FLOOD RISK MANAGEMENT REPORT

Pittwater Council

Proposed New 2 Storey House
& Secondary Dwelling
at
1186 Barrenjoey Road, PALM BEACH

Job No. 151148
Issue A – 09 September 2016

Prepared for: Beecraft Pty Ltd

Prepared by: Rhys Mikhail

Contents

FLOOD RISK MANAGEMENT REPORT

DATE	09 September 2016
SITE	1186 Barrenjoey Road, PALM BEACH
ENGINEER	Rhys Mikhail
CLIENT	Beecraft Pty Ltd
JOB No	151148

INTRODUCTION:

NB Consulting Engineers (NBCE) assessed the supplied architectural plans for the premises, prepared by *Beecraft* (received 22/08/2016) for an application at the above site address in reference to potential flooding issues. The proposed development generally meets the intent of the requirements of *Pittwater Council 21 DCP* provided a Development Application is submitted.

The architectural plans and Council supplied flood information was used to determine flooding extents and impacts and to assess associated risks. The premises have been assessed in accordance with the requirements of Pittwater Council 21 DCP, *NSW State Environmental Planning Policy (2008) – section 3.36C*, Councils supplied flood information, Pittwater Council's Flood Risk Management Reports – "*considerations when preparing a report"* sheet, *Pittwater LGA Flood Risk to Life Classification Study (2015)*, *The Pittwater Overland Flow Mapping and Flood Study (Cardno 2013), Flood Emergency Response Planning for Development in Pittwater (2015)* and the *NSW Government Floodplain Management Manual (2005).*

The site is located on the corner of Barrenjoey Road and Beach Road in Palm Beach and is generally sloping towards the street. There currently exists a restaurant on site fronting Beach Road. The proposed development is in

reference to a new two storey house and attached secondary dwelling towards the south-eastern section of the property (Refer Appendix B).

The development site is located within the vicinity of the flood extents (for the 1% AEP flood event) as predicted by council flood information supplied (refer Appendix A). It should be noted that the supplied information predicts that the 1% AEP flood extents will inundate approximately 75% of the property to a maximum approximate depth of 0.41 m.

Below is a summary of flood information in reference to *Northern Beaches (Pittwater) Council 21 DCP* requirements and the *NSW Government Floodplain Management Manual* with reference to the 100 Year ARI storm event (1% AEP).

FLOOD RISK REPORT:

- Flood Category — 1 & 3 – identified by council
- Hydraulic Categorization — Flood Storage, Flood Fringe
- Hazard classification — Low
- Life Hazard Category — H1-H2
- Maximum 100 Year Flood Level (1% AEP) — 3.1 m AHD
- 1% AEP Maximum Velocity — 1.45 m/s
- Flood Planning Level (FPL) — 3.6 m AHD
- Probable Maximum Flood Level (PMF) — 3.31 m AHD
- PMF Maximum Velocity — > 2.5 m/s
- Existing Ground Floor Level — 3.64 m AHD
- Degree of inundation — 75%
- Hazard Level — Low
- Impacts of waterborne objects — Low
- Buoyancy — Low

- Impact on surrounding properties — None envisaged
- Flood levels — No anticipated increase
- Flood storage — No anticipated net loss

  The proposed 'flood blockage' area for the proposed development has been reduced due to the raising of the proposed dwellings at the FPL. This will ensure there is no net increase or decrease in flood storage volume for the site. Refer Appendix C for flood storage areas.

  The following is required to ensure this is achieved:

  - The proposed dwellings are to be suspended above the 1% AEP flood level at a minimum of the FPL.
  - Openings are to be provided in the perimeter walls to allow for floodwaters to flow below the structure unimpeded.
  - Onsite drainage is to be provided in accordance with Pittwater Council DCP21 and AS3500.3.2 and is to be prepared by a qualified civil engineer.

- Flood behavior

  The flooding expected for the site is predominately a flood storage area located within the flood fringe. This type of flooding generally occurs from an overburdened local drainage infrastructure resulting from intense rainfall within the local catchment. There also appear to be effects from an adjacent overland flow path from the street trunk drainage that may enter the development site. Refer Appendix A for council website and council supplied flood information indicating the predicted localised flood extents adjacent the development property. Note that the effects of boundary fences running through the overland flow path have not been considered in this report.

- Recommendations for structural design

  The proposed structure is to be designed and inspected by a structural engineer certifying that the structure is adequate to withstand flood forces up to and including the 1% AEP flood level. The structure is to be designed

to suspend above the 1% AEP flood level to allow for floodwaters to flow below the structure unimpeded. Openings are to be provided as required.

- Driveway

  The velocity verse depth ratio for the driveway area is approximately 0.4 for a flow depth of approximately 0.3m. This is considered a "Low Hazard" area outlined in the "*Floodplain Management Manual: the management of flood liable land – January 2001 NSW Government*".

  The driveway is proposed to be suspended, however this should be constructed on compacted or form fill material to reduce any potential Work Health and Safety risks in relation to the access of a confined space. Design grades are to comply with local council *DCP21* and *AS2890.1* requirements.

- Waterproofing methods

  All electrical equipment is to be fitted with circuit breakers. Switchboard and main circuit unit to be fitted above a council recommended level of 3.6m AHD. Other valuable materials or possessions are to be stored as above and should be acknowledged by the owner and occupants that a reasonable extent of damage to fittings below the RL 3.6m AHD is to be expected during the 1% AEP storm event. Electrical wiring/data cable needs to be made suitable for continuous submergence to a depth of 3.6m AHD and conduits graded to they are free draining in a flood event to council requirements.

