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DA CONCEPT REPORT-CIVIL

OUR REF: 9247-DADR

PACIFIC BROOK CHRISTIAN SCHOOL AT LOT 100 DP 1261496 72-74 MAITLAND STREET, MUSWELLBROOK NSW 2133

PREPARED BY: GRISHMI KHANAL
DATE: 10/07/24
Rev: C

DOCUMENT VERIFICATION

Project Title	Pacific Brook Christian School
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Client Contact	NBRS Architecture

	Name	Signature
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Checked by	Michael Grogan	
Issued by	Michael Grogan	

REPORT DELIVERABLES

DOCUMENT HISTORY

Date	Revision	Issued to	Description
10/05/24		NBRS	DA Draft
24/05/24	A	NBRS	DA Issue
26/06/24	B	NBRS	DA Issue
10/07/24	C	NBRS	DA Issue

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1 EXECUTIVE SUMMARY

Birzulis Associates have been commissioned by NBRS Architecture to provide a stormwater report on the basis of the targets that have been proposed to be achieved for Stage 1 for the redevelopment of the above-mentioned site.
This report has been prepared with reference to the architectural proposal and the stormwater guidelines that govern for this site.

2 OVERVIEW OF PROPOSED MODIFICATIONS

The proposed development is for the establishment of a new K-12 school (Pacific Brook Christian School) on the subject site. The proposed development will comprise site preparation and remediation, tree removal, construction of new school buildings, covered outdoor learning area, covered walkways, car parking, landscaping, and associated works. The school will accommodate 140 students and 16 staff.

3 EXISTING CONDITIONS

3.1 LOCATION

The site is located adjacent to Muswellbrook Golf Course and is approximately 2.432 ha and currently is partially developed with sparsely located and sized buildings with garden bed areas. See Figure 1.
The site has Muswellbrook Golf Course (Crown Land) to the north-east, Maitland Street (TfNSW Classified Road) to south-west, residential development to the south-east.

Figure 1 – Aerial image of Site

The site is mostly an existing undeveloped site with agriculture type use with the existing unsealed ring road internally. From a stormwater point of view, it is mostly a "green field" type site.

3.2 GEOTECHNICAL

A geotechnical investigation has been undertaken by Douglas Partners (DP 91601-03 August 2020 Rev B) and identifies that generally the site is a clay type site which would be unsuitable for bulk stormwater infiltration disposal.

3.3 EXISTING STORMWATER

3.3.1 EXTERNAL STORMWATER DRAINAGE

A working trunk stormwater drainage system is located in Maitland Street to the south-west of the site with pipes ranging from 900mm diameter to 375mm diameter. This stormwater currently discharges at a multiple outlet headwall to the north-west of the site and flows to Muscle Creek. This trunk drainage system is also fed by kerb inlet pits and junction pits along the main line to the headwall.
No significant change to this external stormwater strategy is being proposed. We anticipate some new connections to this network but there adequately spaced existing pits to connect to a pit and not construct any additional pits in the trunk drainage system. The existing system can be kept “live” for the duration of the works.

3.3.2 INTERNAL STORMWATER DRAINAGE

The current site has an existing easement “for pipeline” believed to be in favour of the upstream residential development. The survey notes a number of sewers rising mains in this easement. It does not show any stormwater in this easement.
The site has a known existing stormwater connection to the trunk drainage system in Maitland Street. This existing connection will be utilised as the discharge point for the carpark.

3.4 FLOOD DOCUMENTATION REVIEW

We have contacted Muswellbrook Shire Council and they have confirmed the site is only partially affected by the 1:100-year stormwater event, additional flood studies have been carried out by Royal Haskoning DHV (FIA PA2391_Pacific Brook School FIA 03.01 21/June 2022). The revised 1% flooding mapping is indicated in Figure 2 and as such a proposed stormwater system for the developed part of the site will perform as designed.

