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

OVERLAND FLOW
PROPOSED SUB DIVISION
337 LOWER PLATEAU RD
BILGOLA PLATEAU

ADDENDUM TO THE
FLOOD INUNDATION & RISK ASSESSMENT REPORT
PROPOSED SUB DIVISION
337 LOWER PLATEAU RD BILGOLA PLATEAU
DATED MARCH 2023 AND *ADDENDUM* DATED 25. 03. 2024
BY BARRENJOEY CONSULTING ENGINEERS PTY LTD

Job No 211203
Jul 2024
Prepared by
Lucas Molloy
BE CPEng NER

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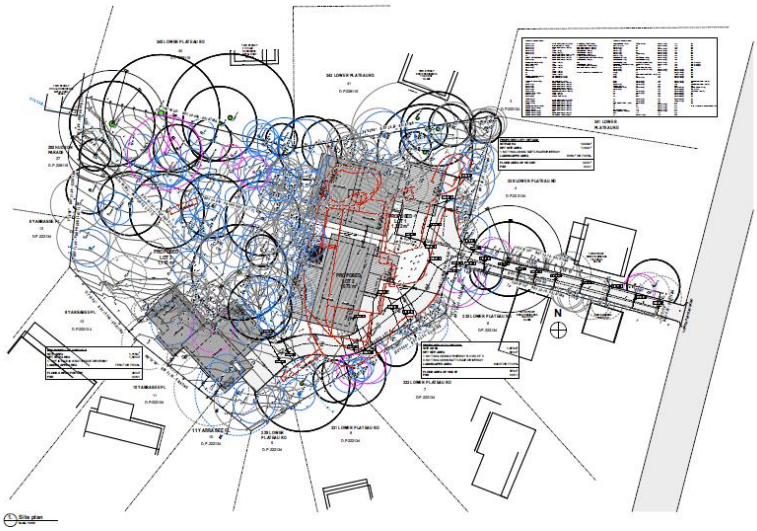
INTRODUCTION

This Addendum (to the *Flood Inundation & Risk Assessment Report Proposed Sub division 337 Lower Plateau Rd Bilgola Plateau* by Barrenjoey Consulting Engineers pty ltd dated March 2023 and Addendum dated 25. 03. 2024) has been prepared in respect to Northern Beaches Councils request for further information dated 13 June 2024 (refer excerpt Appendix A). The proposed development is a 3 Lot residential sub division as detailed in the architectural plans by *Gartner Trovato Architects*. The expected flood impact is associated with the natural watercourses that flow through the site, the watercourses collecting runoff from the ~8Ha catchment that extends to Plateau Park and Bilgola Plateau Public School above (refer Appendix E). Barrenjoey Consulting Engineers pty ltd maintain that the proposed development and indicative house designs will satisfy the intent of Northern Beaches Councils Water Management for Development Policy Section 10 Flood Risk Management and Pittwater 21 DCP Section B3.11 Flood Prone Land.

1% Flood Extents (Northern Beaches Council *Flood Information Report – Comprehensive*)



Proposed subdivision plan (*Gartner Trovato Architects*)

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RESPONSE TO COUNCILS REQUEST FOR FURTHER INFORMATION

From Northern Beaches Councils request for further information dated 13 Jine 2024 -

Development Engineer

The proposed three lot subdivision has been reviewed and is not supported for the following reasons:

5) As the property is impacted by overland flow Barrenjoey Consulting Engineers has summarised the flood information in terms of 1/100 AEP and FPL levels throughout the development site from Councils Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017 as prepared by Manly Hydraulics Lab. However, no assessment has been made as requested in the previous development application in terms of whether the proposed dwellings have habitable floors w a minimum of 500mm freeboard to the 1/100 AEP overland flow path levels. Additionally, an assessment is to be made on the proposed location of the internal access road and the existing overland flow paths that impact the site.

BCE response –

The primary risk relevant to stormwater flow on the development site is the natural watercourse/s traversing the site from east to west. As per our previous analysis (refer Appendix C and Appendix D) these watercourses are significantly defined within steep edged "gullys", with depths of flow (in the vicinity of the proposed residences) during the 1/100 AEP event of between 130 and 220mm (refer Appendix B).

