

17 Narroy Road, North Narrabeen

04 November 2024

1. Introduction

Development Application (DA) at 17 Narroy Road, North Narrabeen. Northern Beaches Council (NBC) has identified the property as Medium to Low Hazard Category and land risk to life categories H4. Therefore, a Flood Management Report (FMP) of the design, flooding and evacuation process as detailed in Development Control Plan 2014 (DCP Dection B3.11) is required.

The following investigation was undertaken and submitted for NBC considerations as part of the DA process. Note that 17 Narroy Road, North Narrabeen will be referred to as the site.

1.1 Aim

This study explores the impact of mainstream flooding envisaged to occur at the subject site up to the 1% AEP storm event. This area is not predicted to experience mainstream flooding during heavy rainfall events. The anticipated flood behaviour within the contributing catchment for the 1% Annual Exceedance Probability (AEP) has been assessed in relation to the proposed development.

1.2 Description of Development

The proposed development at the subject site consists of alterations and additions to the ground floor level, garage and carport. The existing ground floor level is and will remain above the Maximum Flood Plain Level of 3.53M AHD.

1.3 Site Conditions

The property is approximately 519m² and located within the Northern Beaches Council LGA. The subject site is relatively flat and mildly sloping downwards to the north-east corner towards Narroy Road.

1.4 Flood Behaviour/Key Data

The site is located in the Nareen Creek Catchment Area.

Nareen Creek is a relatively small catchment, however it is fully developed with the exception of Narroy Park. The creek channel is small and accordingly limited in capacity. Whilst the local catchment poses some risks from flash flooding, the flooding from Narrabeen Lagoon provides for the dominant flood condition in terms of peak flood levels. The floodplain of Nareen Creek is relatively low-lying at around 2.0-2.4m AHD for the developed areas downstream of Narroy Park. Flooding in this locality will be dominated by the conditions in Narrabeen Lagoon, including the peak flood levels reached and their relative timing in response to rainfall. Nevertheless, the lower parts of the catchment are still susceptible to the flash flooding risks associated with shorter durations. (Narrabeen Lagoon Flood Study, BMT WBM, September 2013)

There are several features of the topography of the site and its location (proximity to Narrabeen Lagoon and Nareen Creek drainage system) that are important to the potential mainstream flooding processes and a flood evacuation plan.

These are:

1. The site is located on the western flood plain of Narrabeen Lagoon and is in the Nareen Creek Catchment.
2. The Nareen Creek floodplain is generally at an elevation of between 1.5 to 2.5 metres AHD, and is exposed to major to extreme flooding from Narrabeen Lagoon and minor to moderate flooding from the Nareen Creek Catchments. The Lagoon experiences both floods and ocean surges.
3. The datum point on Narroy Road in front of the site is 2.30 metres AHD.

4. The site raises 830mm from the road and varies in level from 3.13 metres to 3.6 metres
5. The general area surrounding the site is a floodplain with no relief. Evacuation from the site may be difficult and requires a flood evacuation plan.
6. The site is within the fringe of the floodplain of Narrabeen Lagoon and would not be exposed to high flood or tidal velocities. Flood flows from the Nareen Creek will be concentrated along the existing concrete lined and natural channels, north of the site.

The site is exposed to major flooding from Narrabeen Lagoon during high rainfall events and elevated ocean levels. Narrabeen Lagoon water level can also be influenced by high ocean water levels when the Lagoon entrance is open. Narrabeen Lagoon, under normal astronomical tidal tides, experiences a tidal range of 0.1 metres near the channels of the site.

1.5 Review of Key Data

The site was surveyed by CMS, Dated 31 November 2024

The Narrabeen Lagoon and Nareen Creek flooding processes have been extensively studied by a number of investigations commissioned by the then Pittwater and Warringah Council. The more recent studies are:

1. Narrabeen Lagoon Flood Study, BMT WBM, September 2013
2. Nareen Creek Flood Study, Cardno Lawson and Treloar, September 2005

The recorded flood level data published in these studies is extensive going back to the early 1940'S. However, many developments such as bridges, drainage channels etc. have been constructed over this period, affecting the flooding processes.

