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SY200096

11 December 2023

Mark Butterfield Central Coast Council PO Box 20 Wyong, NSW 2259

CC: Hugo Cottier (Lahznimmo Architects)

Dear Mark,

#### Re: Memorandum – Gosford Regional Library - Overland Flow Study & Calculations

### 1. Introduction

Development Condition B25 of the Development Consent (DA21/14779) required the following:

"Prior to the issue of any relevant Construction Certificate an Overland Flow Study must be submitted to the satisfaction of the Secretary confirming that:

- a) Regarding at the interface between the loading dock and vehicular access at the southeastern corner of the site to discourage overland flows from the existing car park on the adjoining site to the rear entering the loading dock, and
- b) The raised hump at the top of the vehicle crossing for the proposed loading dock and the re-instatement of the existing kerb t the rear of the proposed building to redirect overland flows away of the ingress of the building, and
- c) Any other measures proposed to mitigate overland flow impacts on development would not have any impacts on surrounding properties."

This memorandum is intended to provide information regarding the calculations for the overland flow study performed to ensure that the intent of this condition has been satisfied.

## 2. Methodology

### 2.1 Catchment & Hydrology

The upstream catchment was determined using a combination of site-specific survey, LiDAR data as well as observation from site visits & google street view. Figure 1 presents the delineation of the upstream catchment, with a total area of 0.147ha.







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Figure 1 - Upstream Catchment Extent

An ILSAX hydrological model was prepared using the run-off routing software DRAINS, using ARR2016 rainfall data obtained from the Bureau of Meteorology. Figure 2 presents a summary of the catchment characteristics adopted to determine the design flow rate. The catchment was conservatively adopted as 100% impervious area with a time of concentration of 5 minutes due to the steep topography.

Sub-Catchment Data	×	
Sub-catchment name Upstream_Cat Sub-catchment area (ha) 0.1473		
Hydrological Model (* abbreviated data (* Default model (* more detailed data (* You specify		
Paved Supplementary Grassed   Percentage of area 100 0 0   Time of concentration (mins) 5 2 5		<b>⊘</b> 0.121
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Figure 2 - Upstream Catchment Characteristics

The 1% AEP design flow rate was determined to be 121L/s.



#### 2.2 Catchment & Hydrology

To determine the capacity of the critical cross-section to ensure adequate conveyance of the design flow rate, two critical sections were assessed using a Mannings equation for channel flow. The two critical sections are presented in Figure 3, which generally consist of:

<u>Section A</u> – Critical section through vehicle access with 1% longitudinal grade, 2.5% grade within the car park, and 10% grade along the dual-purpose kerb ramp to the crest level approx. 120mm above invert of kerb.

<u>Section B</u> – Critical section through barrier kerb access with 1% longitudinal grade, 2.5% grade within the car park, and 150mm high barrier kerb.



Figure 3 - Critical Cross-Sections

Figures 4 and 5 present the manning's calculation for each cross section.



	SY20096 Gosford R	egional Libr	ary				Calcs By Date	RS 11.12.23			
Channel Name =	Critical Se	ction A									
					I				0.140		
AREA sq.m =	0.36				_				0.100		
WETTED PERIMETER m =	6.01								0.050		
VELOCITY m/s =	1.09								0040		
VELOCITY HEAD m =	0.06				-6.000	5.000 4.00	0 -3.000	-2.000	-1.000 0	000 1.000	2000
VxD =	0.13										
	0.014					CHA					
						CHAI					
MANNINGS "n" =											
MANNINGS "n" = GRADE % =			Left offsets				Centre				offsets (+m)
	1.0	Offsets Depth (-m)	Left offset: -4.800 0.120	s (-m) -4.800 0.120	-4.800	-4.800	Centre 0.000 0.000	1.200	1.200	Right 1.200 0.120	offsets (+m) 1.200 0.120

Liguino (	1	Manninga	Calculation	Critical	Contion A
FIGULE 4	+ -	Marinings	Calculation	- Criticai	Section A

Job No.	SY20096						Calcs By	RS			
Job Name	Gosford Re	gional Libi	ary				Date	11.12.23			
Channel Name =	Critical Sec	tion B									
										0.160	
AREA sq.m =	0.45						<u> </u>			0.120	
WETTED PERIMETER m =	6.15								_	0.060	
VELOCITY m/s =	1.25									0.040	
VELOCITY HEAD m =	0.08				-7.000	6.000 -5.00	0 4.000	+3.000	-2.000 -1	000.0 000.	1.000
	0.19										
VxD =	0.10										
VxD =	0.10										
VxD = MANNINGS "n" =						CHA		OFILE			
			Left offsets	s (-m)		CHAN	NNEL PRO	OFILE		Right	offsets (+m)
MANNINGS "n" =	0.014	Offsets	Left offsets -6.000	s (-m) -6.000	-6.000	CHAN		0.030	0.030	Right 0.030	offsets (+m) 0.030

Figure 5 - Mannings Calculation - Critical Section B

As can be observed, the critical section (Section A) has a design capacity of 394L/s assuming the channel profile is flowing full. This has at least three times the capacity of the 1% design storm event, demonstrating there is sufficient redundancy to ensure overland flow does not risk overtopping the crest of the vehicle access.

# 3. Conclusion

Calculations have been presented for the overland surface flow study that was performed to ensure the intent of DA condition B25 was satisfied within the proposed civil design. It was demonstrated that the proposed levels and grading provides more than three times the design capacity of the peak flow anticipated in the 1% AEP design storm event.

We trust this meets your requirements. If you require clarification on the above, please feel free to contact the undersigned on (02) 4365 1668.

R. Suching

Robert Suckling Civil Engineer BE Civil (Hons 1), MIEAust