Overland Flow as defined by Northern Beaches Council "*means inundation by excess rainfall runoff, flowing across land before it enters a principal watercourse. Includes sloping areas where overland flows develop along alternative paths once system capacity is exceeded".*

Barrenjoey Consulting Engineers have analysed the development site / surrounds and summarised that there will be no significant 'overland flow' within the development site as –

- **the site / watercourse/s are located well within the defined 8Ha catchment (refer Appendix E), downstream (apprx. 200m – 350m) from the runoff flows origins / watershed ridge. 99% of flow associated with the 1/100AEP event will be within the watercourse/s at the upper site boundaries.**
- **Only minor insignificant 'overland' flow will enter the watercourse within the site from small catchments less than 500m^2, these flows will collect in minor depressions etc and flow into the watercourses with depths less than 100mm.**
- **The proposed subdivision access driveway layout generally mimics the existing and in part is to be an 'elevated' structure with isolated column supports to the NGLs located as not to adversely affect any 'overland flow'.**
- **Future Residences (as per submitted indicative designs) will be protected from the minor 'overland flow' with the use of conventional building methods as per standard requirements of the National Construction Code / BCA and relevant Australian Standards.**

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SUMMARY

In respect to Councils comments - *whether the proposed dwellings have habitable floors with a minimum of 500mm freeboard to the 1/100 AEP overland flow path levels* -
As previously outlined within the *Flood Inundation & Risk Assessment Report Proposed Sub division 337 Lower Plateau Rd Bilgola Plateau* by Barrenjoey Consulting Engineers pty ltd dated March 2023 and Addendum dated 25. 03. 2024 all habitable floors will have a minimum of 500mm freeboard to the 1/100 AEP flood levels, and (based on the above analysis) with the implementation of the standard requirements of the National Construction Code / BCA and relevant Australian Standards will be protected from the overland flow path levels.

In respect to Councils comments - *an assessment is to be made on the proposed location of the internal access road and the existing overland flow paths that impact the site* -
As previously outlined within the *Flood Inundation & Risk Assessment Report Proposed sub division 337 Lower Plateau Rd Bilgola Plateau* by Barrenjoey Consulting Engineers pty ltd dated March 2023 and Addendum dated 25. 03. 2024. Based on the above analysis the proposed subdivision access driveway generally mimics the existing and in part is to be an 'elevated' structure with isolated column supports to the NGLs located as not to adversely affect any 'overland flow'.

The proposed subdivsion if carried out in accordance with recommendations within the *Flood Inundation & Risk Assessment Report* by Barrenjoey Consulting dated Mar 2023 and this Addendum will satisfy the intent of Northern Beaches Councils Water Management for Development Policy Section 10 Flood Risk Management and Pittwater 21 DCP Section B3.11 Flood Prone Land.

It is our opinion the proposed residential buildings (as detailed in the submitted architectural plans, subject to future DA submissions and review) will also accommodate the requirements of Northern Beaches Councils Water Management for Development Policy Section 10 Flood Risk Management and Pittwater 21 DCP Section B3.11 Flood Prone Land.

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
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BE CPEng NER

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Appendix A

Northern Beaches Councils
request for further information dated 13 June 2024
excerpt re overland flow

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Development Engineer

The proposed three lot subdivision has been reviewed and is not supported for the following reasons:

1) Access handle width and grades.
As highlighted by Councils Traffic Engineers comments the access handle from Lower Plateau Road is limited in width to 4.57m, the Pittwater 21 Development Control Plan (DCP) requires a passing bay to an overall minimum width of 5m for a length of 10m with suitable transitions to be provided. It is not possible to provide a suitable passing bay within the driveway corridor as the ROW is only 4.57m so an easement for a right a way to achieve the passing bay requirements is to be obtained from the adjoining property / properties.
The Pittwater 21 DCP also specifies that internal driveways are to be designed and constructed to provide safe access and shall have a maximum gradient of 1:5 (V:H). For internal driveways on steeply sloping or difficult sites, gradients may be increased up to 1:4 (V:H) over a maximum 20m length. The site gradient is approximately 1:3 (V:H) for the last 20m of the driveway corridor, which exceeds the permissible gradient.

2) The subdivision application does not have supported engineering plans that detail access way long sections, cross-sections and retaining wall locations. The engineering plans requirements are detailed in Councils Auspec one design specification.

