van der meer

FLOODPLAIN MANAGEMENT REPORT

Residential Development

35 to 43 Belgrave Street

Manly NSW 2095

Brisbane
Level 8, 757 Ann Street
Fortitude Valley QLD 4006
P +61 7 3667 8861
ABN 63 609 812 615
www.vandermeer.com.au

Melbourne
Level 6, 379 Collins Street
Melbourne VIC 3000
P +61 3 8614 5555
ABN 48 158 266 329

Sydney
Level 6, 39 Chandos Street
St Leonards NSW 2065
P +61 2 9436 0433
ABN 56 158 266 301

Approved by:	Andrew Wallis
Position:	Civil Manager
Qualifications:	B.Eng, M.I.E.Aust, NER.
Signed:	
Date:	10 July 2023
Job No:	SY232-008

REVISION STATUS

Revision	Description of Revision	Date	Issued By:
A	DRAFT	27 June 2023	Phillip Salem
A	FINAL	10 July 2023	Phillip Salem

Recipients are responsible for eliminating all superseded documents in their possession.

van der Meer (QLD) Pty Ltd
(ABN 63 609 812 615)
Level 8, 757 Ann Street
FORTITUDE VALLEY 4006
P +61 7 3667 8861
E QLD-enquiries@vandermeer.com.au

van der Meer (VIC) Pty Ltd
(ABN 48 158 266 329)
Level 6, 379 Collins Street,
MEBOURNE VIC 3000
P +61 3 8614 5555
E VIC-enquiries@vandermeer.com.au

van der Meer (NSW) Pty Ltd
(ABN 56 158 266 301)
Level 6, 39 Chandos Street,
ST LEONARDS NSW 2065
P +61 2 9436 0433
E NSW-enquiries@vandermeer.com.au

1 Contents

2 Executive Summary

In response to the email dated 8th March 2023 Ref: RE: Proposal - 43,35-39 Belgrave Street, this report has been prepared to address the relevant Flood risk management of the proposed development at 43, 35-39 Belgrave Street, Manly.

This report assesses the Flood risk to the proposed development at 43, 35-39 Belgrave Street Manly for compliance with the Northern Beaches Council Warringah Development Control Plan.

The proposed development is a residential development with a Retail/Community area in the front, which occupies a single dwelling residence.

The Flood impact assessment shows that Flooding is confined to the frontages of Pittwater Road and Raglan St. No changes to the existing Flood extents are expected due to the development of the existing dwelling since the building footprint is remaining the same.

The proposed floor levels for the lobby are to be compliant with the Flood Planning Level being RL 6.32, however, as the overland flow depth is less than 0.3 m and the V.D product is less than 0.3 m^2/s, a freeboard of 0.3 m can be adopted, resulting in a Flood planning level of 6.12 m.

The proposed finished floor levels of the building lobby are also to be placed at RL 6.12.

The retail spaces at the ground floor level are to be at the footpath level, below the FPL, however they are to be flood proofed in structure and services up to the FPL.

Flooding is not anticipated in the basement due to the proposed car park driveway being outside of the PMF flooding extents.

The proposed building is also to be Floodproofed in its structure, materials, and utilities connections up to the Flood Planning Level as detailed in this report.

3 Introduction

Van Der Meer Consultants has been engaged to prepare a Flood Risk Management Report in accordance with the requirements of Northern Beaches Council's 'Water Management for Development Policy'.

In the preparation of this report Van der Meer has relied upon certain data and information contained within the following documents:

- Northern Beaches Council Warringah DCP 2022.
- Northern Beaches Council Warringah LEP 2022.
- Northern Beaches Flood Risk Management Policy 2017
- Northern Beaches Flood Prone Land Design Standard 2017
- Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019
- Northern Beaches Council Flood information report - comprehensive, issue date 14/11/2022.
- 'Technical Flood risk management guideline: Flood hazard' published by the Attorney-General's Department, dated 2014.
- Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas published by the Hawkesbury-Nepean Floodplain Management Steering Committee (HNFMSC), dated 2006.
- 'Floodplain Development Manual: the management of Flood liable land' published by NSW Department of Infrastructure, Planning and Natural Resources (NSW DIPNR), dated April 2005.
- Time and Place – Belgrave St Manly Architectural Package – Job No 6639 – Rev 5 – Dated 2023.06.20

The purpose of this report is to provide the Norther beaches Council with sufficient information to assess the proposed development which is located on Flood affected lands.

4 Description of Development

4.1 Existing Site

The subject site area is approximately 1060m^2 and is bound by Belgrave Street to the west, Whistler Street to the east, Raglan Street to the north, and residential and commercial buildings in the South. Currently, the site is utilised by 2 three-storey buildings and 2 two-storey buildings, they are currently used commercially and residentially. The site being mostly developed, and relatively flat.

The location of the subject site shown in Figure 4.1 below.

Figure 4.1 – Site Plan (Google Maps, 2023)

N

4.2 Proposed Works

The proposal entails the demolition of existing structures, and the subsequent construction of a 4storey development, comprising of a 2-level basement carpark, ground floor retail with three frontages, and shop-top housing that will feature approximately 25 apartments across 3 storeys. See the below figure 4.2 and 4.3 for plan and section views.

The development site will consist of an amalgamation of the following lots:

