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26/02/2018
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G&M Consulting Engineers Reference: 2018014

FLOOD RISK REPORT FOR PROPOSED GRANNY FLAT AT 15 GONDOLA ROAD, NORTH NARRABEEN

Prepared By Greenwood Consulting Engineers

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Contents

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1.0 – INTRODUCTION

Greenwood Consulting Engineers has determined that the site at 15 Gondola road, North Narrabeen is located in a High Flood Risk Precinct in accordance with Northern Beaches Council (Pittwater) Flood Prone Land DCP. The proposed plans prepared by *Site Specific Designs (SSD)– dated December 2017* detail a proposed Granny Flat located at the rear of the site and within the extent of this High Flood Risk Precinct.

This report has been prepared in accordance with Northern Beaches Council (Pittwater) Flood Prone Land DCP for a residential development subject to a High Flood Risk (see table 1.0.1 below). The Narrabeen Lagoon Flood Study (2013), Pittwater Council's Flood Risk Management Reports – "*considerations when preparing a report"* sheet and the *NSW Government Floodplain Management Manual (2005)* have been used as a guideline in preparing this report.

The area hatched in red in table 1.0.1 (below) outline the controls that apply to this development.

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MATRIX 1: Flood Risk Precincts (FRP's)

	High Flood Risk							Medium Flood Risk							Low Flood Risk						
	Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional	Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional	Critical Uses	Vulnerable Uses	Subdivision	Residential	Business & Industrial	Recreational & Environmental	Concessional
A. Flood effects caused by Development	A1 A3 A4	A1 A3 A4	A1 A3	A1 A3	A1 A3	A2 A3	A2 A3	A1 A3 A4	A1 A3 A4	A1 A3	A1 A3	A1 A3	A2 A3	A2 A3	A2 A3 A4	A2 A3 A4	A2 A3				
B. Drainage Infrastructure & Creek Works	B1 B2	B1 B2	B1 B2	B1 B2	B1 B2	B1 B2		B1 B2	B1 B2	B1 B2	B1 B2	B1 B2	B1 B2		B1 B2	B1 B2	B1 B2				
C. Building Components & Structural	C1 C2 C3	C1 C2 C3		C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3		C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3	C1 C2 C3					
D. Storage of Goods	D1 D2	D1 D2		D1 D2	D1 D2	D1 D2	D1 D2	D1 D2	D1 D2		D1 D2	D1 D2	D1 D2	D1 D2	D1 D2	D1 D2					
E. Flood Emergency Response	E1 E2 E3	E1 E2 E3	E1 E4	E1 E2	E1 E2 E3	E1	E1	E1 E2 E3	E1 E2 E3	E1 E4	E1 E2	E1 E2 E3	E1	E1	E1 E2 E3	E1 E2 E3	E4				
F. Floor Levels	F2	F2	F5	F1	F1	F2	F2	F2	F2	F5	F1	F1	F2	F1	F2	F2	F5		F1		
	F3 F7	F3 F7		F2 F3 F6 F8	F2 F3 F6 F8 F10		F3 F6	F3 F7	F3 F7		F2 F3 F4 F6 F8 F9	F2 F3 F4 F6 F8 F9 F10 F11		F2 F3 F4 F6 F11	F3 F7	F3 F7			F2 F3 F8		
G. Car Parking	G1 G4 G6 G7 G9 G10	G1 G4 G6G 7 G9 G10	G1	G1 G2G 3 G4 G5 G6	G1 G2G 3G4 G5 G6 G7	G1 G2G 3 G4 G5 G6 G7	G1 G2 G3 G4G 5 G6 G7	G1 G4 G6 G7 G9 G10	G1 G4 G6 G7 G9 G10	G1	G1 G2 G3 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G1 G2 G3 G4 G5 G6 G7	G2 G6 G7 G9 G10	G2 G6 G7 G9 G10					
H. Fencing	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1	H1					
I. Pools	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1					

Table 1.0.1 – Flood Risk Precincts – excerpt from Northern Beaches (Pittwater) Council DCP.

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1.1 - Flood Information Request Summary

Background Information	
Northern Beaches (Pittwater Council)	General purpose report
Issue Date	5th June 2017
Flood Study Reference	Narrabeen Lagoon Flood Study
Flood Category	1 & 2 (Mainstream)
1% AEP Flood Information	
Flood Level	3.50m AHD
Velocity	< 0.5 m/s (Low Velocity)
Peak Depth on Site	1.05m

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PMF Flood Information	
Flood Level	4.90m AHD
Velocity	< 0.5 m/s (Low Velocity)
Peak Depth On Site	2.90m

2.0 - FLOOD RISK REPORT

Flood Planning Summary	
Life Hazard Category	H3 - H5 (High) *(refer section 2.10 for flood risk matrix)*
Flood Emergency Response Strategy (Onsite Response)	Shelter In Place – No Provision on Plans *(refer sections 2.8, 2.9 for recommendation)*
Flood Planning Level (FPL)	3.50m AHD
Proposed Dwelling Flood Level	3.50m
Degree of Inundation	100%
Hydraulic Category	Flood Storage
Flood Storage	No Reduction *(refer section 2.1)*
Flood Levels	No anticipated increase

