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Stormwater Structural Civil
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FLOOD INUNDATION & RISK ASSESSMENT REPORT PROPOSED RESIDENTIAL DEVELOPMENT 38 PARK STREET & 1795 - 1797 PITTWATER RD MONA VALE

Job No 190803
Sept 2019
Prepared by
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BE CPEng NER

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INTRODUCTION

This report has been prepared in support of the proposed Development Application for a residential development at No 38 Park St and Nos 1795 – 1797 Pittwater Rd Mona Vale in respect to potential flood inundation / impacts and Northern Beaches Councils DCP requirements - Pittwater 21 DCP Section B3.11 Flood Prone Land and Section B3.13 Flood Hazard Flood Emergency Response planning.

It is proposed to construct a Seniors Living Facility as detailed in the architectural plans by *Gartner Trovato Architects* refer Appendix A.

Barrenjoey Consulting Engineers p/l inspected the site on 28th August 2019.

The extent of flooding is as summarized in the "Flood Information Request" data as supplied by Northern Beaches Council, refer Appendix D.
The Flood Planning Level varies across the site and at worst case is the PMF level 12.46m AHD (adjacent to Unit 03 with FFL 12.60m AHD).

For the 1% / PMF events the site is classified -

Flood Hazard	na / Low
Flood Hydraulic Category	na / Fringe + storage
Flood Risk Precinct	na / Low
Land Use Group	Vulnerable works (seniors housing)

Aerial Image of No 38 Park St and Nos 1795 – 1797 Pittwater Rd Mona Vale
(Northern Beaches Council web site)

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Pittwater 21 Development Control Plan - 2014
B3.11 Flood Prone Land
1.2 Prescriptive Controls

A. FLOOD EFFECTS CAUSED BY DEVELOPMENT

A1	na
A2	Certification shall be provided in accordance with Northern Beaches Council's Standard Hydraulic Certification Form (Forms A and A1 of Northern Beaches Council's Guidelines for preparing a Flood Management Report) to the effect that the works have been designed and can be constructed to adequately address flood risk management issues. **Refer Appendix E for certification forms**
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. **achievable as flood volume taken by the proposed structure (ie ~150m2 of area about Unit 03 and Unit 04) to be relocated to eastern boundary of site with proposed compensatory works to FSLs (refer Appendix C).**
A4	Development (including earthworks and subdivision) shall not be approved unless it can be demonstrated in a Flood Management Report that it been designed and can be constructed so that in a Probable Maximum Flood event: (a) There are no adverse impacts on flood levels and velocities caused by alterations to the flood conveyance; **achievable as the predicted PMF flood is a localised site specific flood fringe / flood storage event (ie there is no associated floodway / flood path evident on or within close proximity of the site). The flood is not dependent on or effected by surrounding flood events/extents, but generated by on site runoff and topography. Therefore post development the PMF flood will be shifted to other non-habitable areas of the site (ie north eastern landscaped corner) and will maintain similar flood velocities and depths.** (b) There are no adverse impacts on surrounding properties; **achievable as per the above hypothesis, the PMF flood will be maintained within the site extents by the proposed compensatory works to the north eastern corner of the site.** and (c) It is sited to minimise exposure to flood hazard. **achievable as per the above hypothesis and therefore exposure to the hazard as a result of a PMF flood will be minimal and acceptable** Where relevant certification shall also be provided in Northern Beaches Council's Standard Certification Form (Forms A and A1 of Northern Beaches

B. DRAINAGE INFRASTRUCTURE 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. **No significant flood mitigation works are proposed. Works of a minor nature proposed and only effect the flood behaviour within the site**

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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. **Not applicable to the extent of minor works proposed**

C. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS

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). **Achievable using conventional building practices.**
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. **Achievable using conventional building and engineering practices.**
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. **Achievable using conventional building practices.**

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. **Achievable using conventional building practices**
D2	Goods, materials or other products which may be highly susceptible to water damage are to be located/stored above the Flood Planning Level. **Achievable using conventional building practices**

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. **Achievable by adhering to this report.**
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. **All habitable FFLs are above the adjacent PMF level and therefore provide appropriately sized areas to safely shelter in place**
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. **achievable and to be conditioned within the Development Approval**
E4	na

F. FLOOR LEVELS

F1	na
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% AEP Event. **The site is not effected by a 1% 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 the building. The development must comply with the Flood Prone Land Design Standard. **na**
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 undercroft area is not to be enclosed. **na to this development**
F4	na
F5	na
F6	na
F7	All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level whichever is higher. **All habitable FFLs are above the adjacent PMF level (Unit 03 FFL 12.60m AHD adjacent PMF 12.46m AHD, Unit 04 FFL 12.00 AHD adjacent PMF 11.65m AHD)**
F8	na
F9	na
F10	na
F11	**na to this development**

G. CAR PARKING

G1	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 to this development**
G3	na
G4	na
G5	na
G6	Carports must comply with the Flood Prone Land Design Standard **na to this development**
G7	Where a driveway is required to be raised it must be demonstrated that there is no loss to flood storage in the 1% AEP flood event and no impact on flood conveyance through the site **na to this development**
G8	na
G9	All enclosed car parks must be protected from inundation up to the Probable Maximum Flood level or Flood Planning Level whichever is higher. For example, basement carparks must be provided with a crest at the entrance, the crest of which is at the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher. All access, ventilation and any

	other potential water entry points to any enclosed car parking shall be above the relevant Probable Maximum Flood level or Flood Planning Level whichever is higher **Achieved as the enclosed carpark entry (via No 1797 Pittwater Rd) is not located in a flood (1% AEP or PMF) effected area. No ventilation grills, access or similar to be located on the walls of Garages 04, 06, 07, 08, 11, 12 and Visitor 1.**
G10	Enclosed Garages must be located at or above the Probable Maximum Flood Level or Flood Planning Level whichever is higher. **na to this development**