• Lot 1 / DP719821 known as 43 Belgrave Street Manly

• Lot 1 / DP34395 known as 42 Belgrave Street Manly

• Lot 1 / DP104766 known as 41 Belgrave Street Manly

• Lot 1 / DP100633 known as 40 Belgrave Street, Manly

• SP 14133 known as 35-39 Belgrave Street, Manly

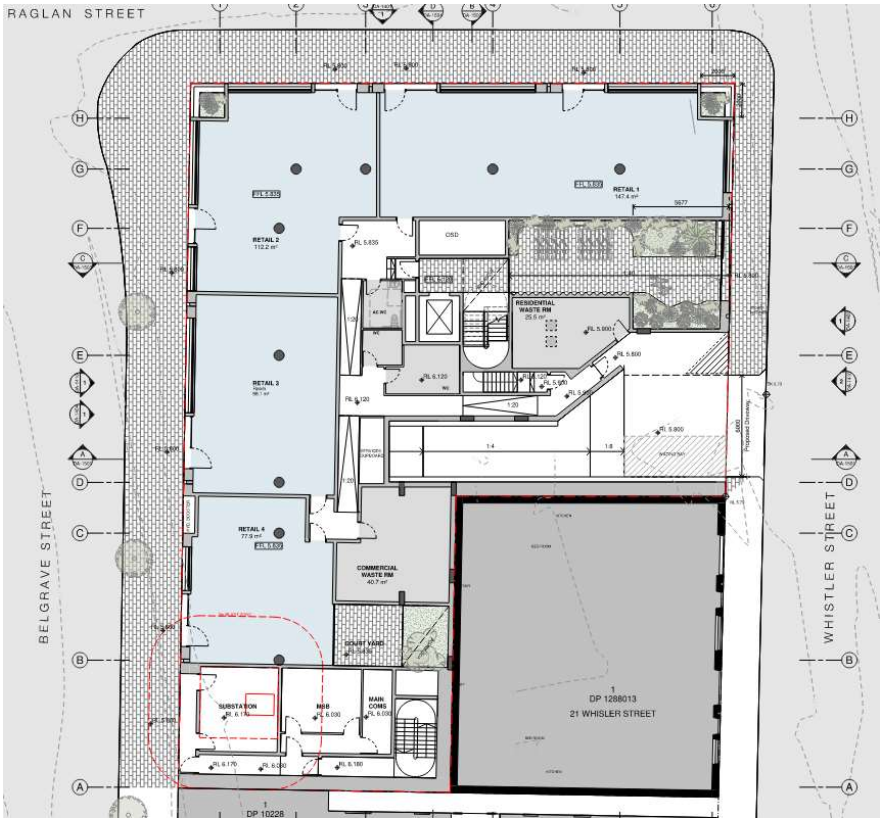

Figure 4.2 – Proposed Site Ground Floor Plan

Figure 4.3 – Proposed Development Western Elevation

4.3 Building Components and Method

The proposed development is to be constructed from Flood compatible materials below 6.12 m AHD. Extensive guidance on Flood compatible building materials and methods is provided in 'Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas' (HNFMSC, 2006); a selection of the Flood compatible materials and practices described in this resource, supplemented by advice contained within Norther Beaches DCP Chapter 5.4.3: Flood Prone Land states that: 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. And 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 – Note that this mostly relates to the Retail/Community space. 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.

Generally, Flood compatible floor and sub-floor materials include reinforced or mass concrete, masonry, and selected types of timber. Suspended timber sub-floor structures constructed of Class 1 (highly durable), Class 2 (durable) or H3 treated timber are Flood compatible; however engineered timber products should not be used unless certified by the manufacturer as being suitable for 96-hour immersion. Hardwood strip flooring with low shrinkage rates is recommended for a timber floor option, with the next best option being marine or exterior grade plywood. Particleboard flooring is not a Flood compatible material. Adequate ventilation needs to be provided to timber floors to allow the timbers to dry after Flood events to minimise long term timber damage; this may require any under floor insulation to be removable in the event of Floodwaters reaching the insulation.

Suitable wall structure materials include solid brickwork, blockwork, concrete, timber stud walls constructed from Class 1 (highly durable), Class 2 (durable) or H3 treated timber, and steel frames. Steel frames should be constructed of open sections where possible and have holes drilled into the bottom steel plates to allow water to drain from the frame in the event of immersion.

Flood compatible wall linings include fibre-cement board, brick, concrete (including concrete blocks), stone with waterproof grout, clay tiles glazed with waterproof mortar, glass (including glass blocks), plastic sheeting with waterproof adhesive, steel with waterproof applications, exterior grade plywood, and fully sealed solid wood products. Plasterboard is not a Flood compatible material as it requires replacement after extended immersion, however for shallow and short duration Floods there may be little damage to plasterboard wall linings. It is recommended that sheet wall linings be installed horizontally with a 20-30 mm gap provided between the bottom wall plate and the base of the wall lining to facilitate

ventilation and cleaning of the wall cavity after a Flood event. The gap may be covered with skirting board when access to the wall cavity is not required.

Insulation should be closed cell type foam. Nails, bolts, hinges and fittings should be made from nylon, brass, stainless steel or hot dipped galvanised steel. Hinges should be of a removable pin type.

Connection to mains power supply, including metering equipment should be located above 6.12 m AHD. All electrical wiring, switches and outlets should, where possible be located above 6.12 m AHD. Note that any systems to be located in the basement are considered outside of the extents of the FPL as the PMF storm extents do not encroach this area. Earth core leakage systems or safety switches are to be installed. All wiring, connections, and conduit below 6.12 m AHD should be suitable for submergence in water. Conduits shall be installed so they will be self-draining in the event of Flooding.

Heating and air-conditioning systems, including fuel supply and ducting, should be installed above 6.12 m AHD. Where this is not possible, they should be installed in such a manner as to minimise damage from submersion. This may be achieved through measures such as access for cleaning and draining of water after Flood events, manually operated cut off valves for fuel supply lines and ducts, securely fastening heating equipment and fuel storage tanks to prevent buoyancy and movement and venting of fuel supply tanks at an elevation of 7.12 m AHD.

4.4 Evacuation

The State Emergency Service of NSW (SES) is responsible for providing Flood updates which can be received by local, radio and television news and SMS messaging. The timing for evacuation of persons is to be established in consultation with the SES.

As the site is located within the Medium Flood Risk Precinct (Northern Beaches Council (2022)) which describes Medium Flood Risk precincts as “not subject to a High Hydraulic Hazard and where there are no significant evacuation difficulties”. As such, evacuation from site is considered possible.

People in the proposed development should evacuate the building and head to the Manly Bowling Club Parking Area see the markup in Figure 1 below:

Figure 1.4 – Evacuation Route and Safe Space

5 Flood Analysis

The site is subject to Flooding from an overland flow path. Overland flows pass the site via Raglan Street towards Manly beach. Flooding within the Manly catchment is the subject of (Manly to Seaforth Flood Study, 22nd February 2019, Cardno).

The nature of Flooding at the site has been identified as overland flow in an east to west direction. Flows originate from a catchment located up raglan street to the east.

The site falls within the Medium Flood Risk Precinct (Cardno 2019) with the localised regions of the frontage on Raglan Street within the Low Flood Risk Precinct.