3) A stormwater management plan is required detailing the provision of on-site stormwater detention in accordance with Councils Water management for development policy and in particular section 9.3.7 minimum required information is to be provided on the stormwater management plan. A DRAINS model is also to be submitted to Council for review.

5) As the property is impacted by overland flow Barrenjoey Consulting Engineers has summarised the flood information in terms of 1/100 AEP and FPL levels throughout the development site from Councils Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017 as prepared by Manly Hydraulics Lab. However, no assessment has been made as requested in the previous development application in terms of whether the proposed dwellings have habitable floors w a minimum of 500mm freeboard to the 1/100 AEP overland flow path levels. Additionally, an assessment is to be made on the proposed location of the internal access road and the existing overland flow paths that impact the site.

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Appendix B

Northern Beaches Councils
Flood Information Report
excerpt

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FLOOD LEVEL POINTS

Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Avalon to Palm Beach Floodplain Risk Management Study and Plan 2017, Manly Hydraulics Laboratory) 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	79.95	0.36	79.98	0.40	1.23	80.48	80.16	0.57	2.05
2	78.30	0.19	78.33	0.22	1.33	78.83	78.45	0.35	2.40
3	76.83	0.19	76.85	0.20	0.80	77.35	76.95	0.30	1.44
4	73.60	0.17	73.63	0.20	1.80	74.13	73.79	0.36	3.14
5	67.95	0.31	67.98	0.34	1.73	68.48	68.21	0.57	2.89
6	78.00	0.29	78.03	0.32	0.99	78.53	78.18	0.48	1.68
7	N/A	N/A	77.53	0.16	0.86	78.03	77.59	0.27	1.48
8	N/A	N/A	75.97	0.13	0.78	76.47	76.00	0.23	1.35
9	73.77	0.17	73.79	0.18	0.86	74.29	73.77	0.27	1.51
10	67.84	0.20	67.86	0.22	0.98	68.36	67.98	0.34	1.68
11	65.51	0.44	65.57	0.50	1.49	66.07	65.87	0.81	2.33
12	61.17	0.54	61.22	0.59	2.29	61.72	61.54	0.92	3.61

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	80.03	0.45
2	78.36	0.26
3	76.87	0.22
4	73.67	0.24
5	68.02	0.38
6	78.07	0.37
7	77.50	0.18
8	75.92	0.15
9	73.70	0.19
10	67.89	0.25
11	65.65	0.58
12	61.29	0.66

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.

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Appendix C

Site, House 1, House 2, House 3 and Driveway
Flood Assessment
(Barrenjoey Consulting Engineers pty ltd)