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 to this development, as no flood conveys across fence lines**

I. POOLS

I1	Pools located within the 1% 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 All chemicals associated with the pool are to be stored at or above the flood planning level. **na to this development**

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FLOOD RISK ASSESSMENT

A flood risk assessment was carried out for the 1% AEP and PMF event adopting the following

- Likehood of the hazard occurring
  - Almost Certain 1:10
  - Likely 1:100
  - Possible 1:1000
  - Unlikely 1:10000
  - Rare 1:100000
- Consequence of the hazard to persons and property
  - Insignificant no injury / $ 0 - low
  - Minor first aid injury / $ low - medium
  - Moderate medical treatment required / $ medium – high
  - Major serious injuries / $ major
  - Catastrophic death / $ major ++

	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain					
Likely (1%)					
Possible					
Unlikely (PMF)					
Rare					

Legend

Low - acceptable
Moderate – tolerable
Sever – unacceptable

1 Risk to persons 'shelter in place' provisions as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – na therefore acceptable risk assessment
PMF event – minor injuries possible therefore low / acceptable risk assessment
2 Risk to structures adequate structural capacity to resist the flood forces (water and debris) as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – na therefore acceptable risk assessment
PMF event – minor damage to structures therefore low / acceptable risk assessment
2 Risk to vehicles vehicles protected from flood exposure, therefore risk assessment -
1% event – na therefore acceptable risk assessment
PMF event – minor damage therefore low / acceptable risk assessment
3 Risk to services protection of services from flood exposure as per the *Flood Risk Management Report* specified / ensured, therefore risk assessment -
1% event – na therefore acceptable risk assessment
PMF event – minor damage therefore low / acceptable risk assessment

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SUMMARY

Assessment of Impacts Compliance Table

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development	-	X	-
B Drainage Infrastructure & Creek Works	X	-	-
C Building Components & Structural	-	X	-
D Storage of Goods	-	X	-
E Flood Emergency Response	-	X	-
F Floor Levels	-	X	-
G Car Parking	-	X	-
H Fencing	-	X	-
I Pools	X	-	-

The proposed works if carried out in accordance with recommendations within this *Flood Inundation & Risk Assessment Report* by Barrenjoey Consulting dated Sept 2019 will satisfy the intent of Clause 1.1 Performance Criteria of Pittwater 21 DCP Section B3.11 Flood Prone Land by complying with Clause 1.2 Prescriptive Controls. Noting the following measures are to be implemented into the works –

- **All occupants are to be informed of the sites flooding potential / impact and available warning services (ie : Councils *Floodwatch*, SES services etc).**
- **All occupants are to be informed of the sites flooding potential / impact and the residences 'shelter in place' capacity.**
- **All structures must be designed and constructed to ensure structural integrity up to the Flood Planning Level**
- **All occupants are to be informed of the sites flooding potential and requirements for goods / valuables storage etc.**

It is to be noted that, due to the many complex factors that can affect a site, the subjective nature of a risk analysis, and the imprecise nature of the science of flood analysis, the risk of persons being injured, to life and property cannot be completely removed. The recommendations within this Report do not remove the risk associated with the predicted flooding event, though lower those risks to an acceptable level reasonably anticipated by the community in everyday life.

Regards
BARRENJOEY CONSULTING ENGINEERS pty ltd

Per
Lucas Molloy (Director)
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Appendix A

Architectural Plans by
Gartner Trovato Architects

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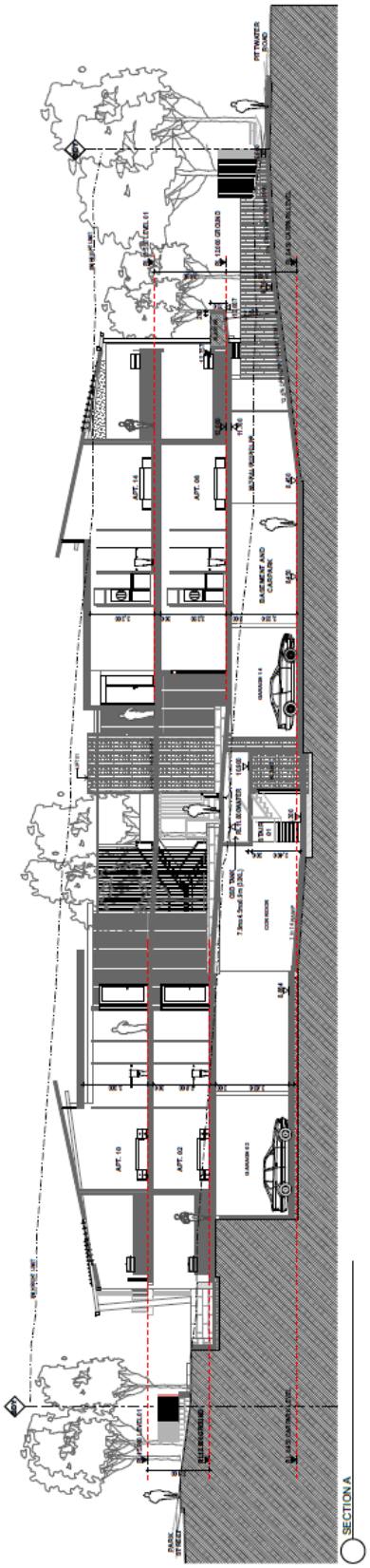