The PMF Floodwaters impact the site at elevations ranging between 6.09 m AHD and 6.15 m AHD (Cardno 2019), resulting in inundation of the site to depths within to 0.35 m. The 1% AEP Floodwaters information at the site has only been provided at locations 1 and 2 in the (Northern Beaches Council Flood Information Report, 2022) at elevation 5.88 m AHD.

As described above, the Flood Planning Level (FPL) for the proposed development is. 6.12 m AHD, providing 0.3 m freeboard to the 1% AEP Floodwaters, in accordance with the Northern Beaches Council, Flood Information Report, 2022.

Figure 5.1 – 1% AEP Peak Flood Extent (Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019)

Figure 5.2 – PMF Peak Flood Extent (Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019)

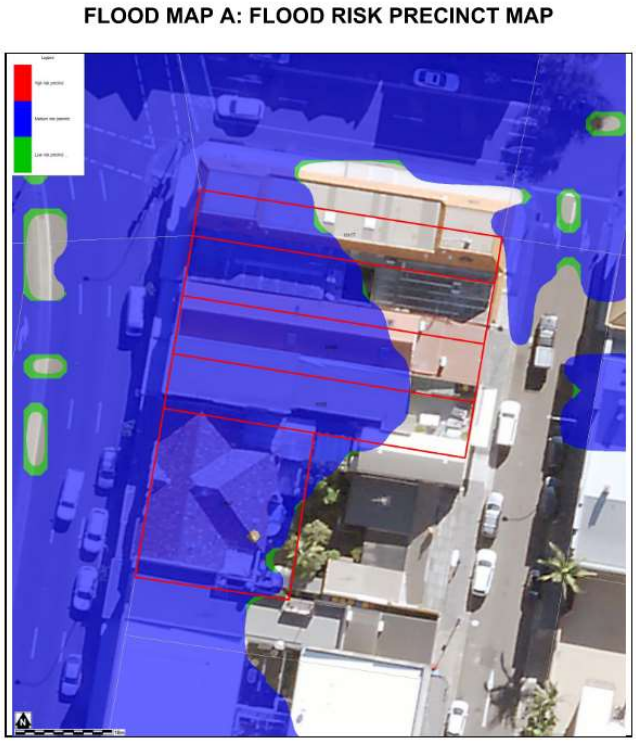

Figure 5.3 – Flood Risk Precinct Map (Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019)

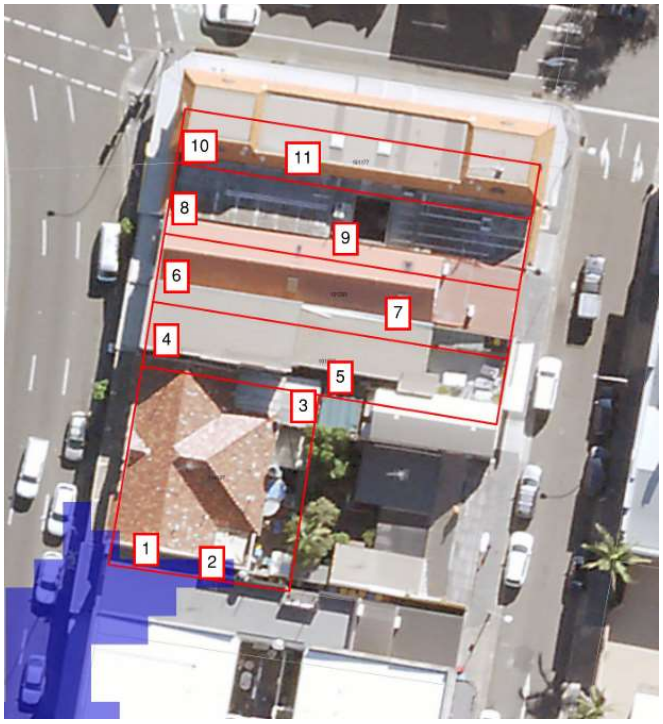

Figure 5.4 – Flood Level Points (Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019)

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	5.88	0.23	0.12	6.38	6.15	0.50	0.13
2	N/A	N/A	5.88	0.16	0.16	6.38	6.15	0.43	0.13
3	N/A	N/A	N/A	N/A	N/A	6.35	6.12	0.26	0.07
4	N/A	N/A	N/A	N/A	N/A	6.36	6.13	0.32	0.12
5	N/A	N/A	N/A	N/A	N/A	6.35	6.12	0.24	0.07
6	N/A	N/A	N/A	N/A	N/A	6.36	6.13	0.31	0.08
7	N/A	N/A	N/A	N/A	N/A	6.32	6.09	0.18	0.07
8	N/A	N/A	N/A	N/A	N/A	6.34	6.12	0.30	0.12
9	N/A	N/A	N/A	N/A	N/A	6.32	6.09	0.19	0.07
10	N/A	N/A	N/A	N/A	N/A	6.34	6.11	0.25	0.09
11	N/A	N/A	N/A	N/A	N/A	6.33	6.09	0.19	0.07

Figure 5.5 – Flood Level Data Table (Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019)

Note that locations 2,3,5,7,9 shown above are protected both by the existing commercial and residential buildings adjacent.

6 Assessment of Impacts

The Manly DCP specifies prescriptive controls for development on Flood prone land, which vary depending on Flood risk and land use. The highest Flood risk for the site of the proposed development is medium risk (Cardno, 2019) and the proposed land use is commercial and residential.

The controls that apply to the proposed development, their impacts on the development, and the proposed development's compliance with these controls are listed in Table 6.2 below.

