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STORMWATER MANAGEMENT REPORT
CONCEPT DESIGN

WILLIAM CAREY CHRISTIAN SCHOOL
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BUMBERA STREET
PRESTONS NSW 2170

Prepared For:
William Carey Christian School

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21st March 2025	DRAFT V3	Justification, Conclusion

Contents

1. INTRODUCTION

Birzulis Associates Pty Ltd has been commissioned by Marathon Modular on behalf of William Carey Christian School to prepare this stormwater management report in support of a proposed development application to be lodged over the site.

The site is located on Bumbera Street, Prestons NSW 2170 and is currently known as the William Carey Christian School. The site is bounded by Cabramatta Creek on the western side and residential developments on the remaining boundaries. The proposed development is for a new block consisting of a two-storey classroom building.

This report provides a summary of the stormwater management design principles and planning objectives for the management of stormwater quality and quantity. The objectives for the development are to provide an appropriate and economical stormwater management system which incorporates best practice in water sensitive urban design consistent with the requirements of Liverpool City Council's (LCC) water quality objectives.

A preliminary set of drawings have been prepared to show that the proposed stormwater quantity and quality requirements for the development can be met. These drawings cover stormwater management elements which cover surface levels and drainage layouts.

The engineering and policy requirements have been provided by Liverpool City Council.

Objectives:

1) To ensure adverse impact from stormwater runoff on downstream properties as a result of development in the catchment for all storm events up to and including a 100 year ARI event.
2) To ensure adequate drainage is provided for developments
3) To protect properties from localized floodings.
4) To minimize erosion and reduce the volume of overland flow entering waterways.
5) To minimize sedimentation and pollution in waterways and drainage waterways.
6) To maintain and enhance the quality of natural water bodies such as creeks, rivers and groundwater.
7) To reduce cost of providing and maintaining water infrastructure.
8) To ensure developments must not cause any adverse impact on adjoining or any other properties. This includes maintaining surface flow paths and not increasing water levels in these flow paths. Diverting flows from one catchment to another will not be permitted.
9) To avoid soil erosion through the use of effective erosion control sediment control measures both during and following any works.
10) To reduce pollution by avoiding land degradation and disturbance of vegetation on site, hence reducing pollution impact to downstream areas and receiving waters and their ecosystems.
11) To minimize costs involved in unblocking drains and water bodies, cleaning of roads and compensating for the loss of topsoil through improved sedimentation and erosion control.
12) To improve water quality by reducing sedimentation.

2 SITE CHARACTERISTICS

2.1 Site Description

The proposed development is located in the suburb of Prestons on Bumbera Street with an area of approximately 0.15 hectares in area, as shown in **Figure 2.1.** The existing site is currently developed and is occupied by a multi-unit school building, internal road network and carparking system, and landscape areas to which it has a mix of impervious and pervious areas.

Figure 2.1) Location Plan

2.2 Proposed Development

The proposed development is for the construction of a new two-storey classroom building. An indicative layout of the development has been produced by Marathon Modular Pty Ltd and can be seen in **Figure 2.2**.

