</sup>	
POS	74.82 m <sup>2</sup>	
	268.81 m <sup>2</sup>	

### LEGENDS:

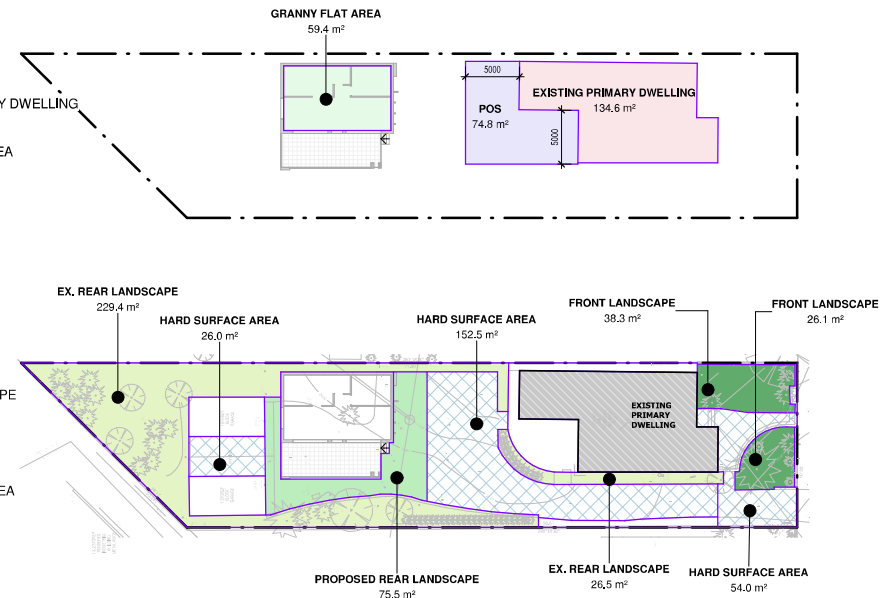
	EXISTING WALL STRUCTURAL
	EXISTING WALL TO BE REMOVED
	EXISTING ROOF TO BE REMOVED
	EXISTING TREES TO BE REMOVED
	EXISTING LANDSCAPE AREA
	PROPOSED LANDSCAPE AREA
	EXISTING PAVING AREA

### LEGEND

	EXISTING PRIMARY DWELLING
	GRANNY FLAT AREA
	POS

### LEGEND

	EX. REAR LANDSCAPE
	FRONT LANDSCAPE
	HARD SURFACE AREA
	PROPOSED REAR LANDSCAPE



Address: 511 Gifford Road, Roseberry NSW 2018  
P: 0415 478 131  
E: info@bryandesign.com.au  
W: bryandesign.com.au  
ABN: 38 615 799 272

NOTE:  
DO NOT SCALE THE DRAWING. THE DRAWING SHOWS DESIGN INTENT ONLY. ALL DIMENSIONS TO BE VERIFIED BY THE CLIENT. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS AND FOR THE ACCURACY OF THE INFORMATION PROVIDED. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS AND FOR THE ACCURACY OF THE INFORMATION PROVIDED. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS AND FOR THE ACCURACY OF THE INFORMATION PROVIDED.

PROJECT DETAILS:  
**PROPOSED SECONDARY DWELLING DEVELOPMENT**

AT:  
**6 ALFRED ROAD, BROOKVALE**  
PROJECT NO.  
**22154**  
LOCATED AT:  
**NORTHERN BEACHES COUNCIL**

PROJECT STATUS:  
**ISSUED FOR DA SUBMISSION**

CLIENT DETAILS:  
**MR. MINH**






ISSUE DETAILS			
REV	DATE	DESCRIPTION	INITIAL
A	05/02/2025	ISSUED FOR DA SUBMISSION ONLY	

DRAWING DETAILS:  
**SITE PLAN**




START DATE  
**19/02/2024**  
DRAWN BY  
**DN**  
CHECKED BY  
**DN**

SCALE  
**As Indicated**  
DRAWING NO.  
**DA 102**



	EXISTING WALL STRUCTURAL
	EXISTING WALL TO BE REMOVED
	EXISTING ROOF TO BE REMOVED
	SMOKE ALARMS
	FLOOR WASTE



	EXISTING WALL STRUCTURAL
	EXISTING WALL TO BE REMOVED
	EXISTING ROOF TO BE REMOVED



AT:  
**6 ALFRED ROAD, BROOKVALE**  
PROJECT NO.  
**22154**  
LOGGED AT  
**NORTHERN BEACHES COUNCIL**

CLIENT DETAILS  
MR. MINH

DRAWING DETAILS  
**ROOF PLAN**

START DATE  
**19/02/2024**

DRAWN BY  
**DN**

CHECKED BY  
**DN**

ISSUE

**A**



**A**