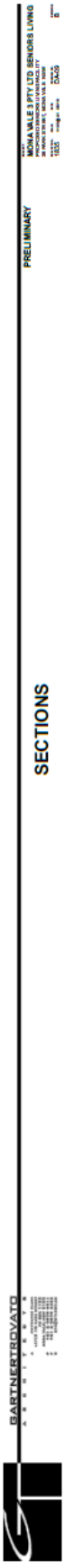

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Appendix B

Site Survey
DP Surveying

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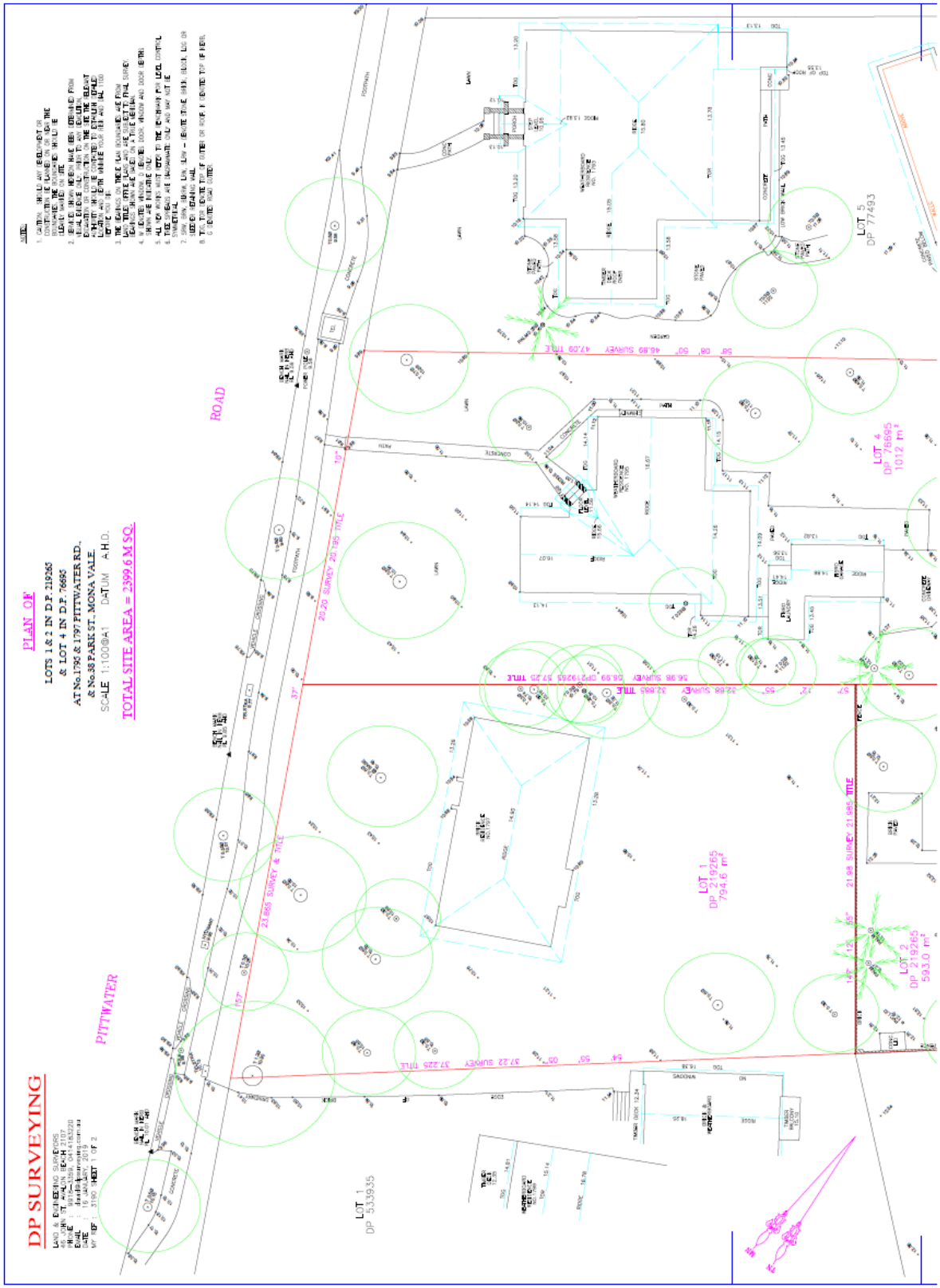

