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Stellen Consulting
Level 1, 27 Belgrave Street
Manly NSW 2095

PO Box 151
Freshwater NSW 2096

+61 450 460 496 tel
ABN 61 149 095 189

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Paul Skrinnikoff
76 Herbert Avenue
Newport NSW 2106

pauls@modernco.com.au

Stormwater and driveway design for a proposed two-lot subdivision at 76 Herbert Avenue, Newport

Dear Paul

Introduction

Stellen Consulting was engaged to assess the proposed new development at 76 Herbert Avenue in reference to stormwater drainage, vehicle parking arrangement and driveway profile design. A civil design drawing set has been prepared to support the development application submission.

Please find attached the drawings describing the civil design for the proposed new development at 76 Herbert Avenue, Newport.

The civil design is described in the following Stellen Consulting drawings:

STORMWATER MANAGEMENT PLAN

DR-000	Revision 1	Legend
DR-001	Revision 1	Pipe Layout & Details
DR-002	Revision 1	On-Site Detention Details
DR-003	Revision 1	Site Areas/ Calculations

DRIVEWAY DESIGN

CV-101	Revision 0	Vehicle Access Layout
CV-102	Revision 0	Long - Sections
CV-103	Revision 0	Swept Paths

Proposed Development

The proposed subdivision is shown in the drawings prepared by Daniel Raymond (listed below in the document list). The development proposes a subdivision of a single lot (approximately 2176m^2) into two smaller lots (1 & 2) of varying size (700m^2 & 1376m^2, consecutively).

The site is located at the end of a cul-de-sac in Herbert Avenue, Newport. The entire site falls naturally towards the northwest.

Stormwater Design Overview

The proposed lots will drain by gravity to a shared underground 24.75 Kl On-Site Detention (OSD) system located in the middle of the shared driveway. The OSD discharges the site's stormwater via gravity to a new kerb outlet proposed in Herbert Avenue.

To reduce the likelihood of overland flow entering downstream properties and to ensure that the OSD system performs satisfactorily, the inground pipe and pit system have been design to the 1%AEP rainfall event.

Performance Criteria

The stormwater management plan has been prepared to meet:

- *Australian Standard AS3500.3 – Plumbing and Drainage: Part 3 Stormwater Drainage*
- The outcomes of Northern Beaches Council Pittwater 21DCP controls B5.7 and B5.10

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On-site Detention System

The proposed OSD system is located in the middle of the driveway to:

- reduce the total area of the site bypassing the OSD, and;
- reduce the velocity of stormwater leaving the site before entering council's system

The OSD system has been designed to restrict post-development flows to the pre-development state detaining more than required for the 5, 20, and 100yr ARI rain events. Also, the OSD was designed to restrict kerb flows to 30l/s for all storm events. For storm events greater than the 100yr ARI, the system is expected to surcharge by conveying water down the driveway.

Modelling

The proposed stormwater system was designed using DRAINS Hydrologic and Hydraulic Urban Catchment modelling. Rainfall data was derived from BOM IFD based on latitude/longitude for the site. The following design parameters were adopted:

- soil type = 2.5
- antecedent moisture content, AMC = 3
- infiltration rates: initial paved = 1 mm, grassed = 5 mm
- hardstand areas roughness coefficient 'n': 0.012
- pervious areas roughness coefficient 'n': 0.13 – (sparse vegetation)
- BOM IFD storm durations: 5min to 6hr

The design process undertaken for this project within DRAINS is outlined below:

1. Determine pre-development peak flows for 5 and 100-year ARI rain events.
2. Match pre and post-development 5 and 100-year ARI peak flow by adjusting the on-site detention volume and orifice size.
3. Check 20-year ARI rainfall events to ensure compliance.
4. Check kerb flows are less than 30 l/s for all storm events up to the 1% AEP.
5. Apply high early discharge (HED) chamber and repeat steps 1, 2, 3 & 4.

Pre-Development

- Pre-development catchment of the site was modelled as 23.8% impervious
- Catchment sizes and flow path lengths were determined from survey data.

Post-Development

- Post-development catchments were modelled as 26.9% impervious
- Catchment sizes and flow path lengths were determined from survey data and subdivision plans.

Results

Table 1 shows that the proposed OSD system successfully restricts the post-development runoff to less than the pre-development rate for all modelled storm durations up to and including the 100-year ARI storm event. Additionally, piped kerb flow is less than or equal to 30l/s.

	PRE-DEVELOPMENT	POST-DEVELOPMENT		
ARI EVENT	TOTAL (l/s)	OSD (l/s)	Bypass (l/s)	TOTAL (l/s)
5 YR	55	29	24	53
20 YR	85	29	36	65
100 YR	145	30	52	82

Table 1 - Pre-Development and Post-Development Peak Flows

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Stormwater Conclusion

The proposed stormwater management plan presents a feasible and safe way to drain the proposed two lot subdivision to council's existing drainage system in 76 Herbert Avenue. The results show an acceptable discharge rate (less than or equal to 30l/s) to council's asset in Herbert Avenue for all rainfall events up to the 1%AEP which meet the requirements of section B.10 of Pittwater 21DCP.

The proposed development is not expected to cause any additional adverse flooding impacts on downstream and neighbouring properties.

Civil Design Overview

The proposed driveway runs parallel to the north-western boundary. A kerb is proposed on the driveway to pick up any nuisance flows and to act as an emergency wheel stop for the vehicles. The driveway slopes toward the cul-de-sac in Herbert Avenue. The development (per lot) also proposes an enclosed garage with two car-spaces, each with sufficient room to allow cars to enter and exit the site in a forward motion.

A B85 vehicle in accordance with AS2890.1 was used for swept paths and transition analysis.

The proposed subdivision will result in two dwellings and thus does not require a passing bay even though it has a ≈50 m driveway (Pittwater DCP sB6.2 *Internal Driveways* requires a passing bay where more than two dwellings are proposed). AS2890.1: cl3.2.2 recommends the use of passing bays where passing opportunities exceed 30m. Due to the straightness, visibility and low traffic of the proposed driveway we conclude that a passing bay is not necessary.

The described vehicular crossing and access conform to the relevant requirements of the following:

- *Australian Standard AS2890.1:2004 – Parking Facilities Part 1: Off-Street Car Parking*
- *Northern Beaches Council Pittwater 21 Development Control Plan 2003 (amended 13 January 2-18) Section B6*

We recommend the proposed civil design as an adequate solution given the site constraints.

Kind regards,

Stuart Steinle-Davies

Engineer
Stellen Consulting
Level 1, 27 Belgrave Street, Manly, NSW 2095
T. 0410 992 700
Stuart.steinledavies@stellenconsulting.com.au

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Document List

Daniel Raymond Architect
Concept design / rev A / 25/06/18

Geomat Engineering Pty Ltd Survey -16052-01
Date: 03/06/2016

Quality Information

Revision: 0
Date: 27 Aug 2018
Prepared by: SSD
Checked by: LES