

FLOOD RISK ASSESSMENT REPORT

Proposed Residential Development

At

Lot 5, 9 Short Street, North Manly

For



- <u>REF:</u> 46471 Issue A
- DATE: 21st March 2025

SIGNED

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GLOSSARY

Annual Exceedance Probability (AEP)

The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

Australian Height Datum (AHD)

A common national surface level datum approximately corresponding to mean sea level.

Average Recurrence Interval (ARI)

The long-term average number of years between the occurrence of a flood as big as or larger than the selected event.

Catchment

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Flood

Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse.

Flood Liable Land or Flood Prone Land

Land susceptible to flooding by the PMF.

Flood Planning Levels (FPLs)

Are the combinations of flood levels and freeboards selected for floodplain risk management purposes.

Freeboard

Is a factor of safety typically used in relation to the setting of floor levels.

Habitable Room

In industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to damage in the event of a flood.

Peak Discharge

The maximum discharge occurring during a flood event.

Probable Maximum Flood

PMF is the largest flood that could conceivably occur at a location, usually estimated from probable maximum precipitation.

Probable Maximum Precipitation

PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year.

Runoff

The amount of rainfall which actually ends up as stream flow.



1 INTRODUCTION AND LIMITATIONS

In accordance with Northern Beaches Council, Nastasi & Associates has been engaged to prepare a Flood Risk Assessment Report to accompany the Development Application submitted for Lot 5, 9 Short Street, North Manly. The following documents pertaining to the proposed development and applicable Council requirements:

- Survey plan by TSS Total Surveying Solutions, Job Number: 230653, Dated 07/09/2023 (Appendix A)
- Architectural Site Plan by Wattle Court Sydney North, Revision E, Job No. NSN0043, Sheet A03 dated 27.02.2025; (Appendix B)
- Pre and Post Flood Effect Underlay (Appendix C)
- Flood information Report by Northern Beaches Council, dated 08.08.2023; (Appendix D)

This report is intended solely for Wattle Court Sydney North as the client of Nastasi & Associates and no liability will be accepted for use of the information contained in this report by other parties than this client. This report is limited to visual observations and to the information including the referenced documents made available at the time when this report was written.



2 EXISTING SITE CONDITIONS

The subject site – 9 Short Street, North Manly, currently contains a single dwelling with tile roof. The profile of the site falls towards the front boundary at a grade of approximately 2%. Fanell Street in front of the property is sloped from South to North, and Wattle Road slopes from East to West.



Figure 1: Frontage view



3 SITE SPECIFIC FLOOD INFORMATION

The flood information for the subject site, presented in **Table 1** below has been summarised from the Flood Information Report by Northern Beaches Council (Refer to Appendix D). In detail, 100 year flood extent appears at the West and North Western corner of the property with the Probable maximum flood level at RL 12.09 m AHD and 100 year flood level at RL 10.81 m AHD.

1% AEP Flood Level	10.81 m AHD
Flood Planning Level (FPL)	11.31 m AHD
Probable Maximum Flood (PMF) Level	12.09 m AHD
Flood Risk Precinct	Low/Medium
Flood Life Hazard Category in PMF	H2-H4
1% AEP Flood Hydraulic Category	Flood Fringe
1% AEP Flood Depth	0.42 m
1% AEP Flood Velocity	0.35 m/s

Table 1 - Flood Analysis



Figure 2 - Flood Risk Precinct





Figure 3 - 1% AEP Flood Extent



Figure 4 - 1% AEP Flood Hydraulic Category Extent Map



4 PROPOSED DEVELOPMENT

The proposed development is described as two-story brick veneer dwelling with colorbond roof. The finish floor level is at RL 11.410 and the finish garage level is at RL 11.110. The proposed development is above 100 year flood level plus 500mm freeboard. No filling is allowed at the frontage boundary of the subject site to maintain overland flow path.

Description	1% AEP Flood Level	Planning Level	Proposed Level
Proposed ground floor (Habitable)	10.810 m AHD	11.310 m AHD	11.410 m AHD
Proposed Garage (non-habitable)	10.810 m AHD	10.810 m AHD (MIN.)	11.100 m AHD



 Table 2: Summary of Flood level and proposed FFL levels

Figure 5 - Site Plan of Proposed Development

Appendix C compares the 1% AEP flood extent for both the pre and post developments. From this comparison, it is evident that the post development building footprint within the flood extent is less than the pre development. The porch is the only area within the 1% AEP flood extent, which is a non-habitable area. Hence, the building proposal proves to improve existing flood scenario.