- Hazardous Material Storage

  All stock storage and/or hazardous chemicals are not to be stored in areas under a council recommended level of 3.6m AHD and should be acknowledged by the property owner.

FLOOD EMERGENCY RESPONSE PLAN:

- Risk Exposure New dwellings

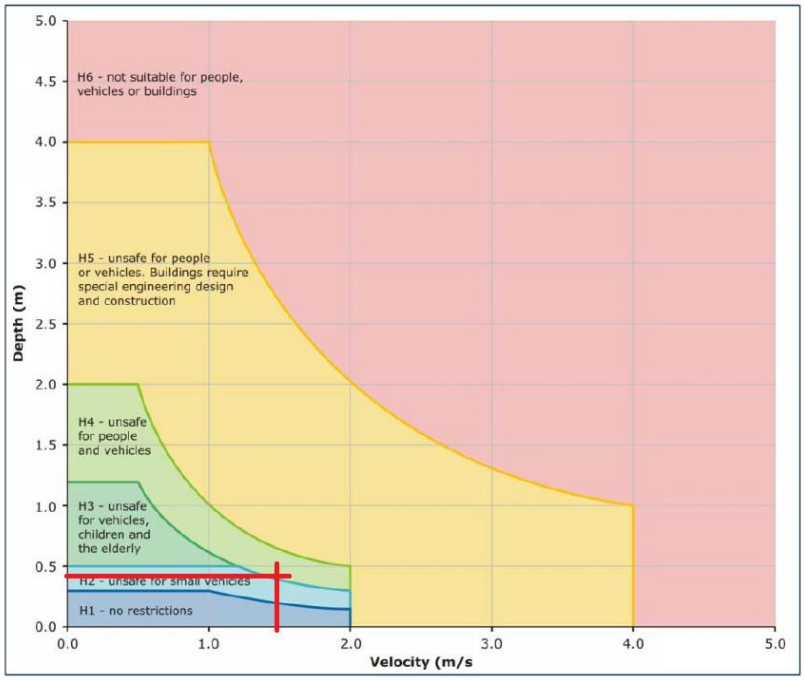


Figure 1.0 – Flood Hazard Curve Risk Level for the Development

- Level of Evacuation 1% AEP Event
- Local Warnings to trigger action of the Response Plan:
  - During heavy rainfall, assess water levels along the property frontage. Should water begin to inundate the kerb and road reserve fronting the property, evacuation is to be implemented.
  - If a server weather warning is issued.
- Evacuation strategy and Onsite Response Plan

  Occupants are to be aware that the rate of rise of floodwaters for the PMF event in this location is less than 15 minutes until the road is unsafe for pedestrians and vehicles. Floodwaters are predicted to reach peak levels in less than 1 hour from rainfall commencing. Should floodwaters begin to rise and encroach within the rear of the property, evacuation procedures are to commence immediately.

Should floodwaters rise and inundate the street fronting the property adjacent the intersection, evacuation is to take place immediately. Residents are to seek higher ground and:

1. head south along Barrenjoey Road
2. find a *safe* place for shelter until flooding abates.

Subsequent updates are to be implemented by the occupants of the dwelling and the practice of flood evacuation procedures are to be undertaken annually.

- Shelter-in-place

  The first floor levels for the development can be designated as high-level onsite refuse. Due to the rapid rate of rise of floodwaters and the high PMF level, high-level on-site refuse is to be implemented if evacuation is not feasible. Because the period of isolation onsite could be greater than 2 hours in a PMF event, adequate floor space area above the PMF level should be recognised as a *shelter-in-place* area. The first floor level is located approximately 3.3m above the PMF level and provides adequate floor space area to achieve the minimum council requirement of $2m^2$ per person.

- Flood warning and signage
  - Flood warning signage is not recommended for this development.
  - A list of emergency contacts is to be kept on both premises that includes but not limited to; emergency services (000), the State Emergency Service (132 500), local Council, the local Police, ambulance and fire and rescues numbers and the Bureau of Meteorology.
  - A copy of this Flood Risk Report and the *Flood Emergency Response Plan* is to be kept on the premises at all times. The owner/occupant is to be fully aware of these documents and requirements in the event of floodwaters rising.

RECOMMENDATIONS / CONCLUSION:

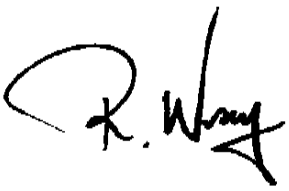
- Proposal Reviewed
- The proposed development is not envisaged to have an adverse effect on surrounding properties. The flood levels provided from council flood information request have been adopted for this assessment. The proposed development generally meets the requirements of *Northern Beaches (Pittwater) Council 21 DCP*. A development application is recommended.
- Authors qualifications / experience

Rick Wray
Director NB Consulting Engineers
BE (Civil) MIEAust CPEng NER RPEQ
Over 30 years professional experience

Rhys Mikhail
Senior Engineer NB Consulting Engineers
BE (Civil) MIEAust CPEng NER RPEQ
Over 10 years professional experience

We trust that this certificate meets with your requirements. Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L



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Director
BE(Civil) MIEAust CPEng NER RPEQ

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APPENDIX A – FLOOD INFORMATION

(Northern Beach Council – Pittwater)