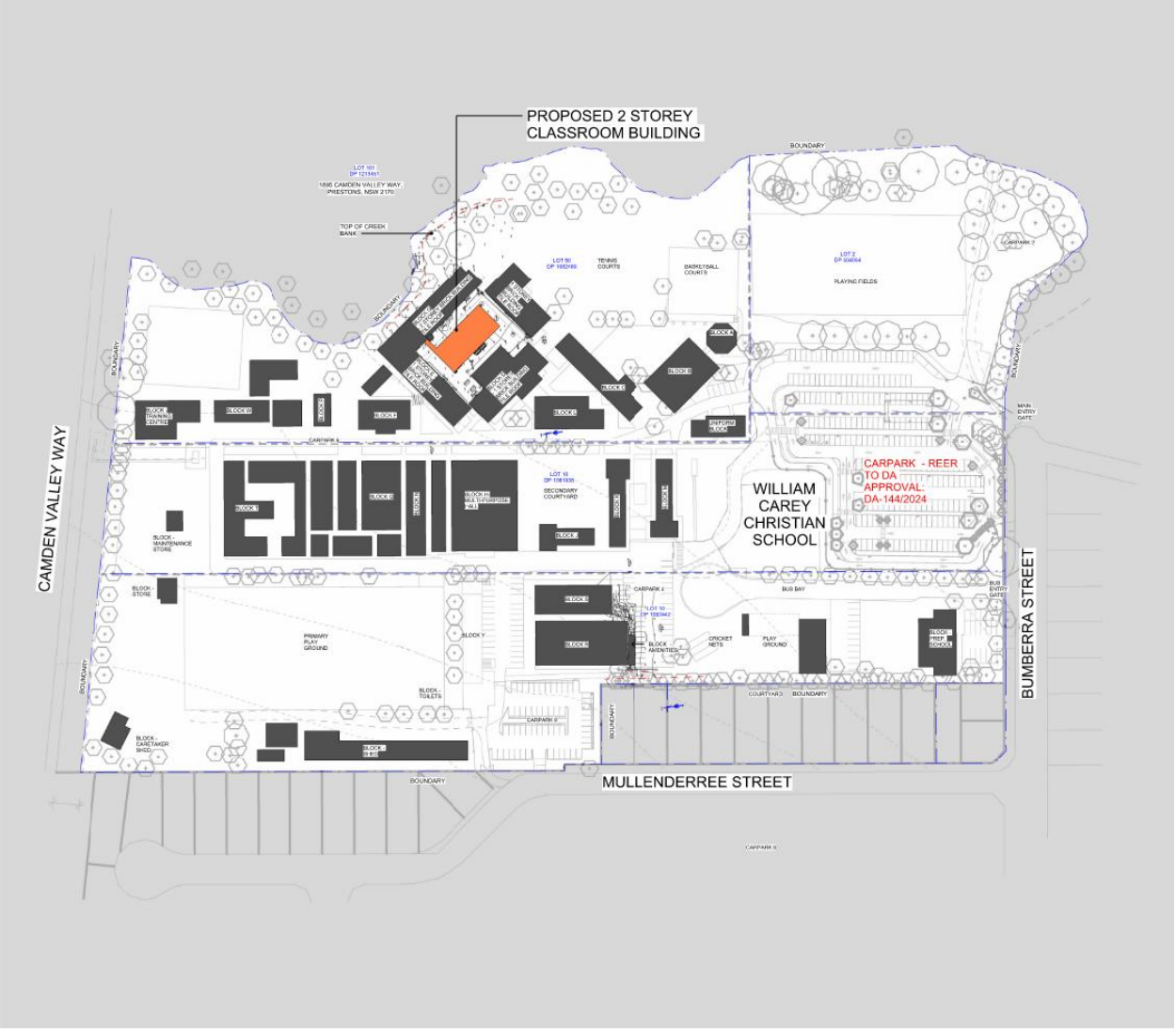

Figure 2.2) Proposed Site Plan (Marathon Modular – Drawing No. SK1C.02.2)

3 STORMWATER DRAINAGE

3.1 Site Drainage

3.1.1 Existing Site Drainage

The proposed site largely consists of impervious concrete area of 1044 m^2 and a small portion of pervious lawn which is 456 m^2. The stormwater infrastructure comprises of a below ground pit and pipe network as well as overland flow routes. The site is graded to overflow into adjacent Cabramatta Creek as shown in the picture below.

Figure 3.1.1) Google maps imagery

Figure 3.1.2) Existing Catchment

Figure 3.1.3) Pre dev – Flow in 1:100 year storm event (source DRAINS)

3.1.2 Proposed Site Drainage

Design criteria : The proposed system shall be completed in accordance with the Australian Rainfall and Runoff guidelines, the guidelines of LCC and AS3500.3.

