JONES NICHOLSON
CONSULTING ENGINEERS

20 February 2015

Our Ref:20140438

Pittwater Council
PO BOX 882
MONA VALE NSW

ATTENTION: CHERYL WILLIAMSON

Dear Cheryl,

PROJECT: **RESPONSE TO COUNCIL ITEMS [N0330/14]**

ADDRESS: 53C WARRIEWOOD RD, WARRIEWOOD NSW

Please find following our responses to Council's flooding and stormwater issues raised in their 15 December 2014 letter. Council's items are reproduced in blue text.

9. Pittwater 21 DCP controls 83.23 Climate Change (Sea Level Rise and Increased Rainfall Volume), CG.4 Flood - , CG.7 Water Management and Creekline Corridors and CG.23 Site Coverage, Sector Development - Warriewood Valley Release Area.

The Flood Assessment Report prepared by Jones Nicholson dated August 2014 is deficient and has not allowed a comprehensive assessment of water management and flood impacts to demonstrate that the application can satisfy the objectives of P21 DCP and Parts 6.1 (4) and 7.3 of PLEP 2014.
We highlight that our flood study (Section 2.6) addresses the DCP objectives on an item-by-item basis. We understand the amends undertaken for the current revision of our flood report (February 2015) will be sufficient to address the DCP and PLEP objectives.

Climate change impacts have been considered in determining the Flood Planning Level but not in the sizing of the OSD tank.
The OSD tank calculations have been revised to include a 30% increase in rainfall intensities due to the potential impacts of climate change.

The inner and outer creek line corridor has been identified on the submitted Building Footprints and Road Layout Plan. However, from the Plan of Subdivision it is unclear if the inner creek line corridor will be excised for dedication to Council. No creek line corridor design details have been provided.
Refer discussion on creek corridor details in our updated flood report (February 2015).

There is an inconsistency between the site coverage figure indicated in the Water Management Plan (57%) and the Building Footprint and Road Layout Plan DA-0 (46.7%).
This has been addressed and corrected. Our current plans and calculations are based on a 43% site coverage.

SUTHERLAND
ABN 51 003 316 032
Suite 45, 40–44 Belmont Street,
SUTHERLAND NSW 2232
PO Box 477, SUTHERLAND NSW 1499
Tel: 02 9521 3088 Fax: 02 9521 3066
Email: mail@jonesnicholson.com.au
www.jonesnicholson.com.au

OFFICE LOCATIONS:
SYDNEY–CBD SUTHERLAND WOLLONGONG
NOWRA GOULBURN PICTON SINGLETON

It is unclear if the tanks identified on the Indicative House Layout Plan SK-05 are independent of the common OSD system.
A central (not individual) rainwater tanks are proposed.

10. Pittwater 21 DCP control 85.11 Stormwater Discharge into Waterways and Coastal Areas

The submitted Water Management Plan does not demonstrate that stormwater discharge into waterways is acceptable and has not fully addressed the objectives of the Warriewood Valley Water Management Specification, Parts 6.1 (4) and 7,3 of PLEP 2014 and P21DCP.

An amended Water Management Report must be provided which includes:
** Creek line corridor design details;* Refer creek-line design by Sym Studio and discussion on creek corridor details in our updated flood report (February 2015).

** Additional flood levels for the 50%AEP and 20%AEP to support creek line design details;*
The 2-yr ARI and 5-yr ARI events have been added to our flood model.

** A reconsideration of the development's flood impact on other properties following the design of the creek line corridor.*
Refer discussion on creek corridor details in our updated flood report (February 2015).

** Flood impact details that consider the developed creek line corridor associated with the development of the property upstream (at 53 and 53A Warriewood Rd) and the current works associated with the ARV development which has not been included in the Narrabeen Lagoon Flood Study 2013 model.*
This has been discussed with Council in detail during January / February of 2015. It was agreed that 53/53A Warriewood was not sufficiently progressed to allow modelling of this development. ARV Stage#4 fill platforms have been incorporated into our flood model.

