



FLOOD RISK MANAGEMENT REPORT

429 Pittwater road, North Manly

[Abstract](#)

As instructed by Metro Planning, Horizon Engineers prepared flood risk management report for above property.

8 June, 2021

Report No
#155-W19 Issue A

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1.0 Site Description

The subject situated in the Manly area within the Northern Beaches Council. It is approximately 1.8 km from the Manly creek.

Subject Site Location



Figure 1: The site location
(image taken from google Earth)

The site is currently developed with a single dwelling. From the survey plan, it can be identified that the property falls to the street.

2.0 Proposed Development

The proposed development will be an alteration/addition to the existing dwellin, which includes;

- 6 x 3 m Pool
- New Deck area (38 sqm)
- New Laundry area (7.1 sqm)
- New Carport (30 sqm)

3.0 Flood Classification and Characteristics

Refer to council local floodplain risk management policy and information of Flood Map.

Three flood classifications have been defined as follows:

- **High Flood Risk-** This has been defined as the area within the envelope of land subject to a high hydraulic hazard (in accordance with the provisional criteria outlined in the Floodplain Management Manual) in a 100 year flood event. The high flood risk precinct is where high flood damages, potential risk to life, or evacuation problems would be anticipated. Most development should be restricted in this precinct. In this precinct, it would be difficult to achieve a substantial reduction in significant risk of flood damages or to ensure safe evacuation with reasonable flood related building and planning controls.
- **Medium Flood Risk-** This has been defined as land below the 100 year flood level subject to low hydraulic hazard (in accordance with the provisional criteria outlined by the Floodplain Management Manual). In this precinct there would still be a significant risk of flood damage or risk to life, but these damages or risk to life can be minimised by the application of appropriate development controls.
- **Low Flood Risk-** This has been defined as all other land within the floodplain (ie. within the extent of the probable maximum flood) but not identified as either a high flood risk or medium flood risk Flood Risk Precinct. There will be a low cost benefit to compulsorily apply flood related development controls, where risk of damages are low for most land uses. The low flood risk precinct is that area above the 100 year flood and most land uses would be permitted within this precinct.

4.0 Classification of the Land

The subject site is classified as being within a **High** Flood Risk caused by Lagoon Flooding with some areas of the property touching the **1% AEP Overland Flow Fringe** within **Medium** Flood Risk as shown in the Council Flood Map - refer to **Appendix A**.

The proposed development will fall under the residential development category because it is a secondary dwelling.

We have received confirmation from council that the flood advise letter dated 25/07/2019(refer to appendix) can still be used as a basis to prepare this flood risk management report.

Flood	Flood Level (m AHD)
1% AEP	3.2
PMF	5.7

Table 1: Flood levels on the subject site (Taken from Council flood letter).

The Adopted flood level for the subject site is as follow:

Size of Flood	Flood Level (m AHD)	Information provided by
1% AEP	3.2	Northern Beaches council
PMF	5.7	Northern Beaches council
Existing Dwelling Level	2.8	Architect
Min. Deck level	2.75	Architect
Min. Non habitable level	2.8	Architect

Table 2: Adopted flood levels for subject site

5.0 Summary of Flood Risk Management Strategies

The following table provides an outline of the flood risk management strategies for the proposed secondary dwelling at 429 Pittwater road, Manly. These strategies represent an approach that will mitigate the present, future and existing flood.

Planning controls key points		Planning control measures
A. Floor Effects caused by Development	<p>A1. Development shall not be approved unless it can be demonstrated in a <u>Flood Management Report</u> that it has been designed and can be constructed so that in all events up to the 1% AEP event:</p> <ul style="list-style-type: none"> (a) There are no <u>adverse impacts</u> on flood levels or velocities caused by alterations to the flood conveyance; and (b) There are no <u>adverse impacts</u> on surrounding properties; and (c) It is sited to minimise exposure to <u>flood hazard</u>. <p>Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no <u>adverse impacts</u> in the Probable Maximum Flood.</p> 	Flood management report is enclosed. It has demonstrated that the proposed development complies with the flood prone land design guidelines.
	<p>A2. Development shall not be approved unless it can be demonstrated in a <u>Flood Management Report</u> that in all events up to the 1% AEP event there is no net loss of flood storage.</p> <p>Consideration may be given for exempting the volume of standard piers from flood storage calculations.</p> <p>If <u>Compensatory Works</u> are</p>	<p>The 7.1 sqm addition to the existing dwelling will be set at the same level as the existing dwelling, which is RL 2.80. This proposal will then reduce the flood storage by 6.532 m3.</p> <p>To compensate for this loss of flood storage, the</p>

