

3 Attachment C – Form 1

**FLOOD EMERGENCY RESPONSE PLANNING FOR DEVELOPMENT IN PITTWATER POLICY**  
FORM NO. 1 – To be submitted with Development Application

Development Application for

DUNCAN BAXTER .

(Name of Applicant)

Address of site: 7 NAILON PL MONA VALE

Declaration made by hydraulic engineer or engineer specialising in flooding/flood emergency response as part of a Flood Risk Emergency Assessment:

I, ANTHONY LAHOLD on behalf of WILSON CONSULTING ENGINEERS  
(Insert Name) (Trading or Business/ Company Name)

on this the 9TH APRIL 2019 (Date) certify that I am a engineer or

consultant specialising in flood emergency response 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 \$2million.

**Flood Risk Emergency Assessment Details:**

Report Title:

FLOOD RISK MANAGEMENT REPORT .

Report Date: 9TH APRIL 2019 .

Author: WILSON ANTHONY LAHOLD

Author's Company/Organisation: WILSON CONSULTING ENGINEERS

I: ANTHONY LAHOLD .  
(Insert Name)

Please tick appropriate box (more than one box can be marked)

☒ have followed Councils guidelines for 'Flood Risk Emergency Assessment Report (FREA)'

☒ have prepared the Flood Risk Emergency Assessment referenced on Form 1 in accordance with Council's guidelines and the Flood Emergency Response Planning for Development in Pittwater Policy.

☒ am willing to technically verify that the detailed Flood Risk Emergency Assessment referenced on Form 1 has been prepared in accordance with Council's guidelines and the Flood Emergency Response Planning for Development in Pittwater Policy.

☒ have examined the site and the proposed development in detail and have carried out a risk assessment (which has been attached to this form), and can confirm that:

☒ The addition/dwelling/building is located outside of the extents for Flood Life Hazard Categories H3-H4, H5 and H6 and a Flood Risk Emergency Assessment is not required.

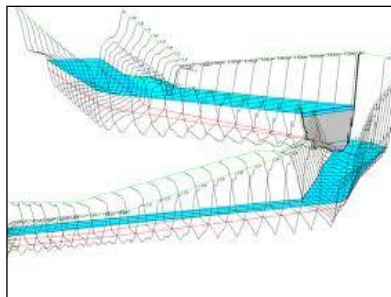
- ☒ confirm that the results of the risk assessment for the proposed development are in compliance with the Flood Risk Management Policy for Development in Pittwater and a detailed risk assessment is not required for the subject site.
- ☒ have examined the site and the proposed development/alteration/addition in detail and I am of the opinion (after carrying out a risk assessment) that the Development Application does not require a Flood Risk Emergency Assessment and I have attached the risk assessment to this form.
- ☒ have reviewed (provide details of Report) the Flood Risk Emergency Assessment previously prepared for this property and can confirm it is up to date and is still current.

**Declaration by engineer/consultant:**

I am aware that the Flood Risk Emergency Assessment referenced on Form 1, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Flood Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable or Tolerable Risk" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature [Signature]  
Name ANTHONY LATHOUD  
Chartered Professional Status MIEAust. 20 YEARS.  
Membership No. 6276193.  
Company BGF & C.  
Number of years specialising in flood emergency response 12 years.

# No. 7 Nailon Place, Mona Vale NSW 2103 FLOOD RISK MANAGEMENT REPORT



Civil Engineering Services

Client – D & D Baxter

DOC - 190301 - NO. 7 NAILON PLACE, MONA VALE NSW 2103 - FLOOD RISK MANAGEMENT REPORT

REV - A

DATE – 09/04/2019

*mail@wcengineers.com.au*

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## Document Control

Revision	Date	Description	Prepared	Reviewed	Approved
01	09/04/19	ISSUED FOR DA	AL	AL	AL

Approved by: Anthony Lahoud (BE CIVIL DIP ENG PRAC)

Signature:



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# 1 EXECUTIVE SUMMARY

This Flood Management Report for the development of No. 7 Nailon Pl, Mona Vale NSW has been provided to enable the developer to set the floor levels above the proposed 100yr ARI storm and to provide overland flow protection measures.