Recorded Peak Flood Levels

Date	Location	Flood Level m AHD	Comments
1942	22 Rickard Road	2.7	Published MHL (Ref 2)
	32 Lido Avenue	2.7	Published MHL (Ref 2)
	25 Narroy Road	2.5	Published MHL (Ref 2)
May 1974	72 Gondola Road	2.4	Published PWD (Ref 2)
	78 Gondola Road	2.4	Published PWD (Ref 2)
August 1986	13, 23, 25 and 32 Lido Avenue	2.3, 2.3, 2.1 and 2.5	Published MHL (Ref 2)
1987	24 Lido Avenue	2.1	Published MHL (Ref 2)
5 th June 2016	Pittwater Road Bridge	2.2	MHL Recorder
9 th February 2020	Pittwater Road Bridge	2.1	MHL Recorder

Generally, the major flood levels in the vicinity of the site over the last 70 years have reached a level of approximately 2.1 to 2.7 metres AHD. These flood levels would not have inundated the site. The rate of rise of flood waters is a process that is significant in planning for major flood events, such as the 1% AEP flood. The history of flooding provides insight to the design events such as the 1% AEP.

FLOOD MANAGEMENT REPORT

The data of interest for this site is shown in Tables below extracted from the Narrabeen Lagoon Flood Study, BMT WBM, September 2013 for Narroy Road.

Designed Event	Modelled Peak Flood Levels (m AHD)									
	50%	20%	10%	5%	2%	1%	0.5%	0.2%	0.1%	PMF
Catchment Derived	2.2	2.4	2.6	2.7	2.8	3.0	3.1	3.3	3.4	4.9

Designed Event	Modelled Peak Flood Levels (m AHD)					
	20%	10%	5%	2%	1%	0.5%
Ocean Derived	1.2	1.4	1.5	1.7	1.9	2.0

Designed Event	Modelled Peak Flood Levels (m AHD)			
	1% AEP 9-Hour Catchment Event	1% AEP Ocean Event	1% AEP Ocean Catchment + 5% AEP Ocean	5% AEAP Catchment + 1% AEP Ocean
Joint Event	2.9	1.9	3.0	2.6

The site is only impacted by the PMF 0.1% AEP (1 in 1000 year flood)

Summary of Key Data

The key findings for the flood simulations are:

1. The critical rainfall duration at Pittwater Road Bridge (PRB) is between 9 and 24 hours which equates (based IFD Bureau of Metrology curves) to between 230 to 340mm of accumulated rainfall over the respective periods. This range and rainfall volumes will generate the highest peak water level of approximately 3m AHD near the site. This level will not inundate the site
2. The 1%AEP ocean storm surge and associated setup is 1.9m AHD. This level will not inundate the site.
3. The rate of rise of the flood level between 2 metre (the site being flooded would trigger a high level of awareness) and 3 metres AHD (peak 1% AEP level) is approximately 3 hours.
4. The combination of extreme catchment rainfall and ocean levels will result in the same predicted 1% AEP peak levels as the extreme catchment flooding alone. This indicates the significant impact the Narrabeen Lagoon catchment runoff could have on the site. The peak flood level is independent to the ocean tide and to a lesser degree Nareen Creek flows at the site.
5. The entire floodplain and associated road network would become inundated, however they are not located in the high flood velocity zone.
6. Access routes east of the site will flood at the same rate.

2. Flood Analysis

2.1 Site Flooding Extent

The site flooding extent has been determined using Council's available flood information (Flood Information Report Basic). All relevant flood information is shown below:

Predicted 1% AEP flood level:	3.03m AHD
Predicted 1% AEP flood depth:	N/A
1% AEP maximum velocity:	N/A
Highest Flood Planning Level (FPL):	3.53m AHD
Highest Probable Maximum Flood (PMF) level:	4.90m AHD
Probable Maximum Flood (PMF) depth:	1.91m
Probable Maximum Flood (PMF) velocity:	0.53 m/s
Flood Risk Precinct:	Medium and Low
Flood Life Hazard Category:	H4
Mapping of relevant extents:	Appendix A
Existing Ground Floor Level (FFL):	3.65m
Proposed Ground Floor Extension Level (FFL):	3.65m
Proposed Garage/Carport Level:	3.28m

3. Assessment of Impacts

3.1 Development Matrix

The subject site is classified under the residential category in figure 1 below.

