Suite 4, Level 1
257-259 Central Coast Highway
Erina NSW 2250
02 4365 1668
centralcoast@northrop.com.au
ABN 81 094 433 100

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.

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.

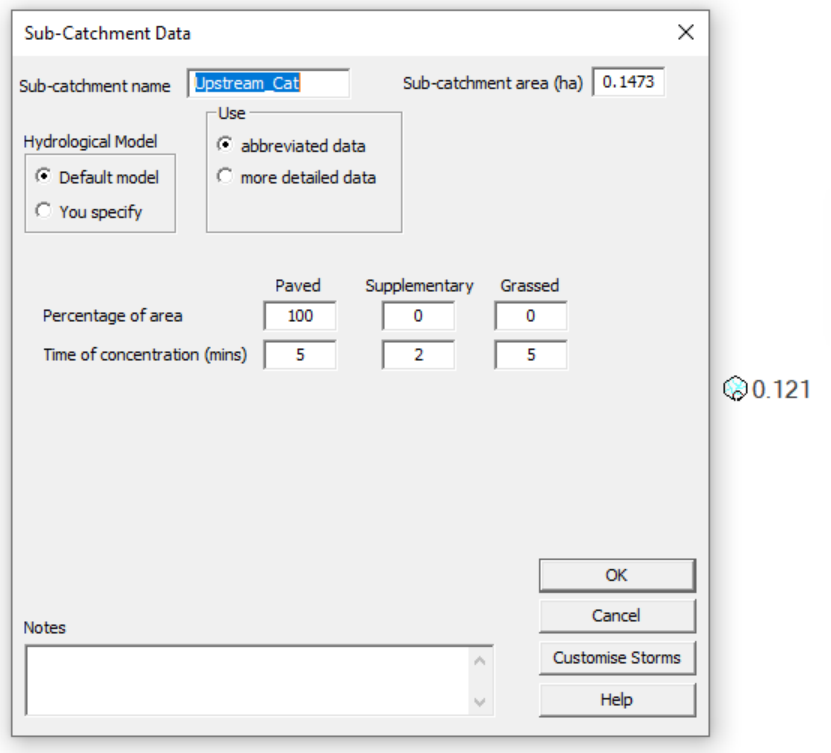


Figure 2 - Upstream Catchment Characteristics

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:

Section A – 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.

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

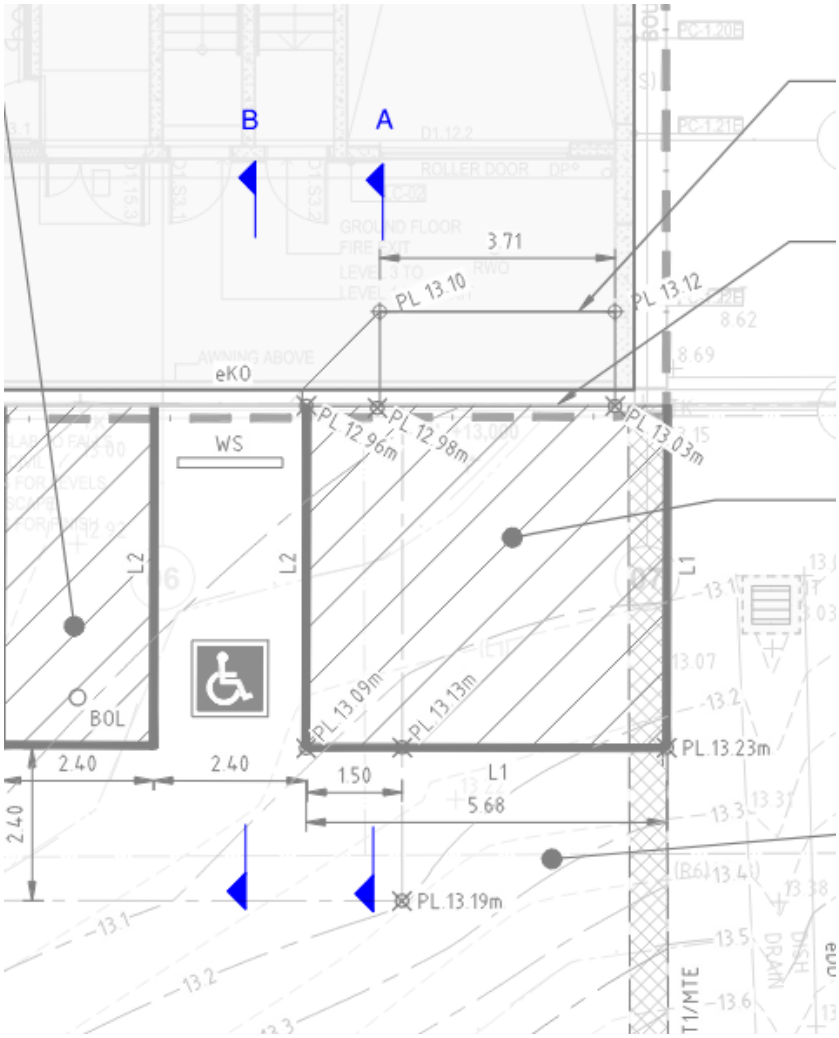
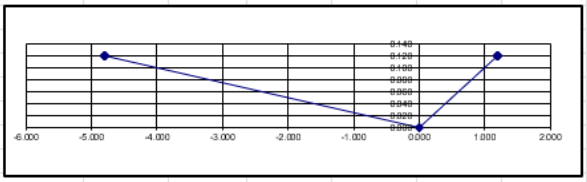


Figure 3 - Critical Cross-Sections

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

Job No.	SY20096	Calcs By	RS
Job Name	Gosford Regional Library	Date	11.12.23

Channel Name =	Critical Section A
AREA sq.m =	0.36
WETTED PERIMETER m =	6.01
VELOCITY m/s =	1.09
VELOCITY HEAD m =	0.06
VxD =	0.13
MANNINGS "n" =	0.014
GRADE % =	1.0
CAPACITY cu.m/s =	**0.394**



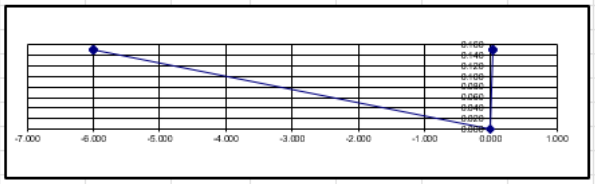
CHANNEL PROFILE

	Left offsets (-m)				Centre				Right offsets (+m)
Offsets	-4.800	-4.800	-4.800	-4.800	0.000	1.200	1.200	1.200	1.200
Depth (-m)	0.120	0.120	0.120	0.120	0.000	0.120	0.120	0.120	0.120

Figure 4 - Mannings Calculation - Critical Section A

Job No.	SY20096	Calcs By	RS
Job Name	Gosford Regional Library	Date	11.12.23

Channel Name =	Critical Section B
AREA sq.m =	0.45
WETTED PERIMETER m =	6.15
VELOCITY m/s =	1.25
VELOCITY HEAD m =	0.08
VxD =	0.19
MANNINGS "n" =	0.014
GRADE % =	1.0
CAPACITY cu.m/s =	**0.567**



CHANNEL PROFILE

	Left offsets (-m)				Centre				Right offsets (+m)
Offsets	-6.000	-6.000	-6.000	-6.000	0.000	0.030	0.030	0.030	0.030
Depth (-m)	0.150	0.150	0.150	0.150	0.000	0.150	0.150	0.150	0.150

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.

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