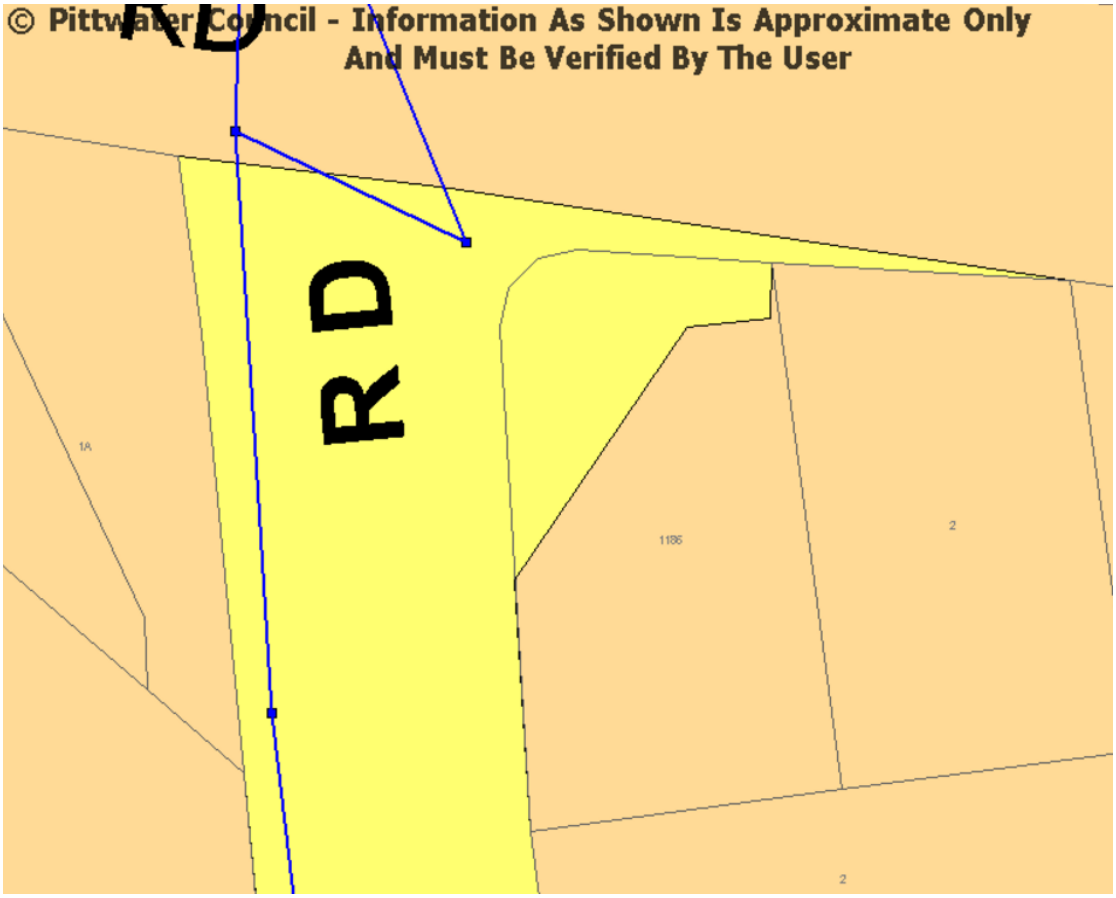

Figure 2 – Northern Beaches Council Drainage Information

PITTWATER COUNCIL

FLOOD INFORMATION REQUEST – BASIC PURPOSE

Property: 1186 Barrenjoey Road, Palm Beach
Lot DP: 1//1050253
Issue Date: 25 November 2015
Flood Study Reference: 2013 Pittwater Overland Flow Flood Study (Cardno)

A property can be impacted by more than one Category of flooding.

Flood Categories defined by the Pittwater 21 Development Control Plan include:

- **Flood Category 1 Areas**- Properties identified on the Flood Hazard Maps and located within Primary Floodplain Areas where the lowest point of the property is affected by the Flood Planning Level (FPL) (1% AEP flood level plus 500mm Freeboard). Flood Category 1 areas are further defined under flood hazard subcategories of high hazard and low hazard.
- **Flood Category 2 Areas**- Properties identified on the Flood Hazard Maps where the lowest point of the property lies above the Flood Planning Level but below the level of the Probable Maximum Flood.
- **Flood Category 3 Areas**- Properties generally located outside or adjacent to the Primary Floodplain Areas that are affected by flooding hazards associated with major stormwater drainage systems, local overland flow paths or drainage easements. Flood Category 3 Areas are further defined under the subcategories of Overland Flow Path – Major and Overland Flow Path – Minor.

Flood Information for lot:

Flood Life Hazard Category – See Map A

Flood Category 1 (Mainstream Flooding) – See Flood Map C

Flood Category 3[5] (Overland Flow) – See Flood Map E

1% Annual Exceedance Probability (1% AEP): See Flood Map B

1% AEP Overland Flow Maximum Water Level[3&4]: 3.1m AHD

1% AEP Overland Flow Maximum Depth from Natural Ground Level[3&4]: 0.5m

1% AEP Overland Flow Maximum Velocity: 1.45m/s

Minimum Floor Level[1,2 &4]: 3.6m AHD or 0.5m above the 1% AEP overland flow major extent and 0.3m above the 1% AEP overland flow minor extent.

1% AEP Overland Flow Provisional Flood Hazard: See Flood Map F

1% AEP Overland Flow Hydraulic Categorisation: See Flood Map G

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Figure 2a – Northern Beaches Council Flood Information (pg 1 of 10)

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Probable Maximum Flood (PMF) Level[2]: 3.31m AHD (See Flood Map D)

PMF Maximum Depth from natural ground level: 0.6m

PMF Maximum Velocity: >2.50m/s

Flood Category 2 (PMF) – See Flood Map D

[1]Intensification of development requires the consideration of climate change impacts which may result in higher planning levels than those indicated on this flood advice.
[2]Special Flood Protection developments require a higher planning level using the higher of the PMF or FPL/minimum floor level.
[3]The flood information does not take into account any local overland flow issues with a depth below 0.15m nor private stormwater drainage systems.
[4]Overland flow water levels may vary across a sloping site, resulting in variable minimum levels across the site.
[5]The applicable Flood Category 3 classification applied for the purpose of development assessment unless otherwise demonstrated in the Flood Risk Management Report that a different classification should apply (dependent on the location of the proposed development).

