

Our Ref: 80017026-LO-05 dna/bcp
Contact: Dean Atkinson

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Attention: Mr Anthony Iannuzzi

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Dear Anthony

DA 2018/1514 WESTFIELD WARRINGAH MALL STAGE 2 WORKS

RESPONSES TO NORTHERN BEACHES COUNCIL NATURAL ENVIRONMENT REFERRAL RESPONSE – FLOOD – 9 JULY 2019

Cardno was engaged by Scentre Design & Construction to assist in the preparation of a DA1514 (2018) for the Westfield Warringah Mall project submitted to the Northern Beaches Council. The project is the second stage of the Westfield Warringah Mall Project comprising of the redevelopment and refurbishment of the existing Westfield shopping complex.

On 10 August 2018 we prepared a Flood Impact Assessment for the redevelopment proposed of Warringah Mall under DA1514 (2018).

On 12 December 2018 we received copies of an (undated) Engineering Referral Response and (undated) Natural Environment Referral Response prepared by Northern Beaches Council. These responses queried the compliance of DA1514 (2018) with a number of the stormwater requirements set out under Part G Warringah Mall Special Area Controls of the 2011 Warringah DCP. We prepared responses to these queries through our letter dated 7 January 2019.

On 9 July 2019 we received further Natural Environment Referral Responses prepared by Northern Beaches Council. These responses again queried the compliance of DA1514 (2018) with two flood requirements set out under Part G Warringah Mall Special Area Controls of the 2011 Warringah DCP. Our responses to these queries are provided below.

Natural Environment Referral Response – Flood

Council Referral Response:

The proposal is not recommended for approval due to non-compliance with the Warringah DCP – Part G4, Warringah Mall – Stormwater Management and the Warringah LEP – Part 6.3 (3). The Flood Impact Assessment Letter Report dated 7 January 2019 shows increased flood levels on Lot 2 DP 600059 as a result of the development. Therefore the proposal is deemed to adversely affect flood behaviour on resulting in detrimental increases in the potential flood affection of other development or properties.

Cardno Response:

As previously agreed with Council two scenarios were modelled for blockage of major inlets on the upstream boundary of Warringah Mall in a 100 year ARI (1% AEP) namely, 50% blocked and 0% blocked. The 50% blockage case was the design case required by Council. Council also requested that a sensitivity assessment be undertaken for 0% blockage. Consequently both 50% blockage and 0% blockage scenarios have been assessed consistently under Existing and Developed conditions since prior to the 2015 approval. The estimated 100 yr ARI (1% AEP) flood levels under Existing Conditions, 2015 Conditions and 2018 Conditions were tabulated at more than 200 reference locations in **Appendix C** attached to our letter advice dated 7 January 2019.

Figures 5A & 5B show 100 yr ARI Flood Level Differences –DA1514 (2018) Conditions less DA1742 (2015) Conditions - **0% Blockage**.

Figures 6A & 6B 100 yr ARI Flood Level Differences –DA1514 (2018) Conditions less DA1742 (2015) Conditions - **50% Blockage**.

Although there is a minor increase in flood levels for the 0% blocked scenario there is a decrease in flood levels for the 50% Blocked scenario which is the worst case scenario. Refer to Table A.5 (Appendix C) Point P142 of our letter dated 7 January 2019 which shows an overall reduction in 1% AEP flood levels of 5 cm when compared to the 2015 flood levels which in turn represented a 25 cm reduction in the flood levels prior to the implementation of works under DA1742 (2015).

It is concluded that the proposal does not adversely affect overall flood behaviour nor result in detrimental overall increases in the potential flood affection of another property.

