

# Memorandum

Title 17 PLAYFAIR RD, NORTH CURL CURL

Re: DA 2019 / 0078 - RESPONSES TO COUNCIL ENGINEERING REFERRAL RESPONSE

Client	Ms Pos Simson	Project No	59918041
Author	David Whyte	Date	27/06/2019
Approver	David Whyte	Revision:	RevB

ATTENTION: Jordan Davies Development Assessment - Planning Northern Beaches Council

# **1** INTRODUCTION

A meeting was held with Northern Beaches Council (NBC) staff Jordan Davies (Planning) & Jacob Strong (Engineering) on 10 April 2019 to discuss Council's Engineering Referral Response to this Subdivision DA 2019/0078, submitted to Council on 1 February 2019.

In response to agreed actions out of that meeting, Cardno prepared a memo dated 23 April 2019 to provide Cardno responses to the NBC Engineering Referral Response along with responses to all previous pre-DA meeting Council Comments to close out all matters.

The memo provided a comprehensive description of the flooding analysis and outcomes undertaken for the 'Ultimate Scenario' based on indicative, proposed dwellings.

The memo presented a design solution with no adverse impacts which included suspended slab dwellings to allow flood storage and overland flow beneath the dwellings in accordance with Northern Beaches Council's Flood Prone Land Design Standard Item F2.

Following consideration of this memo, Northern Beaches Council issued an Engineering Referral Response stating that Council could not support the development, the major reason with relation to Overland Flow being:

"As previously advised, the proposed future dwellings suspended over the overland flow path is not supported. The conveyance and/or storage of overland flows beneath buildings is generally not supported by Council. Council's Engineers are not satisfied that the Applicant has exhaustively investigated all design solutions to address this matter. The Applicant shall investigate and propose appropriate overland flow flood mitigation measures which may include, but not be limited to, the provision of compensatory flood storage at the rear of the property, reduction and/or adjustment of indicative building envelopes, provision of impermeable flood walls adjacent to northern easement, alternate drainage arrangements, or a combination of these measures."

Additional assessment of the site has been undertaken to explore solutions to avoid any flow or flood storage under any future dwellings and to ensure that overland flow paths around any future dwellings can be accommodated without adverse impacts to surrounding properties.

This memo describes the additional analysis and presentation of outcomes to address Council's above outstanding concerns.

# 2 ADDITIONAL FLOOD IMPACT ASSESSMENTS FOR FUTURE DWELLINGS

The following sections outline the additional Flood Impact Assessment undertaken for future dwellings to address Council concerns raised in their Engineering Referral Response of 28 May 2019.

## 2.1 Background

As described in Cardno's memo dated 23 April 2019, the site accepts two, upstream overland flowpaths and is encumbered with a surrogate regional detention basin in the rear yard due to historical filling of the downslope property. The description of the flow paths and flood behaviour on the existing property and figures are reproduced here for clarity.

#### 2.1.1 Flooding Context of the Site

The overland flowpaths and flood behaviour affecting the site are shown in **Figure 2-1** (overlaid on Figure 4-22 from Cardno's FIA Report included in the DA) and described below:

- The site experiences ponding and flood storage in the rear yard as a result of previous filling of the downslope property (19 Playfair Rd) in all events for the 20% Annual Exceedance Probability (AEP) event and larger events.
- Flows arrive to the rear of 17 Playfair Rd from the north which progress through the rear of the site in a north-south direction. This passes through the flood storage area and through a flow 'pinch point' at the boundary of 19 Playfair Rd created by the higher topography along with the building at the rear of 19 Playfair Rd.
- Playfair Rd flowpath flows arrive at the site from the northwest. This flowpath breaks out of Playfair Rd once the limited capacity of Council's stormwater system is reached and travels across the upslope site (15 Playfair Rd) before entering 17 Playfair Rd. The flow then progresses along the north of the property and joins the rear flood storage area.

### 2.1.2 Future Dwellings

A requirement of the Warringah DCP 2011 – E11 Flood Prone land for Subdivision under Item F5 is that "The applicant must demonstrate that future development following a subdivision proposal can be undertaken in accordance with this Control." This then triggers Items F1, F2, F3, F4, F6, F8 and F9 to be assessed against any future dwelling.

Cardno were therefore required to assess this Ultimate Scenario with different configurations for the future dwellings (based on indicative Architectural Plans) and develop a solution which complies with Council DCP requirements to facilitate approval of the subdivision DA. The different configurations for the Ultimate Scenario assessed and referred to in this memo are:

- 1. Full buildings to ground (with no mitigation measures)
- 2. Suspended slab dwellings
- 3. Full buildings to ground (with mitigation measures)

From the previous assessment referred in Cardno's memo dated 23 April 2019, it was found that for the scenario with full buildings to ground (with no mitigation measures), there are localised impacts of approximately 120mm between 17 and 15 Playfair Rd and broader impacts of 10-20mm both upstream and downstream of the rear flood storage area. The full buildings to ground displaces a portion of flood storage volume and off-site impacts to neighbouring properties are caused by the reduction in flood volume in the rear yard detention area. It is noted that the impacts are less than 20mm which is below what is considered adverse impacts in NBC Warringah DCP 2011.