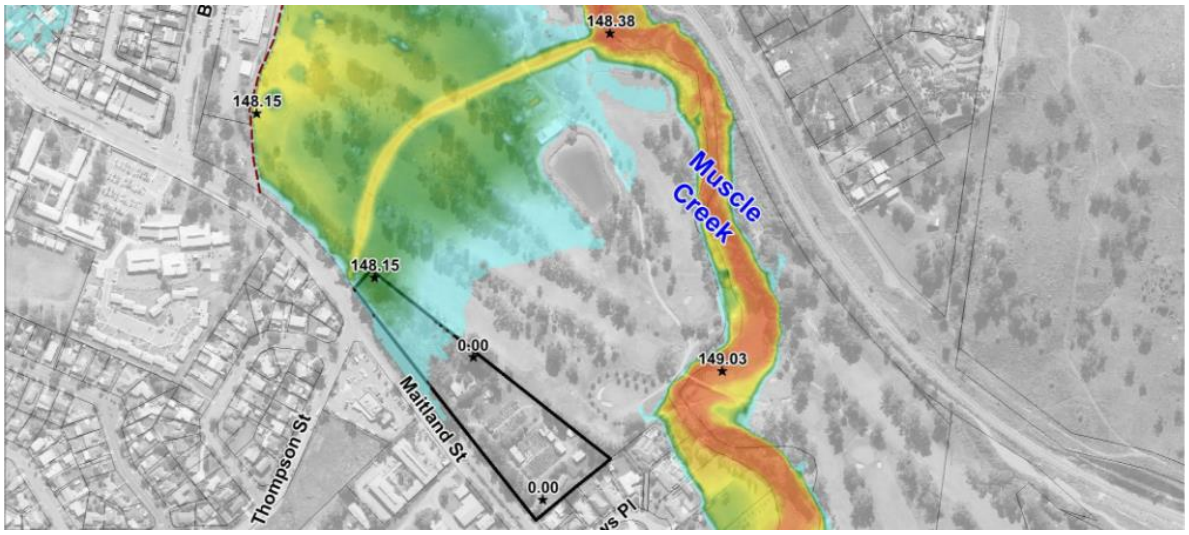


Figure 2 – Flood Mapping for 1% AEP (Source: GHDHV FIA Report 03.01 -MC@ Peak Flood Depth 100-year Event RG)

4 PROPOSED DEVELOPMENT

4.1 CIVIL WORKS

4.1.1 EARTHWORKS

We do not anticipate large scale earthworks as the portable buildings are supported on isolated pad type footings. The main civil works are the pavements (footpath and carpark) which are less than 2500m^2 hence not triggering for sediment basin assessment.
Some contamination has been identified in the remediation action plan prepared by Douglas Partners (91603.02 August 2019) and earthworks and spoil should be handled in accordance with the recommendations of that report.

4.1.2 EXTERNAL WORKS

The external works will consist of new pathways, and new carparking facilities. The new pathways will be a minimum of 110mm thick reinforced with jointing to control cracking. The CBR for the site is low in the vicinity of 2%. Based on the geotechnical report it would be prudent to provide perimeter sub-soil drainage to protect trafficable pavements from shrink swell and other associated moisture effects.
The flexible pavement has been recommended by the geotechnical engineer to have a SMZ under a conventional flexible pavement design for 4 x 10^5 ESA.

4.1.3 TRAFFIC

The traffic assessment and reporting are by others.

4.2 STORMWATER

4.2.1 WATER QUANTITY

We have contacted Muswellbrook Council and they have confirmed via email that the post-development discharge rates should not exceed pre-development discharge rates up to the 1% AEP rainfall-runoff. Council noted the design would need to be consistent with their 2020 DCP Section 25- Water Management.
The site also partially falls to Crown Land and as such should also be consistent with the requirements of the document; Development adjacent to National Parks and Wildlife Service lands.
Muswellbrook Council DCP has been reviewed and has the following guidelines reference.

> **According to DCP 25.2.3 Flooding and Runoff Regimes**
>
> **A - Replicating Natural Conditions**
>
> **Controls**
> **(i) Development is to be designed so that runoff from low intensity, common rainfall is equivalent to the runoff from a natural catchment. This can be achieved by intercepting and storing runoff in extended storage detention basins and discharging at greatly reduced rates.**
> **B. Managing peak runoff.**
> **Runoff generated by more intense rainfall needs to be managed so that there is no downstream property damage or risk to public safety.**

As noted above the site cannot discharge greater than the existing so when there is an increase in impervious area OSD will be required to meet the above target.
A DRAINS software has been used to model the pre-development runoff condition and the post-development runoff condition. Results from DRAINS model has been shown in Appendix A.

Table 4.2.3.1 provides details for the pre-development and post-development flows after proposing a detention system for Stage 1 Development.

Table 4.2.3.1 - Site Hydrology

ARI (years)	Peak Flow (m3/s)	
	Pre-developed Condition	Post-developed Condition
	Runoff (m3/sec)	Runoff (m3/sec)
5 = 20% AEP	0.163	0.161
20 = 5% AEP	0.329	0.322
100 = 1% AEP	0.524	0.508

The modelling has shown that, with the provision of a OSD storage volume of 42 m^3 contained in one modelled system, stormwater flows from the development will be attenuated to less than pre-development flows. The proposed detention system provided excess storage and therefore meets the policy requirements of Muswellbrook Shire Council.