		Medium 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

FLOOD MANAGEMENT REPORT

		Low Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
B	Building Components & Structural	B1 B2 B3				
C	Floor Levels	C2 C3				C5
D	Car Parking	D2 D7				
E	Emergency Response	E1 E2				E3

Figure - Development Matrix. Source: Northern Beaches Council Website Information

Table - Assessment of Impacts

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by the development	✓		
A1	✓		
A2	✓		
B Building Components & Structural		✓	
B1		✓	
B2	✓		
B3	✓		
C Floor Levels		✓	
C1		✓	
C3	✓		
C4	✓		
C6	✓		
D Carparking	✓		
D1	✓		
D2	✓		
D3	✓		
D4	✓		
D5	✓		
D6	✓		
E Flood Emergency Response		✓	
F Fencing	✓		
G Storage of Goods	✓		
H Pools	✓		

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal. As per the accompanying Basic Flood Information Report supplied by the Northern Beaches Council it is not identified in Map B – Flooding – 1% AEP Extent (NBC Basic Flood Information Report).

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control

B. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS

B1

Compliance – Yes

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal. The rear addition is being built on stilts at the existing floor level of 3.65m which is 120mm above the maximum flood plan level of 3.53. This allows for a 90mm joist and 20mm flooring including under house insulation to be above the maximum FPL. All other material below being stilts, footings and bearers will be built out of flood compatible materials being concrete, steel and pressure treated timber.

B2 – B3

Compliance – (N/A)

As per the accompanying Basic Flood Information Report this site is not impacted by the Flood Planning Level (Map B – Flooding – 1% AEP Extent) or any Flood Hydraulic Category (Map C – 1% AEP Flood Hydraulic Category Extent Map). Any electrical equipment, powerpoints, wiring etc in the garage will be above 3.53m AHD. Inground sewer and pipes are waterproofed in accordance with AS/NZS 3500.

C. FLOOR LEVELS

C1 - New floor levels within the development shall be at or above the Flood Planning Level.

Compliance – Yes

The rear addition is being built at the existing floor level of 3.66m. Above the maximum FPL.

C3, C4, C6

Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development

proposal. As per the accompanying Basic Flood Information Report supplied by the Northern Beaches Council it is not identified in Map B – 1% AEP Flood and not identified in Map C – 1% AEP Flood Hydraulic Category Extent Map.

D. CAR PARKING

D1 Compliance – N/A

No floodway's have been identified on this site. The entire site is above the 1% AEP of 3.03m. Map C – 1% AEP Flood Hydraulic Category Extent Map NBC Basic Flood Information Report.

D2 Compliance – N/A

No excavation is occurring. The garage and carport will be develop with a raft slab 120mm above the existing ground floor level with a finish level at of 3.35m ADH.

D3 Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal.

D4 Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal. The proposed carport and parking will be at a height of 3.35m.

D5 Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal. The proposed garage and carport will be at a height of 3.35m.

D6 Compliance – N/A

No such proposal for car parking is required or sort. The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal. The proposed garage and carport will be at a height of 3.35m.

E. EMERGENCY RESPONSE

Compliance – Yes

Refer to flood management plan contained in this report and Appendix A

F. FENCING

F1

Compliance – N/A

The lowest part of the existing property is 3.16m ADH above the 1% AEP event of 3.03m. The control is not applicable to this site. It is compliant by the nature of the existing site levels and development proposal.

G. STORAGE OF GOODS

Compliance – N/A

No such proposal is required or sort

H. POOLS

Compliance – N/A

No such proposal is required or sort

4. Assessment and Recommendations

4.1 Flood Planning Level

The proposed ground floor addition (FFL 3.66m AHD) IS located above the flood planning level (FPL) (RL 3.53 AHD). The proposed architectural plans detail an open substructure up to the FPL. This will allow for the free passage of mainstream flood waters below the dwelling should the site become inundated. Therefore, no loss of flood storage is envisaged to occur as a result of the proposed development.

4.2 Parking and Carport

The proposed carport is above 1% AEP flood. It cannot be inundated by flood waters during a 1% AEP flood event.

4.3 Building Components and Structural Soundness

Any new structures are to be constructed of fit for purpose building materials in accordance with “Reducing vulnerability of buildings to flood damage”. Timber framed construction for any new structures below the PMF (4.90m AHD) and any construction which result in voids that are difficult to clean out after a flooding event are not to be used. New structures are to be designed and certified by a structural engineer prior to CC to ensure structural integrity up to the FPL (3.53m AHD).

The proposed development under 3.53m AHD is limited, only comprising of brick piers and pressure treated LVL’s used as bearers. All other building material will be above the FPL.

The required on-site refuge (see: “Emergency Flood Response”) is proposed to be located within the existing attic conversion. The existing house frame and roof frame is built out of hardwood and compliant with the required building material.