As part of the DA 2019/078 documentation, Cardno presented a design solution with a suspended slab design for future dwellings and earthworks plans that allow a site which does not have any adverse impacts on surrounding properties. This design proposal is in accordance with Northern Beaches Council's Flood Prone Land Design Standard, Item F2 (**Attachment A**).

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Council have expressed a preference to not have overland flow or flood storage beneath dwellings. In order to have no adverse impact to surrounding properties with full buildings to ground, mitigation measures are required.

The previous building on ground assessment described in Cardno's memo of 23 April 2019 has been updated with changes to the proposed design to incorporate mitigation measures.

## 2.2 Future Development Assessment – Full Buildings to Ground

Cardno undertook additional assessment and flood modelling to investigate flood mitigation measures for the full buildings to ground configuration as per Council preference.

2.2.1 Full Building Envelopes On Ground (with Mitigation measures) – Design development

The factors leading to adverse impacts with full buildings to ground were:

- The building envelopes to ground reduce the flood storage in the surrogate regional detention basin in the rear yard – upstream and downstream impacts were <20mm which are within the limits of no adverse impacts;
- The Playfair Rd flowpath is modified and the width reduced with the northern building envelope;
- The Playfair Rd flowpath is modified through fill to achieve the Council requested 300mm cover over the diverted stormwater pipe, which raises ground surface levels. Note: the existing stormwater pipe has limited to no cover through the rear of 17 Playfair Rd.

Cardno and the Applicant have reviewed Council's concerns and recommendations for on-ground solutions to provide overland flow flood mitigation measures.

Cardno has exhaustively investigated and modelled these mitigation measures as raised by Council including:

- > substituting in-ground building envelopes (instead of the suspended solution);
- > various configurations of compensatory flood storage at the rear of the property;
- > reduction and adjustment of indicative building envelopes for the northern building;
- > provision of impermeable walls adjacent to northern easement;
- > alternate drainage arrangements to collect and divert flows; and,
- > combinations of the above measures.

These investigations lead to the proposed design arrangement for full buildings on ground as shown in the sketch provided in **Figure 2-2.** The design configuration to mitigate adverse flood impacts includes the following measures:

- > proposed building envelopes as solid structures to the ground (i.e. completely blocked to flow);
- > diverted stormwater pipe with fill to provide minimum 200mm cover along the pipe alignment;
- > adjustment to the Playfair Rd flowpath levels along the northern boundary to provide a greater flow area for the Playfair Rd flowpath – this includes reducing the cover over pipe to 200mm;
- Compensatory flood storage of approximately 30m<sup>3</sup> on the eastern side of the rear yard. This is achieved through excavation to RL14.4m AHD and use of stepped retaining walls locally along the rear boundary of adjoining properties. There is an existing sewer manhole at approximate RL14.4m AHD and hence the excavation is limited to this level.

This above arrangement was setup in the flood model and was run for the 1% AEP event to determine impacts.

2.2.2 Full Building Envelopes On Ground (with Mitigation Measures) – flood assessment

The 1% AEP flood depths and water level contours for the Full Buildings to ground (with Mitigation measures) are shown in **Figure 2-3** and the flood level difference plot shown in **Figure 2-4**.

Site earthworks plans appropriately divert flowpaths around the future dwelling footprint and maintain the flood storage area at the rear. The Playfair Rd flowpath has been diverted around the dwelling to join the



rear storage area, as per the existing condition. Other flows from Playfair Rd are directed between the proposed dwellings.

The compensatory storage detention area to the east of the diverted pipe alignment is successful in maintaining the existing storage volumes. This removes any adverse impacts to upstream and downstream properties along the Northern flowpath.

There is a minor localised adverse impact of >20mm that affect a 1m wide strip of land over 9 metres between 17 Playfair Rd and 15 Playfair Rd along the side of the garage and granny flat. Impacts of between 50mm – 85mm affect 4 metres of land. The mitigation measures have only made small incremental differences when compared to the assessment of full buildings on ground with no mitigation measures.

The following comments are made regarding the mitigation options investigated:

- The ground levels cannot be further reduced along the Playfair Rd flowpath due to limitations with the existing stormwater pipe invert levels and top of pipe at the connection points (Pit A3 and Pit A1) and the need for filling over the pipe to achieve 200mm minimum cover;
- Investigation of installing a flood wall to constrain flows within 17 Playfair Rd were unsuccessful as this held water on the 15 Playfair Rd side causing even greater impacts to that property;
- Reducing the northern dwelling in-ground envelope along this flowpath did not yield any significant positive impact in reducing flood levels.
- Additional flood storage in the rear yard does not yield benefits to the Playfair Rd flowpath.

## 2.3 Implications for the Subdivision DA

#### 2.3.1 Subdivision DA

The Subdivision DA includes diversion of Council's dilapidated stormwater asset and subdivision of the land with minimal earthworks other than some minor filling over the diverted pipe to achieve the desired cover depth. This is demonstrated to have an acceptable flood impact on surrounding properties as described in Cardno's Flood Impact Assessment (FIA) Report.