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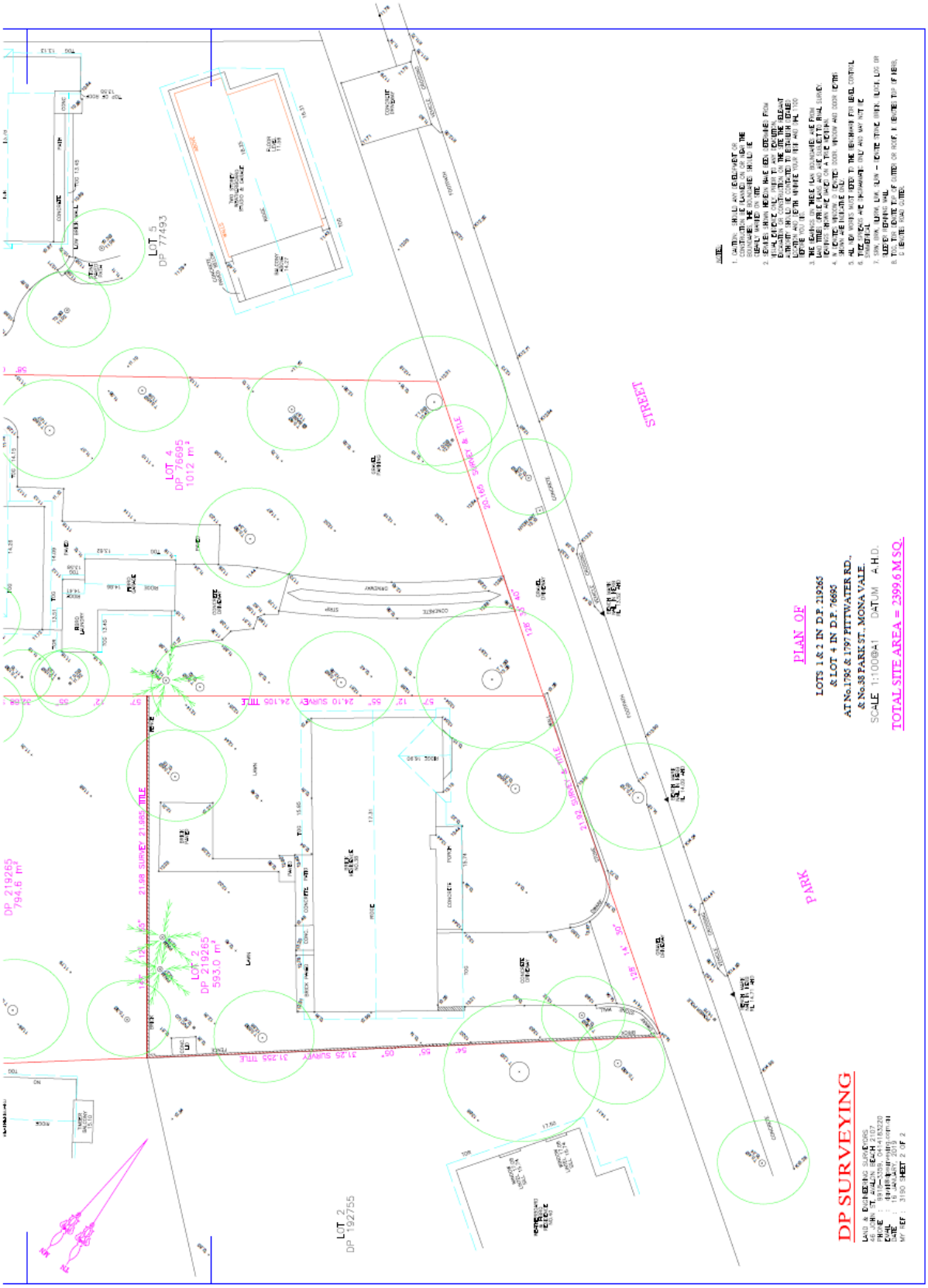

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Appendix C

Proposed Compensatory Works
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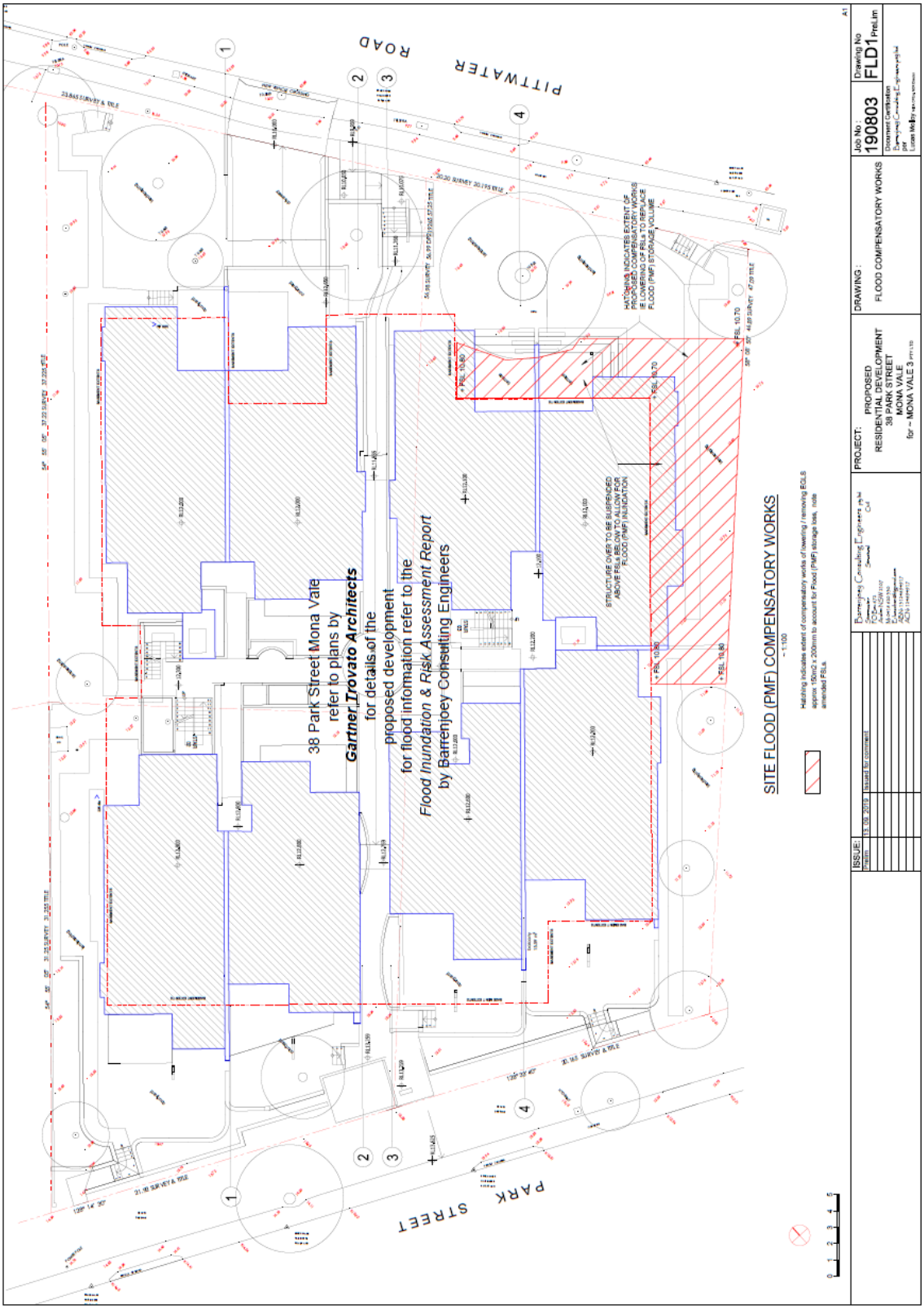