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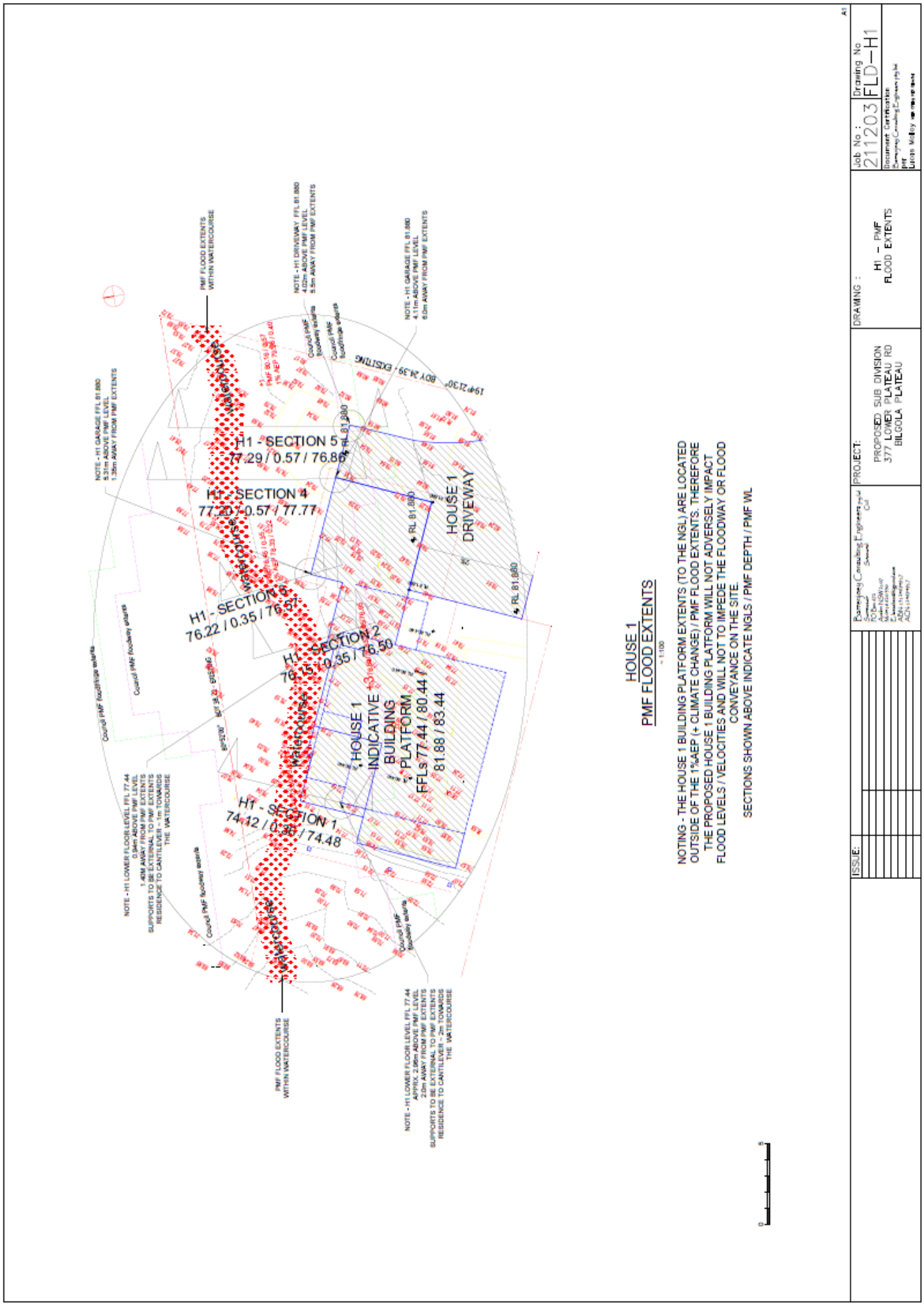

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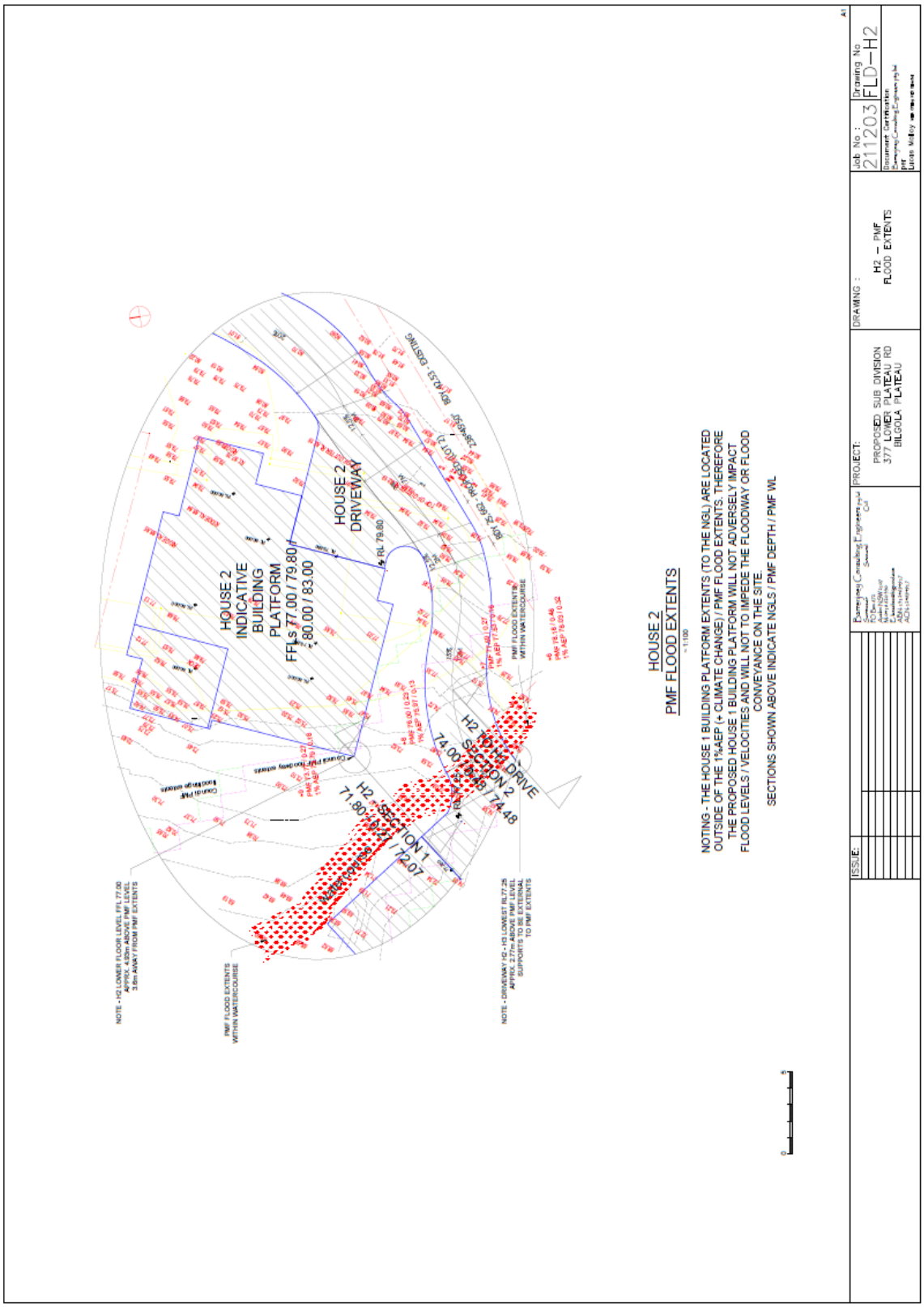