#### 2.3.2 Future Dwellings to Support Subdivision DA

Cardno have presented two solutions for future dwellings to support the Subdivision DA:

- > Optimum Solution Suspended Slab Dwellings (as submitted with DA 2019/078)
  - Overland flow paths have been diverted around buildings as far as reasonably practicable
  - Council dilapidated stormwater asset has been upgraded and diverted
  - Flood storage is maintained beneath dwellings
  - Solution complies with Northern Beaches Council DCP and Flood Prone Land Design Standard (Attachment A)
- > Council Preferred Solution Full Building Envelopes On Ground (with Mitigation Measures)
  - All mitigation options for the buildings on ground solution have been exhausted;
  - minor localised impacts of up to 85mm to the adjacent property at 15 Playfair Rd along the side of the garage and granny flat. At this location there is an existing depth of flow of 100 - 150mm, the localised increase is not adjacent to any habitable dwelling entry points and there is no change to flood hazard;
  - Overland flow paths have been diverted around buildings;
  - Compensatory flood storage has been provided in the rear yard with excavation to an RL of 14.4m AHD using localised retaining walls at the rear of the site;
  - The Playfair Rd overland flow path has been increased by reducing the cover over the new pipe to the minimum 200mm required by AS/NZ3725 for a Class 4 RCP pipe; and,
  - there is no flow or flood storage under future dwellings (buildings to ground).



The optimum solution is the Suspended Slab Dwellings presented in the DA (DA 2019/078) Flood Management Report and which complies with Northern Beaches Council DCP and Flood Prone Land Design Standard. This arrangement and earthworks plan appropriately manages overland flow paths and facilitates the approval of DAs for future dwelling(s) without the need for further flood modelling.

Cardno has exhausted options to achieve no adverse impacts with the full buildings on ground solution as is Council's preference and described in Section 2.2.2. This Council Preferred dwelling design solution requires costly excavation to the rear of the lot to achieve make up flood storage with no significant benefit to justify the expense. Reducing the dwelling footprint did not result in significant benefit to the Playfair Rd flowpath levels.

The Suspended Slab dwellings provides a design solution with no adverse impacts. If the flowpath/flood storage beneath the dwellings was to become blocked, the alternate assessment with full buildings to ground provides the worst case impacts with flow diverting around the dwelling to the rear of the property.





Figure 2-1 Existing 1% AEP flood depths and levels showing overland flowpaths and flood storage area (Figure 4-22 from Cardno's FIA Report)











Figure 2-3 Full Buildings to ground (With Mitigation measures) – 1% AEP flood depths and water level contours

![](_page_8_Picture_0.jpeg)

![](_page_8_Figure_1.jpeg)

Figure 2-4 Full Buildings to ground (With Mitigation measures), 1% AEP water level difference plot – future development case minus existing

![](_page_9_Picture_0.jpeg)

# **3 Conclusion**

Given the analysis carried out by Cardno, two options to progress forward exist:

- a. adopt the Optimum solution as provided in the original DA Submission (dated February 2019) with dwellings suspended above in accordance with Flood Prone Land Design Standard; or,
- b. progress with the Council preferred solution for dwellings going down to ground with the above described flood mitigation measures and an acceptable known minor impact to 15 Playfair Rd in a 1% AEP event. Cardno will need to provide updated Civil DA drawings that include the above measures to support the subdivision DA for Council consideration and approval.

While Cardno and the applicant do not see the Council preferred solution as the optimum solution for the site, all parties wish to see this DA concluded and mitigate further delay to the project.

We trust the above satisfactorily addresses the outstanding matters with respect to the subdivision DA at 17 Playfair Road, North Curl Curl. Please contact the undersigned for any clarification or further discussion in order to bring this project to an acceptable conclusion.

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Yours sincerely,

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cc: BBF Greg Boston, Anthony Roberts, Pos Simson

Enc:

Attachment A – Relevant Planning Controls

![](_page_10_Picture_0.jpeg)

#### Attachment A – Relevant Planning Controls

Extracts:

- 1. Section 9.3 Overland Flows, Northern Beaches Council Water Management Policy
- 2. NBC Warringah Development Control Plan E11 Flood Prone Land
- 3. Manly (2013), Warringah (2011), Pittwater (2015) DCP Flood Prone Land Design Standard

# 9.3 Overland Flow

Overland flow differs from mainstream flooding from creeks or lagoons as they are usually generated from surface run off and overflows from kerbs and smaller pipes, to more serious overland flows involving exceedance in the capacity of major trunk drainage systems.

## 9.3.1 Identifying Overland Flows

To determine if the subject property is affected by overland flow, a Civil Engineer who is currently registered on the National Professional Engineers Register (NPER), should be engaged to investigate and verify whether the subject property is affected by overland flows during a 1 in 100 ARI even. <u>Council's Stormwater Planning Maps</u> may assist identifying Council drainage in the vicinity of the property.

## 9.3.2 Development on Land Subject to Overland Flows

- a) For development on properties subject to overland flow that has not been identified as being flood affected must comply with flood related development controls, in particular the Warringah Local Environment Plan 2011, Warringah Development Control Plan 2011 or Warringah Local Environmental Plan 2000, as appropriate.
- b) Overland flow paths designed to contain a 1 in 100 year ARI storm flow are to be provided over all pipelines that are not designed to cater for this flow. The design of the overland flow path must consider the velocity-depth hazard.
- c) Overland flow paths are to be kept free of obstruction and must not be landscaped with loose material that could be removed during a storm event, such as wood chip or pine bark.