5 FLOOD RISK ASSESSMENT

As per Warringah DCP (2011) – E11 Flood Prone Land, the following flood related development controls apply to this proposed development:

	Modium Flood Bick Procinct					
		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
В	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
с	Floor Levels	C2 C3	C1 C2 C4 C6	C1 C3 C4 C6 C7	СЗ	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	
н	Pools	H1	H1	H1	H1	H1

5.1 Flood effects caused by Development:

Post development building footprint within the 1% AEP flood extent is reduced when compared to pre development. Therefore, post development results in a better flood scenario that pre development due to less obstruction area within flood.

5.2 Building Components & Structural Soundness

Areas built within 1% AEP flood extent area is to be designed and constructed with flood compatible materials (structural engineer to ensure building components are capable of withstanding flood forces). 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.

5.3 Floor Levels

Clause 4 of this report confirms that the internal FFL has been designed to be minimum 0.5m above the 1% AEP flood level. Hence, nominated floor levels have been designed in accordance with flood requirements.



5.4 Car Parking

The proposed garage is enclosed and is proposal at RL 11.110 m AHD, which is 300mm higher than the 1% AEP Flood Level. Therefore, since garage is located above 1% flood level, garage floor level complies with council floor level requirements.

5.5 Emergency Response

The subject site is affected by H1-H4 life hazard category at PMF level as per Figure. Hence, during flood emergency, it is recommended to follow Clause 7: Flood Risk Management Plan of this report

5.6 Fencing

Fencing within the 1% AEP Flood extent is to be constructed of open-style fencing. Refer to figure 9 for example.

5.7 Storage of Goods

Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards, however, since the subject site is located outside of 1% AEP flood extent, no negative impact will cause with storage of goods.

5.8 Pools

Not applicable, swimming pool is not a part of this application



6 RECOMMENDATIONS AND CONCLUSION:

This investigation has been undertaken by Nastasi & Associates based on the information provided by Northern Beaches Council and the available architectural plan. The development will have no impact on flooding to the subject site and neighbouring properties. To ensure compliance with the Council's flood prone land policy, we advise that the finish floor for habitable and non-habitable floor area shall be in accordance with **Table 2**.

We confirm that the proposed development (Architectural Plan by Wattle Court, Job No: NDN0043, Revision E, Sheet A03, dated 27/02/2025) complies with Northern Beaches Council flood controls.

	C	ompliance	
	N/A	Yes	No
A) Flood effects caused by Development		~	
B) Building Components & Structural Soundness		 ✓ 	
C) Floor Levels		~	
D) Car parking		~	
E) Emergency Response		 ✓ 	
F) Fencing		~	
G) Storage of Goods		~	
H) Pools	~		

Figure 7 - Flood Impact Assessment Summary Table



7 FLOOD RISK MANAGEMENT PLAN

- a. At the first signs that there may be a rainfall event, check any form of weather reports (i.e. Bureau of Meteorology, ABC Radio 702) for any possible forecast warnings issued. If any storm warnings have been forecast, this Flood Risk Management Plan must be actioned following the proceeding steps below.
- b. During flood events many local, major streets and roads will be cut off by floodwaters that may make the escape by vehicle extremely difficult. Travelling through floodwaters on foot or in a vehicle can be very dangerous as obstructions can be hidden under the floodwaters, or it is possible to be swept away, even if in a car, or the water may be polluted.
- c. It is recommended that during any flood event, staying within the building as much as practical is always the safest option. If the rainfall event has occurred, do not evacuate the building unless instructed by the State Emergency Services (SES) or police.
- d. Develop your own 'Family Flood Plan' generally in accordance with this Flood Emergency Response Plan. In the case that flooding should occur and children are home alone, arrangements should be ensured the children are aware not to leave the premises and to follow the 'Family Flood Plan'.
- e. If flood levels appear to approach the dwelling of the residence:
 - (i) Move important documents, personal items, precious photographs, and vital medical supplies to a safe and easily accessible place with a pre-prepared 'Emergency Flood Kit'.
 - (ii) Gather medicines, special requirements for infants or elderly, mobile phones, first aid kit, special papers, battery operated torch and radio, fresh water, canned food, water proof or easy dry clothing all packed in one location.
 - (iii) Locate any pets and gather special requirements for them
 - (iv) Put on strong shoes, raise any items within the home that may be damaged by water to a high level as possible, with electrical items on top. Turn off any large electrical items at the power point such as a TV that cannot be raised.