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Recommendations For Structural Design	*Refer section 2.2*
Recommended Construction Material	*Refer section 2.3*
Ground Floor Requirements	No additional requirement *(refer section 2.4)*
Stormwater Management	*Refer section 2.5*
Waterproofing	Above 3.50m AHD *(refer section 2.6)*
Flood Warning	No Signage
Hazardous Materials Storage	Above 3.50m AHD *(refer section 2.7)*

2.1 - Flood storage

- The drawings provided by SSD propose an open subfloor to allow floodwaters to flow underneath the structure. This is necessary to maintain flood storage and ensure there is no net reduction in flood storage volume.

2.2 – Structural Requirements

- Structure must be designed to withstand flood forces up to the PMF (shelter in place response strategy).
- Boundary fences must be designed to withstand flood forces up to the 1% AEP Flood event.

2.3 - Recommended Construction Materials

- Dwelling must be constructed as a flood compatible building
- Standard Building Materials (concrete, steel, timber and/or brickwork above the flood levels.)

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2.4 - Ground floor requirements

- The proposed ground floor is at RL 3.50m AHD and complies with the required FPL (3.5m AHD)

2.5 - Stormwater Management

- To be designed and installed in accordance with AS3500.3 and Northern Beaches Council (Pittwater) DCP requirements and any conditions outlined in the relevant DA Consent.
- Onsite Detention (OSD) is not recommended for this development.

2.6 - Waterproofing methods

- All electrical equipment is to be fitted with circuit breakers.
- Switchboard and main circuit unit to be fitted above RL3.50m AHD (FPL)
- Other valuable materials or possessions are to be stored above RL3.50m AHD (FPL)
- Owner and occupant are to acknowledge that a reasonable extent of damage to fittings below the RL 3.53m AHD (FPL) is to be expected during the 1% AEP storm event.

2.7 - Hazardous Material Storage

- The owner and occupant are to acknowledge that all hazardous materials are to be stored at or above 3.50m AHD.

2.8 – On Site Refuge

- The proposed plans do not provide an onsite refuge located above 4.90m AHD (PMF).
- We recommend a refuge is provided within the proposed roof space located above RL 4.90m AHD (PMF).

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- A floor area of 2m^2 per occupant is required in this refuge. The plans indicate that a maximum 4 occupants would be required to shelter in place at any one time. Therefore, the onsite refuge must provide 8m^2 floor area (minimum).
- The refuge must be intrinsically accessible (internal stairwell), plainly evident and self-directing and must not rely on mechanical systems for access.
- The refuge must provide:
    - Sufficient clean water
    - First aid kit
    - Portable radio with spare batteries
    - Torch with spare batteries

2.9 - Evacuation strategy and onsite response plan

In a Flood Event, occupants are to proceed to the flood refuge on foot within the first 5 minutes of the rainfall event (heavy rainfall or inundation of the kerb and gutter in Gondola road indicate a potential flood event). Occupants can also refer to local flood warnings provided by the Manly Hydraulics Laboratory and the Northern Beaches Council for warnings and updates during flood events.

2.10 – Flood Risk Matrix

- 1% AEP Flood Risk Matrix Table:

Hazard	Likelihood	Consequence	Risk Level
Person in dwelling being impacted by floodwaters	Unlikely	Moderate - Unsafe for people, proceed to flood refuge. (H4)	Low
Person entering floodwaters on the property	Possible	Moderate - Unsafe for people, proceed to flood refuge(H4).	Low

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Dwelling being impacted by floodwaters – structural viability	Possible	Moderate –Onsite Refuge to be designed by a structural engineer to withstand forces from floodwaters up to the PMF. (H4)	Low
Vehicles being impacted by floodwaters	N/A	N/A	N/A
Floodwaters entering the building	Unlikely	Moderate - Unsafe for people, proceed to flood refuge. (H4)	Low
Floodwaters entering the dwelling	Unlikely	Moderate- Unsafe for people, proceed to flood refuge. (H4)	Low

- PMF Risk Matrix Table:

Hazard	Likelihood	Consequence	Risk Level
Person in dwelling being impacted by floodwaters	Possible	Moderate - Unsafe for people, proceed to Flood refuge (H4)	Low
Person entering floodwaters on the property	Possible	Moderate - Unsafe for people, proceed to flood refuge(H4).	Low
Dwelling being impacted by floodwaters – structural viability	Possible	Moderate –Onsite Refuge to be designed by a structural engineer to withstand forces from floodwaters up to the PMF. (H4)	Low
Vehicles being impacted by floodwaters	N/A	N/A	N/A
Floodwaters entering the building	Possible	Moderate - Unsafe for people, proceed to Flood refuge. (H4)	Low
Floodwaters entering the dwelling	Possible	Moderate - Unsafe for people, proceed to flood refuge. (H4)	Low