## 9.3.3 Subdivisions on Lots Affected by Overland Flow

Proposed land subdivisions of lots affected by overland flow will not be approved unless the applicant can demonstrate that future development can comply with the requirements of the Warringah Local Environment Plan 2011, Development Control Plan 2011 or Warringah Local Environmental Plan 2000, as appropriate.

## 9.3.4 Piping Overland Flows

Developments proposing the collection and piping of overland flow through the subject property will generally not be permitted. Where an existing Council pipeline is to be diverted and/or upgraded, the design is to be in accordance with section 6 - Building Over or Adjacent to Council Drainage Systems and Easements.

## 10 Compliance

Council will apply the <u>Compliance and Enforcement Policy PL 120</u> for the investigation of alleged unlawful activity, and any enforcement action required in relation to unlawful activity, within the Warringah local government area for which Council is the appropriate regulatory authority.

## **10.1** Audit of Water Management Requirements

Council may undertake audits of developments to ensure the requirements of this Policy and the development consent are met at all times. For any non-compliances identified, Council will apply the provisions of the <u>Compliance and Enforcement Policy PL 120</u>.

## **10.2 Complaints Relating to Private Property**

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#### E11 Flood Prone Land

#### Applies to Land

Identified on the Flood Risk Precinct Maps as being affected by flooding

#### Objectives

- Protection of people.
- Protection of the natural environment.
- Protection of private and public infrastructure and assets.

#### Requirements

The purpose of this Part is to guide development in accordance with the objectives and processes set out in the NSW Government's Flood Prone Land Policy as outlined in the NSW Government, Floodplain Development Manual, 2005.

Development to which this Part applies must comply with the performance criteria set out in clause 1.1.

Form A and A1 (Attachment A of Northern Beaches Council's Guidelines for preparing a Flood Management Report) is to be completed and submitted to Council

Development that satisfies the prescriptive controls in clause 1.2 is deemed to have satisfied clause 1.1.

1.1 Performance Criteria

- (a) SITE LAYOUT AND BUILT FORM: The site layout and ultimate built form of the proposed development should be compatible with the flood risk. Site analysis and layout should incorporate flood risk as a critical element in site planning.
- (b) PUBLIC INTEREST: The proposed development should not result in increased risk—to human life or damage to property or infrastructure—beyond acceptable limits.
- (c) PRIVATE AND PUBLIC COSTS: The economic and social costs, which may arise from damage to property from flooding, should not be exacerbated by proposed development.
- (d) FLOOD EFFECTS CAUSED BY DEVELOPMENT ACTIVITY: Development should not detrimentally increase the potential flood effects on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain.
- (e) DRAINAGE INFRASTRUCTURE AND CREEK WORKS: Any proposed works on drainage infrastructure or natural creeks, whether or not carried out as flood modification measures, shall:
  - a. Not cause adverse flooding impacts;
  - b. Not result in a loss of flood storage;
  - c. Increase protection of existing and proposed development; and
  - d. Not have a detrimental impact on the environment.
- (f) BUILDING COMPONENTS: Building components and materials likely to be affected by flood waters should be designed, built and installed so as not to be damaged by those floodwaters.
- (g) STRUCTURAL SOUNDNESS: The proposed development shall be designed and constructed so that it remains structurally sound for its intended life taking into account all the likely flood events during that lifetime.
- (h) STORAGE OF GOODS: Goods that are likely to amplify the damages arising from flood events—including but not limited to pollutants and toxic chemicals—shall be stored so as not to find their way into floodwaters.
- (i) FLOOD EMERGENCY RESPONSE: Proposed developments should only be permitted where effective warning time and reliable access is available for evacuation from an area potentially affected by floods to an area free of risk from flooding. Such an area may be within the same building where a shelter-in-place option is appropriate and achievable. The emergency response should be consistent with the Flood Emergency Response Planning for Development in Pittwater Policy where it applies to the land. The proposed development should have procedures in place (such as warning systems, signage or evacuation drills) so that people are aware of the need to evacuate and relocate goods and motor vehicles during a flood and are capable of identifying an appropriate evacuation route.
- (j) FLOOR LEVELS: All floor levels within a proposed development shall be set at the required prescriptive level with additional consideration for the following:
  - a. The passage of flood waters;
  - b. The purpose for which that floor area is to used;
  - c. The relationship with the surrounding roadways;
  - d. The relationship with the existing building if the proposal is an extension; and
  - e. Surrounding built form and streetscape.
- (k) FENCING: Fencing shall be designed and constructed so that it does not impede and/or direct the flow of floodwaters, add debris to floodwaters or increase flood affectation on surrounding land.

#### 1.2 Prescriptive Controls

The prescriptive controls that may be applied to development on flood prone land are listed below. A matrix has been prepared showing which of the controls apply to the various development types and flood risk precincts.