1) The major system will be designed to cater for storms up to the 1-in-100-year ARI, with a freeboard of 300mm to the adjacent habitable floor levels. The major system will employ the use of defined overland flow paths that safely convey excess run-off from the site using gravity drainage to a creek system.

2) Surface flow paths including the provision of an emergency overflow shall be designed to cater for blockage of the system or flows of the 100-year ARI storm flow.

3) The rate of stormwater runoff from the post-developed site is not to exceed the rate of runoff from pre-developed site for storm events from 5-year ARI to 100-year.

4) Increase in impervious area by more than 30m2 will trigger an on-site detention requirement.

5) The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of LCC and accepted engineering practice. Runoff from buildings will be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage. Overall site runoff and stormwater management will be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (2019 Edition), Volumes 1 and 2 (AR&R);

Proposed SW plan:

1) The proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater runoff from the development to legal points of discharge.

2) A grated drain will be required at the bottom of the stairs at the entrance of the new building which will be connected to the nearby existing pit.

3) Downpipes to be conveyed through underslung drainage, suspended from the building. To be designed by others, and discharge into the proposed on-site detention tank through underground pipes which then connects to existing stormwater network on site.

Proposed on-site detention and site discharge requirements:

On-site detention (OSD) has been deemed a requirement for the development in accordance with section 6.1.3. of the Liverpool City Council DCP.
Since the proposed development area adds an increase of impervious area greater than 30m2, Liverpool City Council DCP, On-site stormwater detention standard page 4, 4.3. "Information required with development application submission has been followed".
This outlines the requirement to utilise a computational model, in this case DRAINS, to

ensure detention is sized to detain from 1% Average Exceedance Probability (AEP) proposed development flow to the 20% AEP proposed development flow rate.

The proposed additional roofing has been made to detain into OSD which drains through a 110mm orifice.

Figure 3.1.2.1) Post-dev Catchment

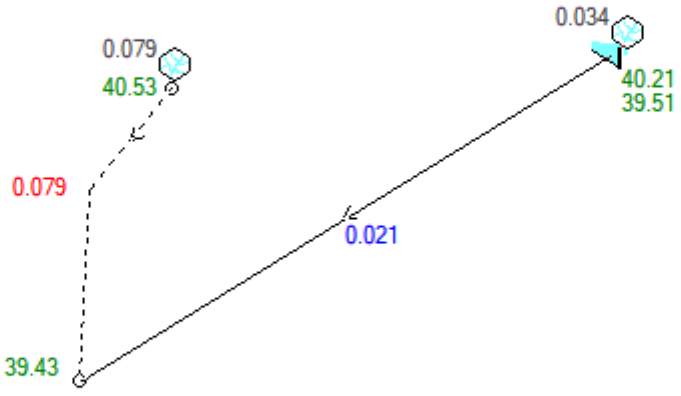

Figure 3.1.2.2) Post-dev flow 1 in 100 year storm event (source DRAINS)

3.2 Justification

Construction Strategy:

- Replace the current pit lid for the ones below the proposed building with that of a Heel Guard Lid with V design, ensuring durability and high-water intake.
  Provide the stormwater pit with an "Atlan Stormsack on site gross pollutant system " or approved equivalent(to be installed as per manufacturer's specifications) to filter fine sediments.
- Building footings and foundation design have been carefully planned to avoid any interference with the existing underground stormwater (SW) pipe network. A detailed assessment of the stormwater layout has been conducted to ensure that no structural elements encroach upon or compromise the integrity of the existing system.
- Piers and structural supports will be positioned in a manner that ensures the existing stormwater system remains fully operational and unaffected during and after construction. The placement of these elements has been reviewed to prevent any structural loads from impacting the underground infrastructure.
- Compliance with structural requirements: The proposed construction methodology aligns with the structural drawings prepared by Birzulis. These drawings have been referenced to confirm that all necessary precautions have been taken to safeguard the existing stormwater network, and the design fully complies with engineering best practices.

