

Stormwater and Flooding Assessment

Palm Beach Residence

Prepared for The applicant C/ Tzannes

28 February 2019

181376 CAAA

Structural Civil Traffic Facade Consulting Engineers

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Contents

1.0	Intro	roduction 3	
	1.1	The Site	3
	1.2	Relevant Documents	5
2.0	Stor	nwater	5
	2.1	Stormwater Quantity	5
	2.2	Stormwater Quality	6
3.0	Floo	ding	7
4.0	Cons	struction Phase Stormwater Management	9
5.0	Con	clusions and Recommendations	10
	Apper	ndix A	

1.0 Introduction

This report has been prepared to identify stormwater requirements and the potential for flood affecting the site at 346-352 Whale Beach Road, Palm Beach.

1.1 The Site

The Site which is residential development and under the jurisdiction of the Northern Beaches Council local government, located at 346-352 Whale beach Road, Palm Beach, as indicated in Figure 1.

The site area is approximately 2,300 m² and the proposed development includes a multi-storey residential building and a basement garage.





Locality Plan (source: Google)



Figure 2

Aerial Photo (source: Google Maps)





Proposed Building Site Plan (Tzannes)

1.2 Relevant Documents

The following documents have been reviewed in preparing this document:

- Pittwater 21 DCP, Section B, General Controls, Northern Beaches Council 2014.
- Pittwater 21 DCP, Appendices, Northern Beaches Council 2014.
- Avalon to Palm Beach Floodplain Risk Management Study and Plan, Northern Beaches Council 2017.
- Architectural drawings prepared by Tzannes (31/01/2019).
- Flood Information Report from Northern Beaches Council (2018)
- Northern Beaches Council WSUD & MUSIC Modelling Guidelines (2016)
- Water Management Plan (2017)

2.0 Stormwater

2.1 Stormwater Quantity

Section B5.67 of the Pittwater DCP states that On-Site Detention (OSD) is required to ensure that the proposed development does not increase stormwater discharge rates compared to the existing site for conditions up to the 1% AEP storm event. Further, allowable discharge rates and minimum OSD capacity are to be calculated using table 1 (extract from Pittwater DCP)

Table 1 OSD requirements

REQUIREMENTS FOR SIZE AND ALLOWABLE DISCHARGE FROM ON-SITE DETENTION SYSTEMS
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Additional Hard	Minimum Capacity of On-Site	Discharge Rate
(Impervious) Surface Area	Detention Tank (Litres)	Litres/Sec
(square metres)		
0 -50	Nil	Nil
>50 - 75	4,500	2
>75 - 100	6,000	3
>100 - 150	9,000	4
>150 - 200	12,000	6
>200 - 250	15,000	7
>250 - 300	18,000	9
>300 - 400	24,000	12
>400 - 500	30,000	15
>500 - 600	36,000	18
>600 - 700	42,000	21
>700 - 800	48,000	24
>800 - 900	54,000	27
>900 - 1,000	60,000	30
>1,000*	A minimum storage capacity of 60 litres per m2 of additional hard/impervious surface area, and a discharge rate which re	eplicates the discharge from the site were it to be undeveloped.

The impervious area of the proposed development is approximately 805m² and the impervious area of the existing development is 289m². The above table shows a site with an additional hard surface area of 500-600m² is required to have an OSD tank of at least 36,000L and a discharge rate of at most 18L/s.

A DRAINS model was created to simulate the stormwater flows of the site and compare the existing stormwater discharge to the proposed stormwater discharge. An OSD tank was modelled with a volume of 50m³ and an orifice plate of 88mm diameter. The proposed catchment area draining to the proposed OSD tank is 1044m² and has been modelled as 87% impervious. The existing catchment of 1044m² has been modelled as 28% impervious. Table 2 shows the proposed site will not increase stormwater discharge rates for storms up to the 1% AEP event when compared to the existing case.

Table 2 Stormwater quantity

AEP	Existing case (cum/s)	Post development with detention (cum/s)
50%	0.014	0.009
1%	0.051	0.018

The top water level in the OSD tank during the 1% AEP storm is RL53.25m. The OSD tank has been designed with a 300mm pipe as an overflow route with an invert level of IL53.26m. The overflow pipe will convey stormwater if there is a blockage or if there is a rainfall event greater than the 1% AEP.

A large portion of the site will remain undeveloped and will bypass the OSD tank. This will not make the site discharge worse and so it has been omitted from calculations.

It is not feasible to connect the driveway to the OSD tank because it is outside the proposed site boundary and the driveway is lower than the OSD tank. The driveway area has been omitted from the DRAINS model for sizing the OSD volume and orifice plate. The driveway area is approximately 60m² and 100% impervious. This area is too low to connect to the OSD tank and surface run-off will flow along the side of Whale Beach Road and into the existing culvert crossing Whale Beach Road. This area produces 5L/s of flow during the 1% AEP storm.

2.2 Stormwater Quality

Stormwater quality analysis was undertaken in accordance with the Water Management Policy and the Northern Beaches Council WSUD & MUSIC Modelling Guidelines.