NOTE: SUITABLE STORAGE AREAS MAY BE ON TOP OF DESKS/TABLES/BENCH TOPS/ATTICS AND BEDS

- f. In the event that flood waters appear they may enter the dwelling:
 - (i) Switch off electricity at the switchboard
 - (ii) Turn off gas at the meter
 - (iii) Turn off water at the meter
 - (iv) Block toilet bowls with a strong plastic bag filled with earth or sand
 - (v) Cover drains in showers, baths and laundry with a string plastic bag filled with earth or sand.
 - (vi) Once flood waters have been entered the building, all occupants residing within the dwelling must move to the 'First Floor' for refuge from a possible PMF storm event. It is only safe to leave this 'Safe Zone' once the flood water being to reside away from the dwelling.
- g. In the event that flood waters have risen up to the building, do not evacuate the building under any circumstances, unless instructed by SES or police personnel. Floodwaters are much deeper, run much faster and are dangerous outside.
- h. Continue to monitor the Bureau of Meteorology forecasts and warnings, listen to ABC 702 radio.
- i. In the case of medical or life-threatening emergency ring 000 as normal, but explain about the flooding.



- j. A laminated copy of this Flood Emergency Response Plan should be permanently attached to an inside cupboard door in the kitchen and/or laundry of the main dwelling and to the inside of the electrical meter box.
- k. This Flood Emergency Response Plan should be reviewed every 5 years, particularly with the potential sea level rise due to the greenhouse effect.

Important Phone	e Numbers	
State Emergency	Service: Emergency 132 500	General Enquires: 4251 6111
Police, Fire, Amb	oulance: Emergency 000	
Bureau of Meteo	prology (Website): <u>http://www.bom</u>	.gov.au/weather
Land, Weather a	nd Flood Warnings, phone: 1300 65	9 215
DR/Hospital:		
Family:		
Friends:		
Other:		



8 FLOOD INFORMATION BACKGROUND

- Stay tuned to ABC 702 on a battery powered radio for official advice and warnings.
- Don't allow any children to play in or near flood waters.
- Avoid entering flood waters in all circumstances unless it is necessary. Check the depth in front of you before every step using a stick/pole or similar.
- Stay away from drains, culverts, and areas where the water is deeper than your knee.
- Don't turn on your gas or electricity until it has been checked by a professional/licensed repairer.
- Avoid using gas or electrical appliances which have been in flood water until checked for safety.
- Do not consume food that has been in flood waters.
- Boil tap water until supplies have been declared safe.
- Watch for trapped animals.
- Beware of fallen power lines.
- Take as many photos as possible of the damages for insurance purposes.
- Notify family and friends of your whereabouts

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Appendix B - Site Plan



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Appendix C - Pre and Post Flood Effect Overlay



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SHORT STREET, NORTH MANLY	drawing status CONCEPT	PLAN FOR APP	ROVAL
	SCALE (AT ORIGINAL	. SIZE)	AS NOTED
STORMWATER DETAILS	ркојест NO. 46471	drawing no. C5	revision no. A

В

С

F

D

8



Appendix D - Flood Information Report



FLOOD INFORMATION REPORT (BASIC)

Property: 9 Short Street NORTH MANLY NSW 2100 Lot DP: Lot 5 DP 5511 Issue Date: 08/08/2023 Flood Study Reference: Manly Lagoon Flood Study 2013, BMT WBM

Flood Information¹:

Map A - Flood Risk Precincts

Maximum Flood Planning Level (FPL) ^{2, 3, 4}: 11.31 m AHD

Map B - 1% AEP Flood

1% AEP Maximum Water Level ^{2, 3}: 10.81 m AHD
1% AEP Maximum Depth from natural ground level³: 0.42 m
1% AEP Maximum Velocity: 0.35 m/s

Map C - 1% AEP Hydraulic Categorisation

1% AEP Hydraulic Categorisation: N/A

Map D - Probable Maximum Flood (PMF)

PMF Maximum Water Level ⁴: 12.09 m AHD PMF Maximum Depth from natural ground level: 1.71 m PMF Maximum Velocity: 0.59 m/s

Map E - Flood Life Hazard Category in PMF

- ⁽¹⁾ The provided flood information does not account for any local overland flow issues nor private stormwater drainage systems.
- ⁽²⁾ Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning Level may be in a different location to the maximum 1% AEP flood level.
- ⁽³⁾ Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels.
- ⁽⁴⁾ Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or FPL.

<u>Notes</u>

General

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a
 registered surveyor to determine any features that may influence the predicted extent or frequency of
 flooding. It is recommended you compare the flood level to the ground and floor levels to determine the
 level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's online <u>Flood</u> <u>Study Reports</u> webpage.
- If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.
- If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL.
- Areas affected by an EPL in the former Pittwater LGA are mapped on Council's online <u>Estuarine Hazard</u> <u>Map</u>. Note that areas in the former Manly LGA affected by an EPL have been identified and will be soon added to this map.
- Council's drainage infrastructure is mapped on Council's <u>Stormwater Map</u>. Note that locations are indicative only and may not be exactly as shown.

