



Prime Consulting Engineers Pty. Ltd.

FLOOD IMPACT ASSESSMENT REPORT

FOR RESIDENTIAL DEVELOPMENT

AT

20 The Esplanade

NARRABEEN NSW 2101

Prepared by: Prime Consulting Engineers Pty Ltd.

Ref: CE-22-261

Date: 08/07/2022

Amendment: -

Prepared by: SD

Checked by: BJ

Dear Mr Jason Smith,

Re: Flood Report – Demolition of Existing Structures & Construction of a New 2-Storey Dwelling and Swimming Pool at 20 The Esplanade Narrabeen NSW 2101

Introduction

Prime Consulting Engineers has been engaged by Shobha Designs to prepare a Flood Impact Assessment report for Proposed Two Storey Dwelling and Swimming Pool at 20 The Esplanade Narrabeen NSW 2101 in respect to flood during an ARI 1:100 rainfall events (1% AEP).

We can confirm that we have reviewed the existing survey levels in order to compare the RLs with 1% ARI flood levels to prepare this report.

At present there is a double-storey house at the property. The proposal is to demolish the existing dwelling and build a new two storey house with a swimming pool. See Appendix A for the proposed site plan and elevation/sections.



Figure 1 : Aerial Map of 20 The Esplanade Narrabeen NSW

Source@ Six Maps

Report

The purpose of this Flood Impact Assessment is to provide a flood level (AHD) RL that can be relied upon for the new 2- storey Dwelling and Swimming Pool development at 20 The Esplanade Narrabeen NSW 2101. This flood report is required as part of documentation for submission for development application.

This report has been prepared based on the flood information issued by Northern Beaches Council on 14/03/2022 which is attached on Appendix B.

The existing survey plan and floor plan for the proposed site is given in Appendix A.

The existing property is affected by the overland flow.

1. Flood Effects: The proposed development is a new two storey dwelling and a swimming pool. The property is affected by the 1% AEP and PMF event. 1% AEP and PMF event affects the northern boundary of property. There is no effect of 1% AEP and PMF at the rear of property. The flood levels at different location of development for 1% AEP and PMF is attached with this report on Appendix A.
2. Floor Levels: As per the report received from the council, the 1% AEP Maximum Water level is 3.05 mAHD and PMF Maximum water Level is 5.02 mAHD. The habitable area of the ground floor level of the development is proposed to be at 3.55 mAHD which is 500mm higher than the 1% AEP level. The floor level for the garage and porch (non-habitable area) is 3.19 mAHD and 3.40 mAHD respectively which is at least 300 mm higher than the 1% AEP flood level.



Conclusion

Warringah DCP 2011 requires owners of flood affected properties to comply with Council's Flood Prone Policy. The above lot 20 The Esplanade, Narrabeen is affected for Flooding (storm) events exceeding the 1% AEP event, evidenced by the planning flood Map B, refer appendix B below.

The proposed ground floor and garage level of the house are set at the level of 3.55 mAHD and 3.19 mAHD with a freeboard of more than 500mm and 300mm respectively, thus complying with the minimum floor level requirement as per the council flood management policy.