** Amendments to reflect the impacts of climate change on all aspects of water management.*
As aforementioned, the OSD calculations have been revised to include analysis of a 30% increase in rainfall intensity scenario. With respect to water quality and water balance modelling (MUSIC), we note this analysis was based on historical recorded pluvio-graph data, and we believe it would be meaningless to simply factor these historical results by a 30% increase. Further to this, we highlight that in the most recent 14 years (since 2000), the year with the highest annual rainfall was 2007 (1499mm, Sydney Observatory station). Increasing this by 30% (1949mm) yields a value that is still less than the wettest year analysed (1963, 2036mm). We therefore believe that the years used for MUSIC modelling (1962-1966) should be retained as-is without alteration or adjustment.

** Details of water quality management issues relating to the maintenance/inspection of the underground OSD/rainwater tank structures including how the stormwater system would be prevented from entering the rainwater collection system and the management of system bypasses;*
An OSD maintenance schedule has been provided in our updated Water Management Report. Further details of the OSD/RWT have been provided on the updated Jones Nicholson stormwater drawings, which demonstrate that an internal weir (located above the 100-yr ARI flood level in the OSD tank) will prevent backflow into the RWT storage section.

** A discussion on how the proposed 57% site coverage impacts the sizing of OSD, water balance calculations and the post development average annual runoff.*
As aforementioned, this site coverage has been amended to reflect the current architectural layout.

** Stormwater infiltration trench concept details;*
An infiltration trench is no longer proposed.

** Details of how the upstream and downstream interface transition within Narrabeen Creek line are proposed;*
Major creekline changes are not proposed, for discussion of this refer Jones Nicholson Flood report (February 2015). The upstream / downstream transitions will remain as they are.

** Water quantity management information detailing:*
** The private community title storm water drainage system (including water quantity and quality facilities) to be separate from the public drainage system;*
As noted in the Jones Nicholson Water Management Plan (February 2015) and the associated Jones Nicholson stormwater drawings, the public road reserve drainage (i.e. Lorikeet Drive) will remain separate to the private system and will not drain through the OSD. This change is reflected in our updated OSD and water quality calculations.

** Stormwater infrastructure upgrades on Warriewood Road.*
No stormwater upgrades are proposed on Warriewood Road. The existing stormwater drainage line crossing Warriewood road is to remain. The existing pit within the footpath reserve will be replaced with a sealed lid within the footpath. The pit surface level will be adjusted to suit the proposed footpath design.

** Appropriate connectivity of the proposed Lorikeet Grove drainage system with the development upstream at 53, 53a & 53b Warriewood Road.*
Stub connections will be provided into the Lorikeet Grove drainage system to allow for future connections if needed.

** Stormwater pipe long sections and stormwater outlet details to Narrabeen Creek.*
These are provided on the updated Jones Nicholson stormwater drawings.

** A concept drawing of the stormwater outlet and stormwater system bypasses to the creek line corridor indicating how erosion is to be prevented must be provided.*
This is detailed on the updated Jones Nicholson stormwater drawings.

** Details of the individual rainwater tanks identified on the Indicative House Layout Plan SK-05;*
A central (not individual) rainwater tanks are proposed.

** A completed document checklist from the Warriewood Valley Water Management Specification;*
This has been completed and is attached.

Additionally, from an ecology perspective, the location and design of the rock headwall (as shown on the Civil Design Site Plan) within the inner 25m creek line corridor will result in significant adverse environmental impacts, and is inconsistent with Part 6,1 (4) of PLEP 2014. This matter must also be addressed as part of the Water Management Report and associated design details for the creek line corridor and water management facilities.
We have designed the headwall in accord with the requirements of the Warriewood Water Management Specification; in this regard we bring attention to this document which states "*Headwalls and energy dissipation structures should have a natural appearance and should have their invert at the base of the creek to ensure there is no additional scour induced by their presence. Details of treatments of outlets are provided in Figure 6.*"

We therefore do not believe that the proposed headwall location is unsuitable; in fact, it directly complies with Council's requirements and relocating it outside of the 25m creek-line zone will result in an

inconsistency with the Warriewood Water specification, which requires it to be located "at the base of the creek".