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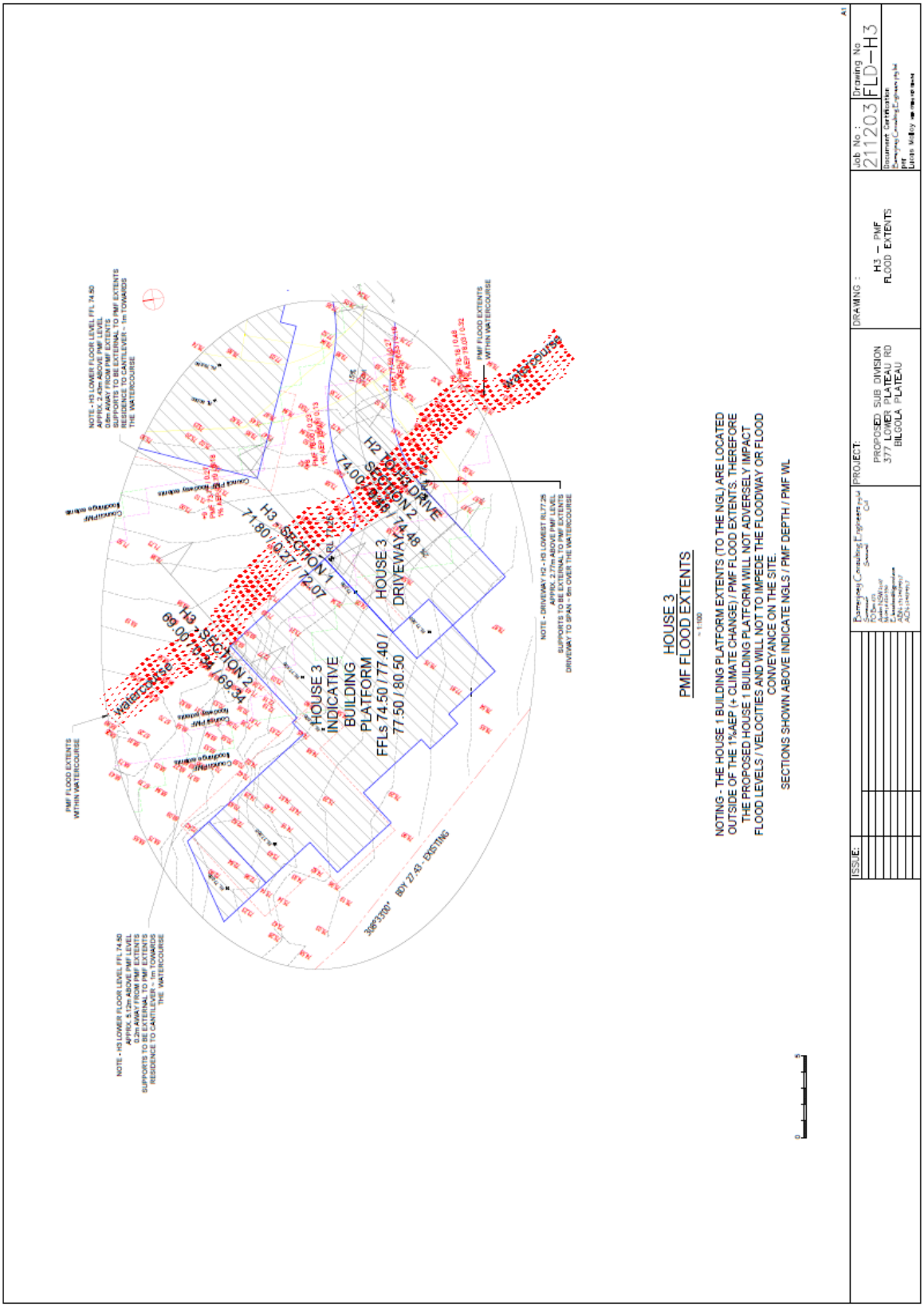