Your Sincerely

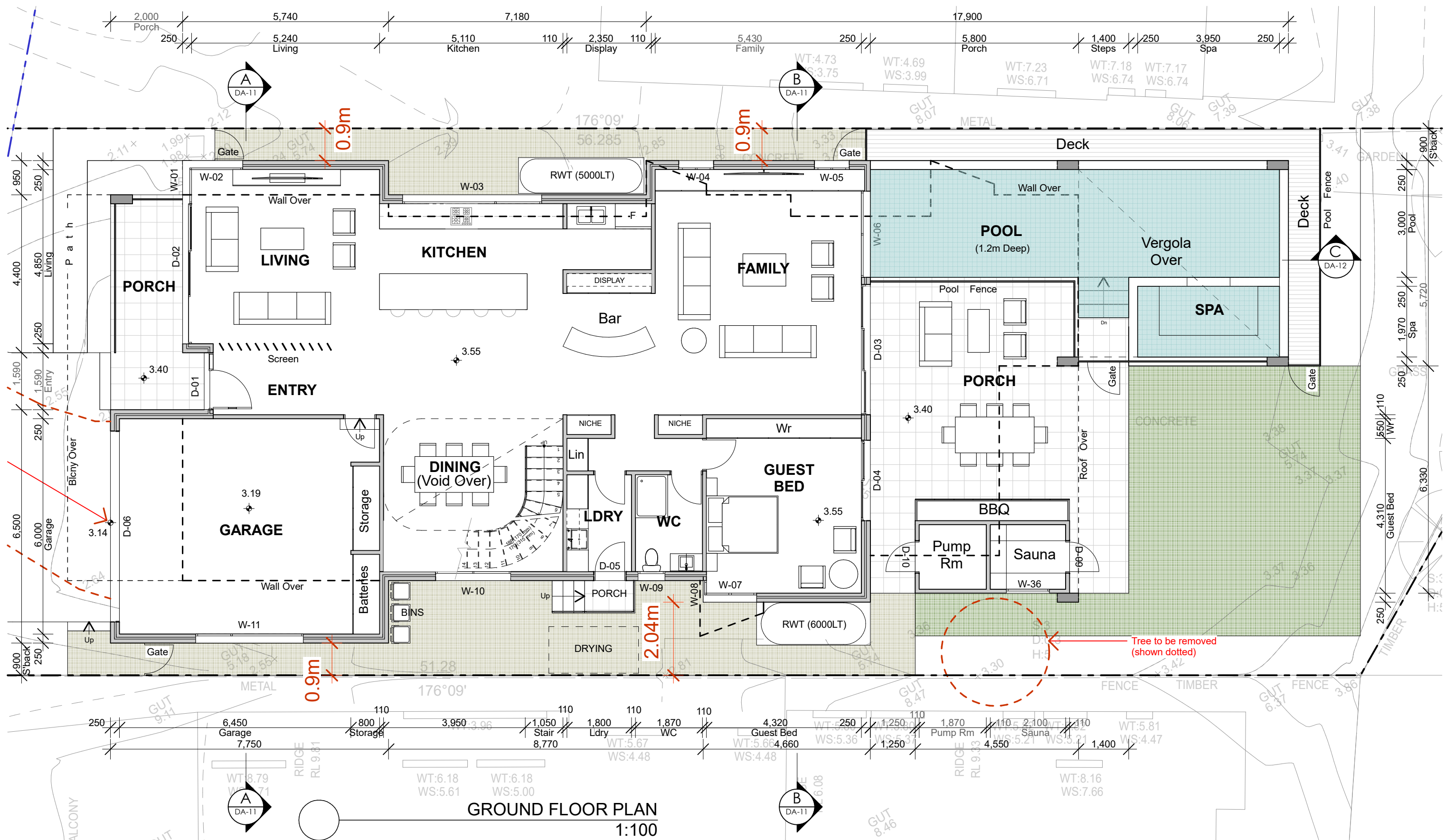
Kevin Zia

BEng, MEng, MIEAust, CPEng, NER

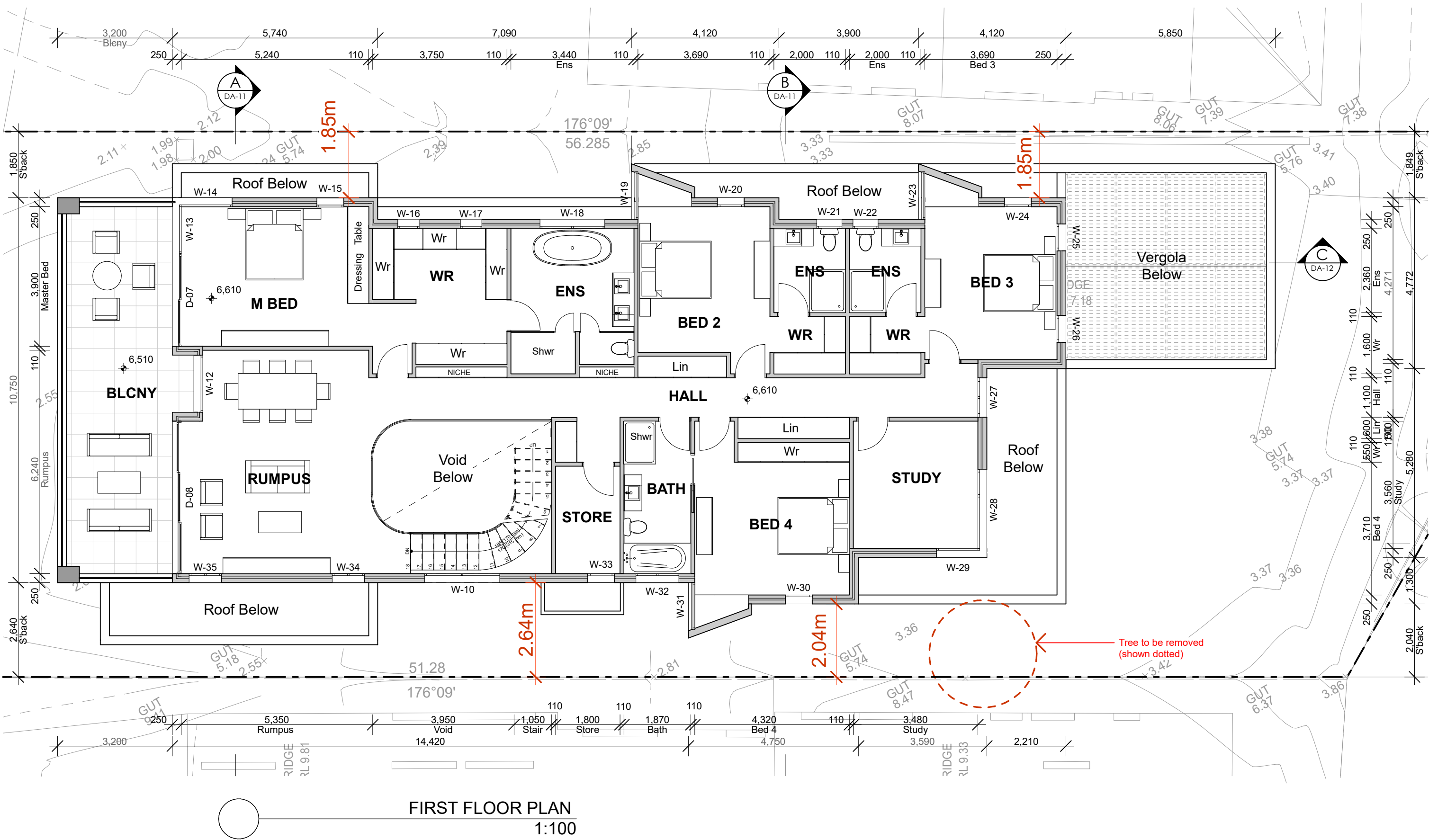


Prime Consulting Engineers Pty. Ltd.

