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FLOODPLAIN MANAGEMENT REPORT

Palm Beach Mixed-Use Development

1102 Barrenjoey Road

Palm Beach NSW 2108

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1 Executive Summary

This report assesses the flood risk to the proposed development at 1102 Barrenjoey Road, Palm Beach, NSW for compliance with Pittwater 21 Development Control Plan. The proposed development is a mixed-used development which occupies a site previously used for commercial purposes. The flood analysis shows that flooding is confined to the western (road facing) portion of the site. The proposed floor levels and basement vehicular access ramp crest level are at the Flood Planning Level of 3.20 mAHD, except for an area at the western side of the ground level which is at 2.56 mAHD. The proposed building is to be floodproofed in its structure, materials and utilities connections up to the Flood Planning Level as detailed in this report.

2 Introduction

Van der Meer Consulting has been commissioned to prepare a Flood Management Report for the proposed mixed-use development at 1102 Barrenjoey Road, Palm Beach NSW. This report will be lodged to Northern Beaches Council for the planning proposal for this development.

The scope of this report includes an assessment of the flood risk for the proposed development and details the design measures and controls needed to achieve compliance with the relevant state and local plans and policies.

2.1 Planning and Policy Background

The following state and local environmental policies and plans are relevant to the development, and are addressed in this report:

- Pittwater Local Environment Plan 2014, Clauses 7.3, 7.4 and 7.5
- State Environmental Planning Policy (Coastal Management) 2018, Clause 15
- Pittwater 21 Development Control Plan, clauses B3.8, B3.9, B3.12, B3.11

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3 Description of Development

3.1 Existing Site

The subject site area is approximately 1,140 m^2 and faces west onto Barrenjoey Road. Currently, the site is currently utilised by a single-storey café, with the lot naturally grading towards the west. A retaining wall is located on the eastern side of the café near the eastern boundary. The site is bounded by a commercial building in the north and residential developments on the eastern and southern sides. The location of the subject site shown in Figure 3.1 below, and in attachment B.

Figure 3.1 – Site Plan (Nearmap, 2021)

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3.2 Proposed Works

The proposed development consists of demolition of all existing structures within the site and construction of a single structure with basement car parking, ground-level commercial spaces and two above-ground residential levels as illustrated in Figure 3.20 below. The building footprint will cover most of the property. Proposed stormwater drainage will connect to existing council assets along Barrenjoey Road.

The basement ramp and upper-ground floor are set at an FFL of 3.20 mAHD, whilst the lower-ground level is at an FFL of 2.56 m and is approximately 124 m^2. The lower-ground levels were set based on the preference of Northern Beaches Council for an at-grade building entry to facilitate street activation.