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Appendix D

Architectural representation of Residences vs Watercourses (Gartner Trovato Architects)

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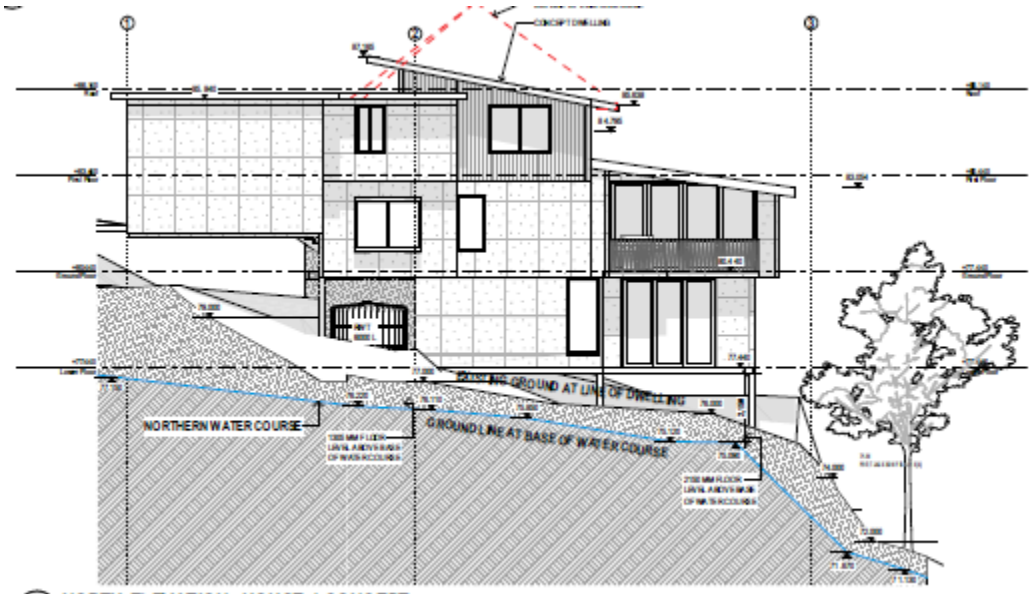
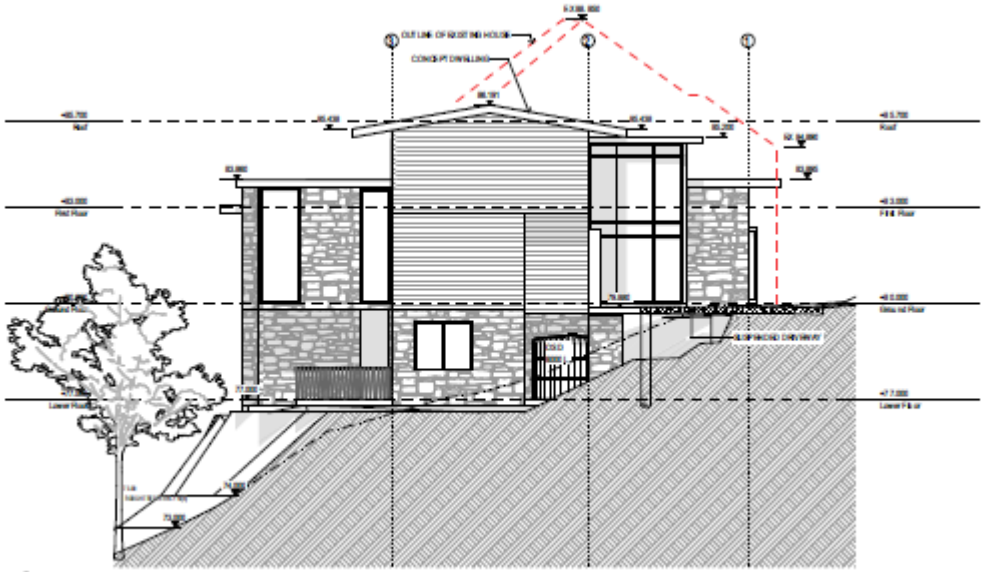