#### Development Matrix

The following is a summary of the major steps to be followed in applying this part of the DCP:

(a) Determine the Flood Risk Precinct i.e. High Flood Risk Precinct, Medium Flood Risk Precinct and Low Flood Risk Precinct within which the site is situated;

Note: Where a property is located in more than one Precinct, the assessment must consider the controls relevant to each Precinct.

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  - (b) The various land use or development types have been grouped into seven (7) Land Use Categories (refer table 1). Determine the Land Use Category relevant to the proposal.
  - (c) Check if the proposal will satisfy the prescriptive controls for the relevant land use category in the applicable Flood Risk Precinct (FRP).
  - (d) If the proposal does not satisfy any one of the applicable prescriptive controls, or where those controls require the preparation of a Flood Management Report, then such a report shall be prepared. The Flood Management Report shall be prepared by a suitably qualified professional and shall outline the identified flood risks relevant to the proposal, indicate the extent of compliance with prescriptive controls and provide a thorough assessment of the appropriateness of the development by reference to each of the performance criteria.

			-	-	-	1		
		Critical	Vulnerable	Subdivision	Residential	Business	Recreational	Concessional
		Uses	Uses			& Industrial	&	
							Environmental	
Α	Flood effects	A1	A1	A1	A1	A1	A2	A2
	caused by	A3	A3	A3	A3	A3	A3	A3
	Development	A4	A4					
в	Drainage	B1	B1	B1	B1	B1	B1	
	Infrastructure	B2	B2	B2	B2	B2	B2	
	& Creek							
	Works							
С	Building	C1	C1		C1	C1	C1	C1
	Components	C2	C2		C2	C2	C2	C2
	& Structural	C3	C3		C3	C3	C3	C3
D	Storage of	D1	D1		D1	D1	D1	D1
	Goods	D2	D2		D2	D2	D2	D2
F	Flood	<b>F</b> 1	F1	F1	F1	F1	F1	F1
	Emergency	E2	E2	E1	E2	E2	<b>L</b> 1	
	Response	E2	E2 E3	L7	LZ	E2 E3		
F	Floor Levels	E0	E0	E5	F1	E0	F2	F2
Ľ.		E3	F3	10	F2	F2	12	F3
		F7	F7		E3	F3		F6
			• •		F6	F6		10
					F8	F8		
						F10		
G	Car Parking	G1	G1	G1	G1	G1	G1	G1
_		G4	G4		G2	G2	G2	G2
		G6	G6		G3	G3	G3	G3
		G7	G7		G4	G4	G4	G4
		G9	G9		G5	G5	G5	G5
		G10	G10		G6	G6	G6	G6
					G7	G7	G7	G7
Н	Fencing	H1	H1	H1	H1	H1	H1	H1
	_							
Т	Pools	l1	11	11	11	11	11	11
L			1	1	1	1	1	1

#### MATRIX 1: Flood Risk Precincts (FRP's) High Flood Risk

		Medium	n Flood Risk					
		Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessiona
Α	Flood effects	A1	A1	A1	A1	A1	A2	A2
	caused by	A3	A3	A3	A3	A3	A3	A3
	Development	A4	A4					
в	Drainage	B1	B1	B1	B1	B1	B1	
	Infrastructure	B2	B2	B2	B2	B2	B2	
	& Creek							
	Works							
С	Building	C1	C1		C1	C1	C1	C1
	Components	C2	C2		C2	C2	C2	C2
	& Structural	C3	C3		C3	C3	C3	C3
D	Storage of	D1	D1		D1	D1	D1	D1
	Goods	D2	D2		D2	D2	D2	D2

Е	Flood	E1	E1	E1	E1	E1	E1	E1
	Emergency	E2	E2	E4	E2	E2		
	Response	E3	E3			E3		
F	Floor Levels	F2	F2	F5	F1	F1	F2	F1
		F3	F3		F2	F2		F2
		F7	F7		F3	F3		F3
					F4	F4		F4
					F6	F6		F6
					F8	F8		F11
					F9	F9		
						F10		
						F11		
G	Car Parking	G1	G1	G1	G1	G1	G1	G1
		G4	G4		G2	G2	G2	G2
		G6	G6		G3	G3	G3	G3
		G7	G7		G5	G4	G4	G4
		G9	G9		G6	G5	G5	G5
		G10	G10		G7	G6	G6	G6
					G8	G7	G7	G7
н	Fencing	H1	H1	H1	H1	H1	H1	H1
Т	Pools	11	11	11	11	11	11	11

		Low Flo	od Risk					
		Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional
Α	Flood effects	A2	A2	A2				
	caused by	A3	A3	A3				
	Development	A4	A4					
в	Drainage	B1	B1	B1				
	Infrastructure	B2	B2	B2				
	& Creek							
	Works							
С	Building	C1	C1					
	Components	C2	C2					
	& Structural	C3	C3					
D	Storage of	D1	D1					
	Goods	D2	D2					
Е	Flood	E1	E1	E4				
	Emergency	E2	E2					
	Response	E3	E3					
F	Floor Levels	F2	F2	F5		F1		
		F3	F3			F3		
		F7	F7			F8		
G	Car Parking	G2	G2					
		G6	G6					
		G7	G7					
		G9	G9					
		G10	G10					
н	Fencing	H1	H1					
I	Pools	11	11					