MAP A: FLOOD RISK PRECINCTS



- Low Flood Risk precinct means all flood prone land not identified within the High or Medium flood risk precincts.
- Medium Flood Risk precinct means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- High Flood Risk precinct means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 or H6 Life Hazard Classification)
 The Flood Planning Area extent is equivalent to the Medium Flood Risk Precinct extent and includes the High Flood Risk
- The Flood Flamming Area extent is equivalent to the Medium Flood Risk Precinct extent and includes the Fligh Flood Risk
 Precinct within it. The mapped extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- None of these mapped extents include climate change.

MAP B: FLOODING - 1% AEP EXTENT



- 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 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

MAP C: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



- 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 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

MAP D: PROBABLE MAXIMUM FLOOD EXTENT



- 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 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

MAP E: FLOOD LIFE HAZARD CATEGORY IN PMF



Notes:

 Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

Preparation of a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on how to determine what rules apply on flood prone land, and how to prepare a Flood Management Report. The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood related planning requirements.

Planning Requirements for Flood Prone Land

Development must comply with the requirements for developing flood prone land set out in the relevant Local Environment Plan (LEP) and Development Control Plan (DCP). There are separate LEPs and DCPs for each of the former Local Government Areas (LGAs), although preparation of a LGA-wide LEP and DCP is currently under way.

The clauses specific to flooding in the LEPs and DCPs are as follows:

LEP Clauses	DCP Clauses
Manly LEP (2013) – 6.3 Flood Planning	Manly DCP (2013) – 5.4.3 Flood Prone Land
Warringah LEP (2011) – 6.3 Flood Planning	Warringah DCP (2011) – E11 Flood Prone Land
Warringah LEP (2000) – 47 Flood Affected Land *	
Pittwater LEP (2014) – 7.3 Flood Planning	Pittwater 21 DCP (2014) – B3.11 Flood Prone Land
Pittwater LEP (2014) – 7.4 Flood Risk Management	Pittwater 21 DCP (2014) – B3.12 Climate Change

* The Warringah LEP (2000) is relevant only for the "deferred lands" which affects only a very small number of properties, mostly in the Oxford Falls area.

Development on flood prone land must also comply with Council's Water Management for Development Policy, and if it is in the Warriewood Release Area, with the Warriewood Valley Water Management Specification. Guidelines for Flood Emergency Response Planning are available for addressing emergency response requirements in the DCP. These documents can be found on Council's website on the Flooding page.

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP clauses.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land (with exceptions noted below), for Council to consider the potential flood impacts and applicable controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

There are some circumstances where a formal Flood Management Report undertaken by a professional engineer may not be required. However the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the floor level is above the Probable Maximum Flood level
- Internal works only, where habitable floor areas below the FPL are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

Issue Date: 08/08/2023

What is the purpose of a Flood Management Report?

The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood planning requirements, particularly the development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Preparation of a Flood Management Report

The technical requirements for a Flood Management Report include (where relevant):

- 1. Description of development
 - Outline of the proposed development, with plans if necessary for clarity
 - Use of the building, hours of operation, proposed traffic usage or movement
 - Type of use, eg vulnerable, critical, residential, business, industrial, subdivision, etc
- 2. Flood analysis
 - 1% AEP flood level
 - Flood Planning Level (FPL)
 - Probable Maximum Flood (PMF) level
 - Flood Risk Precinct, ie High, Medium or Low
 - Flood Life Hazard Category
 - Mapping of relevant extents
 - Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the relevance to the proposed development

If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL. If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.

- 3. Assessment of impacts
- Summary of compliance for each category of the DCP, as per the table below.

	Compliance		
	N/A	Yes	No
A) Flood effects caused by Development			
B) Building Components & Structural Soundness			
C) Floor Levels			
D) Car parking			
E) Emergency Response			
F) Fencing			
G) Storage of Goods			
H) Pools			

 Demonstration of how the development complies with any relevant flood planning requirements from the DCP, LEP, Water Management for Development Policy, and if it is in the Warriewood Valley Urban Land Release Area, with the Warriewood Valley Water Management Specification (2001)

- For any non-compliance, a justification for why the development should still be considered.
- Calculations of available flood storage if compensatory flood storage is proposed
- Plan of the proposed development site showing the predicted 1% AEP and PMF flood extents, as well as any high hazard or floodway affectation
- Development recommendations and construction methodologies
- Qualifications of author Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Institution of Engineers Australia
- Any flood advice provided by Council
- Any other details which may be relevant

Further information and guidelines for development are available on Council's website at:

https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land

Council's Flood Team may be contacted on 1300 434 434 or at <u>floodplain@northernbeaches.nsw.gov.au</u>.