NORTH ELEVATION - HOUSE 1 CONCEPT



SOUTH ELEVATION - HOUSE 2 CONCEPT

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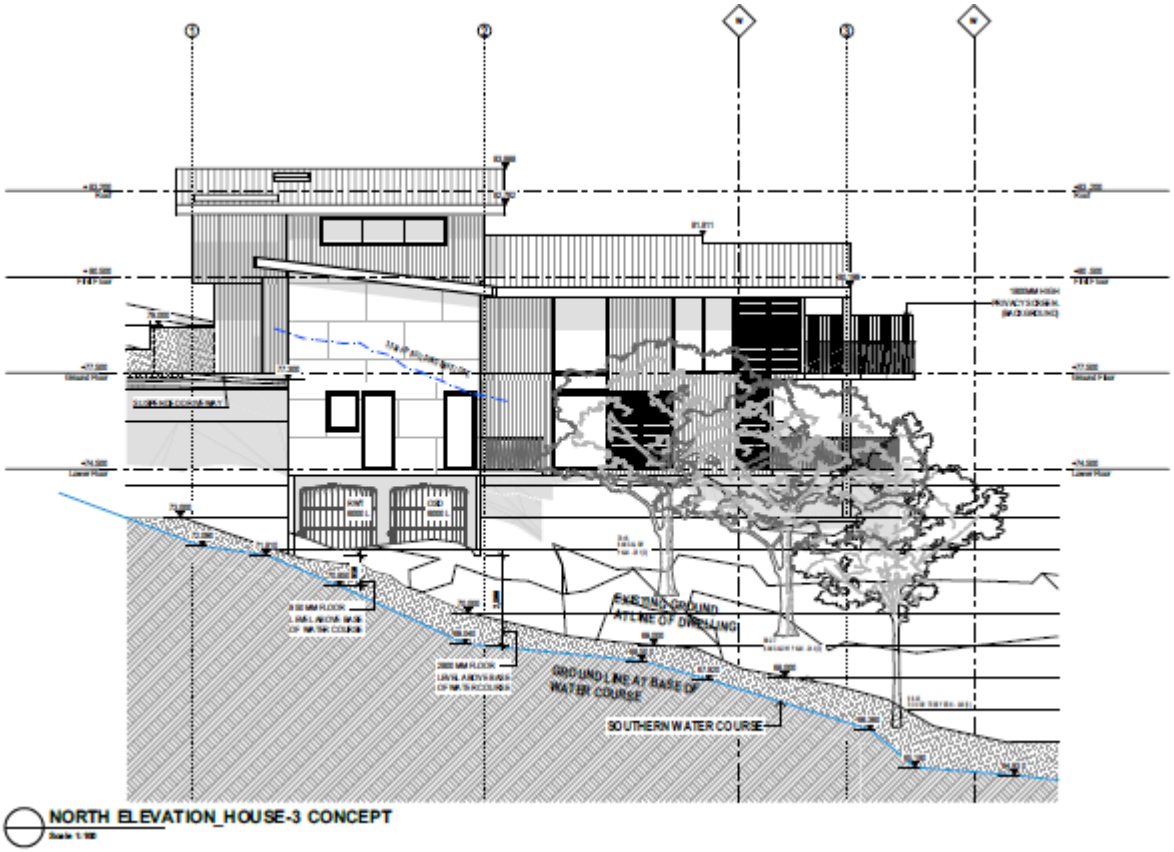