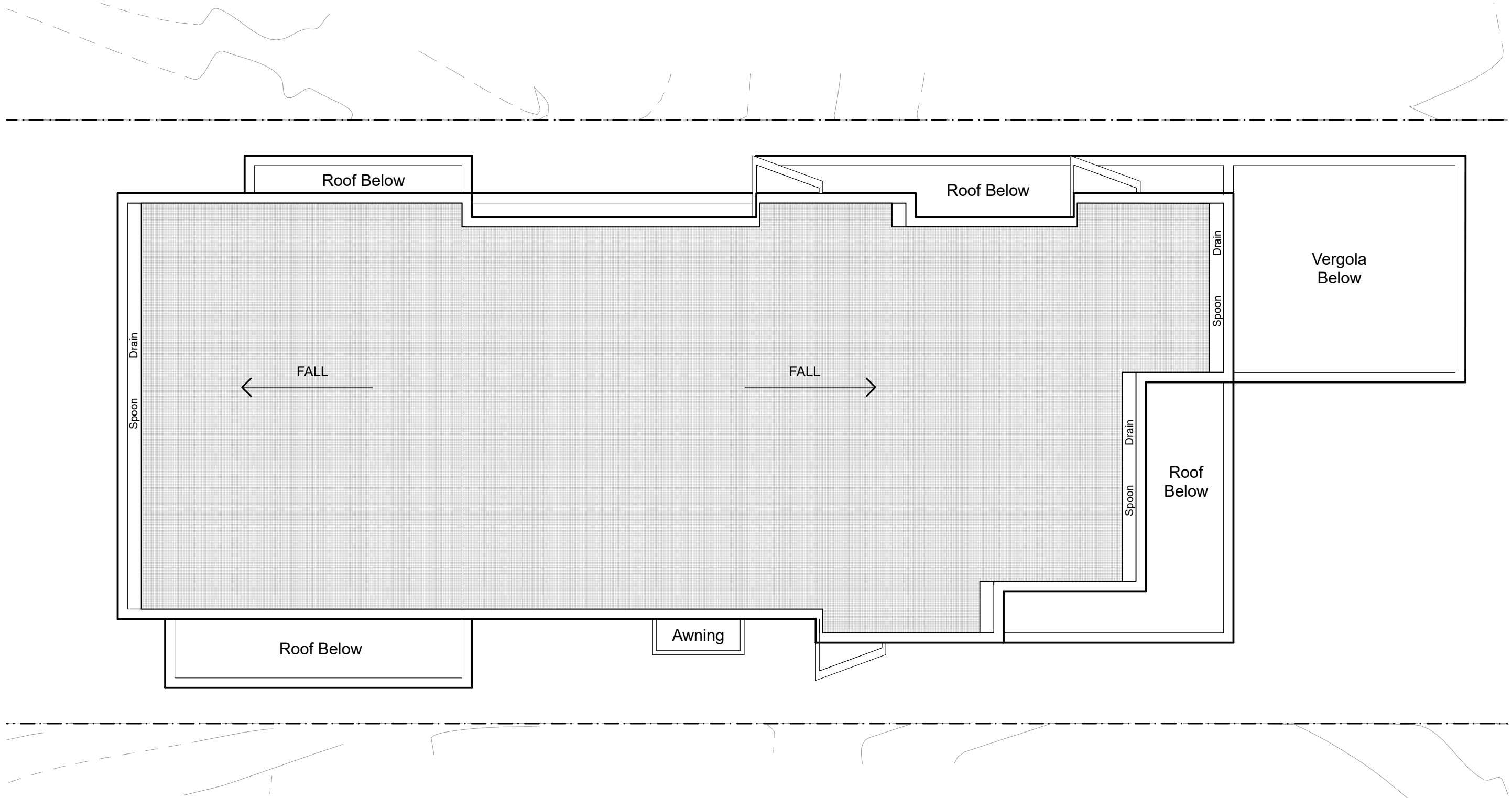
APPENDIX A



Architects: SHOBHA DESIGNS ARCHITECTS & URBAN DESIGNERS Suite 21, 1 - 7 Jordan St, Gladesville NSW 2111 PHONE : 02 98790020 MOBILE : 0418112677 EMAIL : nilesh@shobhadesigns.com.au shobha	PROJECT Demolition of Existing Structures & Construction of a New 2-storey Dwelling and Swimming Pool at 20 The Esplanade Narrabeen CLIENT Jason Smith N	Drawing Name GROUND FLOOR PLAN General Notes The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Drawings shall not be used for construction purposes until issued for construction. Do not scale drawings. All boundaries and contours subject to survey	Amendments				Date of Issue	14-Jul-22
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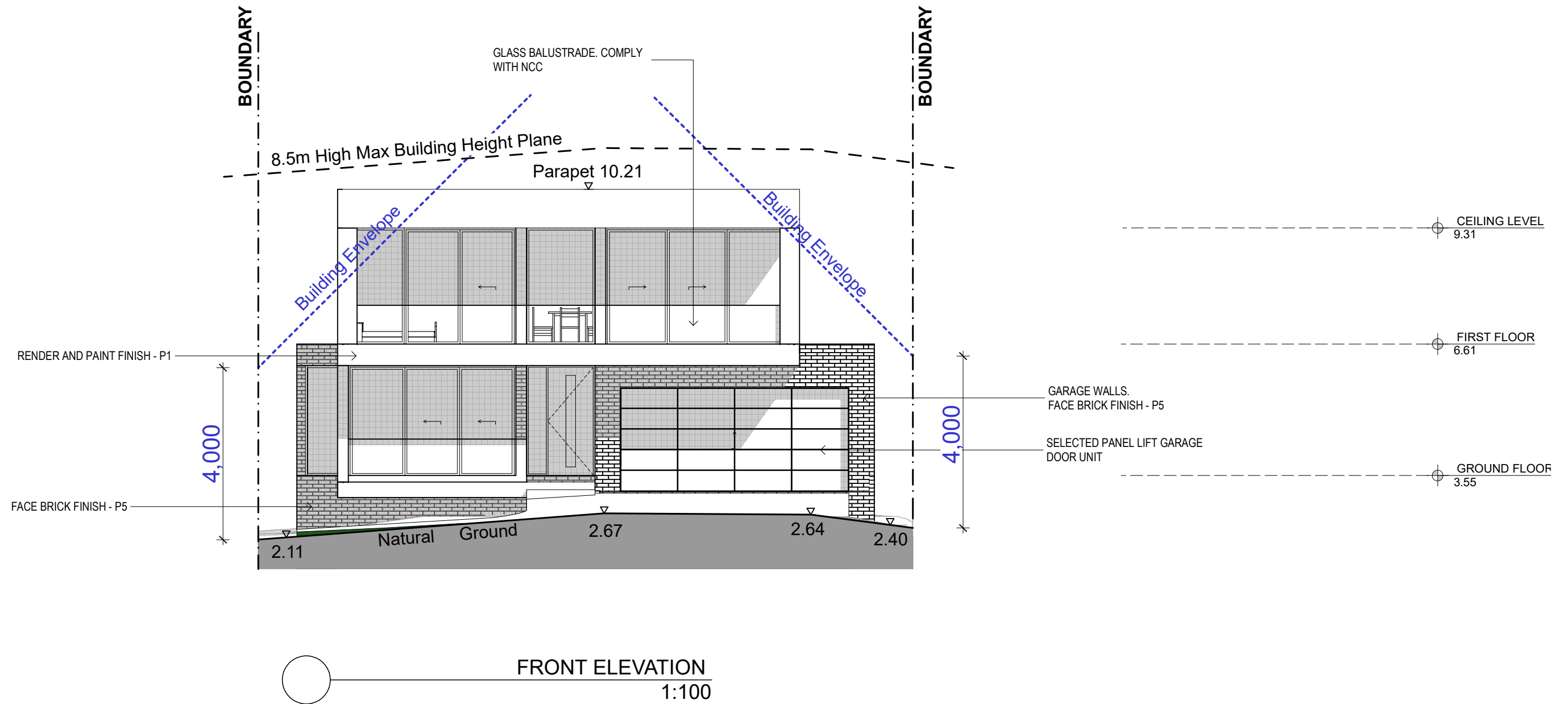