- Wilson Consulting Engineers Pty Ltd requires a freeboard to the adjacent overland flow level of 300mm for the finished floor level of habitable floors.
- Ensure 100mm gap beneath side and rear boundary fences to allow overland flow.
- The existing floor levels of the residence, are a minimum of 300mm above the 100yr ARI overland flow levels as per flood plan sketch 190213\_C01.
- The garages to be 150mm above the overland flow levels
- Ensure 100mm gap beneath side and rear boundary fences to allow overland flow.
- Flood Evacuation to the first floor level in the event of a storm greater than the 100 year

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## 2 INTRODUCTION

### 2.1 Background

The developer of No. 7 Nailon Pl, Mona Vale NSW has proposed to develop the double storey cottage into a refurbished duplex two storey residence.

Council have suspected that, due to the existing stormwater easement within the rear of the site on the eastern boundary, running to the north, there is a risk of site stormwater overland flow in the 100yr ARI storm event.

This report will set design conditions which will form part of the proposed development application.

### 2.2 Study Objectives

The objectives of the overland flow risk management report can be described as follows:

- To determine the overland flow stormwater characteristics of the overland flow path hydraulic capacity and flow heights from the existing pipe catchment upstream of No. 7 Nailon Pl, Mona Vale NSW;
- To provide measures to protect the proposed development from stormwater inundation; and
- To ensure the development complies with the requirements of Northern Beaches Council (in relation to flooding).

### 2.3 Site Location

The subject site is situated in the Northern Beaches Council (NBC) municipality. It is approximately 20 km northwest of the Sydney CBD (refer to Figure 1 in Appendix A).

The total site is of an area of about 625.5m<sup>2</sup>. The existing site consists of buildings and concrete slabs.

The property generally grades down from the north to the south boundary at a grade of 5.0%.

### 2.4 Northern Beaches Council Requirements

NBC policy, stipulates that an overland flow report must be adopted and shall include the following: -

- Any proposed buildings footprints would need to be elevated above the minor overland flow area so that the building floor slabs / services and drop edge beams are a minimum of 300mm above the 1 in 100 year ARI design overland flow level.
- All structures will need to be designed to withstand the forces of overland flow water, debris and buoyancy up to and including the 100 year ARI plus freeboard. The structures will need to be certified by an experienced practicing Structural Engineer.
- There shall be a safe path for users to an evacuation point above the PMF storm level



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## 3 DATA ACQUISITION

### 3.1 Available Data

The following readily available data was acquired and used during the study:

**Table 3.1**

Title	Source	Type
McCarrs Creek, Mona Vale and Bayview Flood Study Review	Northern Beaches Council	Flood Study
NSW Floodplain Development Manual – the management of flood liable land	NSW Department of Infrastructure, Planning and Natural Resources	Floodplain Management Manual
PLAN SHOWING DETAIL AND LEVELS OVER LOT 17 IN DP 21357 AT No. 7 Nailon Pl, Mona Vale NSW	Geographic Solutions Surveyors Job: 0349 Rev A	Contour & Detail Survey Plan

### 3.2 Historical Records

Discussions with NBC engineering staff revealed that historical records of flooding at this particular site are not available. NBC advised that the site is possibly subject to the effects of inundation, from the upstream catchments for large storm events.

### 3.3 Minor Drainage System Capacity

NBC has also advised that the majority of the piped drainage lines within the NBC municipality have a capacity to convey between the 2 and 5 years ARI storm events.



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## 4 OVERLAND FLOW

### 4.1 Catchment & Trunk Drainage

The site falls within the Mona Vale Main Drain catchment within the Pittwater Estuary.

Information from NBC suggests that the rear boundary is affected by a 1% AEP flood level of RL 2.03m AHD.

NBC requires an applicable freeboard of 300mm, so the Flood Planning Level at the rear of the property would be RL2.33m AHD. This level is associated with a flow path running from south-west to north-east in the channel outside the rear of the property.

Separate to this, there is also some flooding in the Nailon Place roadway, with a 1% AEP flood level of 1.86m AHD and a Flood Planning Level of 2.16m AHD.

The proposed development includes the enclosing of the courtyard and extension of the garage. The ground level of both of these areas appears to be just above the relevant Flood Planning Level, which would mean no reduction of storage below the 1% AEP flood level.

The trunk drainage channels are assets of NBC and according to the hydraulic modelling provided by Northern Beaches Council are not within their capacity in the 100yr ARI storm event.