NORTH ELEVATION_HOUSE-3 CONCEPT

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Appendix E

Catchment Plan
(Northern Beaches Council)

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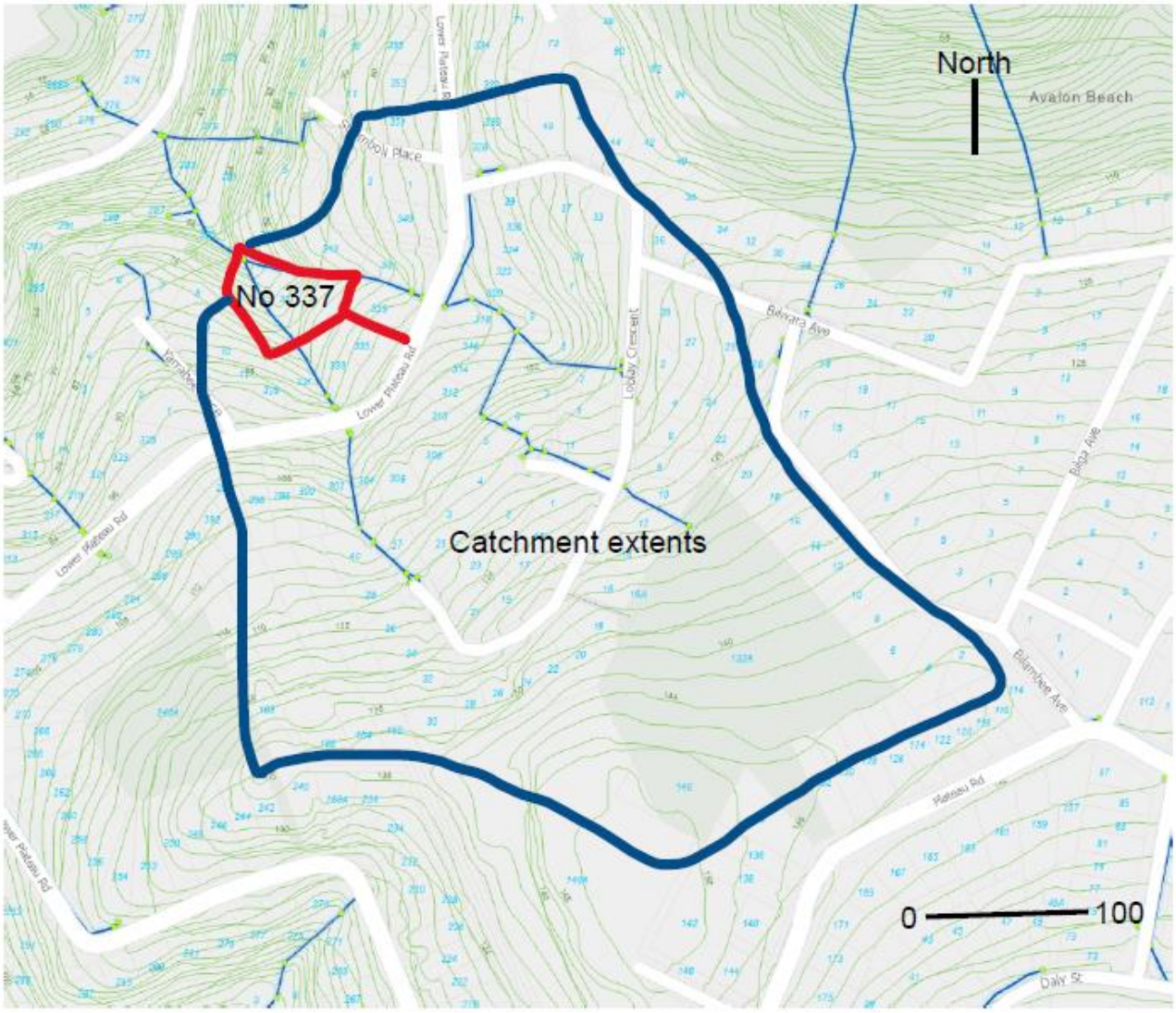

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