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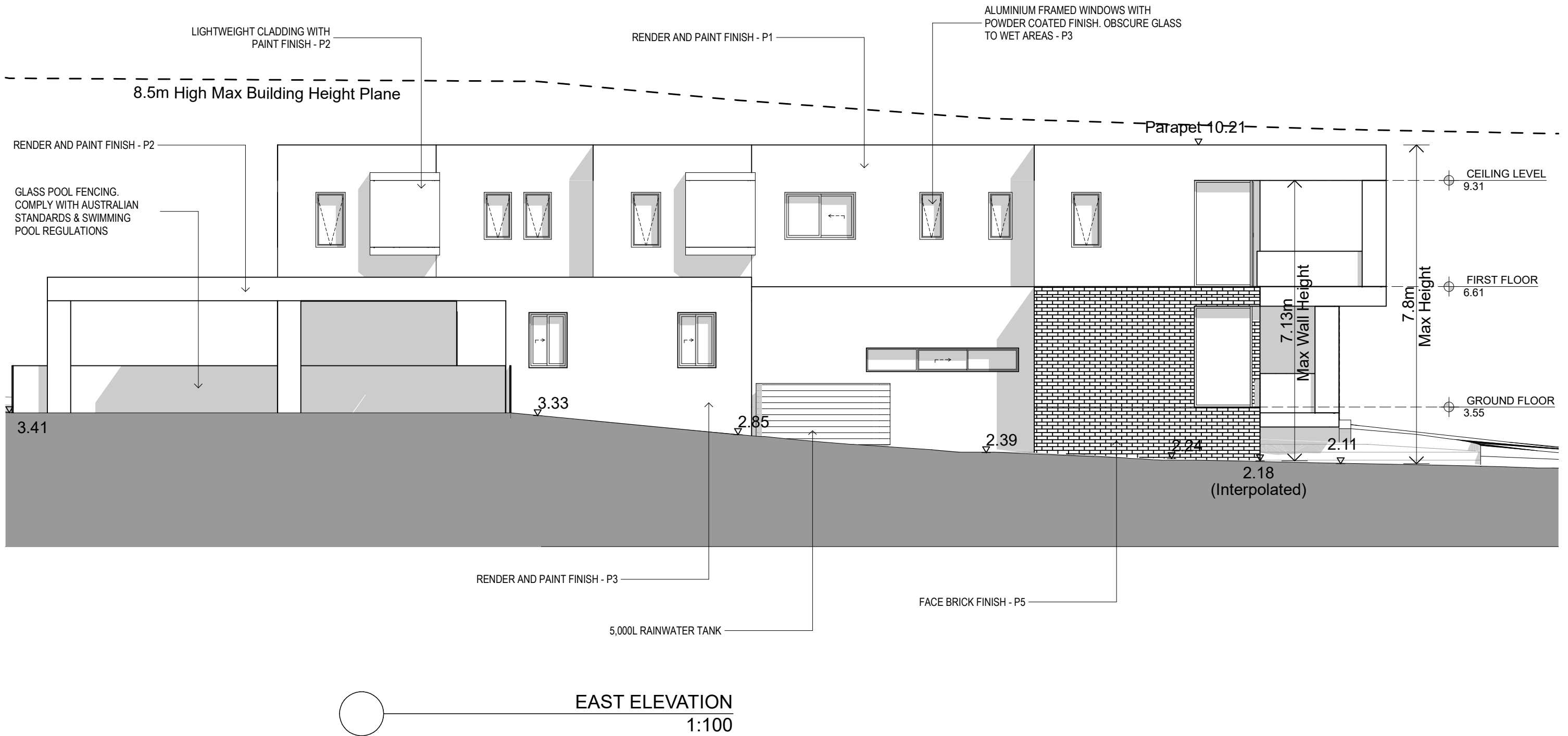


ROOF PLAN
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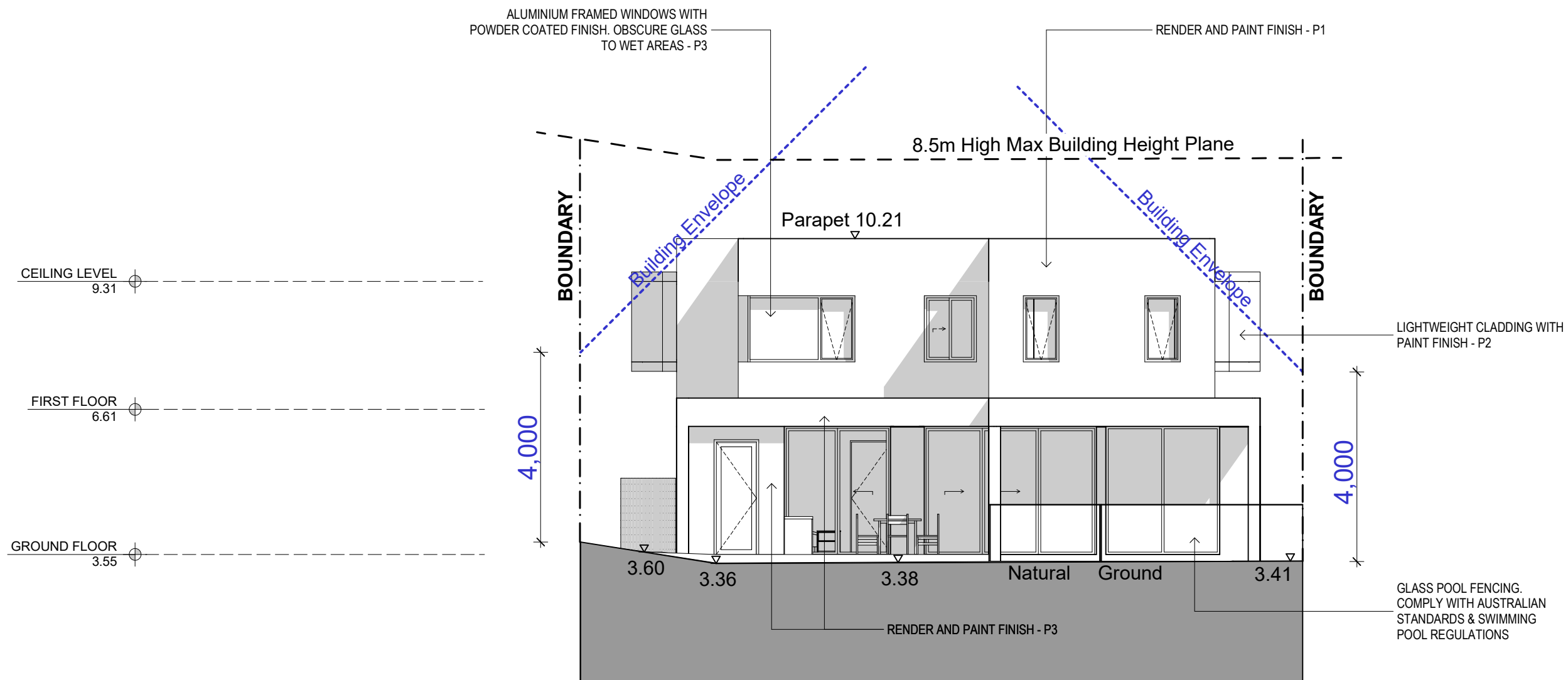
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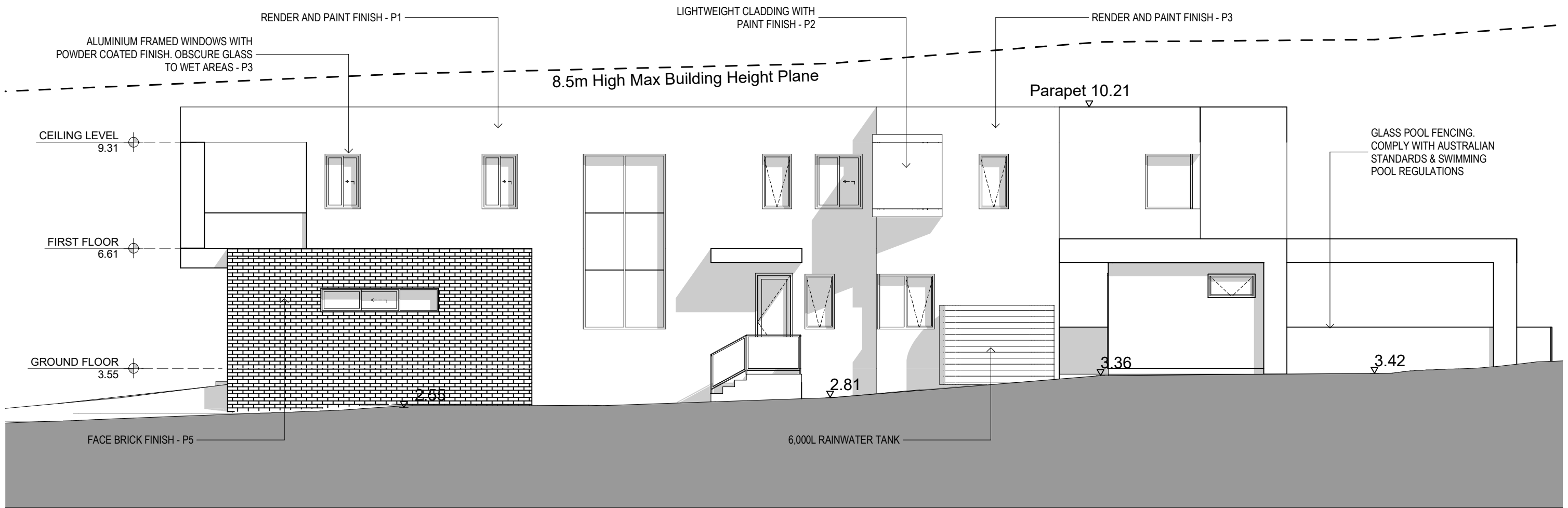