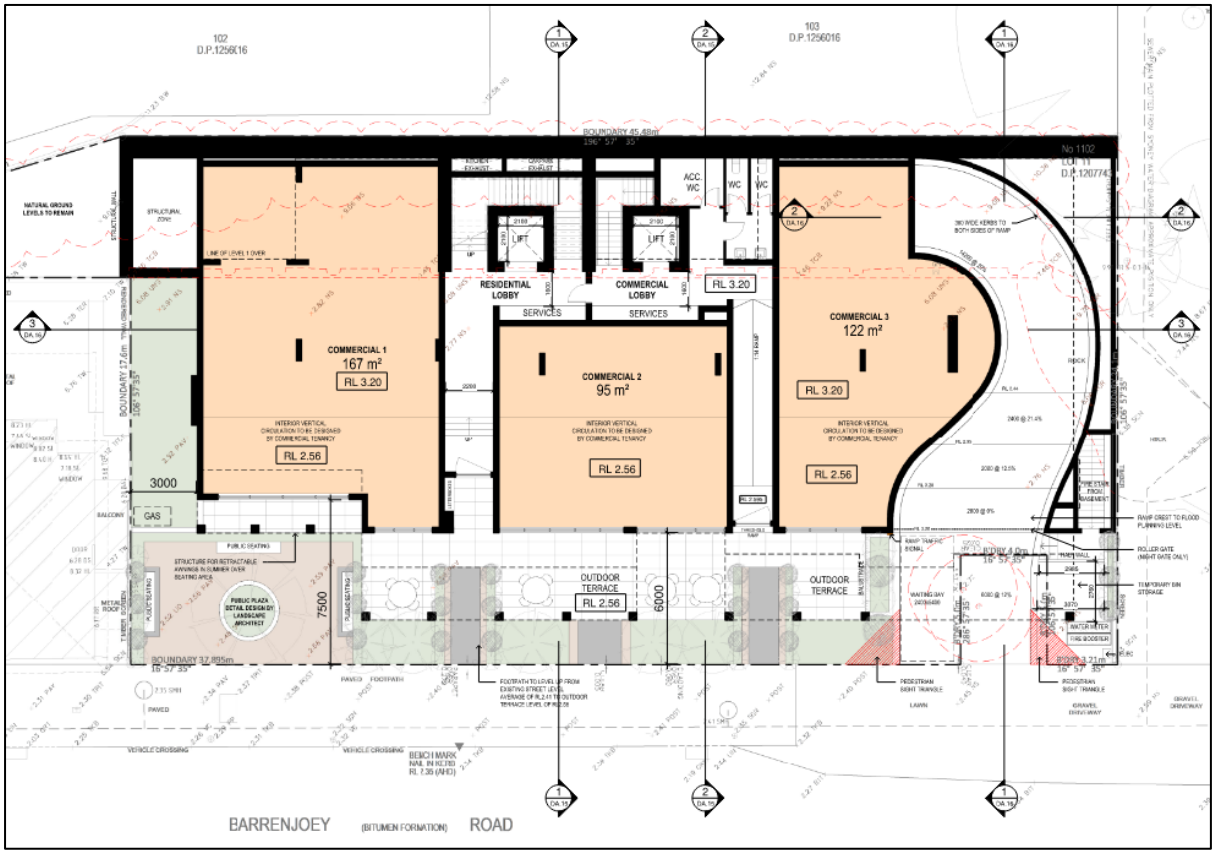

Figure 3.20– Proposed Ground Floor Plan (Innovate Architects, 2024)

In consultation with Council, an objective of the development is to improve street activation and provide an entry at the street level. To achieve this, a lower floor level has been adopted along the frontage of the development for the retail area that is below the flood planning level. The extent of the lower retail floor level has been limited to 5 m in accordance with the DCP, however the resulting floor area below the flood planning level is 124 m^2, instead of the prescribed 30 m^2 under the DCP (section B3.11, C7).

4 Flood Analysis

4.1 Flood Risk Precinct

As shown in Figure 4.1, the site is bounded on the western side by medium and low flood risk precincts which partially extend into the site.

4.2 Flood Planning Level & Flood Life Hazard Category

The Flood Planning Level (FPL) for the site is 3.20 mAHD. The ground floor finished floor level of the proposed development will be at 3.20 mAHD, apart from an area within 5 m from the western frontage which will be at the existing footpath level of 2.56 m.

Figure 4.4 shows the Flood Life Hazard categories for the site. The proposed development is impacted by areas which are classified as H1 (generally safe for people, vehicles and building) and H2 (unsafe for small vehicles). The public domain and road frontage is also partially classified as H3, though this is not within the site.

4.3 1% Annual Exceedance Probability (AEP) Flood Characteristics

Figure 4.2 shows the flood extents for the critical 1% AEP flood. The following characteristics are associated with the critical 1% AEP event:

- 1% AEP Maximum Water Level: 2.70 mAHD
- 1% AEP Maximum Depth from natural ground level: 0.19 m
- 1% AEP Maximum Velocity: 0.14 m/s
- 1% AEP Hydraulic Categorisation: Flood fringe (refer to Figure 4.5)

4.4 Probable Maximum Flood (PMF) Characteristics

The following characteristics are associated with the PMF:

- PMF Maximum Water Level 2.80 mAHD
- PMF Maximum Depth from natural ground level: 2.05 m
- PMF Maximum Velocity: 0.65 m/s

4.5 Climate Change Effects

Flood Planning Levels for climate change scenarios are not adopted by Council, as stated in Pittwater 21 Development Control Plan B3.12.