4.2.2 WATER QUALITY

Muswellbrook Council DCP has been reviewed and has the following guidelines reference. Water quality system has been designed using ocean guard pit inserts, and ocean protects filter cartridges to meet the pollution reduction targets.

According to DCP 25.2.5 Pollutants

Objectives
a) To ensure that stormwater generated from development does not result in pollution of water courses or receiving waters
Controls
i) Stormwater management systems are to be designed to capture and remove all litter larger than 5mm in size.
ii) Pollution reduction devices. The objective of pollution reduction devices e.g. Gross Pollutant Traps, is to remove contaminants such as oil, sediment and other pollutants before stormwater discharges into the receiving system beyond the site of the development.

We have prepared a MUSIC software model to meet the requirements of the Muswellbrook Shire Council DCP and the above Crown Land document. In MUSIC we

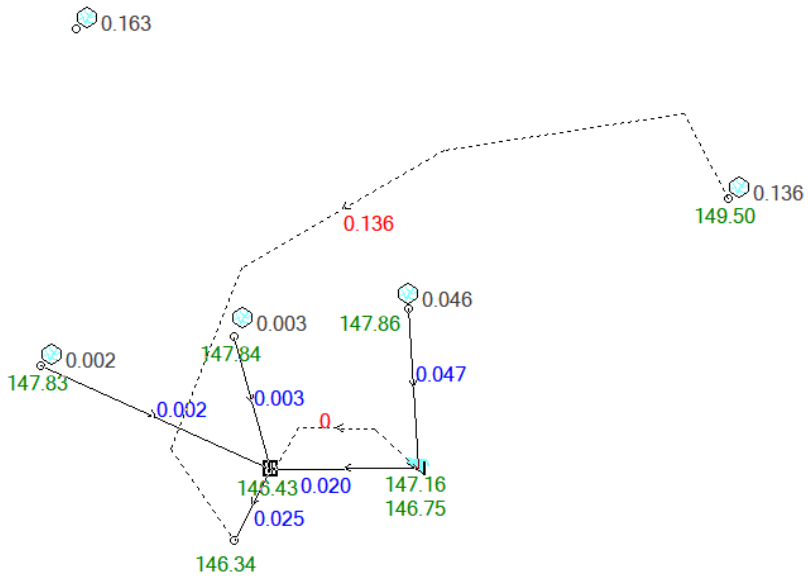
have used the baseline targets of the below to comply with the above. Results from MUSIC model has been shown in Appendix B.

POLLUTANT	MINIMUM % REDUCTION	ACHIEVED REDUCTION %
Total Suspended Solids (kg/yr)	80	98.48
Total Phosphorus (kg/yr)	45	92.14
Total Nitrogen (kg/yr)	45	57.81
Gross pollutants (kg/yr)	70	100