For and on behalf of Jones Nicholson Pty Ltd

Andrew Wiersma

Reviewed by:

Alistair McKerron
BE, MIEAust, CPEng, NPER
Project Engineer
NPER no. 2220277

DOCUMENTATION CHECKLIST - DEVELOPMENT APPLICATION

(Detach and include with submissions)

Section	Item	Requirement	Check (√)
4.1	Water Cycle Assessment - Water Balance Modelling Pre & Post Development	++++++++++	✓
4.1.1	Stream Gauging, infiltration testing and use of local rainfall data for modelling	◆◆◆◆◆◆◆◆	✓
4.2.1	Water Quality Monitoring Plan	◆◆◆◆◆◆◆◆	✓
4.2.1	Water Quality Monitoring Sites Shown on Plan (at least 2 only due to small site	◆◆◆◆◆◆◆◆	✓
4.2.1, 2, C	Water Quality Monitoring Data	◆◆◆◆◆◆◆◆	✓
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data	◆◆◆◆◆◆◆◆	✓
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data from SQID's		
4.3	Water Quality Management Assessment - Load Modelling Pre and Post Development	++++++++++	✓
4.3.1, 3	Justification of assumptions for Event M EMC's as per CMA guidelines, refer JN Water MP	◆◆◆◆◆◆◆◆	✓
4.3.2	Identification of and details for Stormwater quality facilities	□□□□□□□□□□	✓
4.3.2, 4.4.5	Mosquito Risk Assessment for both Watercourse and Water Quality/Quantity features	◆◆◆◆◆◆◆◆	✓
4.3.6, 4.6.5	Inspection and Cleaning Reports for SQID's and OSD		
4.3.6	Management Plan for Stormwater Quality Improvement Devices	◆◆◆◆◆◆◆◆	✓
4.3.5	Environmental Management Plan (Soil and Water Aspects)		
4.3.4	Erosion and Sediment Control Plan		
4.4.3, 4, 5	Existing and Proposed Creek Corridor in plan with cross/long sections with flood levels refer discussion in Jones Nicholson Flood Assessment	◆◆Note 1◆◆	✓
4.4.4	Proposed Creek Corridor Planting Schedule refer iSym Studio documents	□□□Note 1□□□	✓
4.4.5	Creek Corridor Vegetation Monitoring and Management Plan	Note 1	
4.4.5	Vegetation and Creek Maintenance and Monitoring Reports		
4.5	Flood Analysis – existing and design conditic refer Jones Nicholson Flood Assessment		✓
4.5.2	Compliance of structures and creek corridor with flood planning levels	□□□□□□□□□□	✓
4.5.4	Details of Interim Flood Protection Works Not applicable	□□□□□□□□□□	N/A
4.6.3	Design Storm Hydrological Modelling of Site - Pre and Post Development	++++++++++	✓
4.6.3	On-Site Detention Facilities	□□□□□□□□□□	✓
4.6.4	Stormwater Retention Facilities	□□□□□□□□□□	✓
4.7	Stormwater Concept Drainage Plan	◆◆◆◆◆◆◆◆	✓

KEY:

	Preliminary Calculations/Assessment Required		*Work as Executed Plans*
□□□□□□□	*Concept Design Required*	◆◆◆◆◆◆	*Required/Reviewed/Updated*
+++++++	*Detailed Assessment/Calculations/Design*		*Not required*

Note 1 Even if the works are not to be constructed by the Applicant on the land to be transferred to Council under the Material Public Benefit Option in the Section 94 Plan, preliminary investigation for Rezoning and concept design at DA stage is required

Completed by Principal Certifier:

Name: .....

Title: .....

Organisation: .....

Signature: .....

Date: .....