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- The source information on this advice was obtained from numeric modelling prepared by consultants for Pittwater Council for existing site conditions at the time of the flood study. Separate review and flood model verification has not been undertaken by Council.
- The interpolated information is for the purpose of planning only. Detailed flood data for individual land areas were not determined from the exercise.
- Flood models only approximate flood behaviour. Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding. A site specific flood study/risk assessment may be required for any future development. Care and expertise is required in the interpretation of these flood levels. Engage a suitably qualified engineer to assist you in this matter.
- You need to refer to the Pittwater 21 DCP flood development controls, if you are planning to lodge a Development Application.The advice may be reviewed and amended by Pittwater Council in the course of assessment of a specific development application.
- While this advice is periodically updated, it is possible that the Council holds further information dealing with the flooding which has not been incorporated into the above advice.
- Estuarine/coastal inundation has not been taken into account in the flood information.
- Council is currently reviewing the 2013 Pittwater Overland Flow Flood Study for this area and as such the property's flood classification and flood level may be subject to changes as a result of the updated flood modelling.

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Figure 2b – Northern Beaches Council Flood Information (pg 2 of 10)

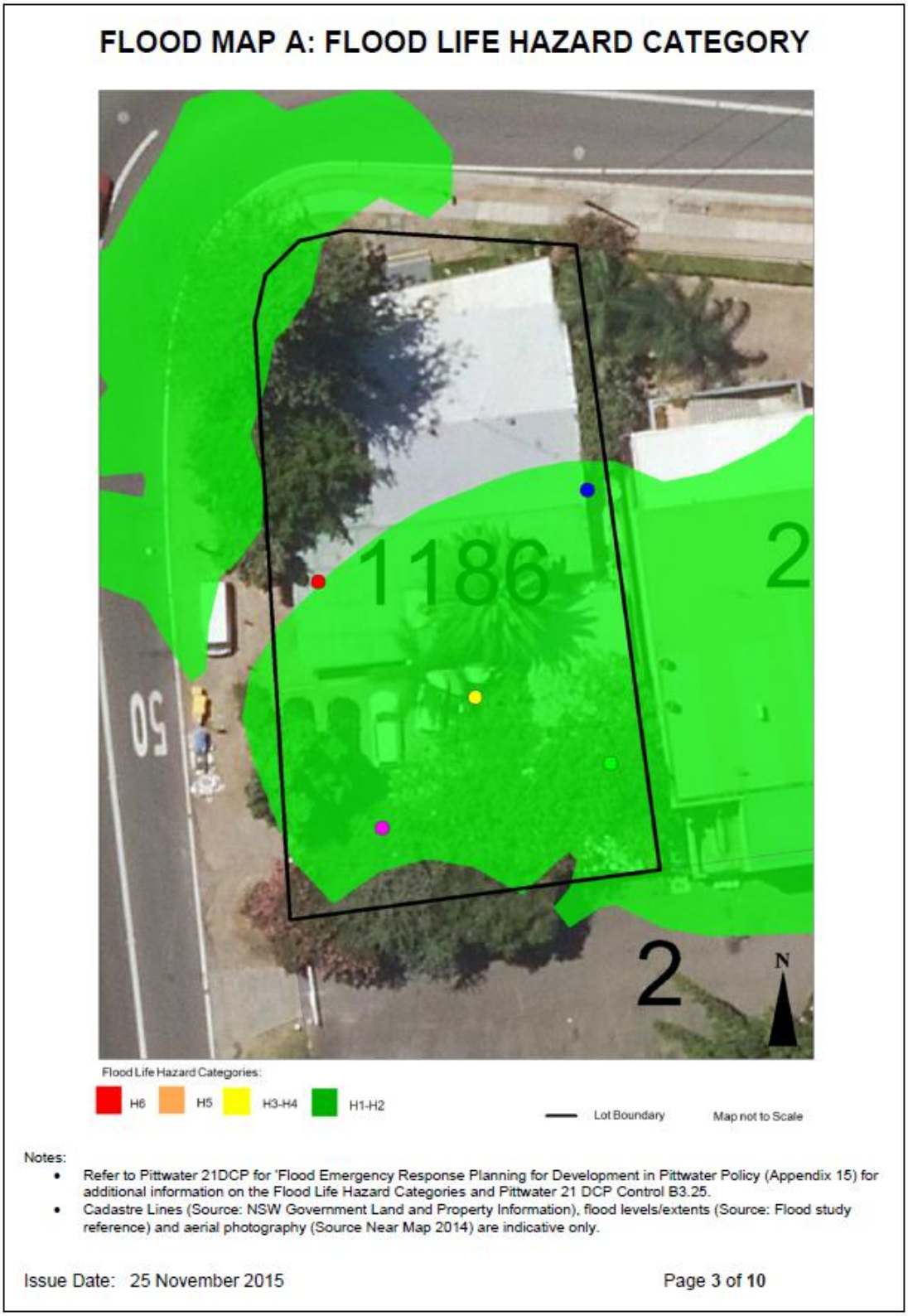

Figure 2c – Northern Beaches Council Flood Information (pg 3 of 10)

FLOOD LEVEL POINTS

Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Flood study reference) and aerial photography (Source: Near Map 2014) are indicative only

