Proposed New Liverpool Primary School Development

Forbes Street, Liverpool, NSW

SSD Report

Revision: 02

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Report Amendment Register

Rev. No.	Issue/Amendment	Author/Initials		Reviewer/Initials		Date
0	Draft Issue	Youmna Khalid	YK	George K	GK	19/03/21
1	Draft Issue	Youmna Khalid	YK	George K	GK	31/03/21
2	Final	Youmna Khalid	YK	George K	GK	16/04/21

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1. Introduction

Meinhardt-Bonacci has been engaged by NSW School Infrastructure (SINSW) to report on the civil engineering and flooding elements associated with the proposed development of the Southern Suburbs Cluster (SSC) which includes the development of a new Liverpool Primary School.

This SSD Report addresses the proposed civil engineering works associated with the development of the new Liverpool Primary School including drainage works and water quality/quantity control measures. Preliminary water quantity and quality assessment has been undertaken to ensure the proposed development complies with Liverpool City Council (LCC) requirements.

2. Site Description

2.1. Location

The new Liverpool Primary School (NLPS) is located within the grounds of the existing Liverpool Boys and Girls High School in the Liverpool Central Business District (CBD), at 18 Forbes Street, Liverpool. The proposed new Liverpool Primary School is located in the eastern portion of the existing school grounds (refer to Figure 2-1).

The site is legally described as Lot 1 in DP 1137425. The application seeks consent for the construction and operation of a new Liverpool Primary School. This will include construction of a new school building for core school facilities, teaching spaces, support units, preschools as well as associated landscaping and open space improvements. A detailed description of development is provided by Ethos Urban within the EIS.

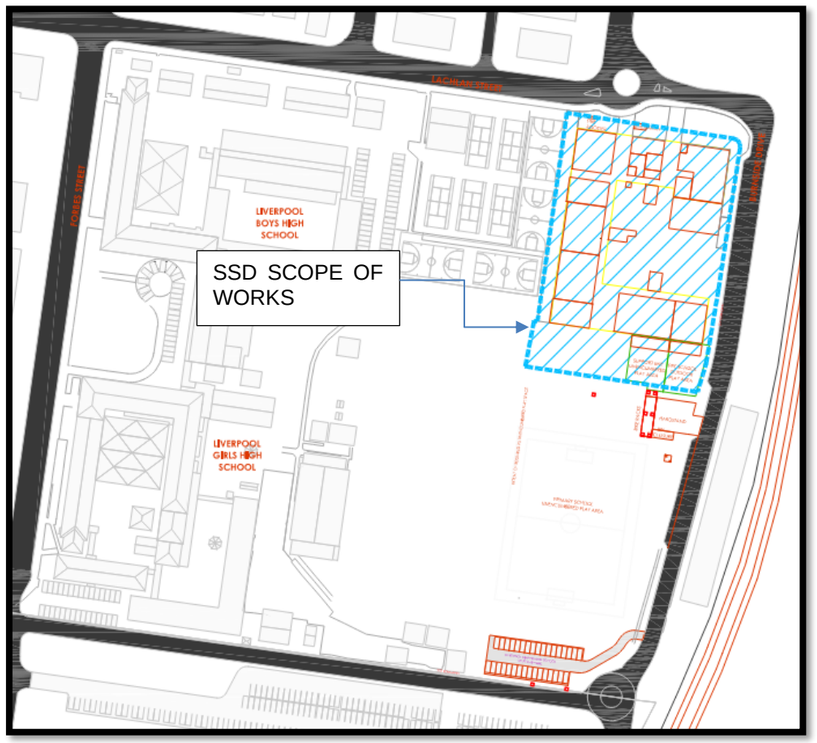

Figure 2-1: NLPS Site Plan (Source:JEJ)

The site is located within the Liverpool City Council (LCC) local government area and bounded by Liverpool Boys and Girls High Schools from the west, Lachlan Street from the north, Burnside Drive from the east and Liverpool Hospital from the south.