	Medium Flood Risk	
	Residential	Business & Industrial
A. Flood effects caused by Development	A1 A3	A1 A3
B. Drainage Infrastructure & Creek Works	B1 B2	B1 B2
C. Building Components & Structural	C1 C2 C3	C1 C2 C3
D. Storage of Goods	D1 D2	D1 D2
E. Flood Emergency Response	E1 E2	E1 E2 E3
F. Floor Levels	F1 F2 F3 F4 F6 F8 F9	F1 F2 F3 F4 F6 F8 F9 F10 F11
G. Car Parking	G1 G2 G3 G5 G6 G7 G8	G1 G2 G3 G4 G5 G6 G7
H. Fencing	H1	H1
I. Pools	I1	I1

Figure 6.1 – Flood Prone Land Matrix Requirements Manly DCP 2013 - Amendment 11 2017

Table 6.2 – Flood Risk Management Compliance Table

Item	Description	Impact on Development	Compliance
A. FLOOD EFFECTS CAUSED BY DEVELOPMENT			
A1	Development (including earthworks and subdivision) shall not be approved unless it can be demonstrated in a Flood Management Report that it complies with the Flood Prone Land Design Standard found on Council's webpage.	A) No building footprint change – and OSD has been provided. B) Street levels are unchanged and OSD is provided meaning no adverse impacts to surrounding properties.	Yes

Item	Description	Impact on Development	Compliance
A3	The applicant shall include in their submission, calculations to illustrate that any fill or other structures that reduce the total flood storage are replaced by Compensatory Works.	Building footprint remain unchanged, there is no net loss of flood storage, in addition an OSD is provided in the proposed plans.	N/A
B. DRAINAGE INFRASTRUCUTRE AND CREEK WORKS			
B1	Flood mitigation works or stormwater devices that modify a major drainage system, stormwater system, natural water course, floodway or flood behaviour within or outside the development site may be permitted subject to demonstration through a Flood Management Report that they comply with the Flood Prone Land Design Standard found on Council's webpage.	NA	NA
B2	A Section 88B notation under the Conveyancing Act 1919 may be required to be placed on the title describing the location and type of flood mitigation works with a requirement for their retention and maintenance.	NA	NA
C. BUILDING COMPONENTS AND STRUCTURAL			
C1	All buildings shall be designed and constructed as flood compatible buildings in accordance with Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas, Hawkesbury-Nepean Floodplain Management Steering Committee (2006).	Confirmed	Yes
C2	All structures must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Structural certification shall be provided confirming the above. Where shelter-in-place refuge is to be provided the structural integrity is to be to the Probable Maximum Flood level.	Confirmed	Yes
C3	All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.	Confirmed	Yes

Item	Description	Impact on Development	Compliance
D. STORAGE OF GOODS			
D1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.	Confirmed	Yes
D2	Goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the Flood Planning Level.	Confirmed	Yes
E. FLOOD EMERGENCY RESPONSE			
E1	Development shall comply with Council's Flood Emergency Response Planning for Development in Pittwater Policy and the outcomes of any Flood Risk Emergency Assessment Report where it applies to the land.	Confirmed	Yes
E2	New development must provide an appropriately sized area to safely shelter in place above the Probable Maximum Flood level and appropriate access to this area should be available from all areas within the development.	The residential lobbies above the ground floor have ample room for safety shelter, with access available.	Yes
E3	Adequate Warning Systems, Signage and Exits shall be installed to allow safe and orderly evacuation without reliance upon the SES or other authorised emergency services personnel.	TBC.	TBC.
F. FLOOR LEVELS			
F1	New floor levels within the development shall be at or above, the Flood Planning Level. A reduced Flood Planning Level may be considered only where it is permitted in this Development Control Plan. The structure must be flood proofed (wet or dry) to the Flood Planning Level. This control cannot be applied to critical or vulnerable uses.	Building lobby is at the FPL, otherwise portions of the ground floor retain area are at the footpath level related to condition F10. Structure is to be flood proofed to the FPL.	No
F2	All development structures must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no loss of flood storage in a 1 percent AEP Event. Where the dwelling is located over a flow path it must be elevated on suspended pier/pile footings such that the level of the underside of all floors including balconies and decks within the flood affected area are at or above, or raised to the Flood Planning Level to allow clear passage of the floodwaters under	Building footprint remain unchanged, there is no net loss of flood storage, in addition an OSD is provided in the proposed plans.	No

Item	Description	Impact on Development	Compliance
	the building. The development must comply with the Flood Prone Land Design Standard.		
F3	Where the lowest floor has been elevated to allow the passage of flood waters, a restriction shall be imposed on the title of the land, pursuant to S88B of the Conveyancing Act confirming that the under-croft area is not to be enclosed.	NA	NA
F4	A one- off addition or alteration below the Flood Planning Level of less than 30 square metres or an increase of less than 10 percent of the ground floor area (whichever is the lesser) for residential development may be considered only where: (a) it is an extension to an existing room (b) the Flood Planning Level is incompatible with the floor levels of the existing room This control will not be permitted if this provision has previously been utilised since the making of this Plan. The structure must be flood proofed to the Flood Planning Level.	NA	NA
F6	Any existing floor level may be retained below the Flood Planning Level when undertaking a first-floor addition provided that: (a) it is not located within a floodway; (b) there is no increase to the building footprint below the Flood Planning Level; P a g e | 5 Manly Development Control Plan 2013 Amendment 10 – last amended 28 August 2017 (c) it is flood proofed to the Flood Planning Level;	NA	NA
F8	The minimum floor level of any first-floor additions shall be at or above the Probable Maximum Flood Level.	NA	NA
F9	Foyers – consideration may be given to a minimum floor level of a foyer being set at the 5 percent AEP flood level, provided it can be demonstrated that it complies with the Flood Prone Land Design Standard.	NA	NA
F10	Consideration may be given to a minimum floor level for the first 5m from the street front of new development in business zonings below the Flood Planning Level provided it can be demonstrated that it complies with the Flood Prone Land Design Standard.	For the proposed design, the internal distance from the front of the building is 7 meters which does not comply with the 5m requirement and the	No

Item	Description	Impact on Development	Compliance
		retail area, the floor level is below the FPL. The floor level of the lobby area is at the FPL and direct internal access has been proposed to the areas above flood planning level.	
F11	A one-off addition or alteration below the Flood Planning Level of less than 100 square metres or an increase of less than 10 percent of the ground floor area (whichever is the lesser) for non-residential development may be considered only where the required floor level cannot be achieved for the following reason: (a) it would be incompatible with floor levels of the existing building This control will not be considered if the existing floor level of the additions/alterations are located within a high hydraulic hazard area. This control will not be permitted if this provision has previously been utilised since the making of this Plan. Any features of the additions or alterations on the floor level must be flood proofed to the Flood Planning Level	NA	NA
G. CAR PARKING			
G1	Open carpark areas and carports shall not be located within a floodway.	NA	NA
G2	The lowest floor level of open carparks and carports (unroofed or with open sides) shall be constructed no lower than the natural ground levels.	NA	NA
G3	All enclosed car parks must be protected from inundation up to the relevant flood planning level. For example, basement carparks must be provided with a crest at the entrance, the crest of which is at the relevant Flood Planning Level. All access, ventilation and any other potential water entry points to any enclosed car parking shall be above the relevant Flood Planning Level. Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark	The basement carpark does not have a crest; however, the PMF flood water extent does not affect the Driveway.	No