Flood Levels

	1% AEP Max Water Level (m AHD)	1% AEP Max Water Depth (m)	PMF Max Water Level (m AHD)	PMF Max Water Depth (m)
●	3.08	0.22	3.27	0.40
●	3.02	0.18	3.16	0.30
●	3.08	0.41	3.27	0.57
●	3.09	0.36	3.29	0.56
●	3.07	0.39	3.26	0.51

WL – Water Level
PMF – Probable Maximum Flood

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Figure 2d – Northern Beaches Council Flood Information (pg 4 of 10)

Figure 2e – Northern Beaches Council Flood Information (pg 5 of 10)

FLOOD MAP C: MAINSTREAM FLOODING – FPL EXTENT

Category 1 FPL extent Lot Boundary Map not to Scale

This Property is currently not identified as being affected by Mainstream flooding based off the 2013 Pittwater Overland Flow Flood Study. Council is however undertaking a review of this model/Flood Study, and as a result this property's flood classification may change because of the update to the mainstream model.

Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- Mainstream FPL – Mainstream Flood Planning Level includes the 0.5m freeboard on the 1% AEP extent for planning purposes.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Flood study reference) and aerial photography (Source Near Map 2014) are indicative only.

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Figure 2f – Northern Beaches Council Flood Information (pg 6 of 10)

Figure 2g – Northern Beaches Council Flood Information (pg 7 of 10)

Figure 2h – Northern Beaches Council Flood Information (pg 8 of 10)

Figure 2i – Northern Beaches Council Flood Information (pg 9 of 10)

Figure 2j – Northern Beaches Council Flood Information (pg 10 of 10)

APPENDIX B – EXISTING SITE SURVEY AND PROPOSED PLANS

(*Souter & Associates* and *Beecraft*)