	proposed to balance the loss of flood storage from the development, the <u>Flood Management Report</u> shall include detailed calculations to demonstrate how this is achieved.	landscaped area of min. 43.6 m ² at the rear of the site will be cut by 150 mm to provide the 6.54 m ³ flood storage, which provides more volume than the pre-development. Refer to sketch in Appendix for mark-up on landscaped areas to be cut.
B. Building Components and Structural Soundness	<p>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).</p> <p>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.</p> <p>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</p>	<p>Structural engineer will need to design the proposed development with flood compatible materials.</p> <p>All new development will be designed and constructed up to the RL 3.7 mAHD. Structural certification (by others) need to be provided confirming the above.</p> <p>All new electrical equipment will be waterproofed and/or located above RL 3.7 mAHD.</p>

	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.	All existing electrical equipment and power points located below RL 3.7 m AHD must have residual current devices installed that turn off all electricity supply when flood waters are detected.
C. Floor Levels	<p>C1. New floor levels within the development shall be at or above the Flood Planning Level.</p> <p>C3. All new development must be designed and constructed so as not to impede the <u>floodway</u> 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.</p> <p>For suspended pier/pile footings: .</p> <p>(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</p> <p>(b) At least 50% of the perimeter of the underfloor area is of an open design from the <u>natural ground level</u> up to the 1% AEP flood level; and</p>	<p>Refer to flood controls C4. The proposed extension within the existing dwelling is only 7.1 sqm. Therefore, it is considered as a minor addition. The floor levels does not need to be at or above the flood planning level.</p> <p>Proposed pool will be designed to have the coping flush with natural ground level. The proposed deck will need to be designed as a timber deck with bearers and joists to allow water travel below the deck. Refer to appendix to show calculation on the flood storage and mark-up to show the proposed flood storage compensatory works. Hence, there will be no effect on the floodway, flood conveyance on the site and net loss of the flood storage up to the 1% AEP event.</p>

	<p>(c) No solid areas of the perimeter of the underfloor area would be permitted in a <u>floodway</u></p> <p>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:</p> <ul style="list-style-type: none"> (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. <p>This control will not be permitted if this provision has previously been utilised since the making of this Plan.</p> <p>The structure must be floodproofed to the Flood Planning Level, and the <u>Flood Management Report</u> must demonstrate that there is no net loss of flood storage in all events up to the 1% AEP event.</p> <p>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:</p> <ul style="list-style-type: none"> (a) it is not located within a <u>floodway</u>; and (b) the original foundations are sufficient to support the proposed final structure above them. The <u>Flood Management Report</u> must include 	<p>The area of the proposed laundry room is 7.1 sqm, which is less than 10 sqm. The flood planning level is incompatible with the floor level of the existing room. Existing room RL is 2.8 m AHD. Therefore, the addition can be located below the flood planning level.</p> <p>The structure will need to be floodproofed to min. RL 3.7m AHD. Refer to Appendix for flood compensatory works mark-up to ensure no net loss to the flood storage.</p> <p>There is no first floor addition within the development. Therefore, this flood controls is not applicable.</p>
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	<p>photos and the structural certification required as per Control B2 must consider whether the existing foundations are adequate or should be replaced; and</p> <p>(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</p> <p>(d) the ground floor is floodproofed</p>	
D. Car Parking	<p>D1. Open carpark areas and carports shall not be located within a <u>floodway</u>.</p> <p>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.</p> <p>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.</p> <p>D4. Where there is more than 300mm depth of flooding in a car park or carport during a 1% AEP</p>	<p>The proposed carport is not located within the floodway.</p> <p>The floor level of open carport is proposed to be the same as the natural ground levels.</p> <p>The proposed carport is an open design with at least 2 sides completely open.</p> <p>Based on the flood information provided by council, the maximum flood</p>