4.6 Estuarine Hazard and Coastal Management

The property is included in SEPP - Coastal Management 2018 mapping and Pittwater DCP 2014 Estuarine Hazard mapping. These issues are to be addressed separately to this report, and may require the following:

- Obtaining Estuarine Planning Level (EPL) advice from Council, or an independent assessment undertaken by a Coastal Engineer
- Providing an Estuarine Risk Management Report, if the requirements of Pittwater 21 DCP B3.9 cannot be met

If the EPL is higher than the FPL, then the EPL is to be taken as the minimum FFL. However, this is unlikely given that the 2013 Flood Study by CPM Engineering for the development identifies a storm surge level of 1.50 mAHD with a potential rise of 0.90 m due to climate change.

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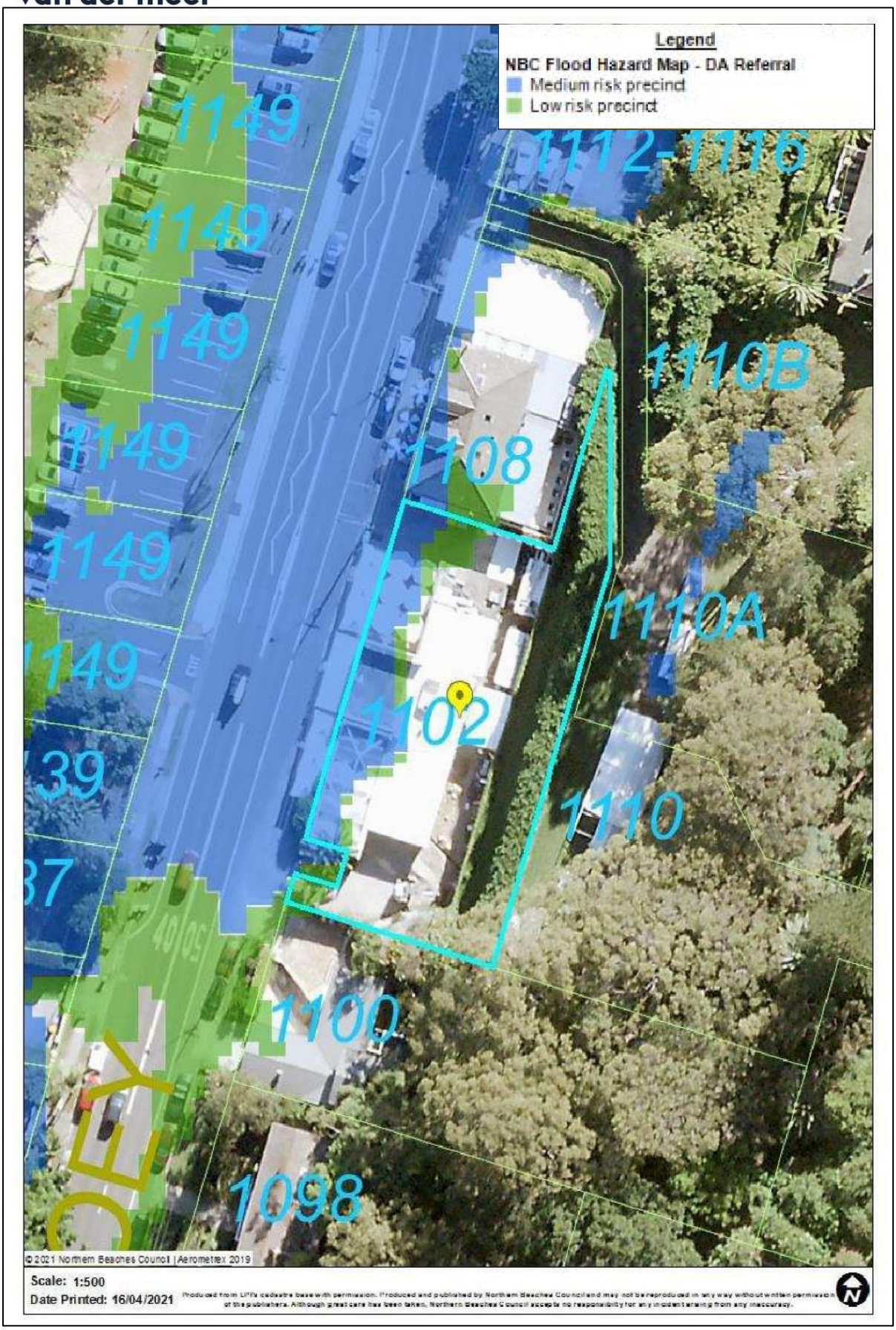