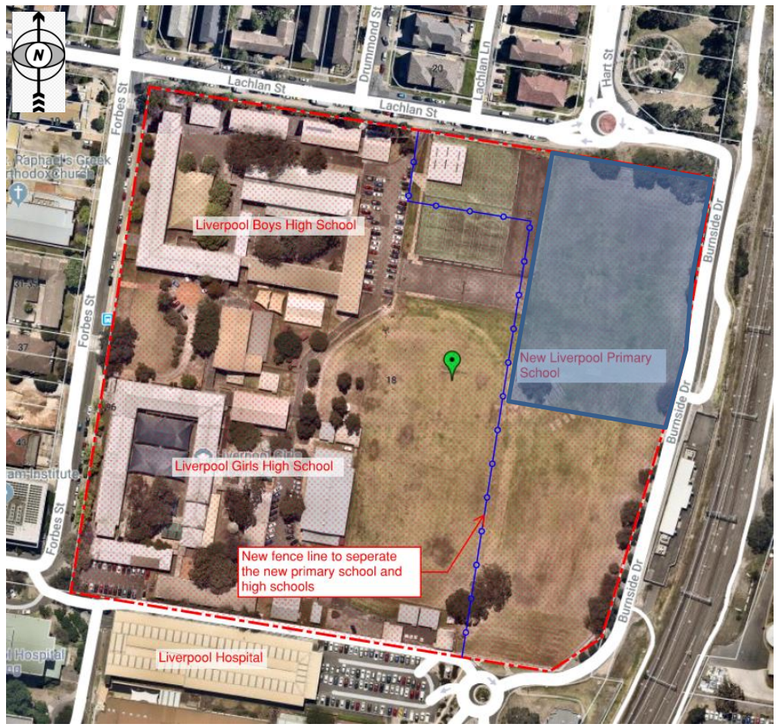

Figure 2-2 Locality and Aerial Map of the Site (Source: Nearmaps)

2.2. Topography

The site area is approximately 0.95 ha and is mostly grassed with a brick building, tennis court and a footpath adjacent to Lachlan Street. The site slopes in a south easterly direction with levels vary from RL9.85 to RL8.80 with a gradient of approximately 0.5% which is considered to be a flat site.

2.3. Existing Stormwater System

Meinhardt-Bonacci has been provided with site survey produced by John Lowe and Associates Pty Ltd, dated December 2018, see Figure 2-2 (refer Appendix A for complete site survey). Majority of the existing stormwater drainage system is located within the high school site. There are existing pits/pipes around the tennis court area and the outlet connection/discharge point is assumed to be the underground drainage system on Burnside Drive.

No stormwater detention system, rainwater harvesting system and water quality control measures have been identified in the survey or during the site visit.

Figure 2-3 Plan of Detail and Levels of Liverpool West Public School & Mainsbridge School (LTS, 27/04/2019)

2.4. Existing Services

A DBYD enquiry has been undertaken, the results show utilities including electrical, water, telecommunication and gas lines located outside the site boundary. No internal services have been identified by DBYD results.

However, relocation and adjustment of the existing services along Lachlan Street may be required for the proposed accessway.

2.5. Existing Stormwater Network

Based on the provided survey produced by John Lowe and Associates Pty Ltd dated December 2018, two piped discharge points exist from the site. A 225mm diameter pipe connection to Burnside Drive after collecting runoff from the tennis courts and a 600mm diameter pipe connection to the hospital site. However, the connection points to the hospital and Burnside Drive have not been identified on the site survey and additional survey will be required to establish the drainage network onsite to facilitate detailed design. Assumed layout of the existing drainage system is shown in Figure 2-7.