### 4.2 Land Use

The land usage upstream and downstream of the site is largely low density detached residential property dating from the 1970's.

From ortho-photo maps of the area lot density for the upstream catchment is estimated at 11-15 lots per hectare.

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## 5 OVERLAND FLOW RISK MANAGEMENT

### 5.1 General

Using the council results shown in section 4.1, the minimum proposed residential floor levels are required to be 300mm above the 100 year storm flood level of RL 2.03m.

The 100 year flood level is generally at RL 2.03m throughout the site.

The overland flow would be categorised as a Low to Medium Hazard Floodway.

Referring to 'Notes' on Figure L2 of "NSW Floodplain Development Manual – the management of flood liable land" under section L5, it states that "the degree of hazard may be reduced by establishment of an effective flood evacuation procedure". As there is a flood evacuation procedure in place, signage and due to raising the floor level this shall be reduced in category to a Low Hazard floodway.

### 5.2 Northern Beaches Council - Floodplain Management

Using the Low Flood Risk category the residential development would require the following measures: -

#### 5.2.1 Floor Level

- Habitable floor levels to be no lower than the 100 year flood level plus freeboard of 300mm.  
**Floor level proposed to be RL2.03m minimum**
- Non-habitable floor levels to be equal to or greater than the 100 year flood level plus freeboard where possible, or otherwise no lower than the 20 year flood level plus freeboard unless justified by site specific assessment.  
**The only non-habitable area was the garage and is to be above the 100 year storm**
- No restrictions are to be placed on the title of the land, pursuant to S.88B of the Conveyancing Act, as the lowest habitable floor area is elevated above finished ground level

#### 5.2.2 Building Components & Method

- All structures to have flood compatible building components below the 100 year flood level plus freeboard.  
**Design of the building construction components will be made to ensure that structural integrity of the building is maintained during a flood event. Construction materials must be durable for short term duration immersion in flood waters. This would include all structural components being constructed from reinforced concrete, bricks or reinforced masonry blocks.**

#### 5.2.3 Structural Soundness

- Applicant to demonstrate that the structure can withstand the forces of floodwater, debris and buoyancy up to and including a 100 year flood plus freeboard, or a PMF if required to satisfy evacuation criteria (see below). An engineer's report may be required.

Various types of loads must be considered in the design of the proposed building in relation to flood protection. These include:

- Impact loading caused by debris carried by flood waters;
- Uplift or buoyancy forces;

- Hydrostatic forces; and
- Hydrodynamic forces.

The structure will be designed in accordance with AS1170 for the types of loadings listed above for all flood events up to the PMF.

The hydrostatic and hydrodynamic forces caused by the rising flood water surrounding the structure are the most critical forces in terms of damage they can cause to the structure. Because of this the structural engineer will need to ensure the building's structure retains integrity during flooding. Impact loading in this area should not be a major issue.

#### 5.2.4 Flood Effects

- The flood impact of the development to be considered to ensure that the development will not increase flood effects elsewhere, having regard to: (i) loss of flood storage; (ii) changes in flood levels and velocities caused by alterations to the flood conveyance ; and (iii) the cumulative impact of multiple potential developments in the floodplain. An engineer's report may be required. **This is satisfied as the existing building area is maintained the proposed state.**

#### 5.2.5 Evacuation

- Reliable access for pedestrians or vehicles is required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF level, or a minimum of 20% of the gross floor area of the dwelling to be above the PMF level. In the case of alterations or additions to an existing development, this may require retro-fitting the existing structure if required to support a refuge above the PMF. **The proposal includes a second storey level for refuge above the PMF.**

The resident/tenant must be made aware of the flood risks of the property in storm events from the 100yr ARI.

Based on the size of the catchment and the random nature of rainfall patterns, it is understood that the flood waters will rise with little to no warning. Therefore for storms above the 100ARI to the PMF, it suggests that at the very best there will be a matter of 10 minutes or less of warning for a major flood. In the event of a flood it is the resident/tenants responsibility to start implementing the evacuation plan. Once the resident/tenant has received the flood warning they are to ensure that all patrons head towards the **flood evacuation zone at the internal second storey of the building** and steer clear of the flood zone around the building.

The effective warning time is typically used to move equipment, evacuate people and transport their possessions away from flood zone ie. external yards.

A flood evacuation path has been documented in the flood sketch drawing No. 190301\_C01 shown in Appendix C.