At the completion of construction, the structural engineer is to certify that the development has been constructed as per the above mentioned design requirements.

The existing switchboard and main circuit will remain fitted above the FPL (3.53m AHD). 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 FPL (3.53m AHD) and conduits must be laid such that they are free draining. There are no existing or proposed electrical equipment and power points located below the FPL (3.53m AHD) within the subject structure must have residual current devices installed that turn off all supply of electricity to the property when flood waters are detected.

4.5 Flood Management Plan

The access to a flood free haven away from the site in extreme flood events is considered less than a 1% chance. Access is available via Venetian Ave 15 metres to the East and onto the Western section of Gondola Ave that runs parallel to the adjoining lots at the rear of the site.

During the lead up to this event there are a number of flood prediction services available which should be used to ensure sufficient planning and action. The sequence of information available are:

1. This report provides information on the flooding processes of the site. The residents of the site should be aware of this information and the Action Plan should be posted in a visible location. BoM warning process, inundation process of the site and an action plan. The Action plan is in Appendix A.
2. Severe flood warning for the Northern Beaches predicted by the Bureau of Meteorology (BoM), should prepare for a potential flooding at the site. Typically, rainfall intensities in an excess of 100mm/hr over a period of several hours will generate flooding near the site. The SES have a facebook page on flooding situations along with an SMS warning system sent to all mobile phones within the impacted area.
3. Flood levels exceeding 3.66 metres AHD (130mm above the maximum FPL) will inundate the site and should be a trigger to prepare. When rain is predicted to continue a major event may occur, particularly if flood warnings continue to be issued by BoM.
4. As discussed, the 1% AEP flood will rise above 2 m to its peak value in 2 to 3 hours. During that time the final preparations should be concluded to secure items on the site and ensure the safety of all persons.



Raised Corner allotment of 15 and 17 Narroy Road, North Narrabeen (Photo facing South)



Raised Corner allotment of 15 and 17 Narroy Road, North Narrabeen (Photo facing South/West – corner of Narren and Venetian)

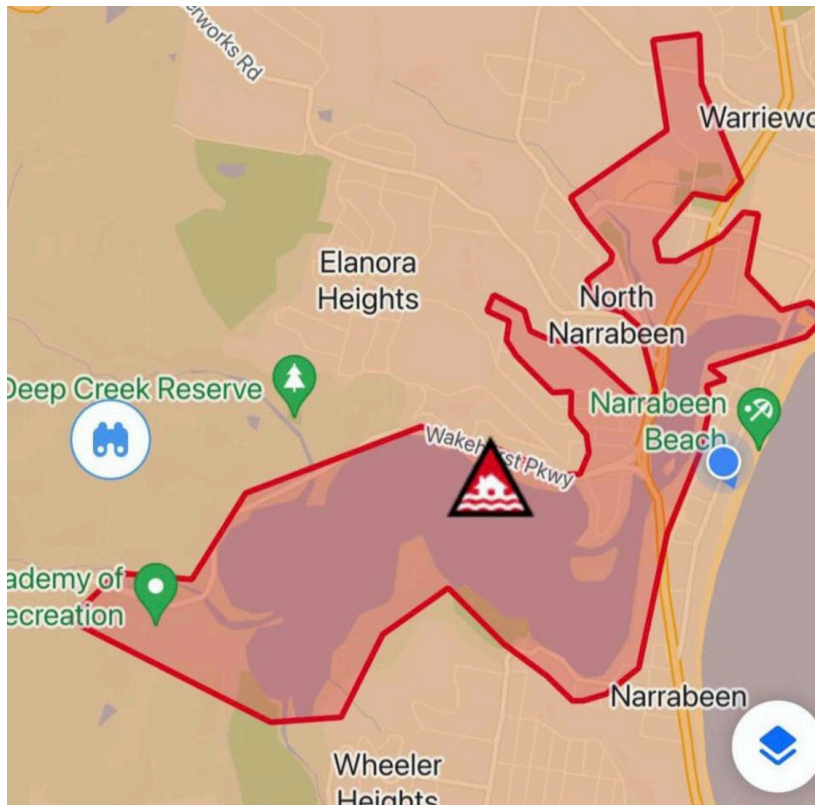


Raised Corner allotment of 15 and 17 Narroy Road, North Narrabeen (Photo facing West – corner of Narren and Venetian)

15 and 17 Narroy Road are naturally raised by the natural ground level and are unique to the other lie lowing properties on Narroy Road and surrounding areas. As illustrated in the images above, 17 Narroy Road is over 80cm above the natural road level.