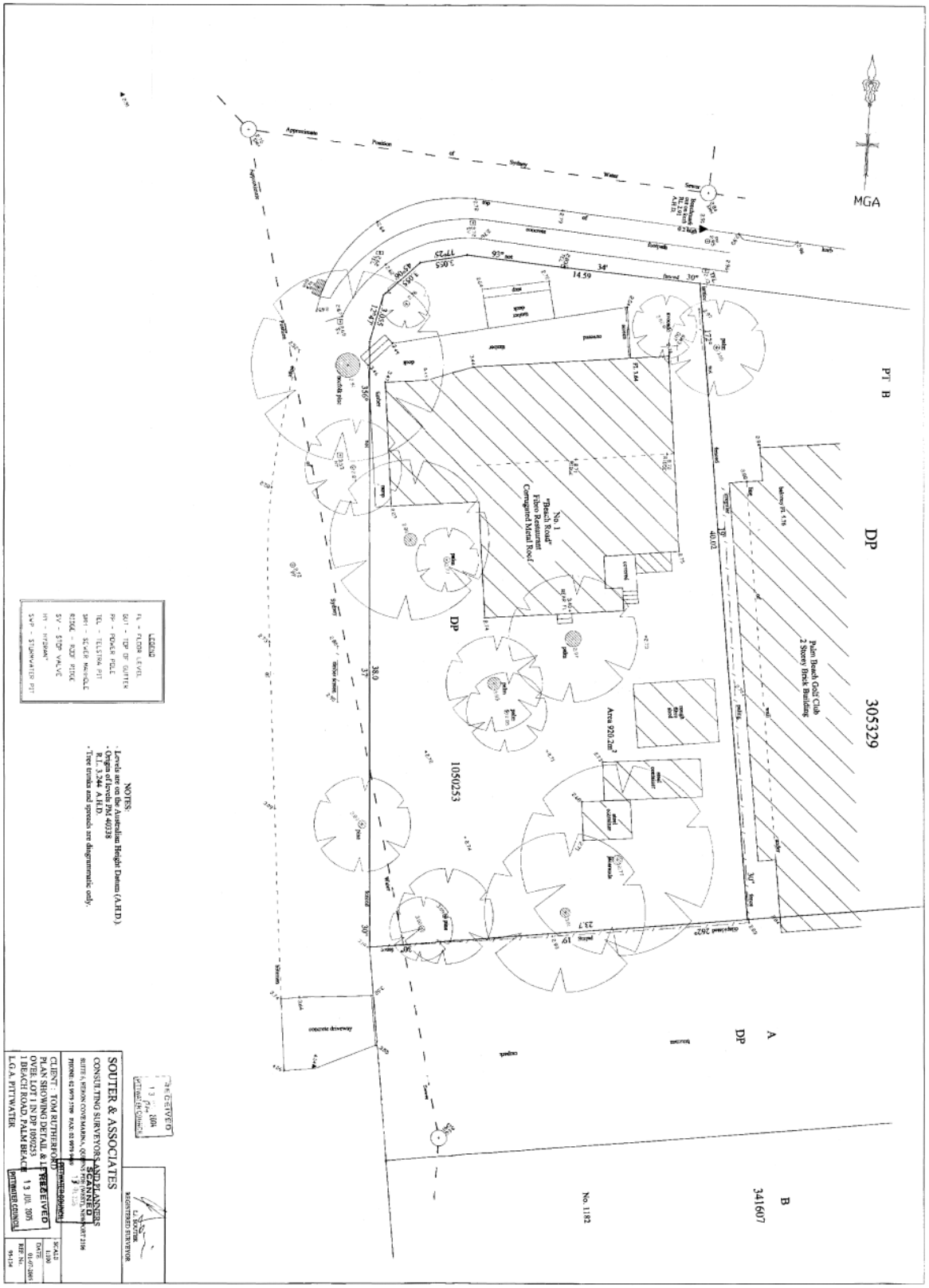

Figure 3 – Existing Site Survey Plan

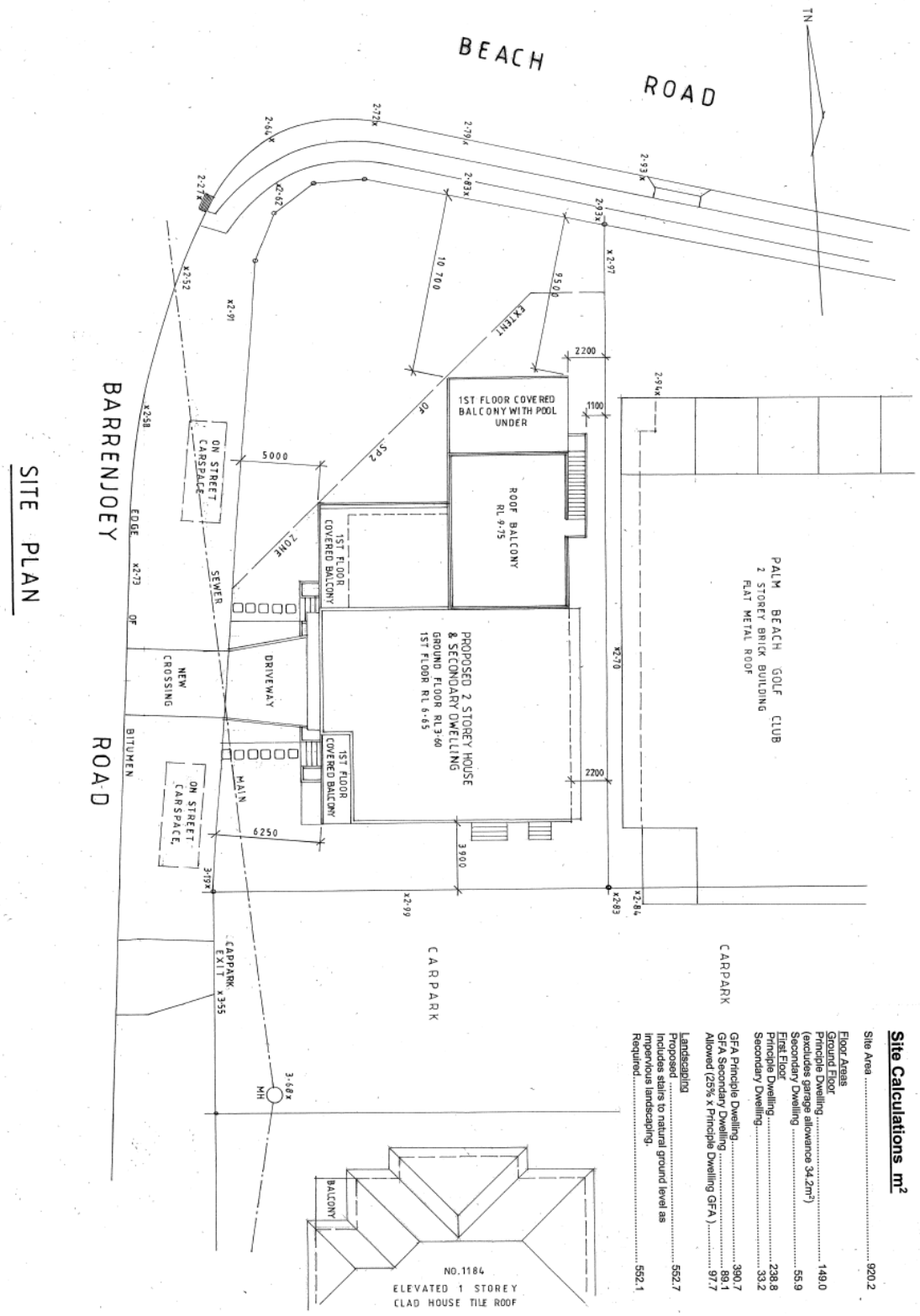

Figure 4 – Proposed Site Plan

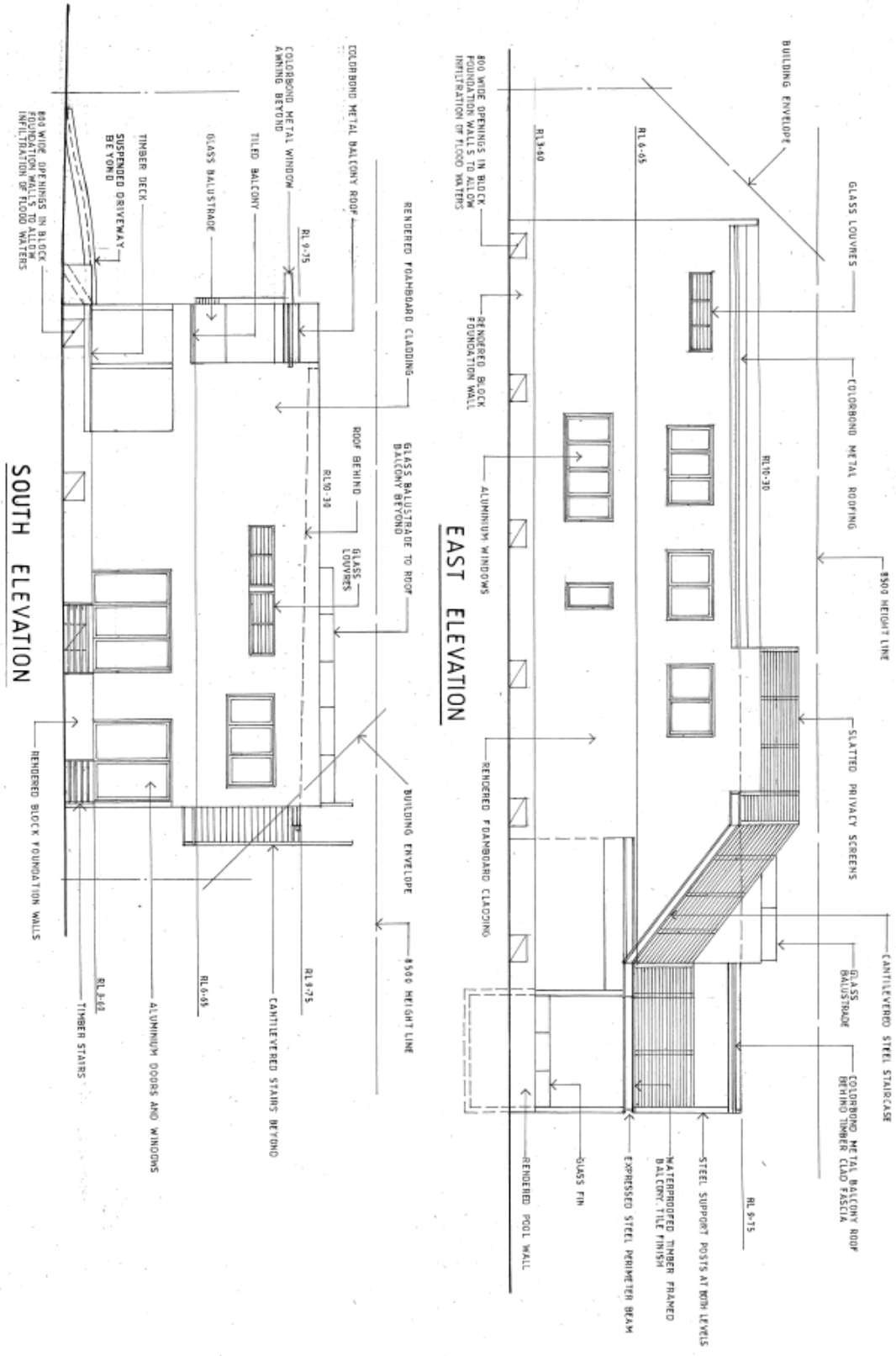