Figure 2-7 Assumed Existing Drainage Layout (Based on Survey dated December 2018)

3. FLOODING

3.1. Existing Flooding Conditions

The site is subject to mainstream flooding from Georges River to the southeast of the site and overland flooding from the CBD catchment to the south and west of the site. The Georges River Probable Maximum Flood (PMF) level is 10.80m AHD while the Liverpool CBD overland flow PMF is approximately 9.3m AHD based on the supplied documents. Based on the flood information provided (refer to Figure 2-3), the NLPS site is located within the Georges River and CBD Overland Flow PMF extent but outside of the 1% Annual Exceedance Probability (AEP) flood extent for both Georges River and CBD Overland Flow. As advised by LCC Council Flood Engineer, no flood impact modelling is required to be undertaken for this development.

It is also noted that in accordance with the Council DCP, schools are classified under the Land Use Risk Category of 'Sensitive Uses and Facilities'. For this particular use, the Floor levels should be no lower than the PMF level. However, for the proposed development, an evacuation plan would have to be considered with ground floor levels of the proposed buildings being difficult to construct above the PMF level due to the depth of inundation. Please refer to Section 3.1.3 of the report for additional details of flood risk mitigation measures.

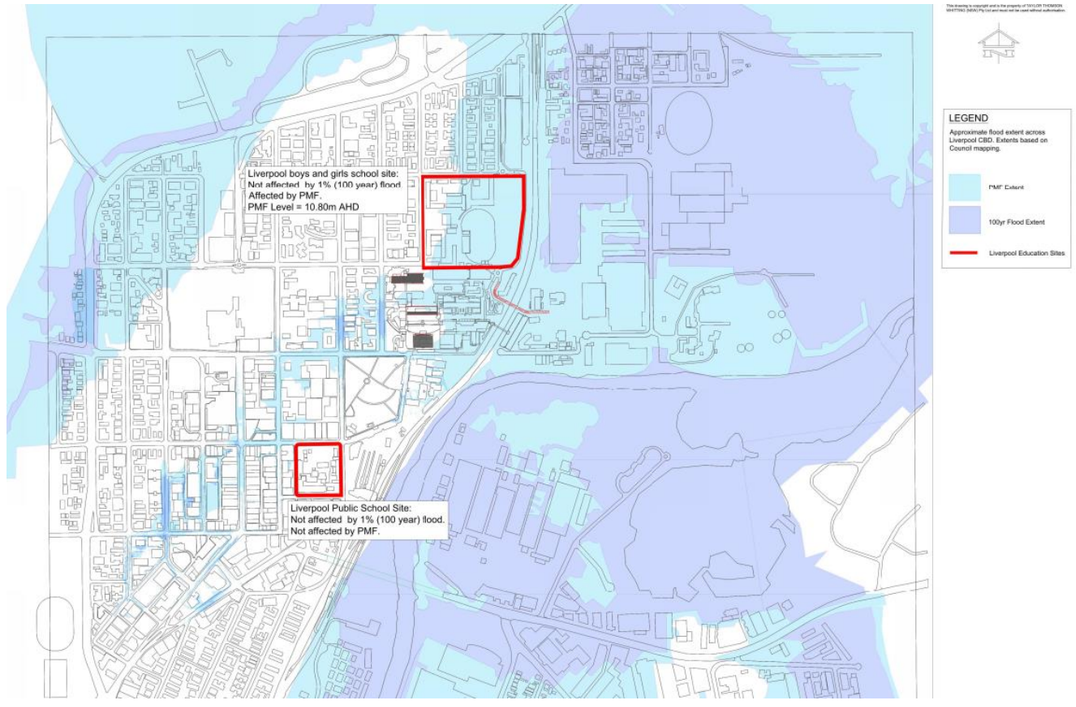

Figure 3-3 Flood Extent for Mainstream and Overland Flooding (supplied by SI NSW)

Bonacci have been supplied with documents by School Infrastructure NSW (SI NSW) which illustrate the localised flood risks for NLPS and Liverpool Health & Academic Precinct (LHAP). The documents identify significant localised flood risk at Campbell, Goulburn and Elizabeth Streets due to trapped low points within the overland flow path across the CBD catchment. Therefore, an upgrade on the existing stormwater system was proposed for LHAP.