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Appendix D

Flood Information Request – Comprehensive
Northern Beaches Council

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northern beaches council

FLOOD INFORMATION REQUEST – COMPREHENSIVE

Property: 1795 Pittwater Rd, Mona Vale
Lot DP: 4//76695
Issue Date: 15/08/2019
Flood Study Reference: McCarrs Cr, Mona Vale and Bayview Flood Study Review, 2017

Flood Information for lot:

Flood Life Hazard Category – See Map A

1% AEP – See Flood Map B

1% AEP Maximum Water Level[3]: N/A mAHD

1% AEP Maximum Peak Depth from natural ground level[3]: N/A m

1% AEP Maximum Velocity: N/A m/s

1% AEP Provisional Flood Hazard: N/A **See Flood Map E**

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

Flood Planning Area – See Flood Map C

Flood Planning Level (FPL) [1, 2, 3 & 4]: N/A m AHD

Probable Maximum Flood (PMF) – See Flood Map D

PMF Maximum Water Level[2]: 12.47 m AHD

PMF Maximum Depth from natural ground level: 0.38 m

PMF Maximum Velocity: 0.52 m/s

PMF Flood Hazard: Low **See Flood Map G**

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PMF Hydraulic Categorisation: Flood storage **See Flood Map H**

Flooding with Climate Change (See Flood Map I)

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

1% AEP Maximum Water Level with Climate change[1&3]: 12.39 m AHD

1% AEP Maximum Depth with Climate Change[3]: 0.23 m

1% AEP Maximum Velocity with Climate Change[3]: 0.45 m/s

Flood Risk Precinct – See Map J

Indicative Ground Surface Spot Heights – See Map K

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

General Notes:

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

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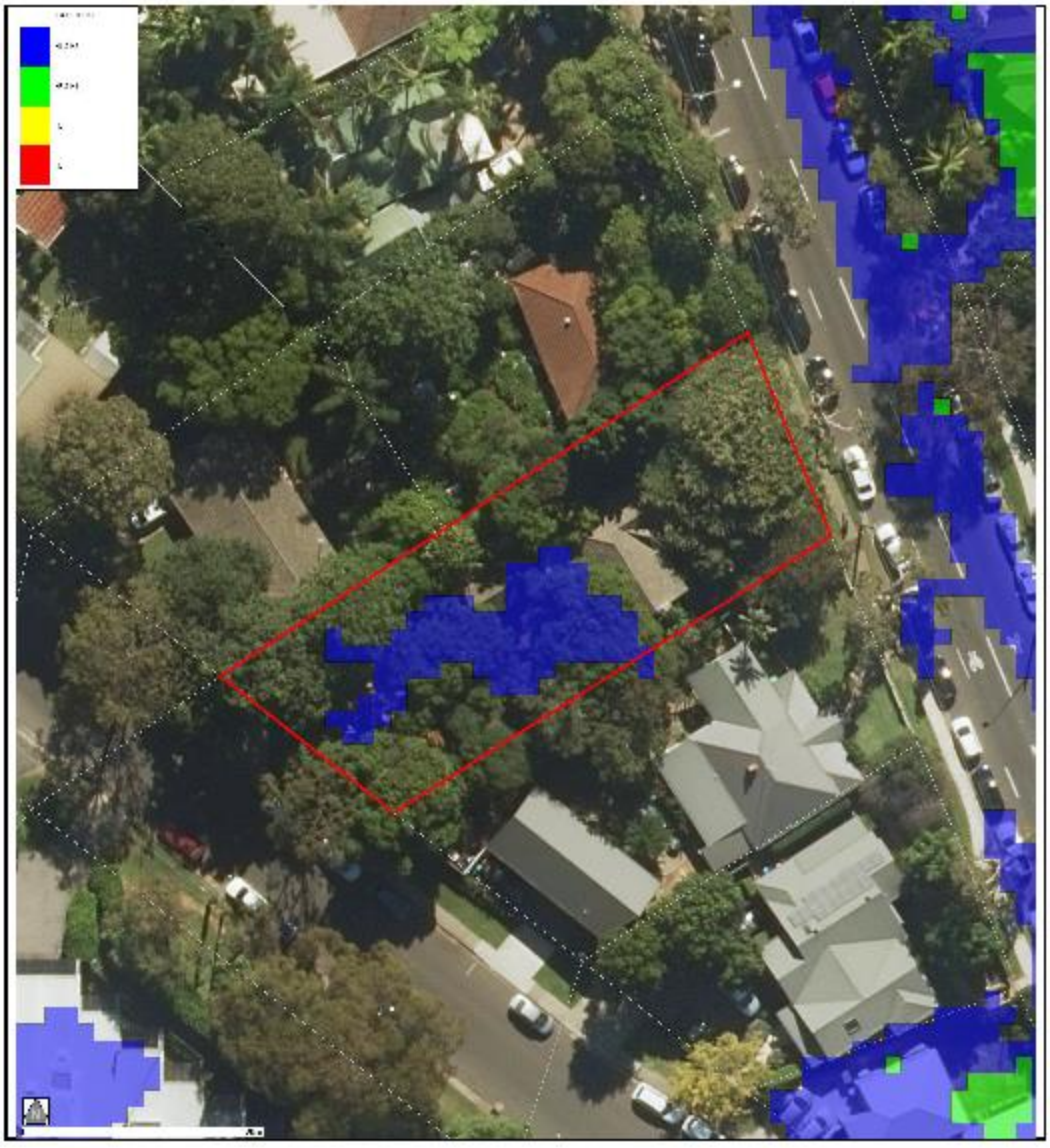
FLOOD MAP A: FLOOD LIFE HAZARD CATEGORY