Figure 4.1 – Flood Risk Precinct Map (Northern Beaches Council, 2021)

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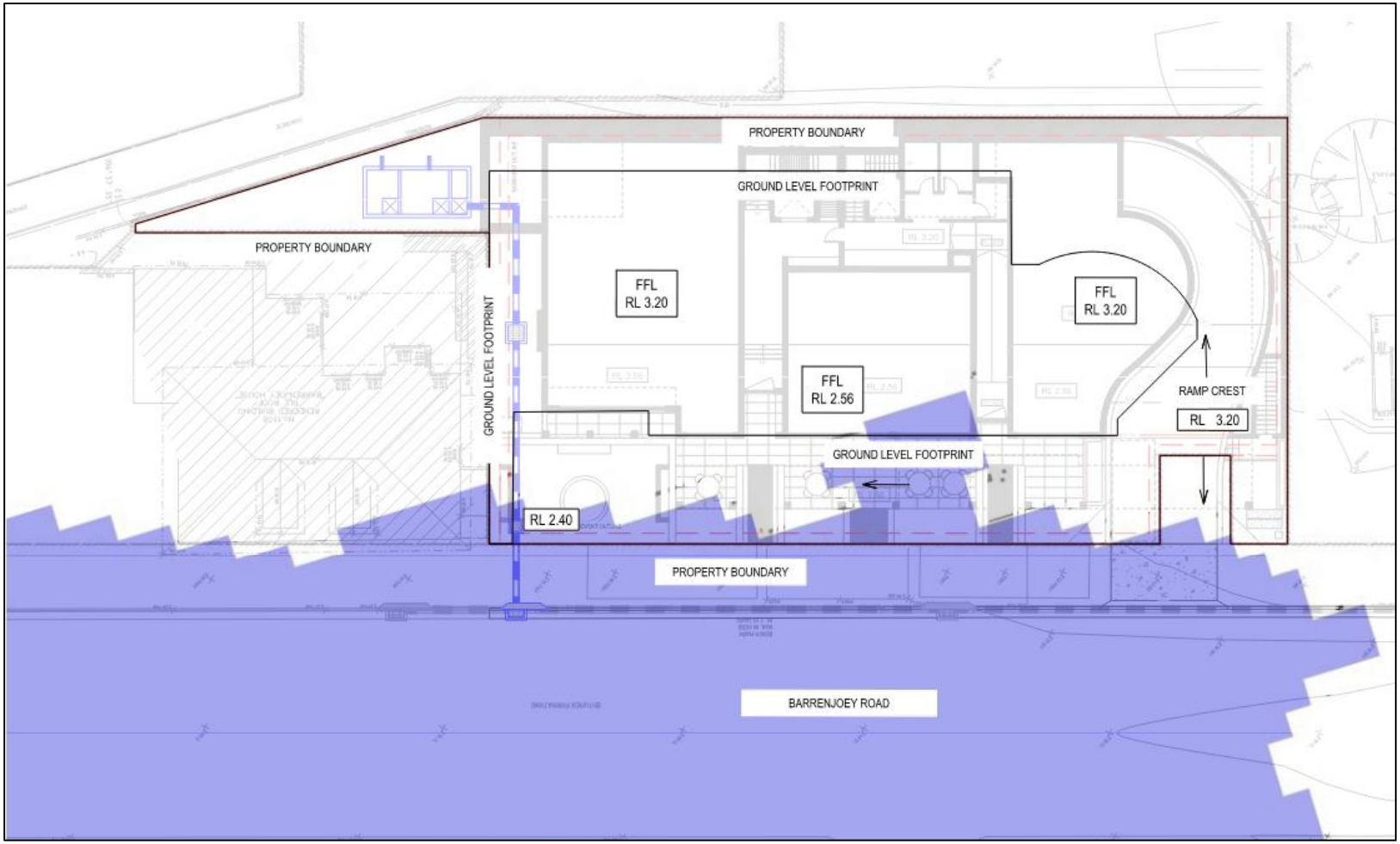