It is understood based on the supplied LHAP project documents that the proposed stormwater upgrades include additional inlet pits and installing a new 900mm diameter pipe to collect flows from the low point on Goulburn Street which is extended north. The 900mm diameter pipe is further extended east along Campbell Street to connect to a new 1200mm pipe traversing the hospital site which connects to an existing 1200 x 1500 culvert that discharges to Georges River. Liverpool Hospital's proposed drainage upgrade is shown in Figure 2-4.

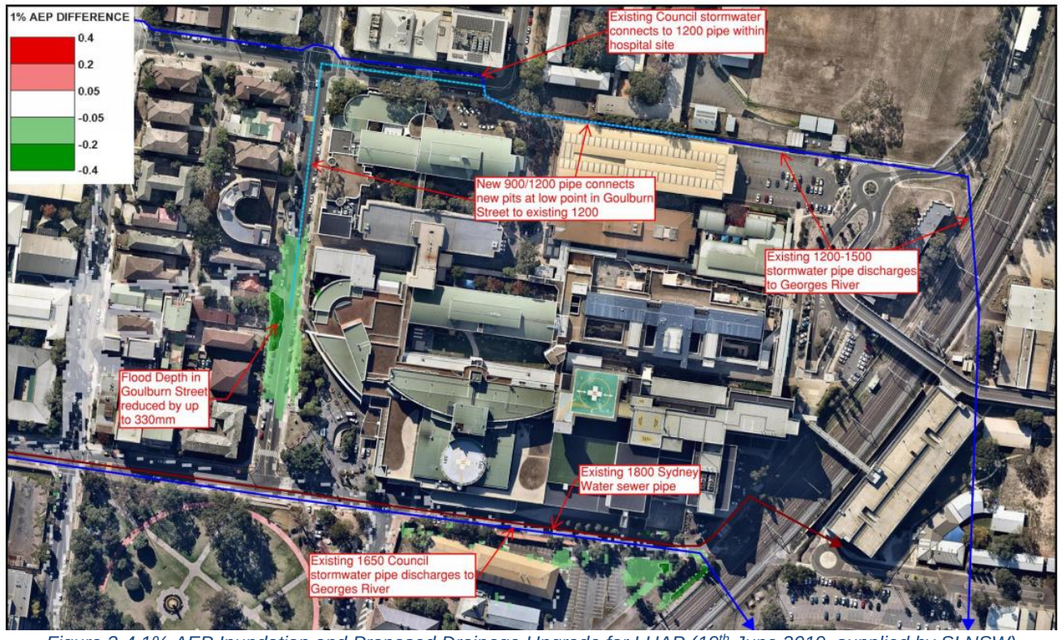

Figure 3-4 1% AEP Inundation and Proposed Drainage Upgrade for LHAP (19th June 2019, supplied by SI NSW)

The proposed upgrade reduces the Liverpool CBD Overland Flow 1% AEP flood extent in the Goulburn Street. The results (refer Figures 2-5 and 2-6) of the drainage upgrade also suggests that the school site is impacted with a slight worsening effect by LHAP's proposed stormwater upgrade works with the proposed PMF flood extent is extending further into Liverpool Girls High School with a marginal increase of the PMF flood levels.