Council Referral Response:

The proposed development has not made a significant reduction in medium or high flood hazard areas in a 100 year Annual Recurrence Interval (ARI) event on the site. The Letter Report (dated 7 January 2019) highlights very significant reductions in flood hazard on the site appear to have been made as a result of previous developments on the site. However, there is a significant area of medium and high flood hazard mapped on the site opposite Lot 1 DP 1223831. The current development application has proposed re-grading works to reduce low flood hazard areas to the east of Warringah Mall, Condamine St and the Golf Course, which is positive, but the development application has not made any significant reductions of this area of high and medium flood hazard opposite Lot 1 DP 1223831. Nor has the development application adequately justified why the Development should be approved without this DCP requirement (Part G4 - Clause 64) being met.

Cardno Response:

Major flood mitigation works recently completed have operated as they were originally intended and have significantly improved the flood conditions within Warringah Mall. DA 2008/1742 works included:

- Construction of stream stabilisation and rock scour protection bank works within Brookvale Creek Lot 2 DP 600059 upstream of Warringah Mall;
- Installation of flood walls at key locations and numerous flood barriers;
- Construction of win major culverts through the site from the upstream boundary to Condamine Street;
- Installation of a high capacity inlet pit beside Green Street;

- Installation of three high capacity grated inlet pits within the Dale Street roundabout to capture overland flows;
- Re-diversion of 1350mm diameter pipe from Pittwater Road sag to the twin culverts;
- Reconstruction of the stormwater chamber (C6) just upstream of Condamine Street culverts to accommodate all existing conduits and culverts, the new culverts and the lowered culverts under Condamine Street;
- Increased the flow capacity of the four cell box culvert under Condamine Street via lowering the two central culverts by 1.0m.

These works represented the culmination of many flood modelling assessments of a number of stormwater augmentation schemes for the whole Warringah Mall site which occurred over a 10+ year period. The augmentation schemes sought to achieve the best possible flooding outcome across the Warringah Mall site within the constraints posed by existing stormwater infrastructure, which had been previously augmented in the past, and by many utility services including a 1200 mm diameter sewer along the Pittwater Road/Condamine Street boundary. The structural measures which were identified in the 2015 scheme sought to convey overland flows through the site in a low hazard nature up to the 100 yr ARI flood as far as practicable.

Notwithstanding the improvements achieved by the 2015 works an area of medium and high hazard overland flow remained between the Pittwater Road sag point and the Dale Street inlets. This medium and high flood hazard is generated from the upstream external catchment to the east of Warringah Mall which flow west onto Warringah Mall and through the site and is collected via the three high capacity inlet pits within the Dale Street roundabout.

Improvements in flood hazard in comparison to the existing 2008 conditions have included the elimination of low flood hazard within Palm Tree and Starfish Car Parks, elimination of high flood hazard within the at-grade car park directly opposite Condamine Street and elimination of low flood hazard within Aldi as well as the reduction in high flood hazard to low flood hazard within Green Street, Woolworths Loading dock area and car park just south of Dale Street roundabout. Refer to **Figures 11 & 15** of our letter dated 7 January 2019 shows the differences between 1% AEP Flood Hazard for 2008 and 2018.

It is concluded that the DA1514 (2018) works do not adversely impact on flood hazards between Pittwater Road and the Dale Street inlets in comparison to DA1742 (2015) Conditions and that the proposed re-grading works on the eastern side of Warringah Mall beneficially eliminate hazards in events up to the 100 yr ARI flood including across Condamine Street and through sections of the Golf Course.

While it is noted that a small area of medium and high hazard in events up to a 100 yr ARI flood remain between Pittwater Road and Dale Street it is concluded that there are no further practicable augmentations or viable alternative options which could be undertaken given the constraints posed by existing stormwater and utility infrastructure, which now includes several major stormwater augmentations and many utility services including the 1200 mm diameter sewer along the Pittwater Road / Condamine Street boundary.

For the reasons as outlined above, we support the approval of the development application noting all measures as far as practicable have been pursued and adopted on site.

Should you have any queries regarding the above, please do not hesitate to contact me on 9496 7700.

Yours faithfully



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Dr Brett C. Phillips
Global Senior Principal
for **Cardno**