## Table 1 Land Use Groups

Critical	Vulnerable Uses	Residential
Emergency services facility	Child care centre	Boarding house
Hospital	Educational establishment	Dual occupancy
Sewerage system	Home-based child care	Dwelling house
Telecommunications facility (SP2)	Community health service facility	Exhibition home

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Critical	Vulnerable Uses	Residential
Public Utility Undertaking (SP2)	Information and education facility	Exhibition village
Electricity generating works	Respite day care centre	Hostel
	Seniors housing	Residential flat building
	Caravan park	Rural worker's dwelling
	Group home	Secondary dwelling
	Residential care facilities	Semi-detached dwelling
	Correctional centre	Multi dwelling housing
	Tourist and visitor accommodation	Shop top housing
		Attached dwelling

Business & industrial	Business & industrial					
Animal boarding or training establishment	Boat building and repair facility	Business premises				
Camping ground	Car park	Charter and tourism boating facility				
Community facility	Crematorium	Depot				
Eco-tourist facilities	Entertainment facility	Freight transport facility				
Function centre	General industry	Health consulting rooms				
Heavy industrial storage establishments	Highway service centre	Home business				
Home occupation	Home occupation (sex services)	Industrial retail outlet				
Industrial training facility	Industries	Management facility				
Marina	Medical centre	Mortuary				
Neighbourhood shop	Office premises	Patient transport facilities				
Place of public worship	Port facility	Public administration building				
Recreation facility (indoor)	Registered club	Research station				
Restricted premises	Retail premises	Rural industry				
Service station	Sex services premises	Storage premises				
Transport depot	Truck depot	Turf farming				
Vehicle body repair workshop	Vehicle repair station	Veterinary hospital				
Warehouse or distribution centre	Waste disposal facility	Waste water disposal system				
Water recreation structure	Water supply system	Wharf or boating facilities				
Wholesale supplies						

Recreational and Environmental	Subdivision	Concessional
Aquaculture	Subdivision	Development ancillary to residential development
Boat launching ramp		Occupation/change of use of an existing premises
Boat shed		Demolition
Earthworks		Additions/alterations to residential dwelling
Environmental facility		Additions/alterations to business/industrial buildings
Environmental protection works		Advertising structure
Extensive agriculture		Signage
Extractive industry		
Farm building		
Flood mitigation works		
Forestry		
Horticulture		
Recreation area		
Recreation facility (major)		
Recreation facility (outdoor)		
Road		
Viticulture		

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No controls		
Intensive livestock agriculture	Jetty	Tree and/or bushland removal
Intensive plant agriculture	Mooring	Development / subdivision of a sector, buffer area or development site in a release area
Open cut mining	Mooring pen	

#### A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

A1	Jetty
Intensive plant agriculture	Development (including earthworks and subdivision) shall not be approved unless it can be demonstrated in a Flood Management Report that it complies with the Flood Prone Land Design Standard found on Council's webpage.
A2	Certification shall be provided in accordance with Northern Beaches Council's Standard Hydraulic Certification Form (Forms A and A1 of Northern Beaches Council's Guidelines for preparing a Flood Management Report) to the effect that the works have been designed and can be constructed to adequately address flood risk management issues.
A3	The applicant shall include in their submission, calculations to illustrate that any fill or other structures that reduce the total flood storage are replaced by Compensatory Works.
A4	Development (including earthworks and subdivision) shall not be approved unless it can be demonstrated in a Flood Management Report that it been designed and can be constructed so that in a Probable Maximum Flood event: (a) There are no adverse impacts on flood levels and velocities caused by alterations to the flood conveyance; (b) There are no adverse impacts on surrounding properties; and (c) It is sited to minimise exposure to flood hazard.
	Where relevant certification shall also be provided in Northern Beaches Council's Standard Certification Form (Forms A and A1 of Northern Beaches

B. DRAINAGE INFRASTRUCTURE AND CREEK WORKS		
	54	

	B1	Flood mitigation works or stormwater devices that modify a major drainage system, stormwater system, natural water course, floodway or flood behaviour within or outside the development site may be permitted subject to demonstration through a Flood Management Report that they comply with the Flood Prone Land Design Standard found on Council's webpage.
	B2	A Section 88B notation under the Conveyancing Act 1919 may be required to be placed on the title describing the location and type of flood mitigation works with a requirement for their retention and maintenance.

#### C. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS

C1	All buildings shall be designed and constructed as flood compatible buildings in accordance with Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas, Hawkesbury-Nepean Floodplain Management Steering Committee (2006).
C2	All structures 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. Structural certification shall be provided confirming the above. Where shelter-in-place refuge is to be provided the structural integrity is to be to the Probable Maximum Flood level.
C3	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 must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

#### D. STORAGE OF GOODS

D1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.
D2	Goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the Flood Planning Level.

#### E. FLOOD EMERGENCY RESPONSE

E1	Development shall comply with Council's Flood Emergency Response Planning for Development in Pittwater Policy and the outcomes of any Flood Risk Emergency Assessment Report where it applies to the land.
E2	New development must provide an appropriately sized area to safely shelter in place above the Probable Maximum Flood level and appropriate access to this area should be available from all areas within the development.