FLOOD MANAGEMENT REPORT

As illustrated in the SES evacuation order on 06 April 2024. All houses on Narroy Road excluding 15 and 17 were ordered to evacuate. SES messaging service.



SES Evacuation Order 06 April 2024

The site has a natural vantage point to observe the rise of flood waters incurring from Nareen Creek/Narrabeen Lagoon to execute the flood management plan.



Image: View from 17 Narroy Road of Narroy Park. Minor inundation of Narroy Park from Nareen Creek – 06 April 2024



Image: Lake Park/Narrabeen Lagoon. Flooding on April 06 2024 – No recorded data

4.5 Emergency Flood Response

There is an existing attic conversion in place at a floor level of 6.425m AHD. It provides an on-site refuge above the PMF (4.90m AHD) should the flood evacuation plan fail. The on-site refuge has appropriate access installed to enable access points from all areas within the development and is designed and constructed in accordance with the Section 4.3

The on-site refuge must provide:

- Sufficient clean water for all occupants
- Portable radio with spare batteries
- Torch with spare batteries
- First aid kit

5 Conclusion

At present the site is located in Northern Beaches Council Flood Hazard Map to be within the Medium and Low Flood Risk Precinct. Generally, low-risk flood precincts are areas determined to have a low probability of flooding, often defined by particular flood event levels (such as the 1-in-100 year flood level). The %1 AEP for the site is 3.03m AHD. No existing level on the site is lower than 3.16m and there is no anticipated excavation/removal of land to be lower than this. As per the accompany survey report by CMS.

FLOOD MANAGEMENT REPORT

The only identified flooding event that may possibly impact the site is the 1 in 1000 year flood with a 0.1% chance of inundation. As per this report and NBC Development Control Plan only three (3) of the (19) nineteen listed flood controls are applicable to this site. The information required to comply with these controls is minimal. B1 is standardised, C1 (brick piers/foundations) will be certified on the engineer plans and E an evacuation plan/emergency response should not require an engineering qualification to prepare. For this reason it is not relevant for a qualified engineer with experience in flood design/management who has, or is eligible for, membership to the Institution of Engineers Australia to prepare this report.

Appendix A:

FLOOD WARNING

AWARENESS

- Heavy rain and Ocean storms predicted by the Bureau of Meteorology (BoM): flood warning/flash flooding for the Northern Beaches
- Monitor media reports for flood warnings in the Sydney Metropolitan Area
- Observe local rainfall and flood levels in Narroy Park, Gondola Road and Lido Avenue
- Check Predicted Fort Denison Tides
- Narroy Park overtopped triggers Action Plan

ACTION **BoM WARNINGS ISSUED**

- Account for all residents and visitors. Inform all residents and visitors of the potential flood situation and this Action Plan
- Any items transportable by flood waters move to the FL
- Secure the vehicles in the garage/carport. Move essential items to FL (250mm of the garage slab)
- Observe inundation of Narroy Park and Narroy Road to the North and East and state of tide
- Continue to monitor BoM reports and tide
- If rainfall is intense and warning continue remain at FFL.

POST FLOOD

- Account for all residents and visitors
- Inspect vehicles and site generally for safety particularly electrical issues
- Monitor BoM reports to ensure no further flood warnings and check on tide predictions. Continue observing flood levels
- Note that several peaks are possible depending on the rainfall patterns

Note : the flood conditions and orders can be viewed through SES facebook page

BASIC FLOOD INFORMATION REPORT

Property: 17 Narroy Road NORTH NARRABEEN NSW 2101

Lot DP: Lot 299 DP 16719

Issue Date: 30/10/2024

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

Flood Information^{1:}

Map A - Flood Risk Precincts

Maximum Flood Planning Level (FPL) ^{2, 3, 4:} 3.53 m AHD

Map B - 1% AEP Flood

1% AEP Maximum Water Level ^{2, 3:} N/A m AHD

1% AEP Maximum Depth from natural ground level^{3:} N/A m

1% AEP Maximum Velocity: N/A 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:} 4.90 m AHD