Figure 5 – Proposed Elevation Indicating Openings for Floodwaters

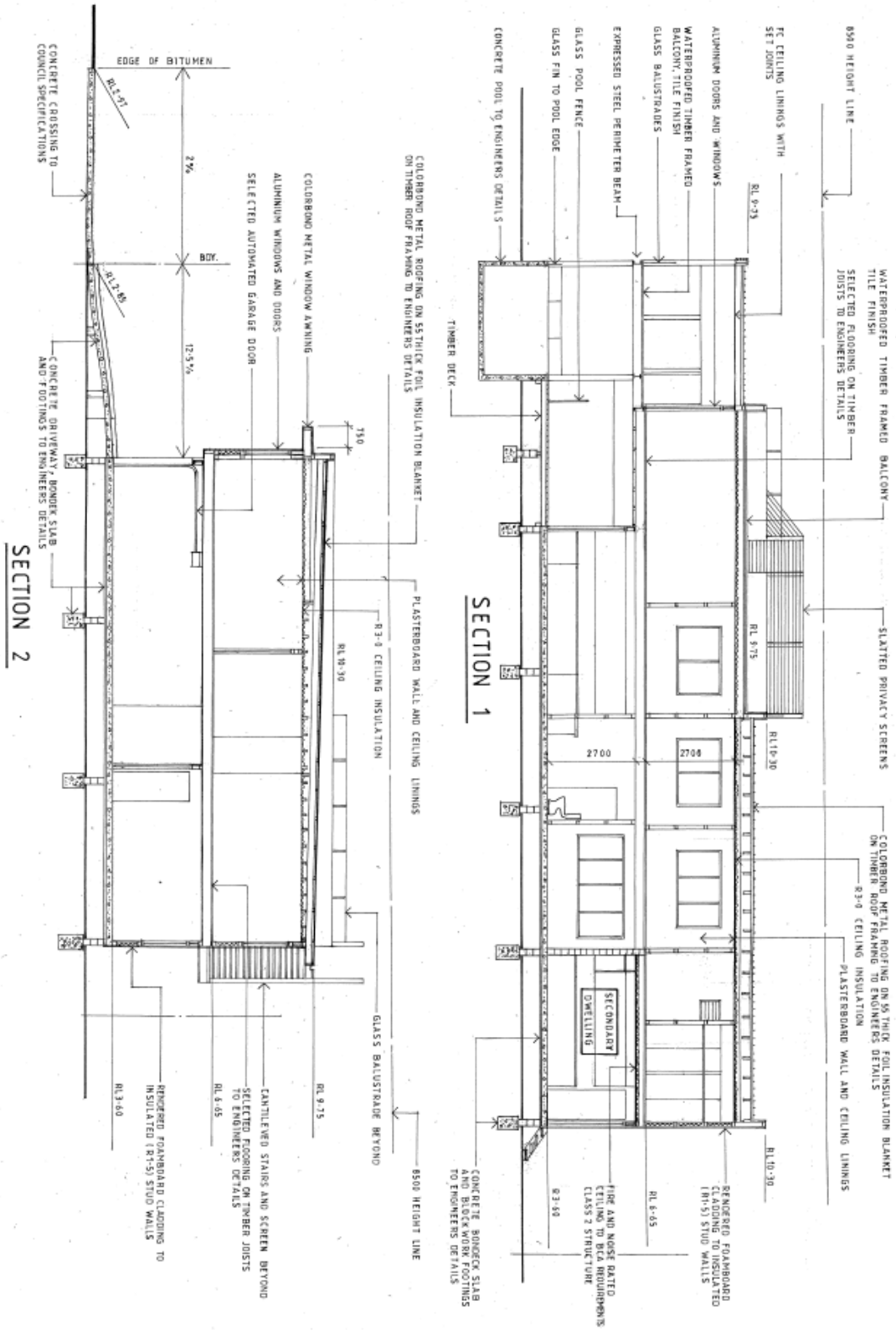

Figure 6 – Proposed Section Indicating Dwellings Suspended Above 1% AEP Flood Level