E3	Adequate Warning Systems, Signage and Exits shall be installed to allow safe and orderly evacuation without reliance upon the SES or other authorised emergency services personnel.
E4	The application shall demonstrate that evacuation/shelter in place in accordance with the requirements of this DCP will be available for any potential development arising from a torrens title subdivision.

F. FLOO	DR LEVELS		
F1	New floor levels within the development shall be at or above, the Flood Planning Level. A reduced Flood Planning Level may be considered only where it is permitted in this Development Control Plan.		
	The structure must be flood proofed (wet or dry) to the Flood Planning Level. This control cannot be applied to critical or vulnerable uses.		
F2	All development structures must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no loss of flood storage in a 1% AEP Event. Where the dwelling is located over a flow path it must be elevated on suspended pier/pile footings such that the level of the underside of all floors including balconies and decks within the flood affected area are at or above, or raised to the Flood Planning Level to allow clear passage of the floodwaters under the building. The development must comply with the Flood Prone Land Design Standard.		
F3	Where the lowest floor has been elevated to allow the passage of flood waters, a restriction shall be imposed on the title of the land, pursuant to S88B of the Conveyancing Act confirming that the undercroft area is not to be enclosed.		
F4	A one- off addition or alteration below the Flood Planning Level of less than 30 square metres or an increase of less than 10% of the ground floor area (whichever is the lesser) for residential development may be considered only where: (a) it is an extension to an existing room (b) the Flood Planning Level is incompatible with the floor levels of the existing room		
	This control will not be permitted if this provision has previously been utilised since the making of this Plan.		
	The structure must be flood proofed to the Flood Planning Level.		
F5	The applicant must demonstrate that future development following a subdivision proposal can be undertaken in accordance with this Control.		
F6	Any existing floor level may be retained below the Flood Planning Level when undertaking a first floor addition provided that: (a) it is not located within a floodway; (b) there is no increase to the building footprint below the Flood Planning Level; (c) it is flood proofed to the Flood Planning Level;		
F7	All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level whichever is higher.		
F8	The minimum floor level of any first floor additions shall be at or above the Probable Maximum Flood Level.		
F9	Foyers – consideration may be given to a minimum floor level of a foyer being set at the 5% AEP flood level, provided it can be demonstrated that it complies with the Flood Prone Land Design Standard.		
F10	Consideration may be given to a minimum floor level for the first 5 metres from the street front of new development in business zonings below the Flood Planning Level provided it can be demonstrated that it complies with the Flood Prone Land Design Standard.		
F11	A one-off addition or alteration below the Flood Planning Level of less than 100 square metres or an increase of less than 10% of the ground floor area (whichever is the lesser) for non-residential development may be considered only where the required floor level cannot be achieved for the following reason: (a) it would be incompatible with floor levels of the existing building This control will not be considered if the existing floor level of the additions/alterations are located within a high hydraulic hazard area. This control will not be permitted if this provision has previously been utilised since the making of this Plan. Any features of the additions or alterations on the floor level must be flood proofed to the Flood Planning Level		
G. CAR PARKING			

G1	Open carpark areas and carports shall not be located within a floodway.	
G2	The lowest floor level of open carparks and carports (unroofed or with open sides) shall	
	be constructed no lower than the natural ground levels.	

![](_page_17_Picture_5.jpeg)

![](_page_17_Picture_6.jpeg)

# NORTHERN BEACHES COUNCIL

G3	All enclosed car parks must be protected from inundation up to the relevant flood planning level. For example, basement carparks must be provided with a crest at the entrance, the crest of which is at the relevant Flood Planning Level.
	All access, ventilation and any other potential water entry points to any enclosed car parking shall be above the relevant Flood Planning Level.
	Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark
G4	Vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site where there is more than 300mm depth of flooding in a 1% AEP flood event.
	The minimum height of the vehicle barriers or restraints must be at or above the Flood planning Level.
	Vehicle barriers or restraints must comply with the Flood Prone Land Design Standard.
G5	Enclosed Garages must be located at or above the 1% AEP level
G6	Carports must comply with the Flood Prone Land Design Standard
G7	Where a driveway is required to be raised it must be demonstrated that there is no loss to flood stage in the 1% AEP flood event and no impact on flood conveyance through the site
G8	Multi Dwelling Housing and Shop Top Housing residential carparking – consideration may be given to a minimum floor level for open or covered carparking being set at the 5% AEP flood level, provided it can be demonstrated that it complies with the Flood Prone Land Design Standard.
G9	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 carparks must be provided with a crest at the entrance, the crest of which is at 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 above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher.
G10	Enclosed Garages must be located at or above the Probable Maximum Flood Level or Flood Planning Level whichever is higher.
H. FENCING	

H1 Fencing, including pool fencing, shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. Appropriate fencing must comply with the Flood Prone Land Design Standard in addition to other regulatory requirements of pool fencing.

# I. POOLS

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.