PMF Maximum Depth from natural ground level: 1.91 m

PMF Maximum Velocity: 0.53 m/s

Map E - Flood Life Hazard Category in PMF

H4

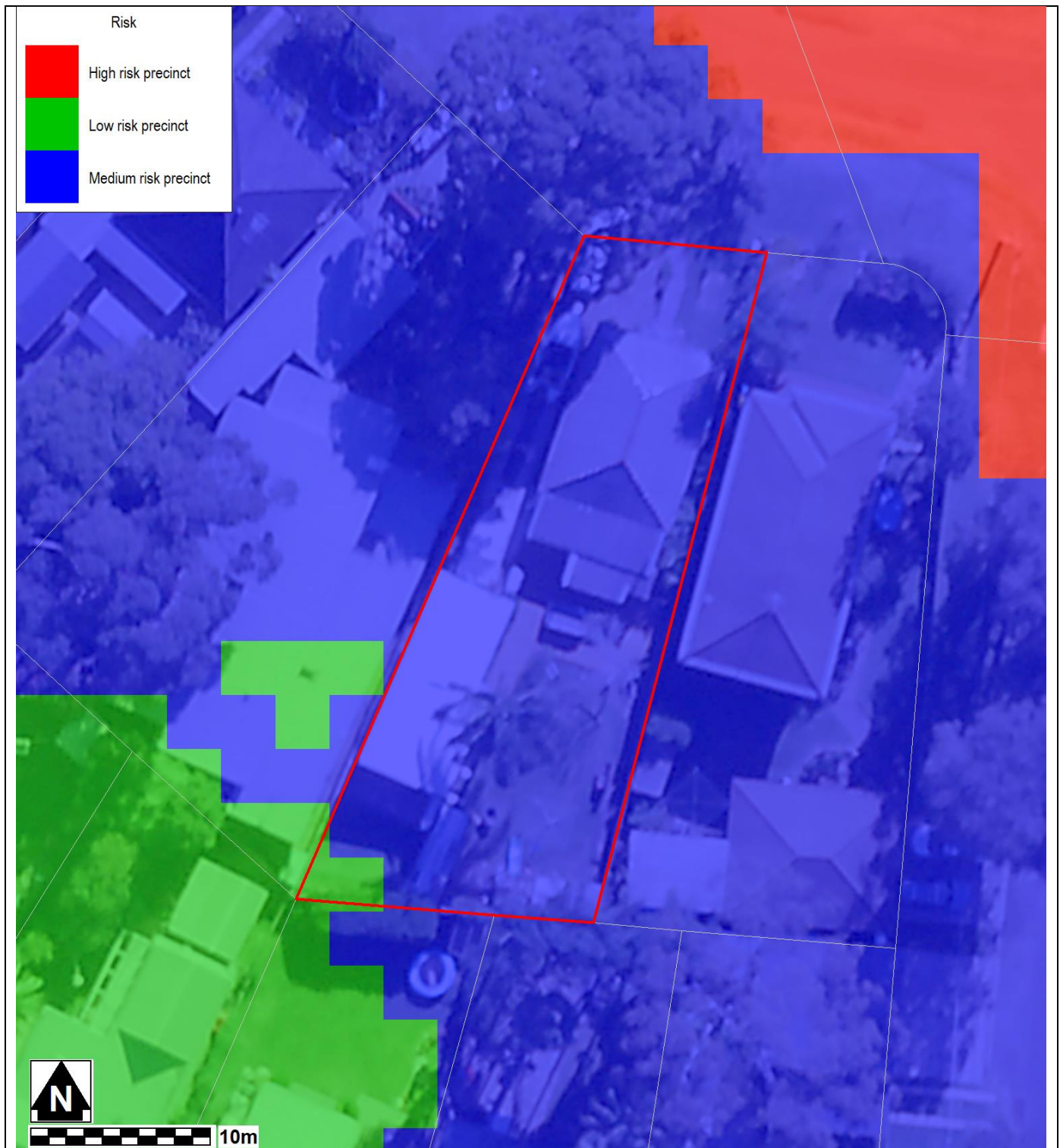
- (1) The provided flood information does not account for any local overland flow issues nor private stormwater drainage systems.
- (2) Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning 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.

Notes

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 [Flood Study Reports](#) 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 [Estuarine Hazard Map](#). 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 [Stormwater Map](#). Note that locations are indicative only and may not be exactly as shown.

MAP A: FLOOD RISK PRECINCTS



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 (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 Precinct within it. The mapped extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- None of these mapped extents include climate change.