Maintenance strategy:

- Regular maintenance of the stormwater (SW) pits will be conducted to prevent blockages and ensure the system continues to function as intended (Follow operations and maintenance manual provided by Atlan storm sack for required interval of maintenance). Routine inspections and cleaning will help maintain optimal performance and prevent any potential water build-up or drainage issues.
- Compliance with NCC 3.4.1: In accordance with the National Construction Code (NCC) 3.4.1, a minimum 400mm vertical clearance has been provided to allow for regular inspection and maintenance activities. This clearance ensures that access to the stormwater infrastructure remains unobstructed, facilitating efficient upkeep.

3.3 Mitigation

Erosion and sediment control measures will be provided in accordance with the "Blue Book" – Managing Urban Stormwater – Soils and Construction (Landcom, 2004) to mitigate potential impacts to the downstream water quality from construction activities.

Controls would include:

- Sediment management devices, such as fencing, hay bales and sandbags.
- Measures to divert or capture and filter water prior to discharge, such as drainage channels and first flush devices.
- Appropriate location and storage of construction materials, fuels, and chemicals where appropriate.
- All refuelling of vehicles and equipment on site would be undertaken a minimum of 50 metres away from water bodies and surface drains, where possible.

- Any fuel, oil or other liquids stored onsite would be stored in an appropriately sized impervious bunded area; and
- Measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site.
- Scour protection and energy dissipaters shall be provided.
- During the demolition and construction phase, an erosion and sediment control plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff. The existing stormwater system shall be kept in place for as long as possible for drainage and practicality purposes.
- During the operational phase of the development, a treatment train system will be proposed to mitigate the increase in stormwater pollutant loads generated by the development.

5 STORMWATER QUALITY CONTROLS

5.1 Regional Parameters

Since the increased impervious roofing is being discharged into an On-site detention system which in-turn discharges into the existing stormwater network, there is no need to provide any preliminary design for stormwater quality controls.

6 FLOODING & OVERLAND FLOW

Through the western side of the site there is a riparian corridor with Cabramatta Creek flowing adjacent to the site. The proposed development site is considered a low flood prone area by LCC (as shown in the figure below), Floor levels of the proposed building are to be no lower than the PMF level unless justified by site specific assessment. (LCC DCP, page 48, Table 6)