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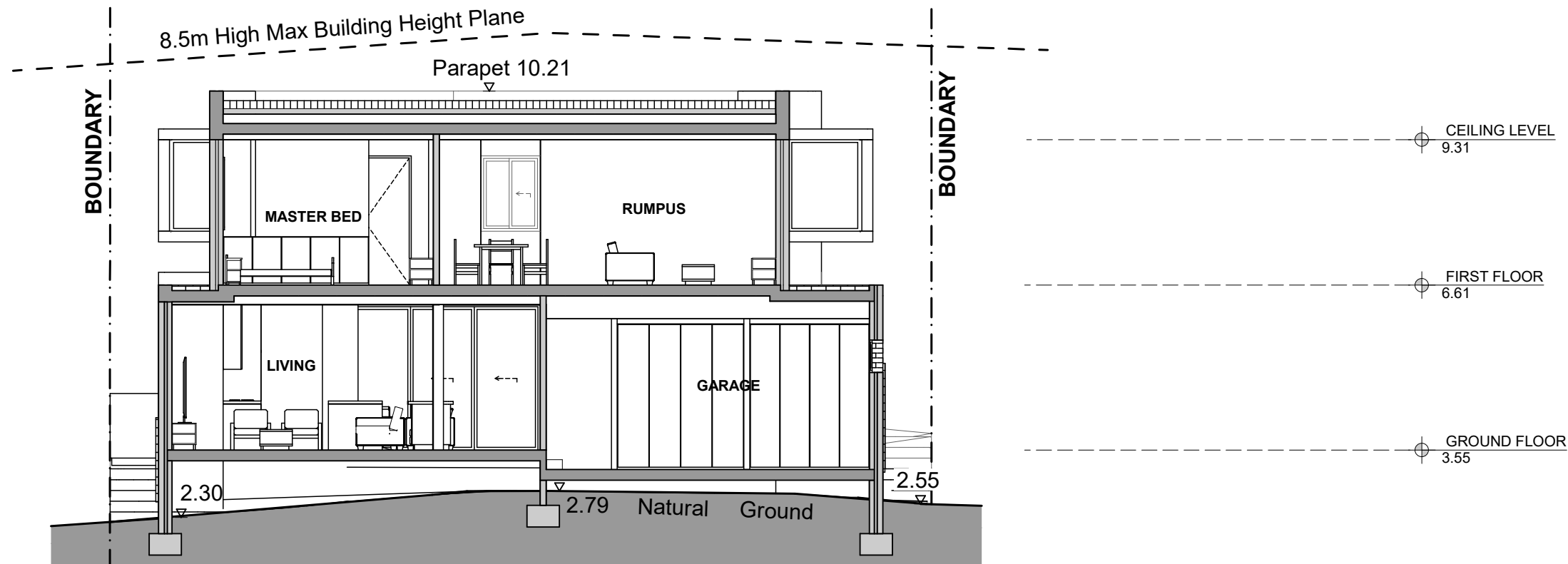
REAR ELEVATION
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Architects: SHOBHA DESIGNS ARCHITECTS & URBAN DESIGNERS Suite 21, 1 - 7 Jordan St, Gladesville NSW 2111 PHONE : 02 98790020 MOBILE : 0418112677 EMAIL : nilesh@shobhadesigns.com.au shobha	PROJECT Demolition of Existing Structures & Construction of a New 2-storey Dwelling and Swimming Pool at 20 The Esplanade Narrabeen CLIENT Jason Smith	Drawing Name REAR ELEVATION General Notes The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Drawings shall not be used for construction purposes until issued for construction. Do not scale drawings. All boundaries and contours subject to survey	Amendments				Date of Issue		14-Jul-22
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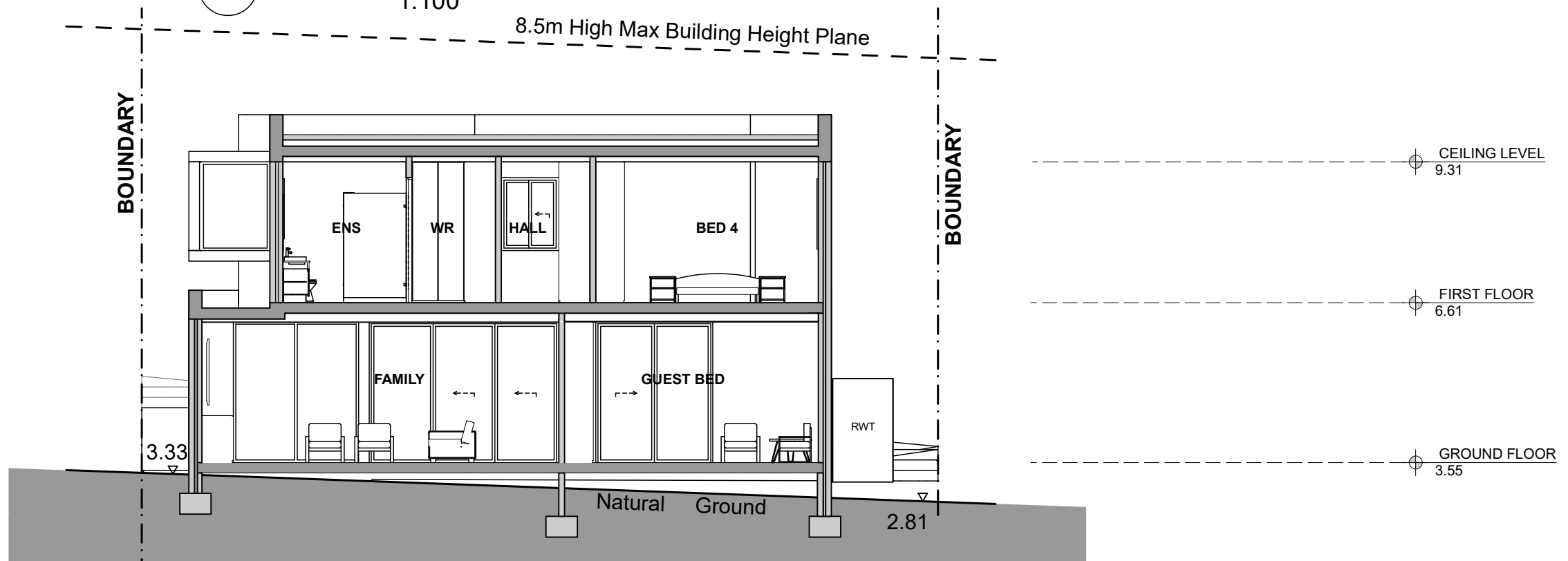