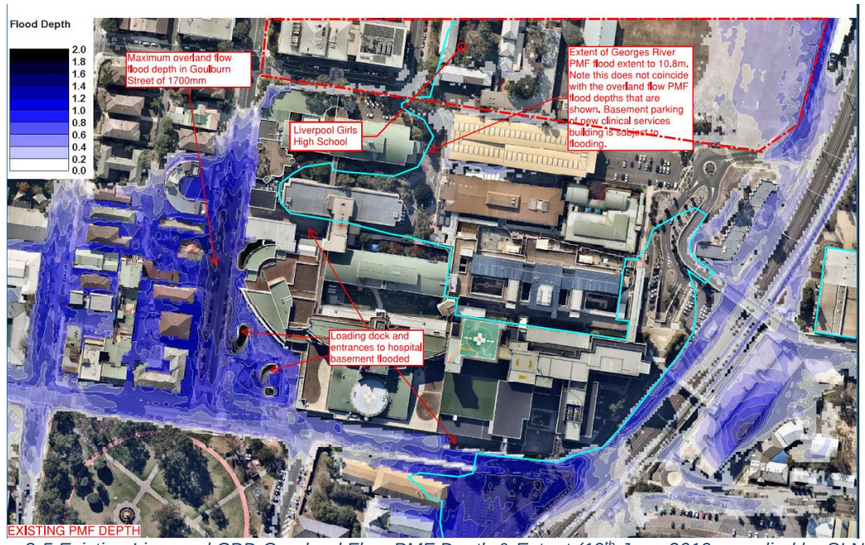

Figure 3-5 Existing Liverpool CBD Overland Flow PMF Depth & Extent (19th June 2019, supplied by SI NSW)

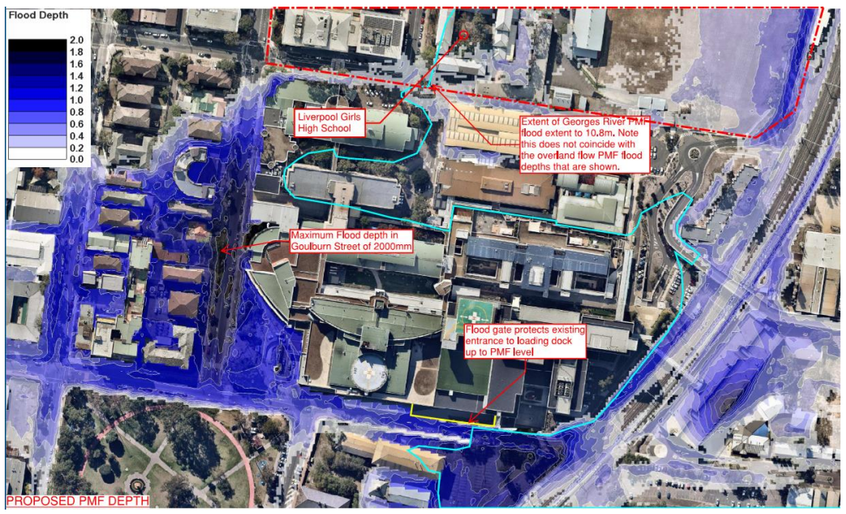

Figure 3-6 Proposed Liverpool CBD Overland PMF Depth & Extent (19th June 2019, supplied by SI NSW)

3.2. Flood Risk Mitigation

As discussed in Section 3.1, the site is subjected to mainstream flooding from Georges River to the southeast of the site and overland flooding from the CBD catchment to the south and west of the site. Based on flood information supplied by SI NSW for LHAP project, the site is located within the Georges River and CBD Overland Flow PMF extent but free from hazard during 1% AEP flood extent for both; Georges River and CBD Overland Flow paths.

It is also noted that LCC DCP states that educational establishments are classified under the Land Use Risk Category of 'Sensitive Uses and Facilities'. For this particular development, floor levels are to be no lower than the PMF level unless justified by a site-specific assessment.

Setting the Finished Floor Level (FFL) at mainstream (Georges River) PMF level at 10.8m AHD in accordance with the Council DCP has the following complications:

- The existing ground level around the northeast corner of the site is RL8.8, which is approximately 2m lower than the mainstream PMF level. Appropriate access between the ground floor to the external ground will be difficult to achieve.
- Ramps and stairs may need to be provided. Achieving the Disability Discrimination Act (DDA) compliance would require approximately 45m of ramping into and out of the buildings.
- Significant earthworks will be required to fill up to the building pad at RL10.8.