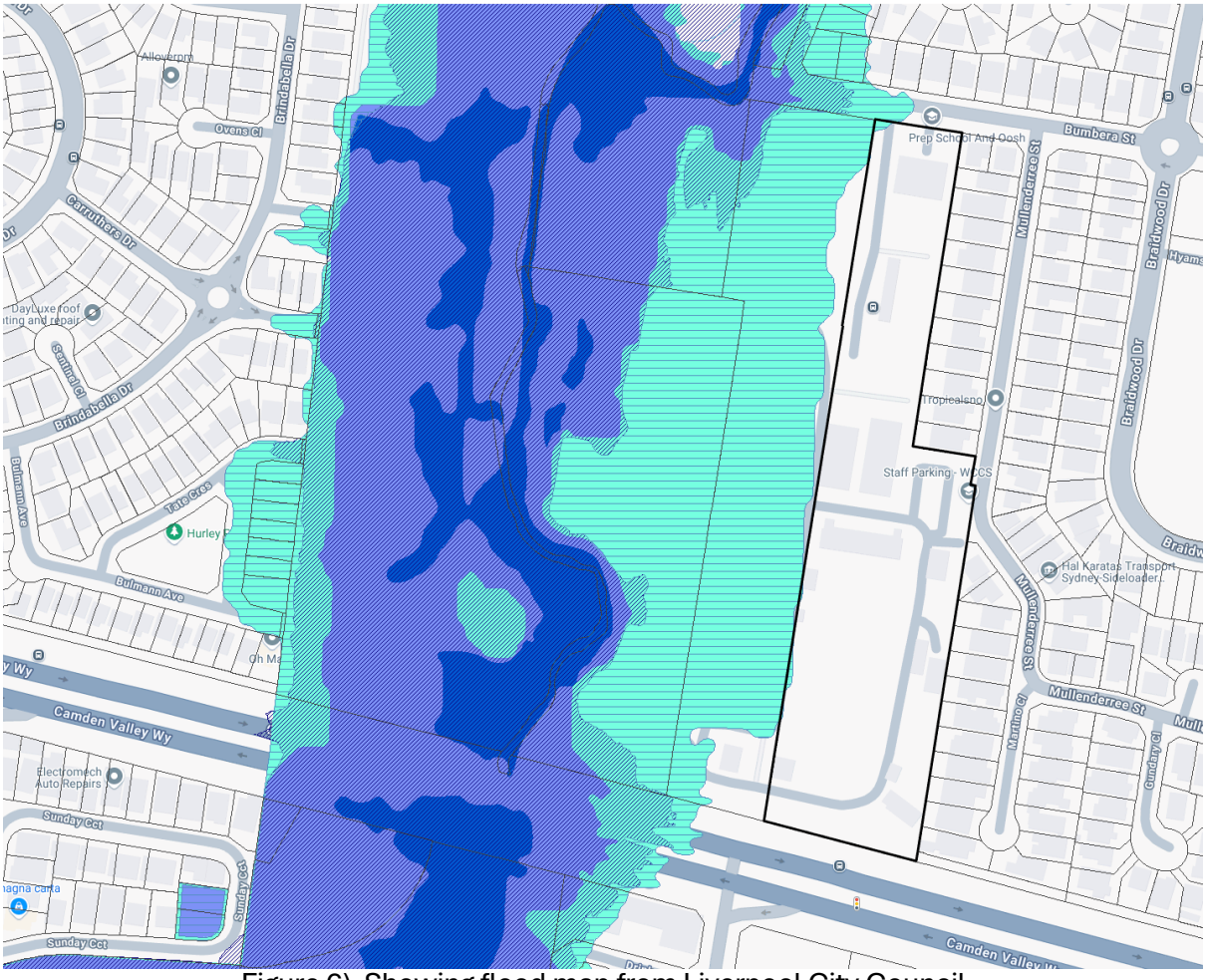

Figure 6) Showing flood map from Liverpool City Council

7 CONCLUSION

In this report we addressed several aspects of the stormwater management plan including stormwater quantity, erosion and sediment control, construction strategy and maintenance strategy to ensure the existing stormwater network under the building continues to function as intended.

The site stormwater management has been designed to meet the requirements set out in the Liverpool City Council DCP Part 6.1 – Water Cycle Management – Gravity Drainage to Council's drainage system.
The proposed estimated flow rates from the development have been modelled to the requirements specified by the Liverpool City Council. The results show that the site storage requirement and permissible site discharge are achievable for the proposed development.

In addition, no water quality controls are required for this site.

The construction strategy ensures that the existing stormwater network beneath the building remains fully functional and undamaged throughout the process. Additionally, we have proposed replacing the pit lids under the building to mitigate the risk of blockages and maintain optimal drainage performance.
A comprehensive maintenance strategy has also been developed, outlining regular inspection to ensure long-term efficiency. This strategy ensures that maintenance can be carried out seamlessly, without disruption to site operations, and includes proactive measures to prevent sediment build-up and system blockages.

An erosion and sediment control plan has been designed in accordance with principles outlined in the "Blue book Managing Urban Stormwater – Soils and construction by Landform (2004)". During the construction certain activities such as earthwork and demolition will increase the pollution to the stormwater system and generally the environment. The bluebook helps all those involved in the construction industry to comply with appropriate stormwater quality outcomes. These outcomes have been established by various consent authorities, including the NSW Department of Planning, Industry and Environment., Due to the minimal excavation works and with implementation of the strategies mentioned above it is expected that the impact of the development on stormwater quality and quantity will be acceptable.