#### 5.2.6 Car Parking and Driveway Access

- Garages capable of accommodating more than 3 motor vehicles on land zoned for urban purposes, or enclosed car parking, must be protected from inundation by floods equal to or greater than the 100 year flood. **Not applicable in this case as the garage is only capable of storing two vehicles.**

- Where the level of the driveway providing access between the road and parking space is lower than 0.3m below the 100 year flood, the following condition must be satisfied - the depth of inundation on the driveway during a 100 year flood shall not exceed: (i) the depth at the road; or (ii) the depth at the car parking space. (Refer to Schedule 3). A lesser standard may be accepted for single detached dwelling houses where it can be demonstrated that risk to human life would not be compromised. **The development is in compliance with this clause as the driveway level at the boundary is less than the garage**
- Enclosed car parking and car parking areas accommodating more than 3 vehicles with a floor level below the 20 year flood level plus freeboard or more than 0.8m below the 100 year flood level, shall have adequate warning systems, signage and exits. **Not applicable in this case as the garage is only capable of storing two vehicles.**
- Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a site during a 100 year flood. **As the depth of flow at the carport is less than 100mm, it would not create enough buoyancy to lift a car through the flow, therefore this clause is satisfied.**

#### 5.2.7 Management and Design

- If this application involves subdivision, the applicant is to demonstrate that potential development as a consequence of the subdivision can be undertaken in accordance with this DC. **Not applicable in this case as no subdivision is allocated for this site.**

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## 6 SUMMARY & RECOMMENDATIONS

### 6.1 Summary

From the results derived in section 4&5 of this study, the hydraulic analysis of the overland flow path shows minor inundation of the 100yr ARI water surface into the proposed development site at the rear.

There is no increase in 100 ARI flow heights due to the development.

Flood evacuation with safe passage to the first floor area of each duplex is possible in the PMF storm.

### 6.2 Recommendation

The existing floor levels of the residence, are a minimum of 300mm above the 100yr ARI overland flow levels as per flood plan sketch 190213\_C01.

The garages to be 150mm above the overland flow levels

Ensure 100mm gap beneath side and rear boundary fences to allow overland flow.

Flood Evacuation to the first floor level in the event of a storm greater than the 100 year

Refer to Appendices C for the flood plan sketch.