Figure 4.2 – 1% AEP Flood Extents (Northern Beaches Council, 2021)

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Figure 4.3 – Probable Maximum Flood Extents (Northern Beaches Council, 2021)

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Figure 4.4 – Flood Life Hazard Category (Northern Beaches Council, 2021)

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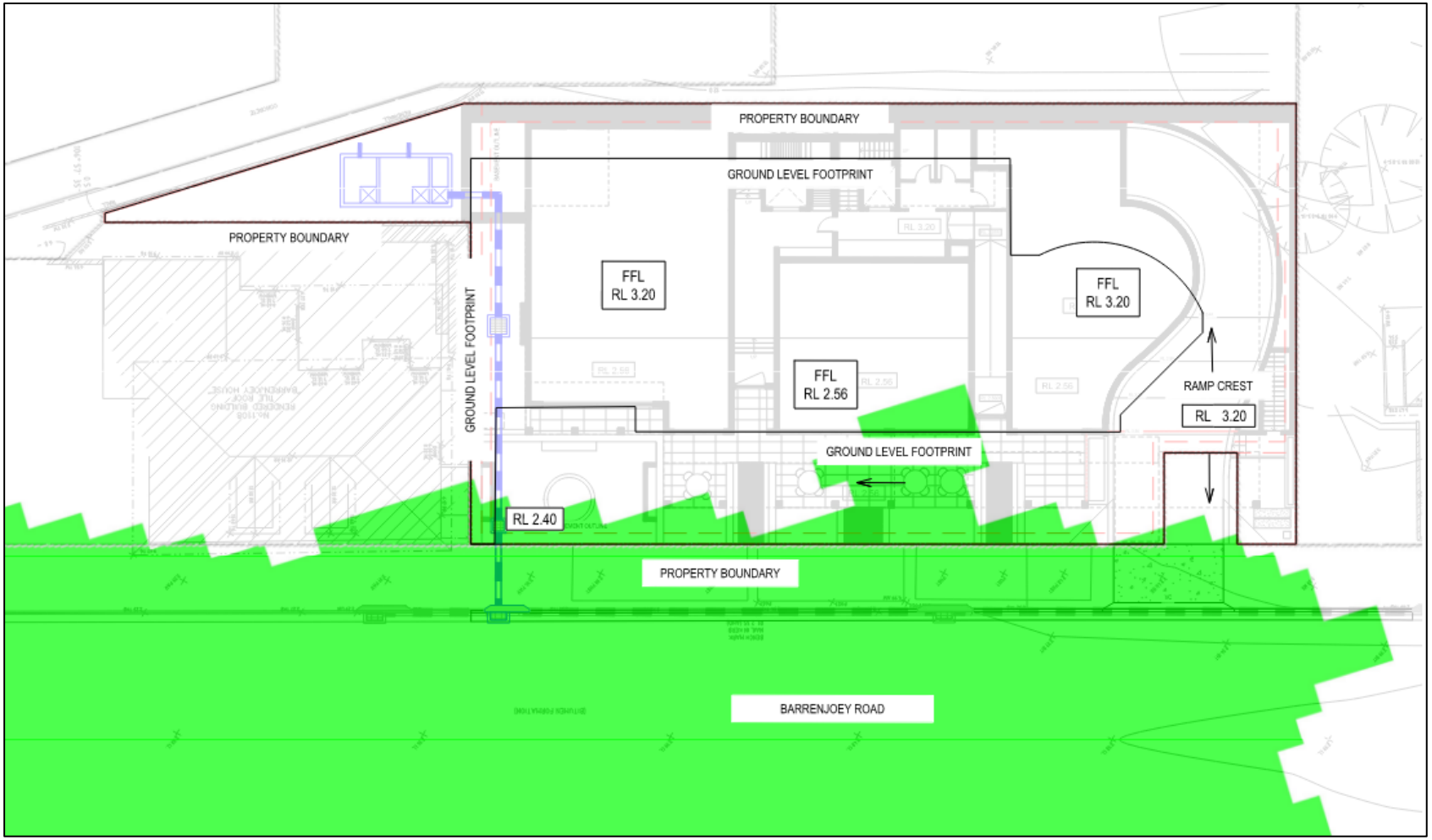