APPENDIX C –EXISTING AND PROPOSED FLOOD BLOCKAGE AREAS

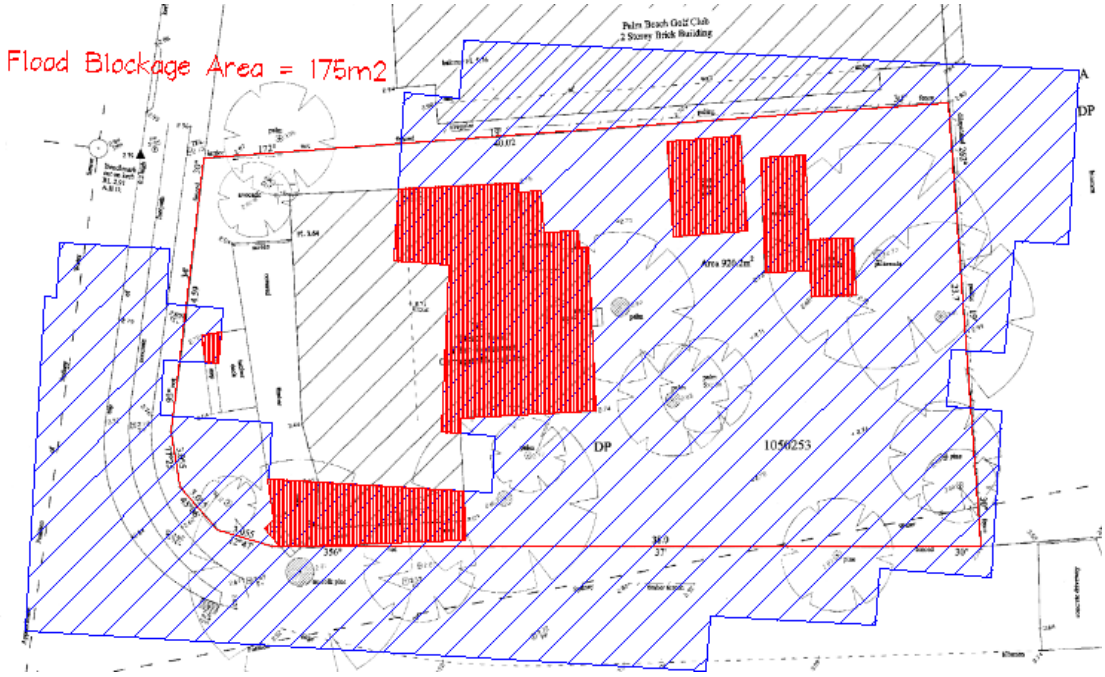

Figure 7 – Existing Flood Blockage Areas

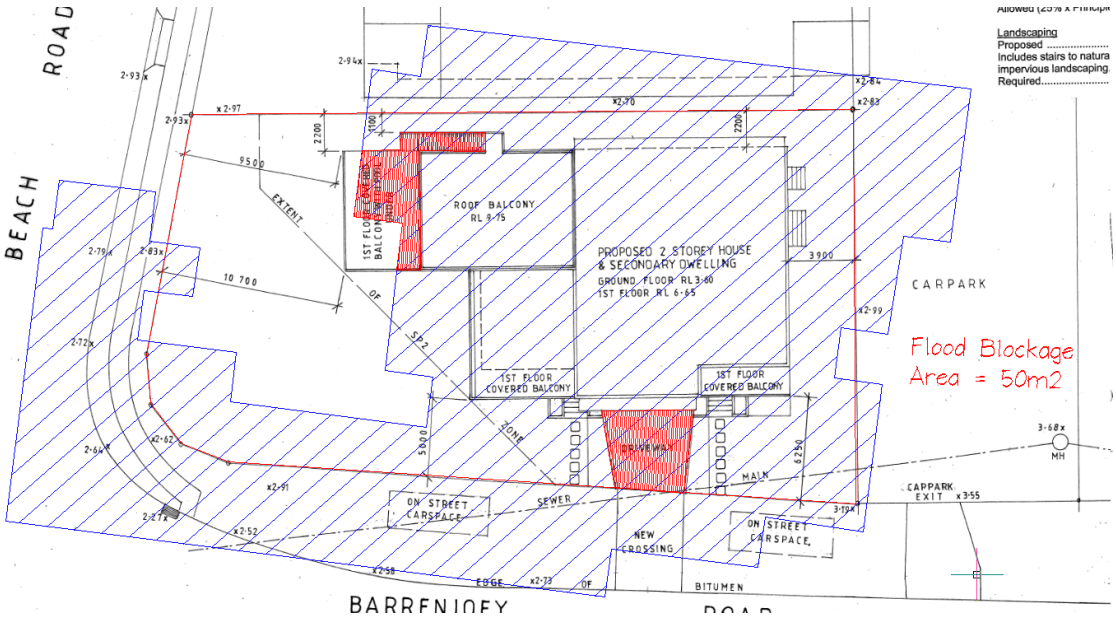

Figure 8 – Proposed Flood Blockage Areas