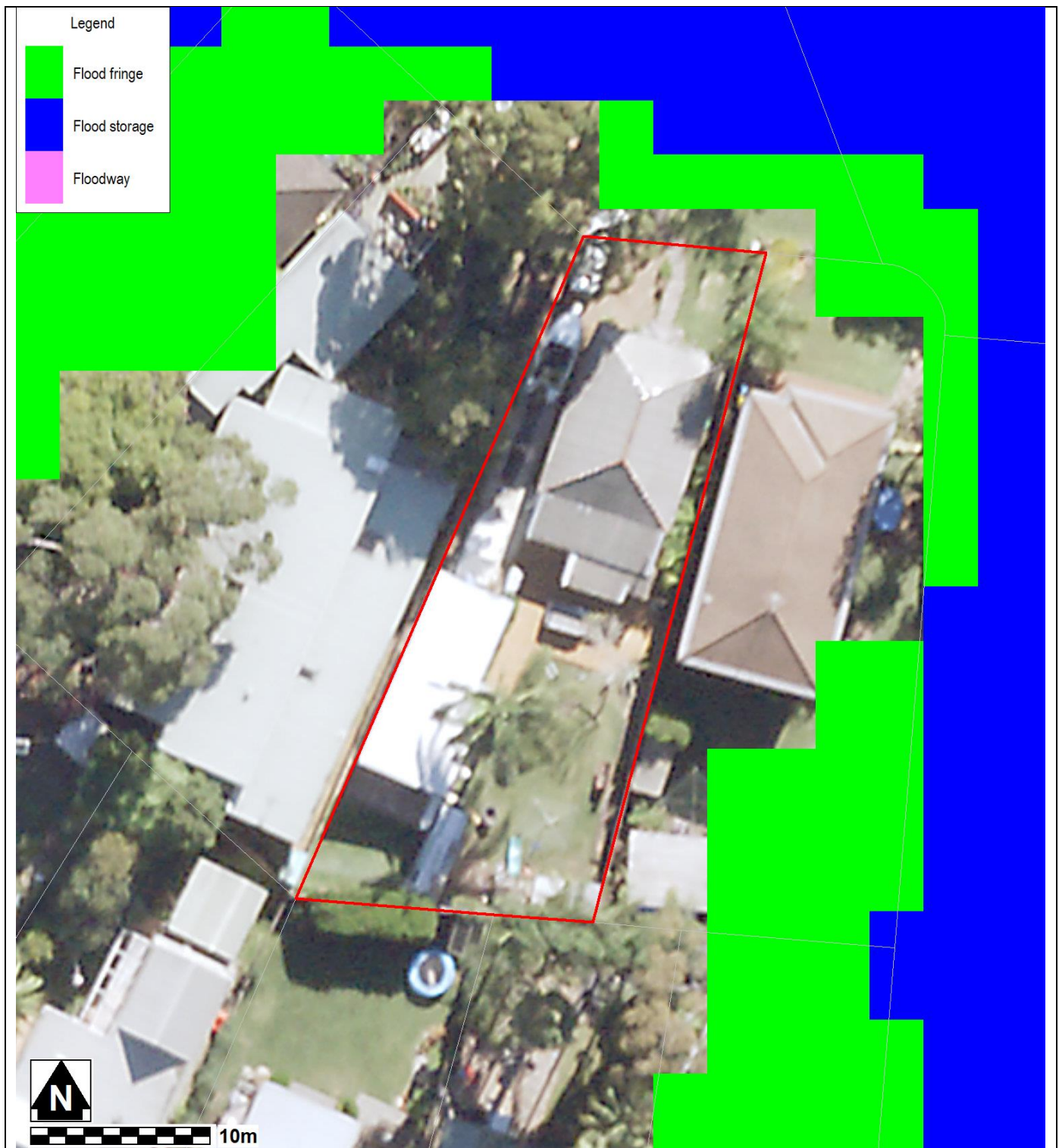
MAP B: FLOODING - 1% AEP EXTENT



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: Narrabeen Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

MAP C: 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: Narrabeen Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