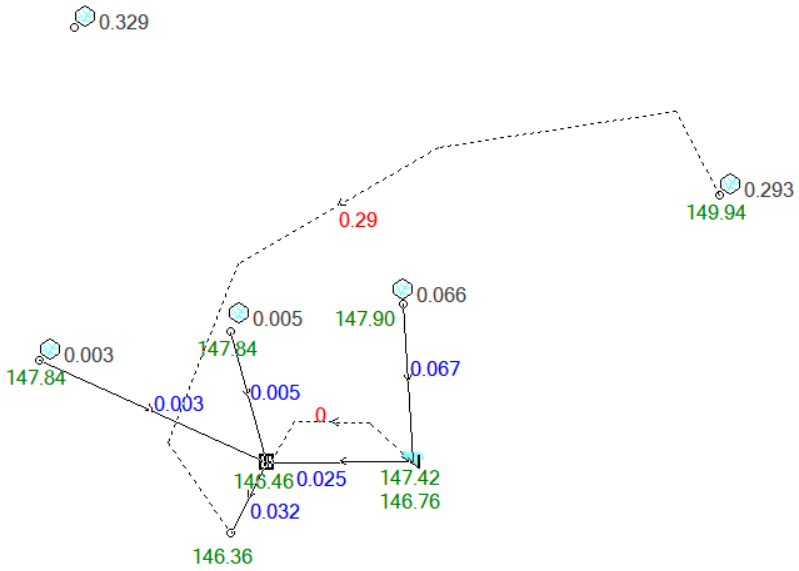
5 APPENDIX

5.1 APPENDIX A (DRAINS Results)

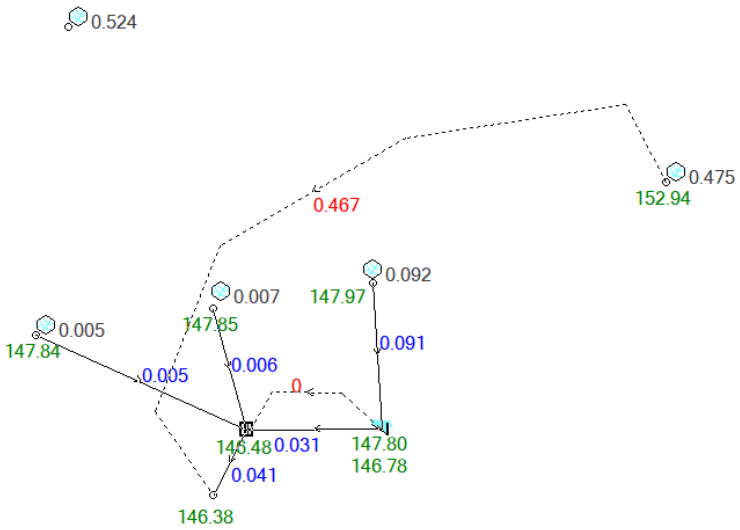
5 YEARS



20 YEARS



100 YEARS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0.092
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0.005
147.84
0.091
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0.005
0
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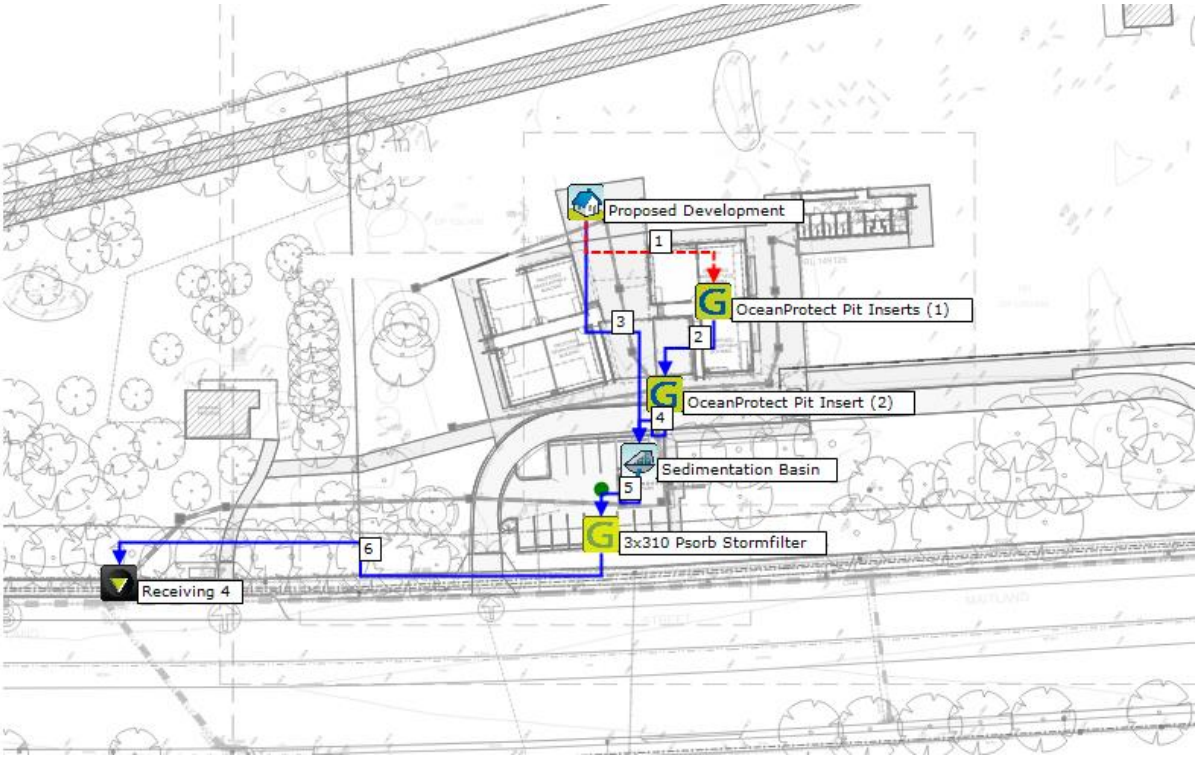
0.031
147.80
146.78
0.041
146.38

5.2 APPENDIX B (MUSIC Results)



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.576	1.576	-0.01287
Total Suspended Solids (kg/yr)	288.4	4.375	98.48
Total Phosphorus (kg/yr)	0.6098	0.04793	92.14
Total Nitrogen (kg/yr)	4.397	1.855	57.81
Gross Pollutants (kg/yr)	90.74	0	100