WEST ELEVATION
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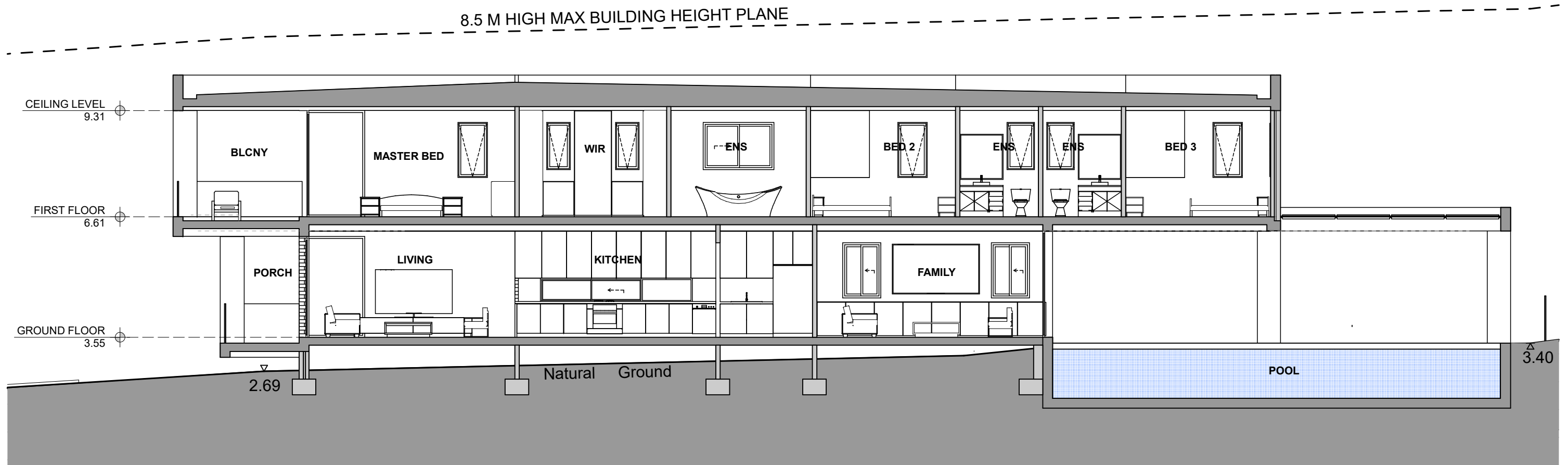


SECTION A
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SECTION B
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APPENDIX B

FLOOD INFORMATION REPORT – COMPREHENSIVE

Property: 20 The Esplanade NARRABEEN NSW 2101

Lot DP: Part Lot 32 Sec D DP 7090

Issue Date: 14/03/2022

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

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}: 3.55 m AHD

1% AEP Flood – See Flood Map B

1% AEP Maximum Water Level ^{2, 3}: 3.05 m AHD

1% AEP Maximum Depth from natural ground level³: 1.41 m

1% AEP Maximum Velocity: 0.12 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: 5.02 m AHD

PMF Maximum Depth from natural ground level: 3.38 m

PMF Maximum Velocity: 0.37 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 change³: 3.92 m AHD

1% AEP Maximum Depth with Climate Change³: 2.28 m

1% AEP Maximum Velocity with Climate Change³: 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.

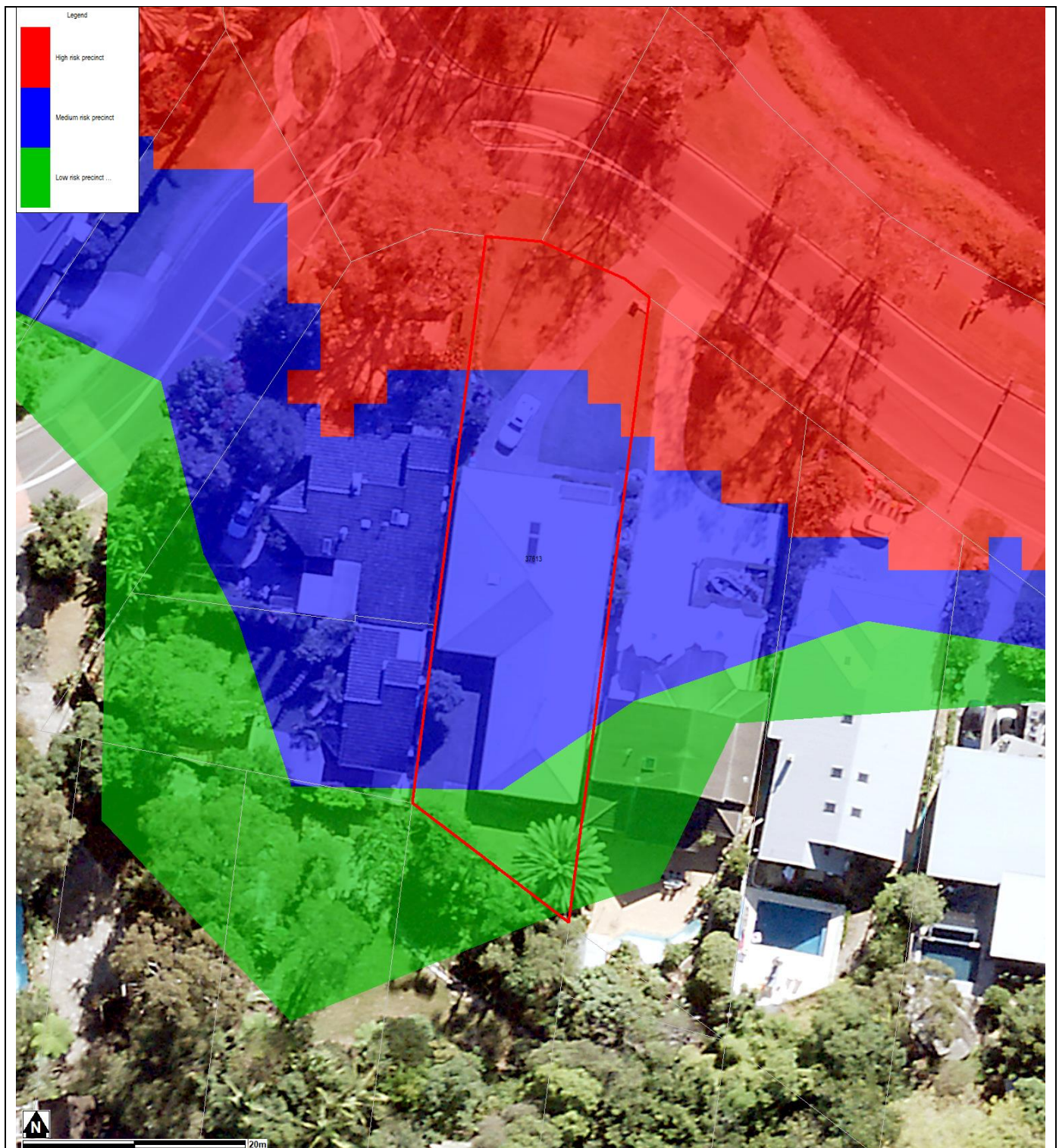
³ Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels.