Notes:

- Refer to 'Flood Emergency Response Planning for Development in Pittwater Policy for additional information on the Flood Life Hazard Categories and Pittwater 21 DCP Control B3.12.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source:) and aerial photography (Source Near Map 2014) are indicative only.

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FLOOD LEVEL POINTS

Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source:) and aerial photography (Source: NearMap 2014) are indicative only.

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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	N/A	N/A	N/A	N/A	12.33	0.18	0.32
2	N/A	N/A	N/A	N/A	N/A	N/A	12.46	0.17	0.31
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A	N/A	11.65	0.27	0.39
5	N/A	N/A	N/A	N/A	N/A	N/A	11.46	0.22	0.25
6	N/A	N/A	N/A	N/A	N/A	N/A	11.33	0.31	0.25
7	N/A	N/A	N/A	N/A	N/A	N/A	11.32	0.29	0.21
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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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	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	11.29	0.16
6	11.23	0.16
7	11.21	0.18
8	11.20	0.23
9	N/A	N/A

A variable Flood Planning Level might apply - 0.5m above 1% AEP max water level (for Mainstream flooding) or 0.5m above the 1% AEP max water level flow path extent with depth greater than 0.3m and 0.3m above the 1% AEP max water level flow path with depth 0.3m and less (for overland flow)

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

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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:) and aerial photography (Source Near Map 2014) are indicative only.

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FLOOD MAP C: FLOOD PLANNING AREA EXTENT

Notes:

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

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FLOOD MAP D: 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:) and aerial photography (Source: NearMap 2014) are indicative only

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FLOOD MAP E: 1% AEP FLOOD HAZARD 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:) and aerial photography (Source: NearMap 2014) are indicative only

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FLOOD MAP F: 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:) and aerial photography (Source: NearMap 2014) are indicative only

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FLOOD MAP G: PMF FLOOD HAZARD EXTENT MAP

Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- 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:) and aerial photography (Source: NearMap 2014) are indicative only

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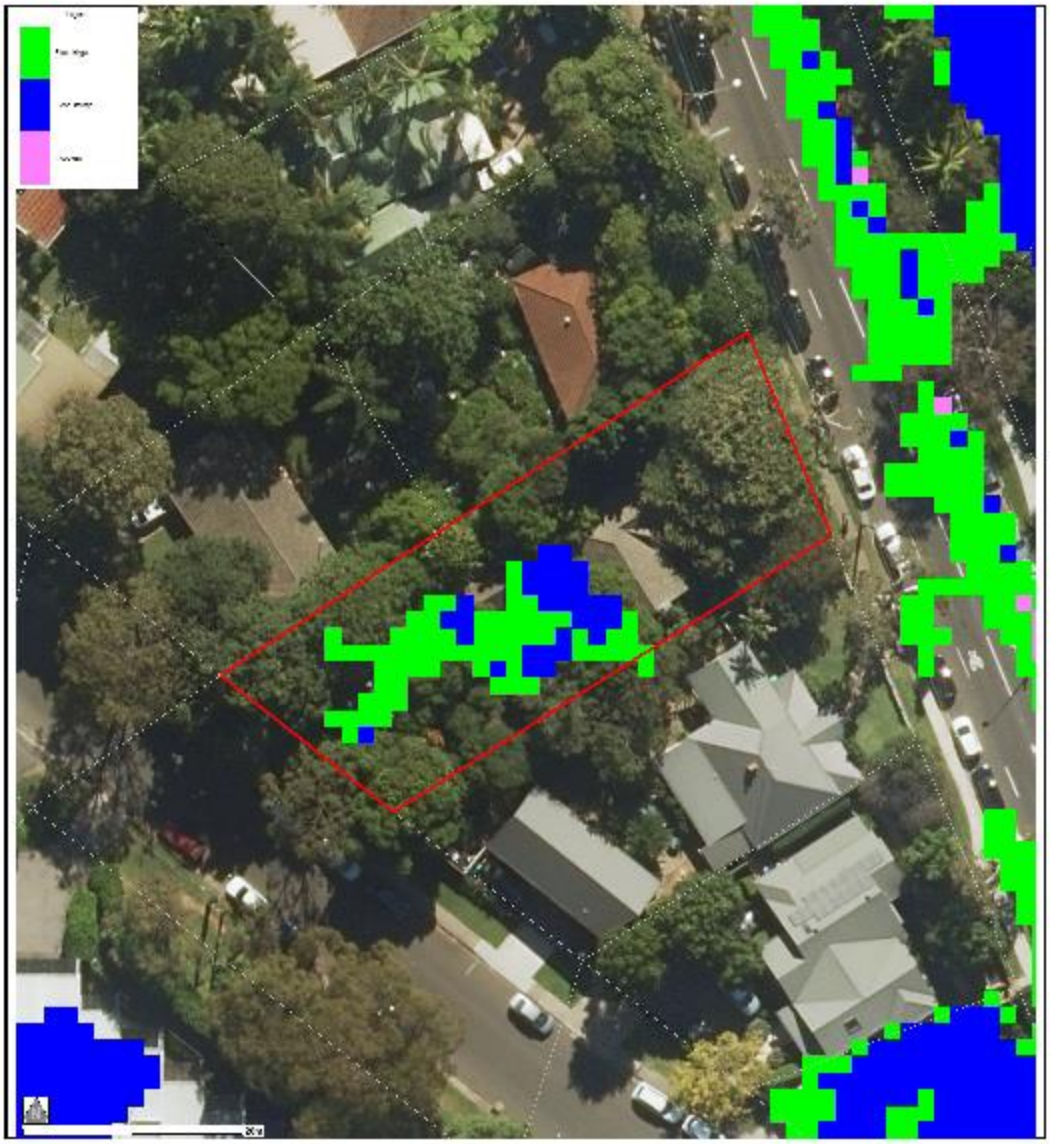
FLOOD MAP H: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP



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:) and aerial photography (Source: NearMap 2014) are indicative only

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FLOOD MAP I: 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:) and aerial photography (Source: NearMap 2014) are indicative only

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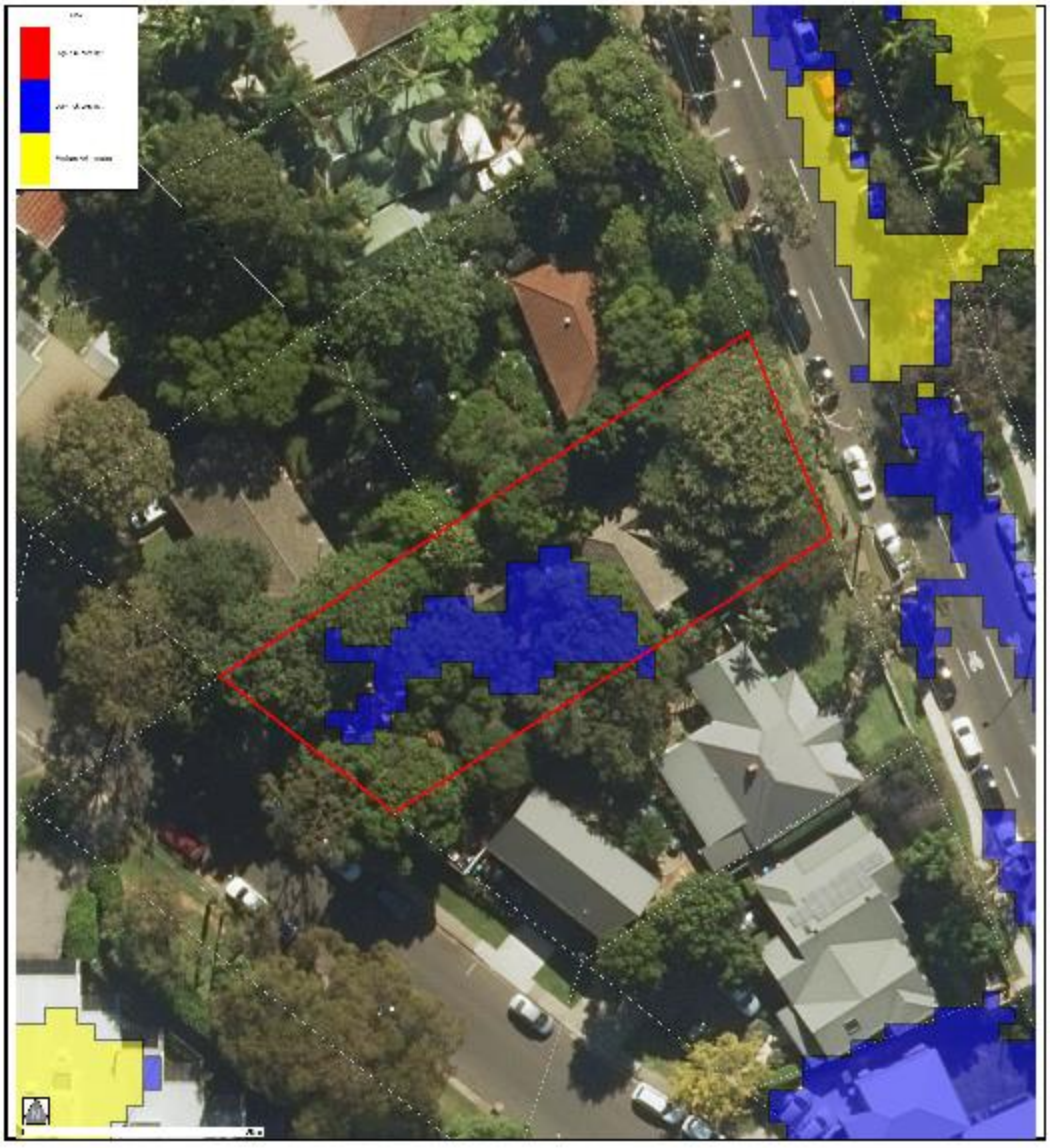
FLOOD MAP J: FLOOD RISK PRECINCT MAP



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 and or H6 Life Hazard Classification).
- Does not include climate change

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MAP K: 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.