#### WILSON CONSULTING ENGINEERS PTY LTD



Anthony Lahoud

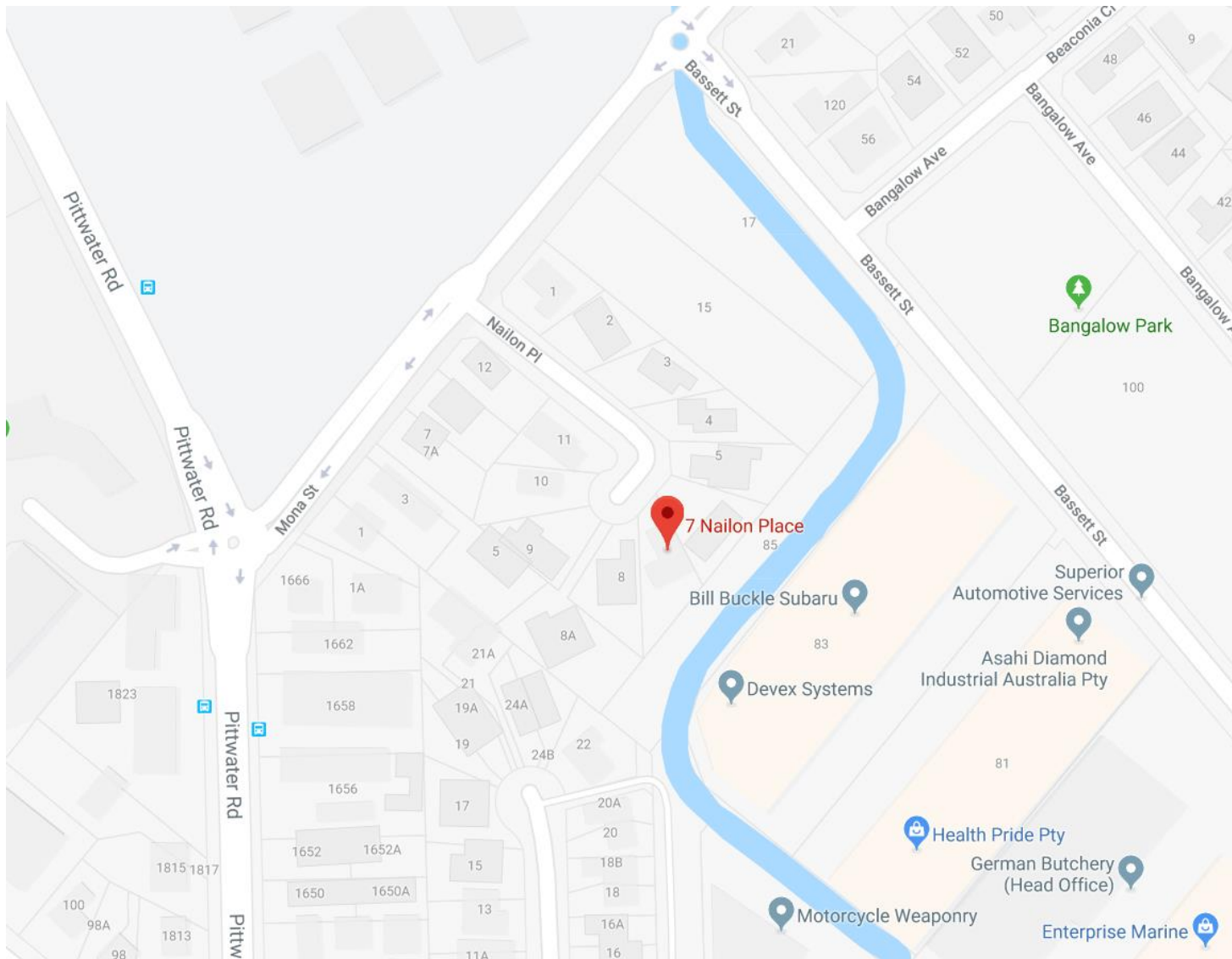
Director

BE Civil Engineering Dip Eng Prac

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Appendix A    LOCATION MAP

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Appendix B    COUNCIL INFORMATION