It is noted that the peak mainstream flood level from Georges River occurs during the 48-hour storm, this would allow for sufficient time for an evacuation plan to be implemented with advance warning system in place.

Based on survey and supplied flood information, it is recommended to set the FFL to be at RL9.30 for the following reasons:

- As setting the floor levels to be no lower than the PMF level is impractical, it is recommended to have the FFL at no lower than 1% AEP flood level plus 500mm freeboard. As discussed before, the existing the 1% AEP level from the Georges River Flooding is approximated at 8.8m AHD, which results in a minimum FFL at RL9.3.
- As the peak flood level from the overland flooding from the CBD catchment occurs during the 1.5-hour storm, this would allow for sufficient time for evacuation, it is important to protect the buildings from CBD Overland Flow PMF. As discussed in Section 2.5, the PMF level from the Liverpool CBD Overland Flow Flooding is approximated as 9.30m AHD, setting the FFL at RL9.3 can protect the new development from the PMF of the overland flooding of the CBD catchment.
- The development is mostly concentrated in the northern portion of site which has existing ground levels vary from RL8.8 to RL9.2, use of ramps and stairs can be reduced by setting the FFL at RL9.3. DDA compliance is achievable without major earthworks.

In addition to above flood mitigation measure, the following site-specific assessment also needs to be considered. The specific controls are to be determined/applied based on the final built form.

- Evacuation – provide reliable access for pedestrians during flood events towards west of the site (Liverpool Boys High School area).
- Building components – relates to flood compatibility of the building components.
- Structural soundness – relates to resilience of the structure to withstand forces of flood water, debris and buoyancy.
- Flood effects – relates to non-worsening of flood levels, flood storage, velocities etc.
- Car parking and driveway access - relates to freeboard for surface level car parks and the inundation of basement carparks.
- Management and design – compliance with the DCP
- Fencing – construction of fencing to not obstruct flows.

4. Proposed Development

The proposed development new Primary School consists of the construction of new buildings, carparks and associated site infrastructure. The Full Scope option is shown in Figure 4-1 below.

Figure 4-1 Proposed Architectural Overall Site Plan (Fitzpatrick + Partners, February 2021)

4.1. Water Quantity Management Strategy

In accordance with Liverpool City Council, an on-site detention (OSD) system is required for any developments with additional impervious surface area more than 30m^2 to ensure there is no adverse impact from increased stormwater runoff on downstream properties as a result of new developments or redevelopments all storm events up to and including the 100-year Annual Recurrence Interval (ARI) event.

The existing site is mostly grassed while the proposed site is approximately 55% impervious based on the proposed design details. An underground Onsite Detention (OSD) tank will be required to limit the post-development flows to the pre-development conditions.

The preliminary analysis was undertaken using DRAINS software indicates a volume of approximately 75m^3 of detention storage is required onsite to maintain non-worsening of post-development flows to pre-development flow conditions based on the architectural SSD design. Please refer Figure 4-2 for the preliminary DRAINS layout.