	<p>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</p>	<p>water level is at RL 3.2m AHD. The RL of the open carport is at the NGL, which is at RL 2.3 m AHD. Therefore, the flood depth is 900 mm which is more than 300mm.</p> <p>Vehicle barriers are to be provided to prevent floating vehicles leaving the site in accordance with this flood control.</p>
E. Flood Emergency Response	<p>E1. If the property is affected by a Flood Life <u>Hazard</u> Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the <u>Flood Management Report</u>. If the property is affected by a Flood Life <u>Hazard</u> Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the <u>risk</u> 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 <u>Hazard</u> Category has not been mapped by Council, then calculations for its determination must be shown in the <u>Flood Management Report</u>, in accordance with the "Technical Flood <u>Risk</u> Management Guideline: <u>Flood Hazard</u>", 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:</p> <ul style="list-style-type: none"> (a) The floor level is at or above the Probable Maximum Flood level; and (b) The floor space provides at least 2m² per person where the flood duration 	<p>The proposed development is considered as minor development. Therefore, part E of the flood controls is exempted for this development.</p>

	<p>is long (6 or more hours) in the Probable Maximum Flood event, or 1m² per person for less than 6 hours;</p> <p>(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</p> <p>(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</p> <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 <u>suitably qualified professional</u>.</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>	
F. Fencing	<p>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 <u>natural ground level</u> up to the 1% AEP flood level. Less than 50% of the perimeter</p>	<p>Pool fencing will need to be design so as not to impede the flow of flood waters. The fence must be an open design with min. opening of 75 mm x75 mm in accordance with this flood controls.</p>

	fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75mm.	
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.	All Hazardous or potentially polluting materials shall not be located below RL 3.7 m AHD unless adequately protected from floodwaters in accordance with this flood control
H. Pools	<p>H1. Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with <u>natural ground level</u>. Where it is not possible to have pool coping flush with <u>natural ground level</u>, 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.</p> <p>All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level.</p> <p>All chemicals associated with the pool are to be stored at or above the Flood Planning Level.</p>	<p>The proposed pool is located within the 1% AEP flood extent.</p> <p>Pool will need to be in ground, with coping flush with NGL to ensure no net loss of flood storage and no impact on the flood conveyance on or from the site.</p> <p>All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above RL 3.7 m AHD.</p> <p>All chemicals associated with the pool are to be stored at or above RL 3.7 m AHD.</p>

6.0 Contact

NSW State Emergency Services (SES)	Phone: (02) 9555 7606 or 132 500
Northern beaches Council	Phone: 1300 434 434
Manly Police Station 3 Belgrave St, Manly NSW 2095	Phone: (02) 9976 8099 or 000
Closest Emergency Meeting Location- Entrance to Site (refer to Evacuation Plan)	To be advised on the day
Energy Australia	Phone: (02) 131 535

Telstra	Phone: (02) 1800 687 829
Jemena Gas	Phone: (02) 131 909
Local Radio Stations 1. Freq: 702 ABC Sydney	Phone: (02) 1300 222 702

These phone numbers are correct at the time of issuing this report.

7.0 Conclusion and Recommendation

This report complies with the Flood Risk Management requirements of council. The proposed alteration/addition to existing dwelling will be built on a High Flood Risk Area of the site with a minor footprint of the building touching the Medium Flood Risk Area of the site. The development is considered as minor addition.

In addition, it is important that a Flood Risk Management Plan be reviewed as a minimum every 5 years or immediately after a major flood event.