Item	Description	Impact on Development	Compliance
G4	Vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site where there is more than 300mm depth of flooding in a 1 percent AEP flood event. The minimum height of the vehicle barriers or restraints must be at or above the Flood planning Level. Vehicle barriers or restraints must comply with the Flood Prone Land Design Standard.	NA	NA
G5	Enclosed Garages must be located at or above the 1 percent AEP level	The basement carpark does not have a crest, however the PMF flood water extent does not affect the Driveway.	No
G6	Carports must comply with the Flood Prone Land Design Standard	NA	NA
G7	Where a driveway is required to be raised it must be demonstrated that there is no loss to flood stage in the 1 percent AEP flood event and no impact on flood conveyance through the site	NA	NA
H. FENCING			
H1	Fencing, including pool fencing, shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. Appropriate fencing must comply with the Flood Prone Land Design Standard in addition to other regulatory requirements of pool fencing.	NA	NA
I. POOLS			
I1	Pools located within the 1 percent AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site. All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level. All chemicals associated with the pool are to be stored at or above the flood planning level	NA	NA

7 Conclusion

The subject site is located within the Medium Flood Risk Precinct. The PMF Floodwaters impact the site at elevations ranging between 6.09 m AHD and 6.15 m AHD (Cardno 2019), resulting in inundation of the site to depths within to 0.35 m. The 1% AEP Floodwater impact the site at elevations at 5.88 m AHD (Cardno 2019), resulting in inundation of the site to depths within to 0.08 m. The current Flood Planning Level (FPL) for the proposed development ground floor lobby is approximately 6.12 m AHD, which allows for a 0.3 m freeboard.

The retail spaces at the ground floor level are to be at the footpath level, below the FPL, however they are to be flood proofed in structure and services up to the FPL.

Flooding is not anticipated in the basement due to the proposed car park driveway being outside of the PMF flooding extents.

Evacuation from site is considered available as the site is located within the Medium Flood Risk Precinct which indicates the site is to have “no significant evacuation difficulties”.

The proposed development is to be capable of withstanding the loads imposed by the PMF Floodwaters plus freeboard (6.12 m AHD). As the existing footprint of the building is not going to increase in size, the effective storage capacity of the site and surrounding areas will not change. Flood compatible building materials are to be used below 6.12 m AHD where relevant. Guidance on appropriate Flood compatible building materials is provided in Section 4.3.

Based on the foregoing, we are of the view that a proposed development in accordance with this report will generally comply with the requirements contained within Norther Beaches Council DCP 2022 and the Northern beaches Council LEP 2022 provisions for sites affected by Flooding.

8 References

- Attorney-General's Department. (2014). Technical Flood risk management guideline Flood hazard. Barton, ACT: Author.
- Hawkesbury-Nepean Floodplain Management Steering Committee (HNFMSC). (2006). Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas. Available from http://www.ses.nsw.gov.au/content/documents/pdf/resources/Building_Guidelines.pdf
- New South Wales Department of Infrastructure, Planning and Natural Resources (NSW DIPNR). (2005).
- Floodplain Development Manual: the management of Flood liable land. Sydney, NSW.
- Northern Beaches Council. Flood Information Report – Comprehensive. Issue Date 14/11/2022.
- Manly to Seaforth Flood Study, Cardno, doc number NA49913018, dated 22nd February 2019.
- Norther Beaches Council Warringah Development Control Plan 2022.
- Norther Beaches Council Warringah Local Environmental Plan 2022.

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Appendix A – Flood Information Request - Northern Beaches Council (June, 2021)

FLOOD INFORMATION REPORT – COMPREHENSIVE

Property: "39 Belgrave Street MANLY NSW 2095","40 Belgrave Street MANLY NSW 2095","41 Belgrave Street MANLY NSW 2095","42 Belgrave Street MANLY NSW 2095","43 Belgrave Street MANLY NSW 2095"
Lot DP: "Lot 1 DP 100633","Lot 1 DP 104766","Lot 1 DP 34395","Lot 1 DP 719821","Lot 1 SP 14133"
Issue Date: 31/03/2023
Flood Study Reference: Manly to Seaforth Flood Study 2019, Cardno

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Flood Information for lot [1]:

Flood Risk Precinct – See Map A

Flood Planning Area – See Map A

Maximum Flood Planning Level (FPL) [2, 3, 4]: 6.38 m AHD

1% AEP Flood – See Flood Map B

1% AEP Maximum Water Level [2, 3]: 5.88 mAHD

1% AEP Maximum Depth from natural ground level[3]: 0.25 m

1% AEP Maximum Velocity: 0.19 m/s

1% AEP Hydraulic Categorisation: N/A **See Flood Map D**

Probable Maximum Flood (PMF) – See Flood Map C

PMF Maximum Water Level [4]: 6.15 m AHD

PMF Maximum Depth from natural ground level: 0.52 m

PMF Maximum Velocity: 0.30 m/s

PMF Hydraulic Categorisation: N/A **See Flood Map E**

Flooding with Climate Change (See Flood Map F)

The following is for the 30% Rainfall intensity increase and 0.9m Sea Level Rise Scenario:

1% AEP Maximum Water Level with Climate change [3]: 5.94 m AHD

1% AEP Maximum Depth with Climate Change[3]: 0.31 m

1% AEP Maximum Velocity with Climate Change[3]: m/s

Flood Life Hazard Category – See Map G

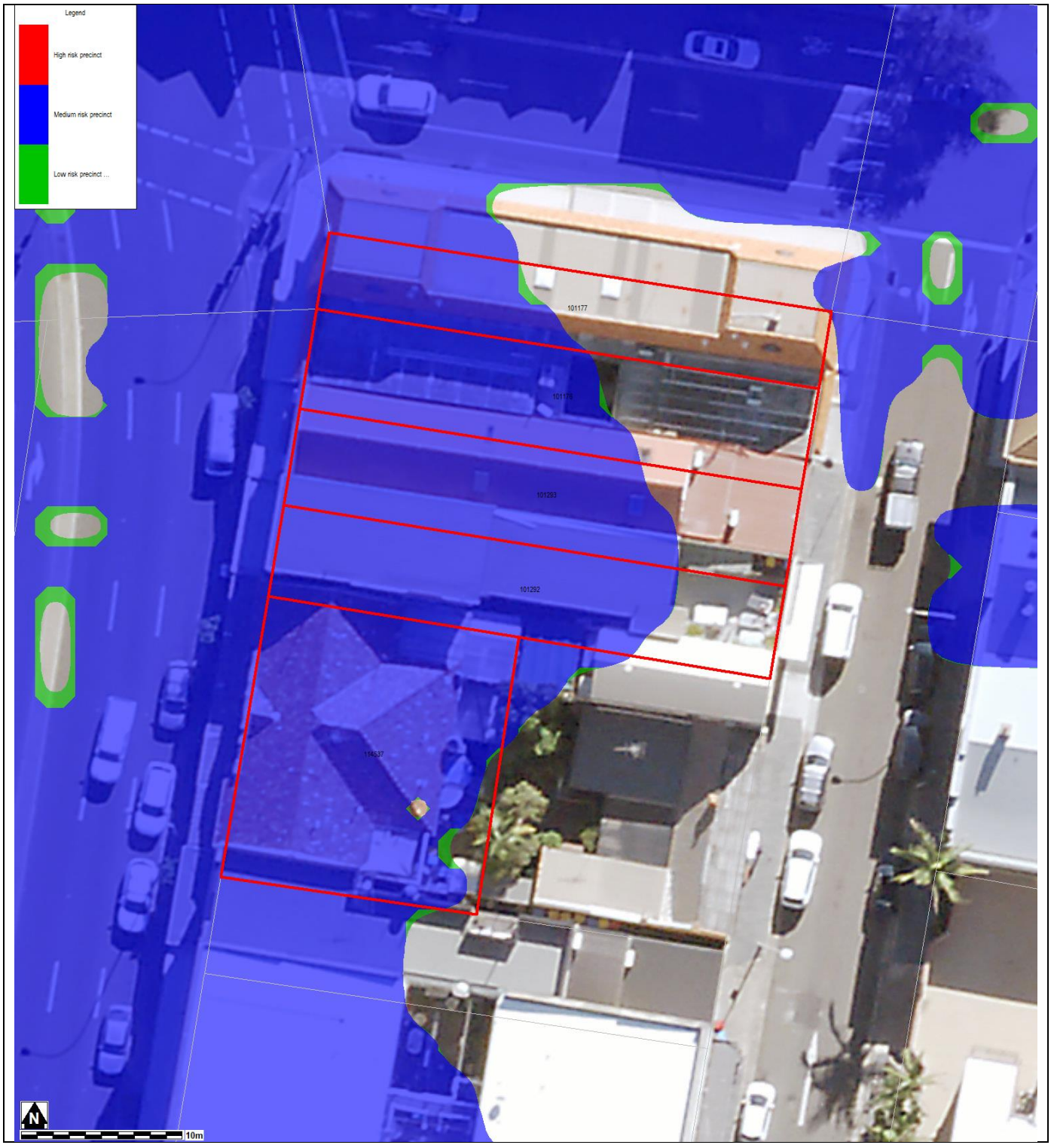
Indicative Ground Surface Spot Heights – See Map H

[1] The flood information does not take into account 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.

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 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 (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.

FLOOD LEVEL POINTS

Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly to Seaforth Flood Study 2019, Cardno) and aerial photography (Source: NearMap 2014) are indicative only.

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	N/A	N/A	5.88	0.23	0.12	6.38	6.15	0.50	0.13
2	N/A	N/A	5.88	0.16	0.16	6.38	6.15	0.43	0.13
3	N/A	N/A	N/A	N/A	N/A	6.35	6.12	0.26	0.07
4	N/A	N/A	N/A	N/A	N/A	6.36	6.13	0.32	0.12
5	N/A	N/A	N/A	N/A	N/A	6.35	6.12	0.24	0.07
6	N/A	N/A	N/A	N/A	N/A	6.36	6.13	0.31	0.08
7	N/A	N/A	N/A	N/A	N/A	6.32	6.09	0.18	0.07
8	N/A	N/A	N/A	N/A	N/A	6.34	6.12	0.30	0.12
9	N/A	N/A	N/A	N/A	N/A	6.32	6.09	0.19	0.07
10	N/A	N/A	N/A	N/A	N/A	6.34	6.11	0.25	0.09
11	N/A	N/A	N/A	N/A	N/A	6.33	6.09	0.19	0.07

Climate Change Flood Levels (30% Rainfall intensity and 0.9m Sea Level Rise)

ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	5.94	0.29
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A

WL – Water Level
PMF – Probable Maximum Flood
N/A = no peak water level/depth/velocity available in flood event.