The proposed site has been modelled in MUSIC to demonstrate that the proposed stormwater treatment devices achieve the stormwater treatment targets outlined in section 8.1.1 of the policy:

- 85% removal of total suspended solids;
- 65% removal of total phosphorus; and
- 45% removal of total nitrogen.
- 90% Gross Pollutants

The stormwater treatment train for the proposed development includes:

- 1x Stormwater360 Enviropod (or equivalent)
- 1x Stormwater 360 Jellyfish 7.5L/s (or equivalent)

Table 2 Stormwater quality

Pollutant	Residual Load	Load reduction (%)	Target (%)
Total Suspended Solids (kg/yr)	17	92	85
Total Phosphorus (kg/yr)	0.0947	71	65
Total Nitrogen (kg/yr)	0.982	60	45
Gross Pollutants (kg/yr)	0.07	99	90

In addition to the above, according to DCP, a rainwater tank with the minimum capacity of 6000 L is required. This should be investigated by the hydraulic engineer as the design progresses.

3.0 Flooding

Northern Beaches Council has completed the Avalon to Palm Beach Floodplain Management Study and Plan (Report No MHL2321 2017). Review of the Council flood maps and Pittwater 21 DCP, Appendices, indicate that a portion of the site along the south-east boundary is within the flood planning area. The proposed works are located outside the flood hazard area and PMF extent. The DCP classifies the site as a Flood Category 3 area because it is adjacent to a primary floodplain area.

 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.



Figure 4 Flood Extents (Northern Beaches Council Online Mapping)

The Pittwater 21 DCP, Appendices 2014 provides flood planning levels for the site. The flood planning level for the proposed site is the 1% AEP flood level plus 500mm freeboard and a 5m horizontal buffer.

A multi-purpose flood information report was issued by Council on the 20/11/2018. The report shows the ground floor level of the proposed building is not at risk of flooding. The steep grade of the site will convey floodwater towards Whale Beach Road and is unlikely to pond near the proposed ground floor. Some ponding will occur on Whale Beach Road near the basement driveway. The Northern Beaches Council (Christina Femia) has identified the maximum ponding depth near the basement to be 220mm.

The flood planning level of the basement garage is the ground level plus 220mm flood depth plus 500mm free board. This equals RL46.72m AHD. The basement will be above the flood planning level of RL46.72m AHD.

Point	100 year ARI Flood Depth (m)
1	0.14
2	0.22
3	0.13
4	0.20
5	0.29
6	0.13



PROPOSED BASEMENT

DRIVEWAY

4.0 Construction Phase Stormwater Management

Construction works to be carried out in accordance with the "Blue Book" erosion and sediment control requirements. The exact controls will vary depending on construction methodology and timing, but typically consist of:

- Sediment fences;
- Vehicle shaker grid and wash down;
- Geotextile filters surrounding pits; and
- Sand bags surrounding existing culverts.

A conceptual erosion and sediment control plan will be included in the civil drawing set.

5.0 Conclusions and Recommendations

The proposed site at 346-352 Whale Beach Road consists of a multi-storey residence with a below ground garage.

Stormwater quantity will be controlled with an OSD tank of 50m³ volume and an orifice plate of 88mm. These measures reduce the stormwater discharge of the proposed development so it is not worse than the existing case.

Stormwater quality will be controlled with a treatment train consisting of a Stormwater360 Enviropod litter basket and a Stormwater360 Jellyfish filter. The treatment train will remove 92% of Total Suspended Solids, 71% of Total Phosphorous, 60% of Total Nitrogen and 99% gross pollutants.

The flood planning level is equal to the 1% AEP flood level plus 500mm freeboard. The below ground garage will be above the flood planning level of RL46.72m AHD. The ground level of the proposed development is not at risk from mainstream flooding.

P:\2018\1813\181376\Reports\TTW\Civil Report.DU.docx

Appendix A

Flood Depth from Northern Beaches Council



RE: Flood Information Report for 346 Whale Beach Road, Palm Beach
 Councan Howley
 [13176

Follow up. Completed on Thursday, 6 December 2018. This message is part of a tracked conversation. Click here to find all related messages or to open the original flagged message.

Dear Duncan,

Sorry about the delay in getting this flood information to you. We are having software issues, so please disregard the last email providing flood levels for point 31 and 32.

Christina Femia <Christina.Femia@northernbeaches.nsw.gov.au>

I have provided the 100 year ARI flood depths at 6 points (See the table and figure below). The information is based off the Avalon to Palm Beach Floodplain Risk Management Study and Plan (2017). This is currently the best available information on flooding in the area, but could be subject to change in the future.

Please note the Aerial photo is approximate.

Tue 4/12/2018 11:14 AM

Feel free to contact myself or Duncan Howely on 9942 2381 if you have any questions.

Point	100 year ARI Flood Depth (m)
1	0.14
2	0.22
3	0.13
4	0.20
5	0.29
6	0.13



Kind Regards, Christina Femia Senior Water Cycle Officer In the office Mondays, Tuesdays and Thursdays Stormwater Floodplain Engineering 102 5942 2696 <u>Christina FemiagRoothembeaches new gov au</u>



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