8 REFERENCES

- Australian Rainfall and Runoff Guidelines (2019); and
- Liverpool City Council's DCP

9. APPENDIX

Sediment Erosion Control Plan

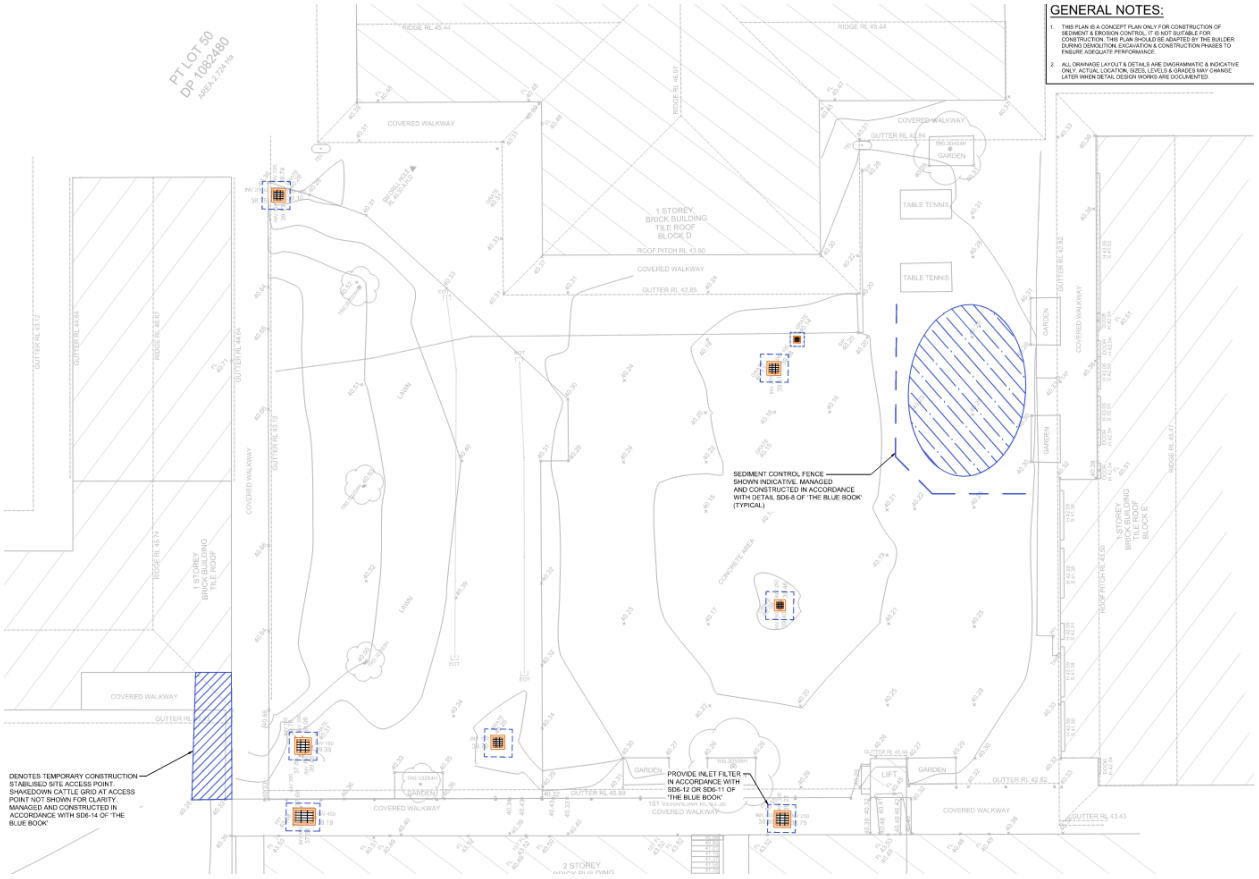

Figure 9) Sediment erosion control plan (Source : Birzulis drawings C.11 : Scale 1:100)