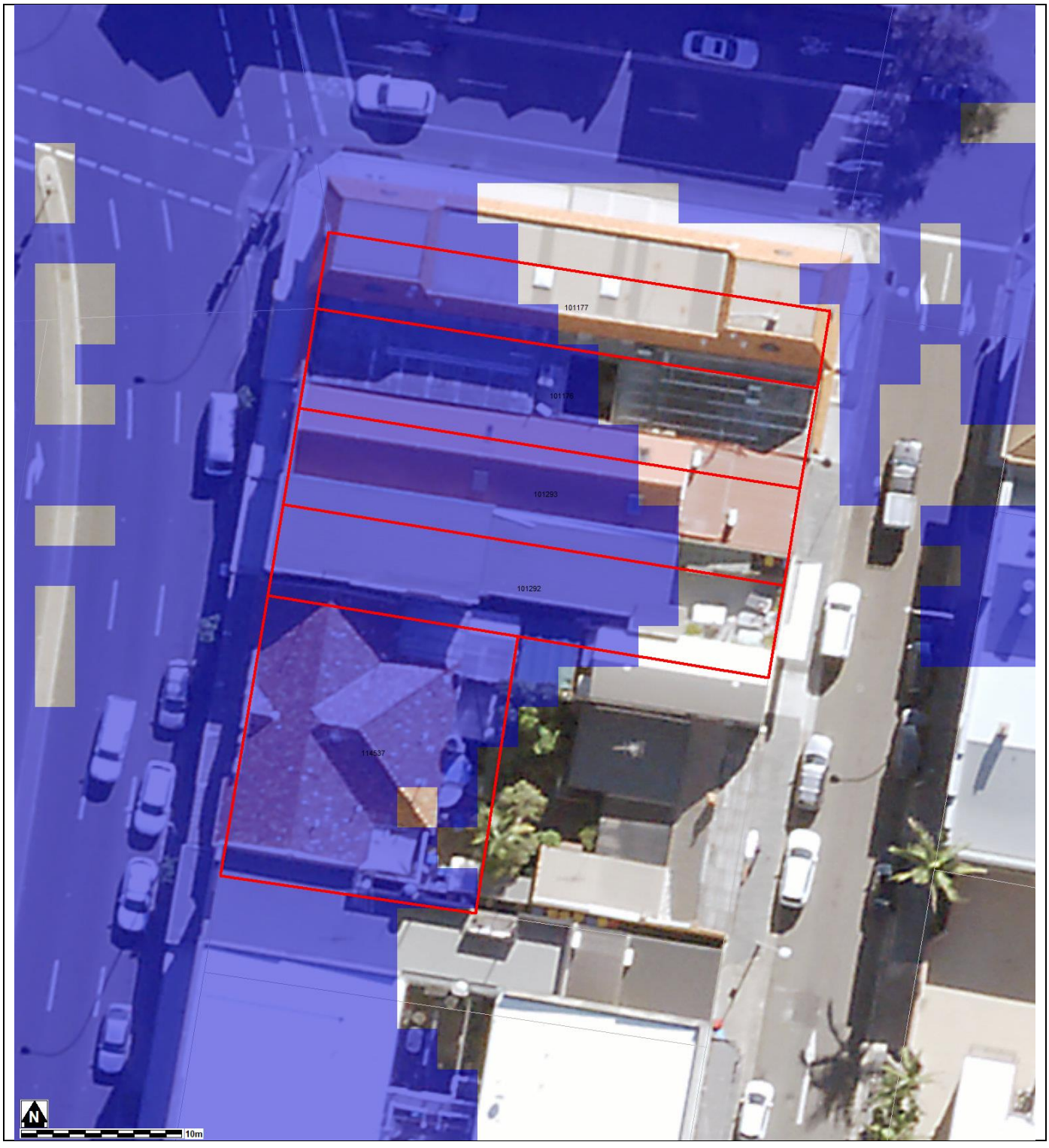
A variable Flood Planning Level might apply. Freeboard is generally 0.5m above the maximum 1% AEP water level. However for overland flow with a depth less than 0.3m and a VelocityxDepth product less than $0.3m^2/s$, a freeboard of 0.3m may be able to be justified.

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 to Seaforth Flood Study 2019, Cardno) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP C: PMF EXTENT MAP



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 to Seaforth Flood Study 2019, Cardno) and aerial photography (Source: NearMap 2014) are indicative only

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

Not Available

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 to Seaforth Flood Study 2019, Cardno) and aerial photography (Source: NearMap 2014) are indicative only

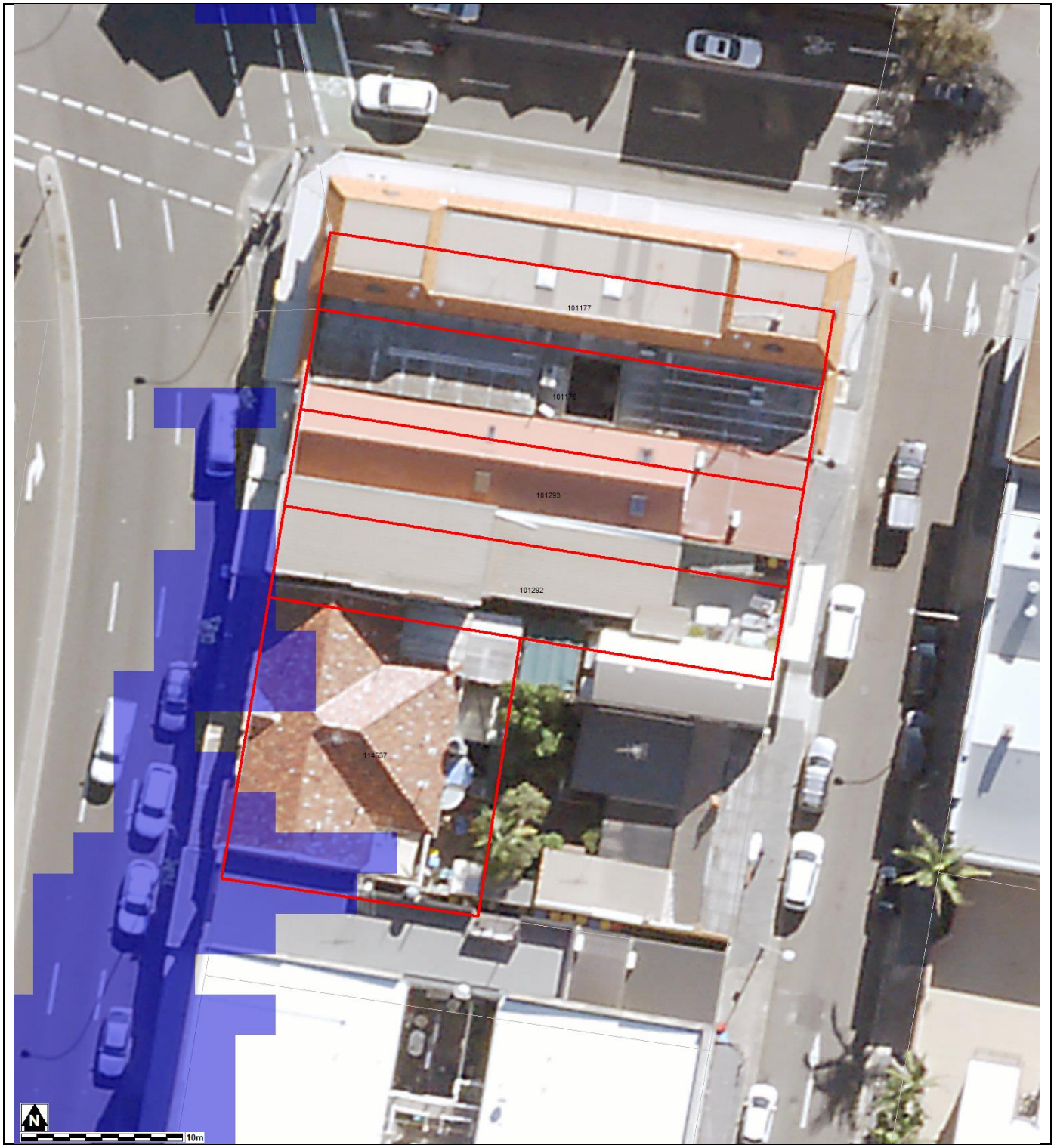
FLOOD MAP E: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP

Not Available

Notes:

- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly to Seaforth Flood Study 2019, Cardno) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP F: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



Note:

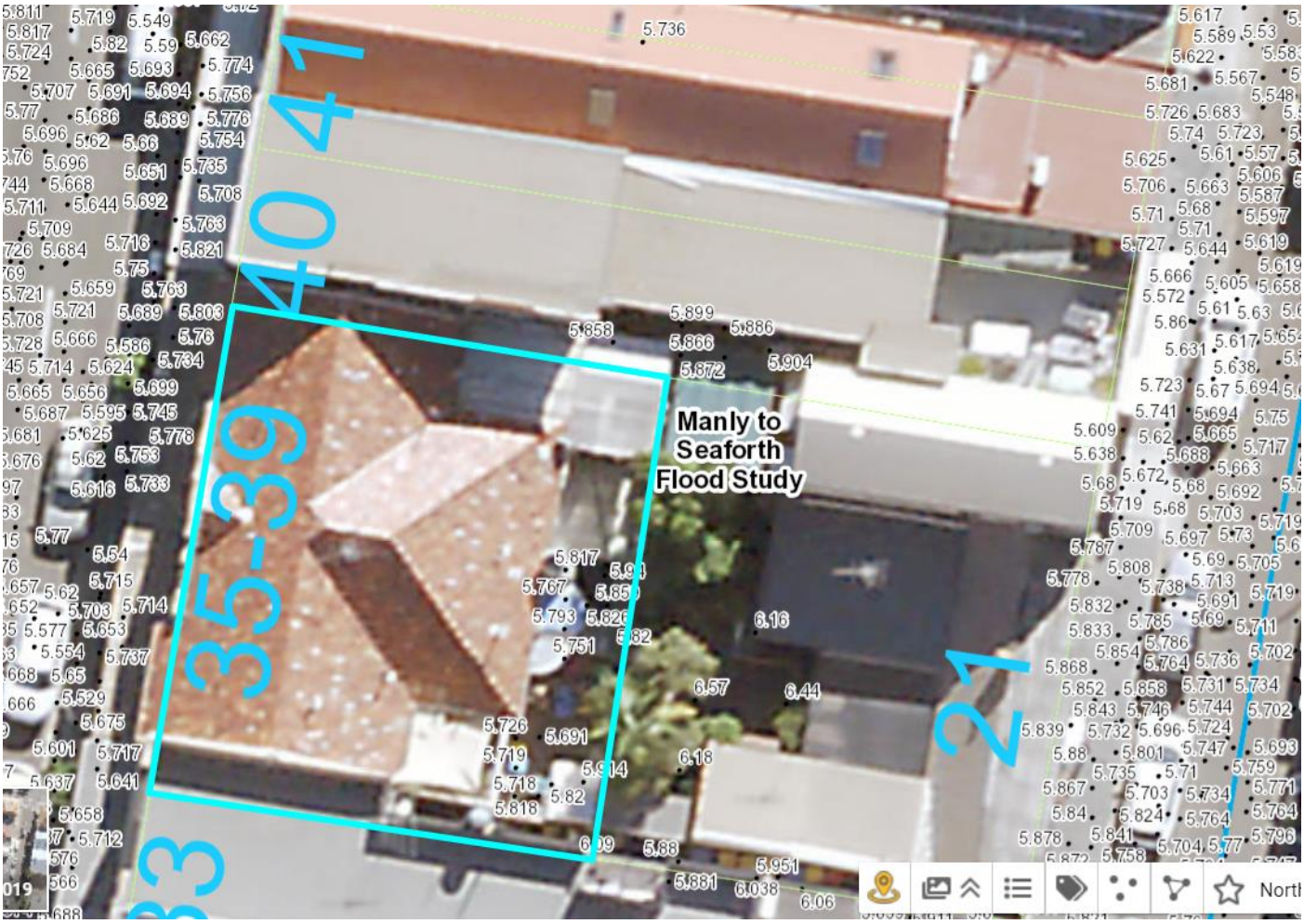
- Extent represents the 1% annual Exceedance Probability (AEP) flood event including 30% rainfall intensity and 0.9m Sea Level Rise climate change scenario
- Flood events exceeding the 1% AEP can occur on this site.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly to Seaforth Flood Study 2019, Cardno) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP G: FLOOD LIFE HAZARD CATEGORY

Notes:

- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Manly to Seaforth Flood Study 2019, Cardno) and aerial photography (Source Near Map 2014) are indicative only.

MAP H: INDICATIVE GROUND SURFACE SPOT HEIGHTS



Notes:

- The surface spot heights shown on this map were derived from Airborne Laser Survey and are indicative only.
- Accuracy is generally within ± 0.2m vertically and ± 0.15m horizontally, and Northern Beaches Council does not warrant that the data does not contain errors.
- If accuracy is required, then survey should be undertaken by a registered surveyor.

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 LEP (2000) – 47 Flood Affected Land *	Warringah DCP (2011) – E11 Flood Prone Land
Pittwater LEP (2014) – 7.3 Flood Planning Pittwater LEP (2014) – 7.4 Flood Risk Management	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. 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.

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 floodplain@northernbeaches.nsw.gov.au .