Appendix A – Council Flood Map/ Flood Letter



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FLOOD INFORMATION REQUEST - BASIC

Property: 429 Pittwater Road, Manly

Issue Date: 25/07/2019

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

Flood Information for lot:

Flood Life Hazard Category – N/A

1% AEP – See Flood Map B

1% AEP Maximum Water Level¹: 3.2 m AHD

1% AEP Maximum Peak Depth from natural ground level²: 1.35 m

1% AEP Maximum Velocity: 0.38 m/s

1% AEP Hydraulic Categorisation: Flood storage See Flood Map E

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) ^{1,2,3 & 4}: 3.7 m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level²: 5.7 m AHD

PMF Maximum Depth from natural ground level: 3.85 m

PMF Maximum Velocity: 1.71 m/s

Flood Risk Precinct – See Map F

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

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

³Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels than those indicated on this flood advice.
⁴Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or Flood Planning Level

General Notes:

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

FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY

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

Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy' for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.25.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study) and aerial photography (Source: NearMap 2014) are indicative only.

FLOOD MAP B: FLOODING - 1% AEP EXTENT



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study) and aerial photography (Source: NearMap 2014) are indicative only.

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FLOOD MAP C: FLOOD PLANNING AREA EXTENT



Notes:

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

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FLOOD MAP D: PROBABLE MAXIMUM FLOOD EXTENT



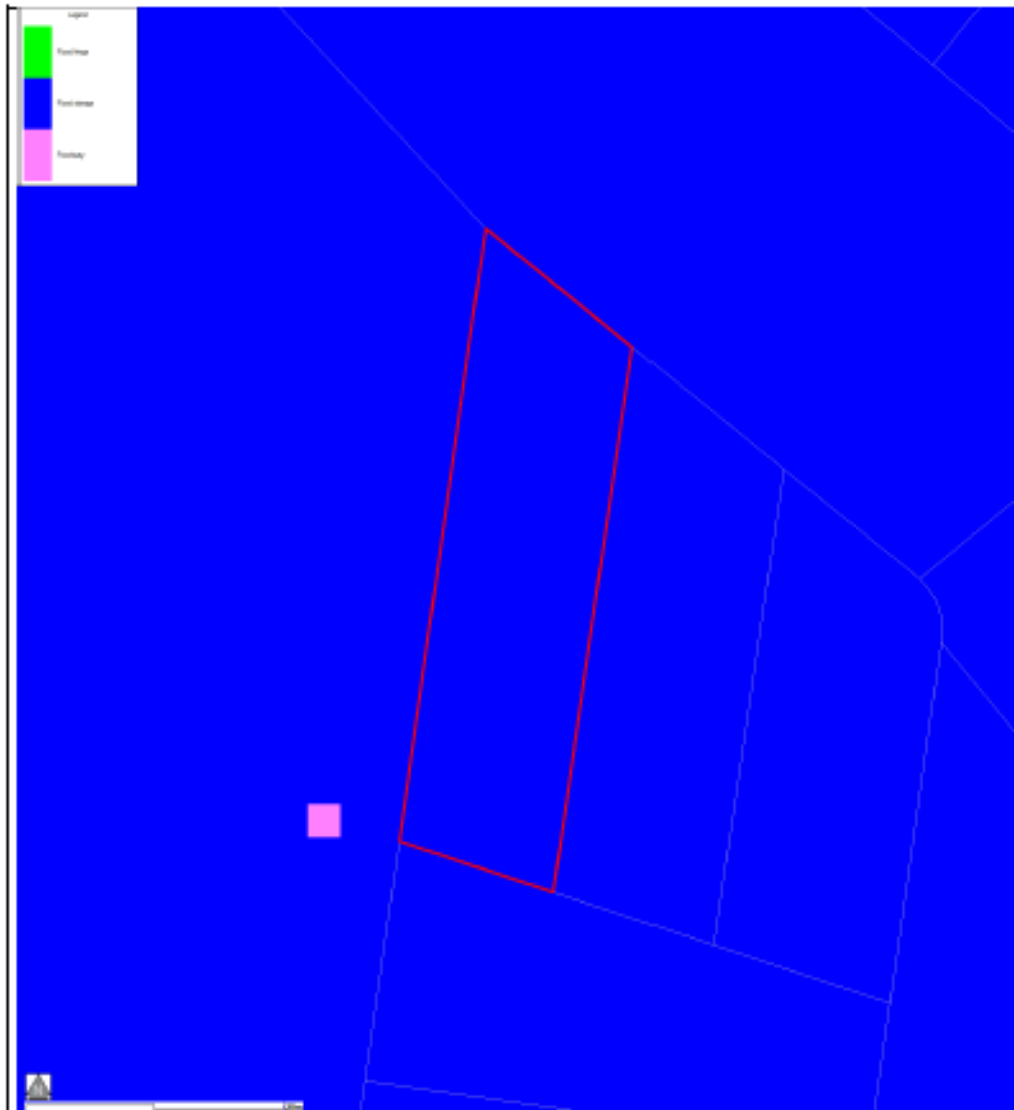
Notes:

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

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



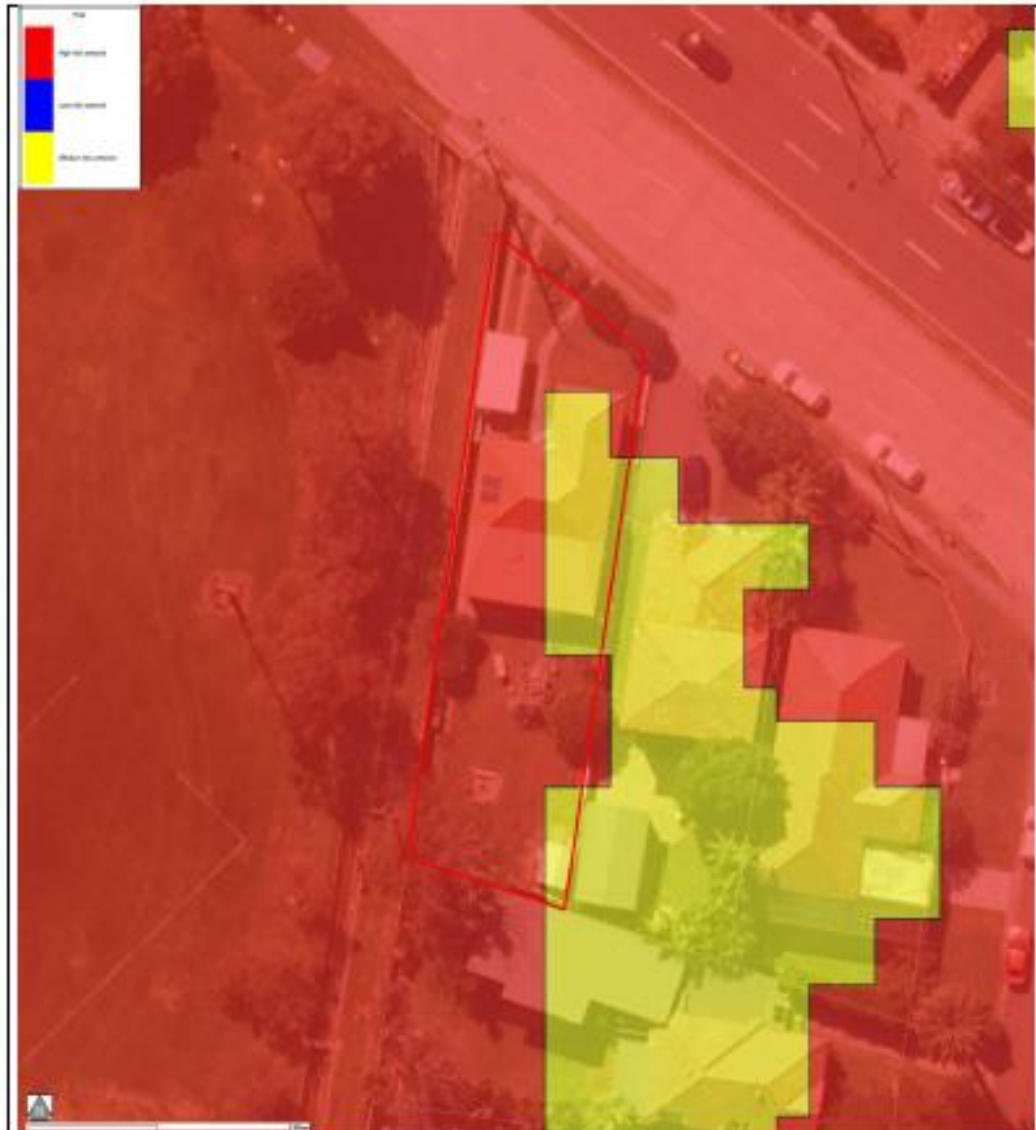
Notes:

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

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FLOOD MAP F: FLOOD RISK PRECINCT MAP



Notes:

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

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Appendix B –Warringah DCP: Flood Prone Land

High Flood Risk Precinct						
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	Flood effects caused by Development	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	Floor Levels	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	Car Parking	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	Emergency Response	E1 E2	E1	E1	E1	E3
F	Fencing	F1	F1	F1	F1	F1
G	Storage of Goods	G1	G1	G1	G1	
H	Pools	H1	H1	H1	H1	H1

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

A1	Development shall not be approved unless it can be demonstrated in a <u>Flood Management Report</u> that it has been designed and can be constructed so that in all events up to the 1% AEP event: (a) There are no <u>adverse impacts</u> on flood levels or velocities caused by alterations to the flood conveyance; and (b) There are no <u>adverse impacts</u> on surrounding properties; and (c) It is sited to minimise exposure to <u>flood hazard</u> . Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no <u>adverse impacts</u> in the Probable Maximum Flood.
A2	Development shall not be approved unless it can be demonstrated in a <u>Flood Management Report</u> 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 <u>Compensatory Works</u> are proposed to balance the loss of flood storage from the development, the <u>Flood Management Report</u> shall include detailed calculations to demonstrate how this is achieved.

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).
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 <u>floodway</u> 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 <u>natural ground level</u> up to the 1% AEP flood level; and (c) No solid areas of the perimeter of the underfloor area would be permitted in a <u>floodway</u> .
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 <u>Flood Management Report</u> 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 <u>floodway</u> ; and (b) the original foundations are sufficient to support the proposed final structure above them. The <u>Flood Management Report</u> 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 <u>floodway</u> .
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 <u>enclosed car parking</u> 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 <u>enclosed car parking</u> 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 <u>Hazard</u> Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the <u>Flood Management Report</u>.</p> <p>If the property is affected by a Flood Life <u>Hazard</u> Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the <u>risk</u> 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 <u>Hazard</u> Category has not been mapped by Council, then calculations for its determination must be shown in the <u>Flood Management Report</u>, 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"> The floor level is at or above the Probable Maximum Flood level; and The floor space provides at least 2m² per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m² per person for less than 6 hours; 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 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 <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 <u>suitably qualified professional</u>.</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	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.
E3	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.

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 <u>natural ground level</u> 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 75mm.
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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.
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H. POOLS

H1	<p>Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with <u>natural ground level</u>. Where it is not possible to have pool coping flush with <u>natural ground level</u>, 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.</p> <p>All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level.</p> <p>All chemicals associated with the pool are to be stored at or above the Flood Planning Level.</p>
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Appendix C –Flood storage compensatory works

Refer to calculations below for the Flood storage loss due to proposed Laundry area (7.1 sqm) at RL 2.80.

- Flood water level at 1% AEP : RL 3.2 m AHD.
 - NGL at the proposed laundry : RL 2.30 m AHD
 - Total area of proposed laundry : 7.1 sqm
- Therefore, the flood storage taken by this proposed laundry is

$$= 7.1 \text{ m}^2 \times (\text{RL } 3.2 - \text{RL } 2.3)$$

$$= 6.39 \text{ m}^3$$

To compensate the loss of the flood storage due to this proposed laundry, we have proposed a landscaping works at the back of the site. The landscaped area at the rear boundary with an area of approx. 43.6 m² will be cut by 150 mm.

Flood storage obtained from this works is approx. $6.54 \text{ m}^3 > 6.39 \text{ m}^3$.