## Note

Applications must demonstrate compliance with the following references:

- Flood Prone Land Design Standard
- Flood Risk Management Policy

#### Flood Prone Land Design Standard

This design standard provides detailed specifications for development on flood prone land in support of the Flood Prone Land clause in the:

- Manly Development Control Plan (2013)
- Warringah Development Control Plan (2011)
- Pittwater 21 Development Control Plan (2015)

A1	The development has been designed and can be constructed so that in a 1%AEP flood event: (a) There is no net loss of flood storage/ floodway; (b) There are no adverse changes in flood levels and velocities caused by alterations to the flood conveyance; (c) There are no adverse effects on surrounding properties; and (d) It is sited to minimise exposure to flood hazard. Where relevant certification shall also be provided in Northern Beaches Council's Standard Certification Form (Form A in Flood Risk Management Policy for Development) to this effect.	
B1	<ul> <li>The development has been designed and can be constructed so that in a 1% AEP flood event:</li> <li>(a) There is no loss of flood storage/floodway;</li> <li>(b) There are no adverse effects on surrounding properties;</li> <li>(c) The works do not have an adverse impact on the environment. (This includes but is not limited to the altering of natural flow regimes, the clearing of riparian vegetation, artificial modification of the natural stream, such as by relocation, piping etc, in accordance with Council's Protection of Waterways and Riparian Land Policy).</li> <li>Certification shall also be provided in Northern Beaches Council's Standard Certification Form (Form A in Flood Risk Management Policy for Development) to this effect.</li> </ul>	
F2	For suspended pier/pile footings, there must also be sufficient openings in perimeter walls located below the 1% AEP flood level to allow for the flood waters to flow through unimpeded: 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, and (b) 50-75% of the perimeter of the underfloor area is of an open design between the natural ground level and the 1% AEP flood level. Only 25-50% of the perimeter would be permitted to be solid, and (c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway.	
F9	It must be demonstrated that: (a) The Flood Planning Level is more than 1 metre above the typical existing ground level, and (b) The maximum footprint of the foyer is limited to 15 square metres, and (c) The foyer is not used for habitable purposes, and (d) All structural elements, external finishes and internal finishes are constructed from flood compatible materials, and (e) All electrical services, power points, fittings and equipment are located above the Flood Planning Level.	
F10	It must be demonstrated that: (a) The development is located within an existing Business Zone and; (b) The minimum floor level of the first internal 5 metres from one street front only, is no lower than the adjacent footpath level, and	

	<ul> <li>(c) The maximum internal distance from the front of the building is 5 metres, and</li> <li>(d) The maximum area for each individual premises below the <i>Flood Planning Level</i> is 30 square metres, and</li> <li>(e) There is direct internal access between areas above and below the <i>Flood Planning Level</i> for each individual premises, and</li> <li>(f) All new and existing structural elements, external finishes and internal finishes below the <i>Flood Planning Level</i> are constructed from flood compatible materials, and</li> <li>(g) All electrical services, power points, fittings and equipment are located above the <i>Flood Planning Level</i>, and</li> <li>(h) All internal areas below the <i>Flood Planning Level</i> are assumed to be enclosed and so will not be available to form an offset for floodplain storage volume.</li> </ul>
G4	Vehicle barriers or restraints (such as mounding, bunding, louvers or similar) that redirect and/or exclude floodwaters will not be permitted. Perimeter walls/louvers installed as vehicle barriers or restraints are to be of an open design, where 50-75% of the perimeter walls/louvers are 'open' between natural ground level and the <i>Flood Planning Level</i> . Only 25-50% of the perimeter walls/louvers would be permitted to be 'solid', openings should permit a 75 mm sphere to pass through, and should not impede the flow of water
G6	Car ports must: (a) Be of an open design, where 50-75% of the perimeter walls are 'open' between natural ground level and the <i>Flood Planning Level</i> . Only 25-50% of the perimeter wall would be permitted to be 'solid', openings should permit a 75 mm sphere to pass through, and should not impede the flow of water; and (b) Constructed of flood compatible material.
G8	It must be demonstrated that: (a) The <i>Flood Planning Level</i> is more than 1.5m above the typical existing ground level, and (b) All structural elements, external finishes and internal finishes below the <i>Flood</i> <i>Planning Level</i> are constructed from flood compatible materials, and (c) All electrical services, power points, fittings and equipment are located above the <i>Flood Planning Level</i> , and (d) 50-75% of the perimeter walls are 'open' between natural ground level and the <i>Flood Planning Level</i> . Only 25-50% of the perimeter would be permitted to be 'solid', Openings should permit a 75 mm sphere to pass through, and should not impede the flow of water, and (e) Internally there are no solid dividing walls within the carparking area, and (f) No 'storage cages' are permitted within the carparking area below the <i>Flood</i> <i>Planning Level</i> , and (g) Prominent signage is displayed that warns of the possibility of flooding and that personal goods other than vehicles must not be stored in the carparking area, and (h) Vehicle barriers or restraints will be provided to prevent floating vehicles leaving the carparking area.
H1	Fencing (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be open for passage of flood waters - All new fencing on the property must be flood compatible with 50-75% of the fence being of an open design between the natural ground level and the Flood Planning Level. Only 25-50% of the perimeter fence would be permitted to be solid. Openings should permit a 75 mm sphere to pass through, and should not impede the flow of water.