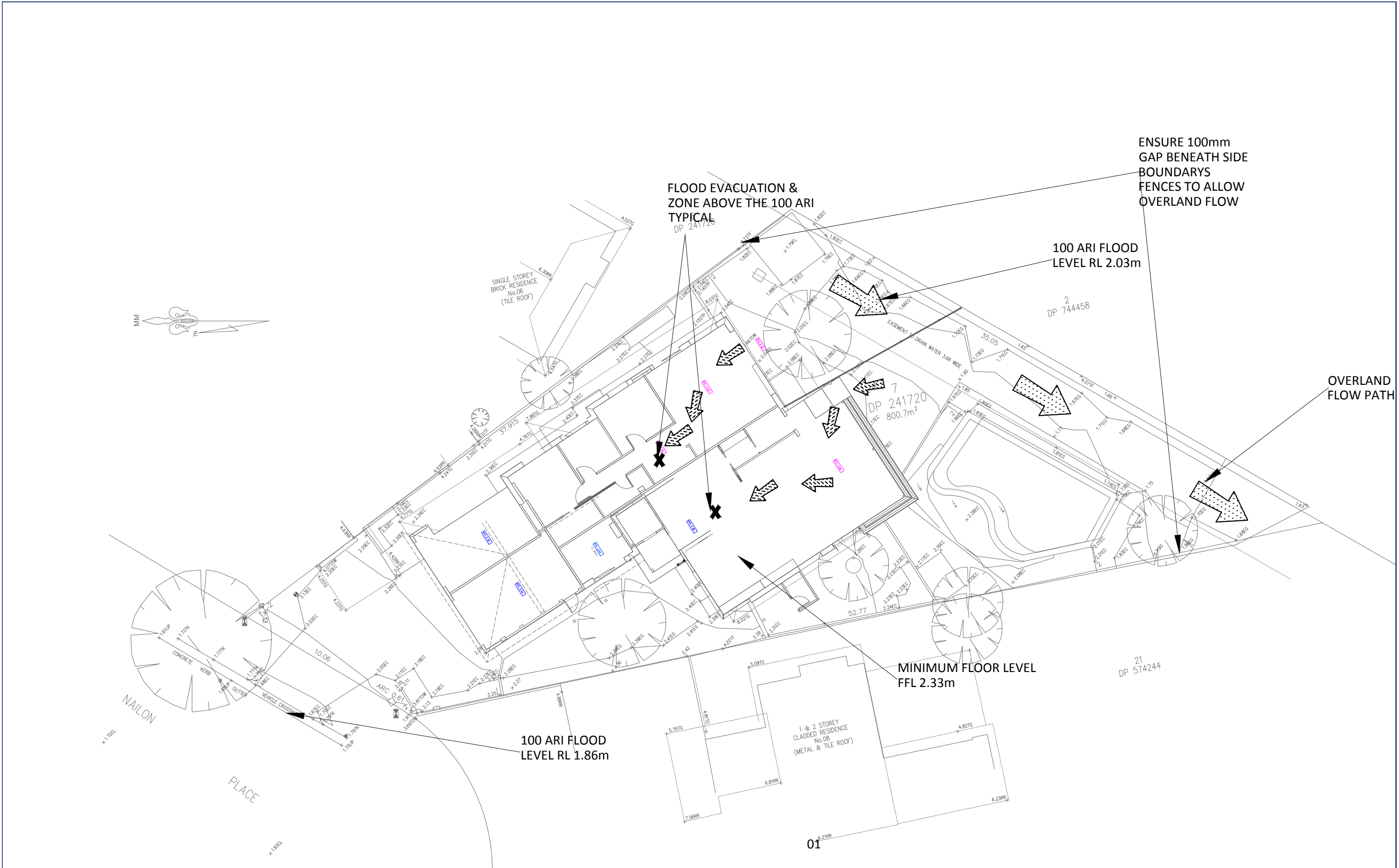
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Specialist Advice
Floodplain
<p><b>Comments</b></p> <p>I have reviewed the documentation, and I believe that the proposed dual occupancy development can comply with the DCP and LEP. However the DA will need to be accompanied by a Flood Management Report prepared by a suitably qualified professional to confirm this.</p> <p>The rear of the property, just inside the fence line, is affected by a 1% AEP flood level of 2.03m AHD. The applicable freeboard is 0.3m, so the Flood Planning Level at the rear of the property would be 2.33m AHD. This flooding is associated with a flow path running from south-west to north-east in the channel outside the rear of the property.</p> <p>Separate to this, there is also some flooding in the Nailon Place roadway, with a 1% AEP flood level of 1.86m AHD and a Flood Planning Level of 2.16m AHD.</p> <p>The proposed development includes the enclosing of the courtyard and extension of the garage. From the ALS, the ground level of both of these areas appears to be just above the relevant Flood Planning Level, which would mean no reduction of storage below the 1% AEP flood level.</p>
Specialist Advice
<p>The property is affected by flood life hazard category H3-H4, so Clause B3.13 for Flood Emergency Response applies. However, the alterations and additions are less than 30m<sup>2</sup>. As per Clause B3.13:</p> <p><i>"The following variations may apply to a change of use of an existing premises and alterations and additions to existing residential and commercial premises (as defined in the DCP):</i></p> <p><i>A variation to the controls requiring a Flood Risk Emergency Assessment Report and/or shelter in place refuge shall only be considered if justified appropriately by a suitably qualified professional.</i></p> <p><i>A completed Form 1 (Attachment A of the Flood Emergency Response Planning for Development in Pittwater Policy), must also be submitted with the development application".</i></p>

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Appendix C   FLOOD SKETCH PLAN

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<div><div><div>WILSON CONSULTING ENGINEERS</div><div>CIVIL - STORMWATER - FLOOD - STRUCTURAL</div><div>WILSON SALVATORE TRUST - ABN: 85 351 400 719 - 6 ACACIA AV RYDE NSW 2112</div><div>mail@wcengineers.com.au - www.wcengineers.com.au M: +61 401 415 555</div></div></div>				Designed by: AL	Checked by: AL	Approved AL	Project No.: 190301	File name: 190301/C01	Date: 09.04.19	Scale: 1:200 A3
				Project: 7 NAILON PLACE MONA VALE NSW			Drawing name: FLOOD SKETCH PLAN		LGA : NBC	
	01	ISSUED FOR CC	09.04.19				Client : Mr & Mrs BAXTER		Drawing No: C01	
	REV	AMENDMENT	DATE							