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: Narrabeen Lagoon Flood Study 2013, BMT WBM) 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	2.71	0.89	3.05	1.23	0.12	3.55	5.02	3.20	0.18
2	2.71	0.93	3.05	1.27	0.04	3.55	5.02	3.24	0.19
3	2.71	1.05	3.05	1.39	0.09	3.55	5.02	3.36	0.24
4	2.71	0.32	3.05	0.66	0.02	3.55	5.02	2.63	0.09
5	2.71	0.26	3.05	0.60	0.02	3.55	5.02	2.57	0.08
6	2.71	0.07	3.05	0.41	0.03	3.55	5.02	2.38	0.07
7	N/A	N/A	N/A	N/A	N/A	3.55	5.02	1.64	0.24
8	N/A	N/A	N/A	N/A	N/A	3.55	5.02	1.53	0.07

WL – Water Level

PMF – Probable Maximum Flood

N/A = no peak water level/depth/velocity available in flood event

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	3.92	2.09
2	3.92	2.13
3	3.92	2.25
4	3.92	1.53
5	3.92	1.46
6	3.92	1.27
7	3.92	0.53
8	3.92	0.42

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 0.3m²/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: Narrabeen Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source Near Map 2014) are indicative only.

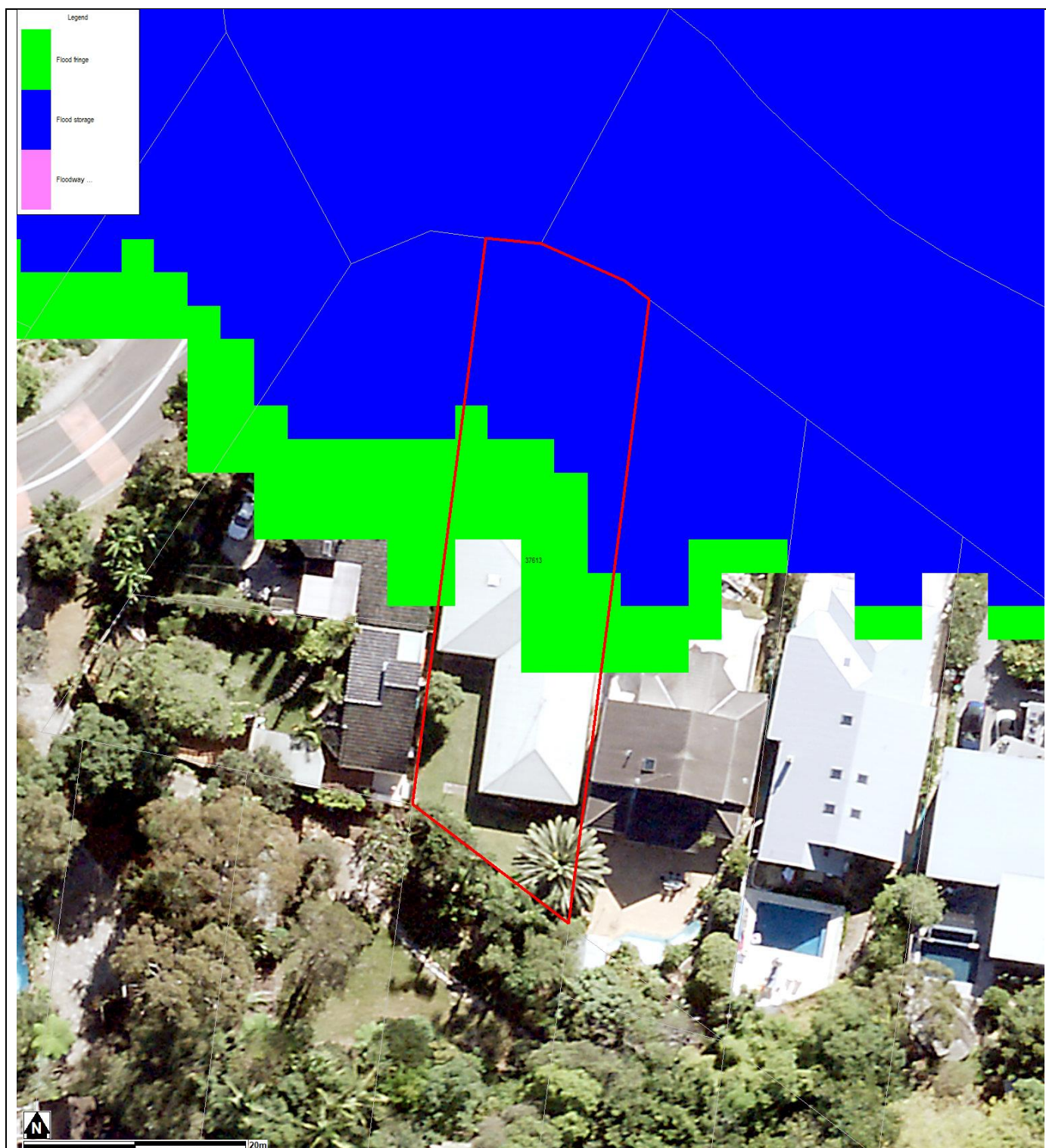
FLOOD MAP C: PMF EXTENT MAP



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

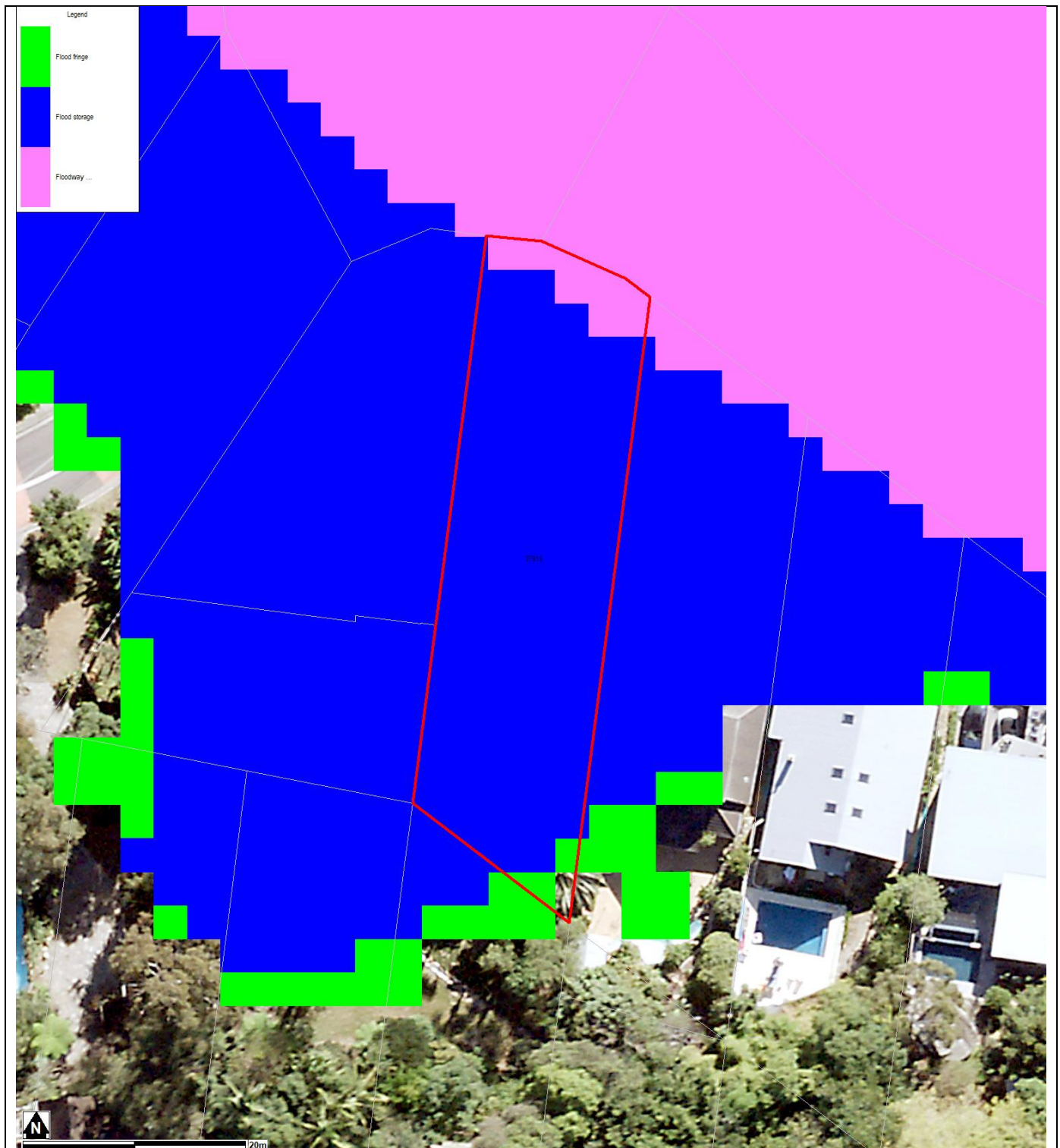
FLOOD MAP D: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM) and aerial photography (Source: NearMap 2014) are indicative only

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

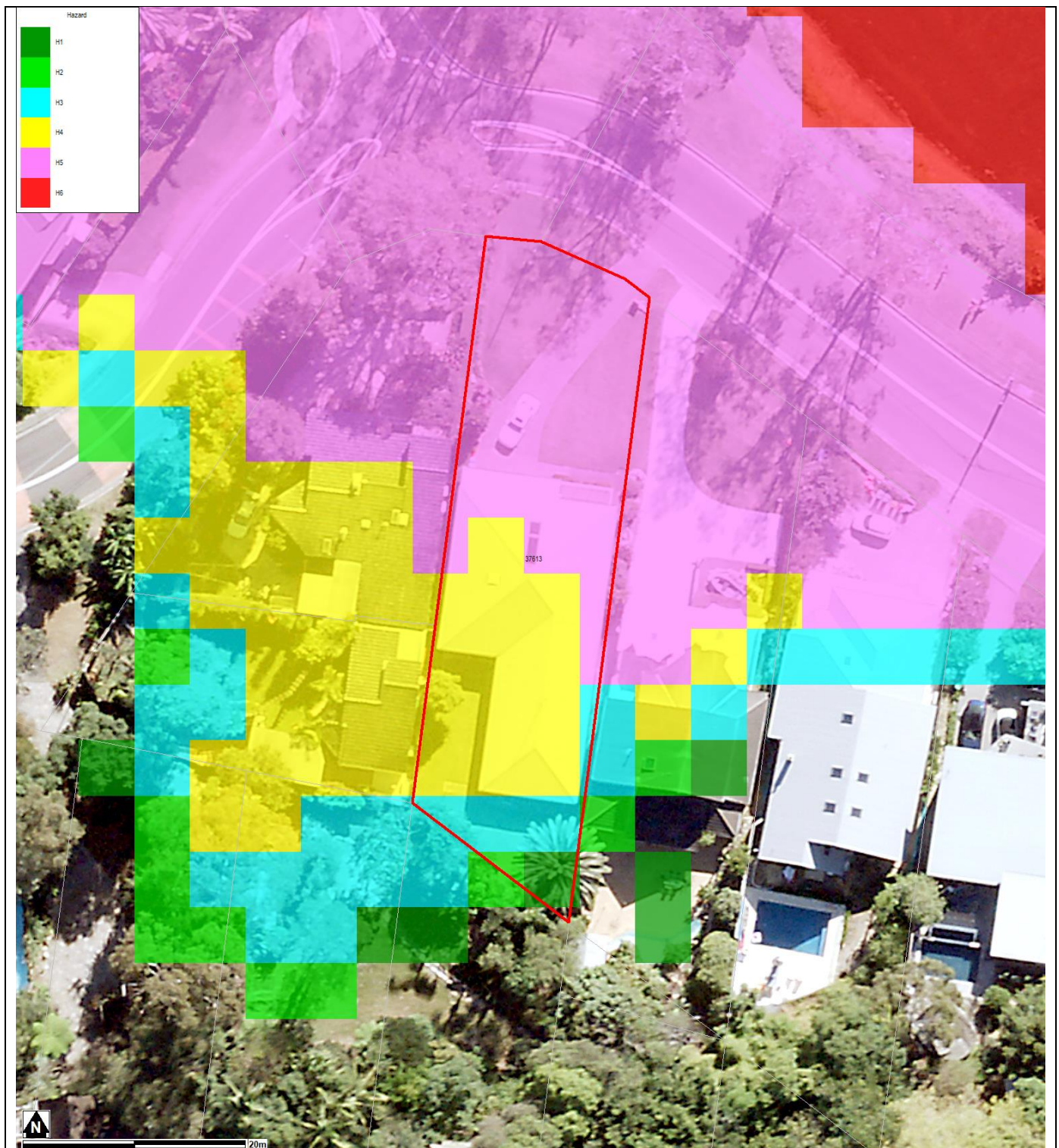
FLOOD MAP F: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE



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: Narrabeen Lagoon Flood Study 2013, BMT WBM) 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: Narrabeen Lagoon Flood Study 2013, BMT WBM) 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 $\pm 0.2\text{m}$ vertically and $\pm 0.15\text{m}$ 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 .