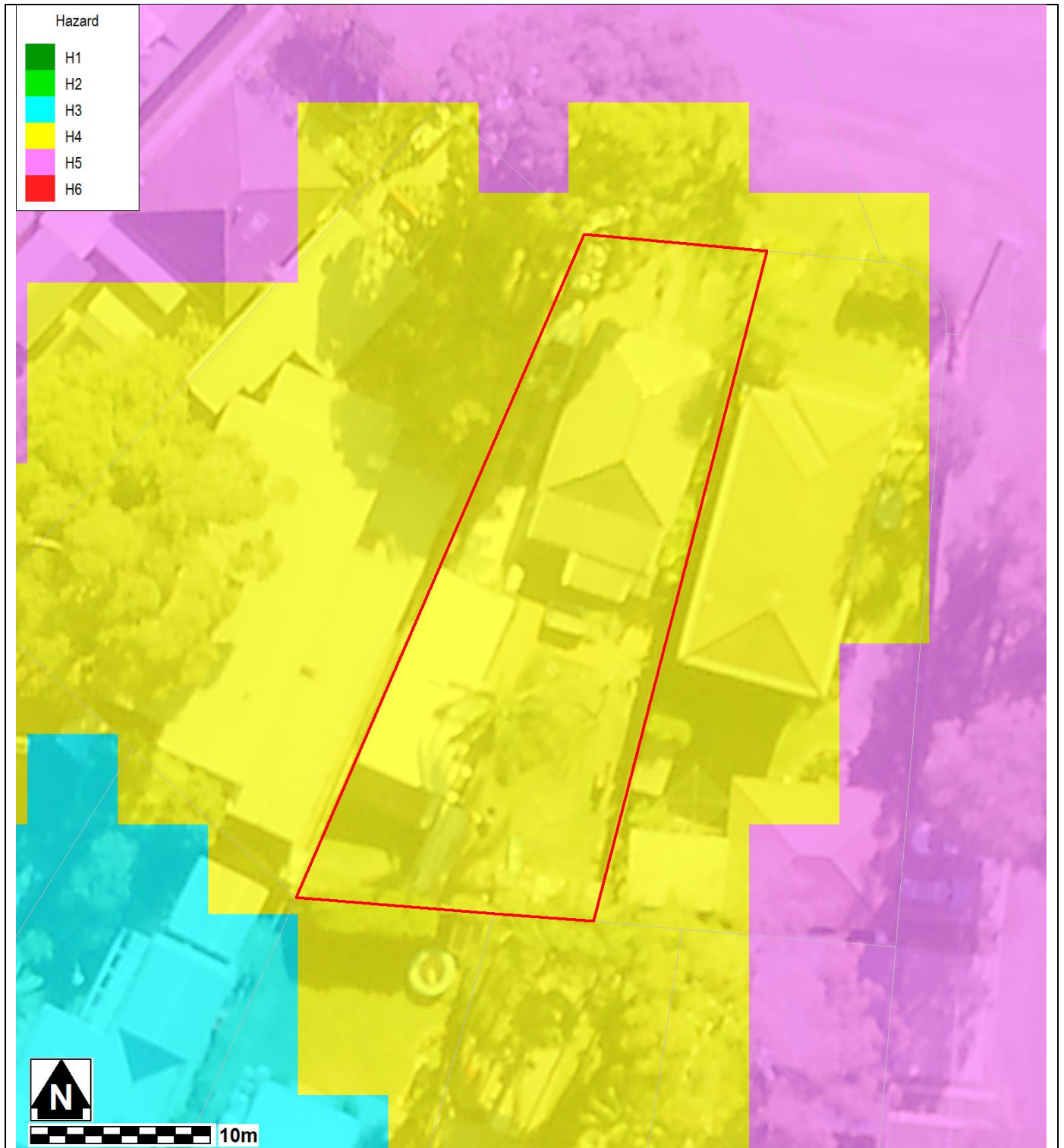
MAP D: PROBABLE MAXIMUM FLOOD EXTENT



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: Narrabeen Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only.

MAP E: FLOOD LIFE HAZARD CATEGORY IN PMF



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) – 5.21 Flood Planning Manly LEP (2013) – 5.22 Special Flood Considerations	Manly DCP (2013) – 5.4.3 Flood Prone Land
Warringah LEP (2011) – 5.21 Flood Planning Warringah LEP (2011) – 5.22 Special Flood Considerations Warringah LEP (2000) – 47 Flood Affected Land *	Warringah DCP (2011) – E11 Flood Prone Land
Pittwater LEP (2014) – 5.21 Flood Planning Pittwater LEP (2014) – 5.22 Special Flood Considerations	Pittwater 21 DCP (2014) – B3.11 Flood Prone Land 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 and Clause C6.1 of the Pittwater 21 DCP (2014). 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 existing ground floor level is above the FPL

- 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.

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			
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- 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 floodplain@northernbeaches.nsw.gov.au .