Figure 4.5 – 1% AEP Hydraulic Flood Category Extents (Northern Beaches Council, 2021)

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5 Assessment of Impacts

The Pittwater 21 DCP, clause B3.11 specifies prescriptive controls for development on flood prone land, which vary depending on flood risk and land use. The highest flood risk for the site of the proposed development is *medium risk* and the proposed land use is both *residential* and *business & industrial*. The controls that apply to the proposed development, their impacts on the development, and the proposed development's compliance with these controls are listed in Table 5.1 below.

Table 5.1 – Flood Risk Management Compliance Table

Item	Description	Impact on Development	Compliance
	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.	Adverse impacts on flood levels, velocities, surrounding properties or exposure hazard are not expected as the proposed development footprint within the 1% AEP floodplain is the same as the existing buildings.	Y
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.	Loss of flood storage is not expected as the proposed development footprint within the 1% AEP floodplain is the same as the existing buildings.	Y

Item	Description	Impact on Development	Compliance
	B. Building Components and Structural Soundness		
B1	All buildings shall be designed and constructed with flood compatible materials in accordance with “Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas”, Hawkesbury-Nepean Floodplain Management Steering Committee (2006).	The proposed building is to be structurally designed and constructed with flood compatible materials up to the FPL in the architectural and structural specifications.	Y
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.	The development is to be designed and certified to ensure structural integrity up to the Flood Planning Level and account for the relevant forces associated with this flooding. In particular, the area at the western side of the property which is set at an FFL of 2.56 m.	Y
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.	Electrical, sewerage and other service connections are to be located at or above the flood planning level or waterproofed appropriately. Existing electrical equipment to be retained are to have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.	Y
	C. Floor Levels		
C1	New floor levels within the development shall be at or above the Flood Planning Level.	The ground level of the proposed development will be located at a level of 3.20 mAHD which is at the flood planning level. The basement is located at FFL -0.65 m but will be protected	Y

Item	Description	Impact on Development	Compliance
		from inundation as per D6 in this table.	
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	Loss of flood storage is not expected as the proposed development footprint within the 1% AEP floodplain is the same as the existing buildings. Suspended pier/pile footings will not be included as part of the proposed development.	Y
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.	A one-off addition or alteration will not be included as part of the proposed development.	N/A