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GUIDELINES for Preparing a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on preparing a Flood Management Report. The purpose of a Flood Management Report is to help applicants measure and manage the flood risk to life and property on their site.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land, for Council to consider the potential flood impacts and 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.

Note that the flood extents shown on the mapping are indicative only. It is recommended that flood levels are compared to registered ground survey to more accurately determine the flood extent.

There are some circumstances where a 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 Flood Planning Level 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 in a Flood Management Report?

The aim of a Flood Management Report is to demonstrate how a proposed development will comply with the flood related 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.

Technical requirements of a Flood Management Report

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

1. ***Description of development***

   The description of development should identify:
   - 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, ie, critical, vulnerable, subdivision, residential, business, industrial, recreational, environmental or concessional

2. ***Flood analysis***

   The flood analysis should include:
   - Predicted 1 in 100 year flood level
   - Flood Planning Level (FPL)
   - Probable Maximum Flood (PMF) level
   - Flood Risk Precinct, ie High, Medium or Low
   - Flood Life Hazard Category (in former Pittwater Council area only)
   - Mapping of relevant extents
   - Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the impact these have on the proposed development

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

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3. ***Assessment of impacts***

The assessment of impacts should address the various elements of the relevant LEP and DCP. A simple compliance table should be provided, similar to the table one below.

	Compliance		
	Not Applicable	Yes	No
A Flood effects caused by Development			
B Drainage Infrastructure & Creek Works			
C Building Components & Structural			
D Storage of Goods			
E Flood Emergency Response			
F Floor Levels			
G Car Parking			
H Fencing			
I Pools			

Further details of what is required for each of these categories can be found in the *Development Control Plan for Flood Prone Land*.

For any of these categories which are applicable, the assessment should demonstrate how the development complies, or if it doesn't, provide an explanation of why the development should still be considered.

Reporting requirements for a Flood Management Report

The Flood Management Report should include:

a) Executive summary
b) Location plan, at an appropriate scale, that includes geographical features, street names and identifies all waterways and Council stormwater pipes, pits and easements
c) Plan of the proposed development site showing the extent of the predicted 100 year, any high hazard or floodway conditions and the PMF flood event
d) Development recommendations and construction methodologies
e) Calculation formulae (particularly for flood storage)
f) Clear referencing using an accepted academic referencing system (eg. Harvard)
g) Analysis of development against relevant State Environmental Planning Policies
h) Analysis of development against relevant Local Environment Plan and Policies
i) Conclusion detailing key points
j) Standard Hydraulic Certification (Form A/A1)
k) Qualifications of author
l) Any flood advice provided by Council
m) Any other details which may be relevant

NOTE: 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 Australian Institute of Engineers.

For further information please contact Stormwater and Floodplain Team on 1300 434 434 or via email at floodplain@northernbeaches.nsw.gov.au

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Attachment A

NORTHERN BEACHES COUNCIL STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: _____

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, _____ on behalf of _____
(Insert Name) (Trading or Business/ Company Name)

on this the _____ certify that I am engineer or a
(Date)

professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

***Flood Management Report* Details:**

Report Title: .....

Report Date: .....

Author: .....

Author's Company/Organisation: .....

I: _____
(Insert Name)

Please tick all that are applicable (more than one box can be ticked)

☐ have obtained and included flood information from Council (must be less than 12 months old) **(This is mandatory)**

☐ have followed Council's Guidelines for Preparing a Flood Management Report

☐ have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature .....

Name .....

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Barrenjoey Consulting Engineers pty ltd
Stormwater Structural Civil
abn 13124694917 acn 124694917

Appendix E

Northern Beaches Council
Standard Hydraulic Certification Form

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Stormwater Structural Civil
abn 13124694917 acn 124694917

NORTHERN BEACHES COUNCIL
STANDARD HYDRAULIC CERTIFICATION FORM

FORM A/A1 – To be submitted with Development Application

Development Application for

Address of site: **38 Park St, 1795 - 1797 Pittwater Rd Mona Vale**

Declaration made by hydraulic engineer or professional consultant specialising in flooding/flood risk management as part of undertaking the Flood Management Report:

I, **Lucas Molloy** on behalf of **Barrenjoey Consulting Engineers p/l** on this the **16th Sept 2019** certify that I am engineer or a professional consultant specialising in flooding and I am authorised by the above organisation/ company to issue this document and to certify that the organisation/ company has a current professional indemnity policy of at least $2 million.

Flood Management Report Details:

Report Title:	**FLOOD INUNDATION & RISK ASSESSMENT REPORT PROPOSED RESIDENTIAL DEVELOPMENT 38 PARK STREET & 1795 - 1797 PITTWATER RD MONA VALE**
Report Date:	**Sept 2019**
Author:	**Lucas Molloy**
Author's Company/Organisation:	**Barrenjoey Consulting Engineers p/l**

I: **Lucas Molloy**

Please tick all that are applicable (more than one box can be ticked)
X have obtained and included flood information from Council (must be less than 12 months old)
X have followed Council's Guidelines for Preparing a Flood Management Report
na have requested a variation to one or more of the flood related development controls. Details are provided in the *Flood Management Report*.

Signature

Name **Lucas Molloy**
BE CPEng NER 788184
Director
Barrenjoey Consulting Engineers p/l

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M: 0418 620 330 E: lucasbce@bigpond.com

Barrenjoey Consulting Engineers pty ltd
Stormwater Structural Civil
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End

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