Item	Description	Impact on Development	Compliance
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.	An existing floor level is not proposed to be retained as part of the development	N/A
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	A floor level below the Flood Planning Level is included in the proposed development. The maximum distance from the building is set at 5 m, however the floor area below the Flood Planning Level is ~124 sqm. This area is at a level of 2.56 mAHD which is below the 1% AEP flood level of 2.70 m and will be affected by flooding in a 1% AEP event (0.14m proposed flood depth). Refer to Attachment C (Northern Beaches Council Correspondence letter) for further details. The basement is located at FFL -0.65 m but will be protected from inundation as per D6 in this table.	N
	D. Car Parking		
D1	Open carpark areas and carports shall not be located within a floodway.	There are no open carparks or carports	N/A

Item	Description	Impact on Development	Compliance
		associated with the development.	
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.	There are no open carparks or carports associated with the development.	N/A
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.	There are no carports associated with the development.	N/A
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	There will not be more than 300 mm depth in the carpark. There are no carports associated with the development. The basement carpark will be protected from inundation as per D6 in this table.	Y
D5	Enclosed Garages must be located at or above the 1% AEP level	The basement carpark will be protected from inundation as per D6 in this table.	Y
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	The basement carpark will be prevented from inundation as all potential water entry points are located at the flood planning level. The crest of the basement access driveway will a level of 3.20 mAHD. Loss of flood storage for the 1% AEP is not expected as the 1% AEP flood only extends to the proposed layback location, but not further into the	Y

Item	Description	Impact on Development	Compliance
		driveway where the crest is proposed to be located.	
	E. Emergency Response		
E1	If the property is affected by a Flood Life Hazard Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the Flood Management Report. If the property is affected by a Flood Life Hazard Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the risk level on the property is or can be reduced to a level below H6 or its equivalent. If the property is flood affected but the Flood Life Hazard Category has not been mapped by Council, then calculations for its determination must be shown in the Flood Management Report, in accordance with the "Technical Flood Risk Management Guideline: Flood Hazard", Australian Institute for Disaster Resilience (2012). Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where: a) The floor level is at or above the Probable Maximum Flood level; and b) The floor space provides at least 2 m^2 per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m^2 per person for less than 6 hours; c) It is intrinsically accessible to all people on the site, plainly evident, and self-directing, with sufficient capacity of access routes for all occupants without reliance on an elevator; and d) It must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; and a first aid kit Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control. In the case of change of use or internal alterations to an existing building, a variation to this control may	The proposed development is not affected by a Flood Life Hazard category of H3 or higher and as such does not require a flood emergency assessment.	N/A

Item	Description	Impact on Development	Compliance
	be considered if justified appropriately by a suitably qualified professional. Note that in the event of a flood, occupants would be required to evacuate if ordered by Emergency Services personnel regardless of the availability of a shelter-in-place refuge.		
	F. Fencing		
F1	Fencing, (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. At least 50% of the fence must be of an open design from the natural ground level up to the 1% AEP flood level. Less than 50% of the perimeter fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75 mm.	Fencing is not proposed in the areas of the property identified in the flood extents maps.	Y
	G. Storage of Goods		
G1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.	Storage of goods is to occur above the Flood Planning Level or be adequately designed for in any basement storage.	Y
	H. Pools		
H1	Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site. All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level. All chemicals associated with the pool are to be stored at or above the Flood Planning Level.	There are no pools associated with the development.	N/A

6 Conclusion

This report has sought to assess the flood risk for the proposed mixed-use development at 1102 Barrenjoey Road, Palm Beach NSW. Whilst the site is impacted by flooding in the 1% AEP and PMF floods, most of the proposed development lies outside the extents of flooding (1% AEP & PMF).

Floor levels and the design of the building frontage means that the development will not be adversely affected by flooding and will not affect 1% AEP flood storage or flood behaviour. The proposed floor levels and basement vehicular access ramp crest level at the Flood Planning Level of 3.20 mAHD, except for the lower floor level in the retail space, which has an FFL of 2.56 m and will therefore be affected by the 1% AEP flood, however this area has been limited to a 5 m setback and an area of 124 m^2.

The proposed building is to be floodproofed in its structure, materials and utilities connections up to the Flood Planning Level as detailed in this report.

7 References

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