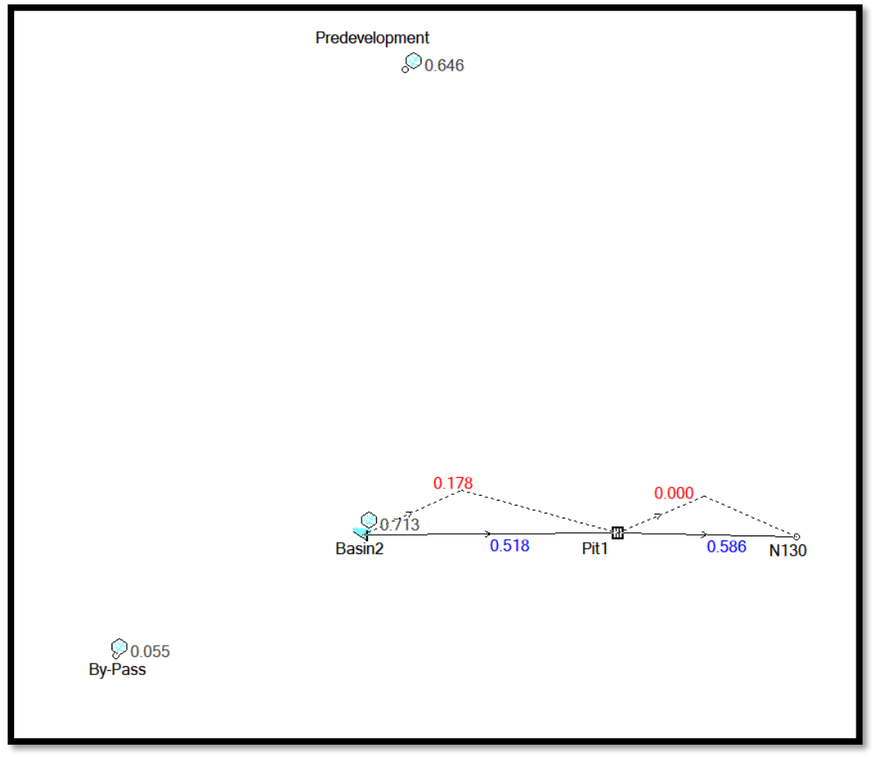

Figure 4-2 Preliminary DRAINS Layout

The OSD system design is subject to change due to change of architectural and landscape layout/scheme.

4.2. Water Quality Management Strategy

To protect the ecology of City of Liverpool, the development will be required to satisfy the water quality requirements of Liverpool City Council. *Liverpool Development Control Plan Part 1(2008)* outlines that any development except for single dwelling houses and dual occupancy housing must undertake a stormwater quality assessment to demonstrate that the development will achieve the post development pollutant load standards indicated below (Figure 3-3):

Pollutant	Council Quality Targets (% reduction)
Gross pollutants (>5 mm)	90 (tbc)
Total suspended solids	80
Total phosphorus	45
Total nitrogen	45

Figure 4-3 Liverpool City Council Pollution Reduction Target (DCP 2008)

Proprietary water quality treatment products including Enviropods and stormfilter cartridges within the OSD tank are proposed for the site as water quality treatment devices. For the benefit of protecting the environment and reducing the demand on water supply, a rainwater harvesting system is proposed onsite via the provision of a rainwater tank. In addition, a rainwater tank will assist to achieve Council's adopted water pollutant removal targets. Based on the design, landscape coverage is approximated and, at least a 5kL rainwater tank is required onsite to meet an irrigation demand (sprinkler system) as per Hydraulic Engineer's advice

4.3. Proposed Stormwater Layout

In accordance with Council's Development Design Specification D5 – Stormwater Drainage Design (January 2003), new developments are to provide a stormwater major/minor system. Additionally, as outlined in the Educational Facilities Standards & Guidelines (EFSG), the proposed development is required to install/upgrade the minor stormwater drainage system including pits, underground pipes and kerb and gutter to cater for storm events up to the 20-year Average Recurrence Interval (ARI).

It is preferable to maintain the existing points of discharge for the underground stormwater drainage system wherever possible. However, the survey does not clearly identify the existing points of discharge and additional survey of the existing internal drainage is required for design development.

A major system is also required for the proposed development in the form of overland flow paths. The major system should be designed to convey flows surcharged from the underground drainage system for storm events up to 100-year ARI. The overland flow is to be directed away from the buildings and carparks and towards the public road kerb and gutter provided that no adverse impact on the downstream properties. If adequate grade cannot be achieved for overland flow path to be directed away from the building entrances or building entrances close to the overland flow paths, alternatively, the drainage system is to be sized to cater for major storm events up to 100-year ARI or more ensure no flows can enter the building.

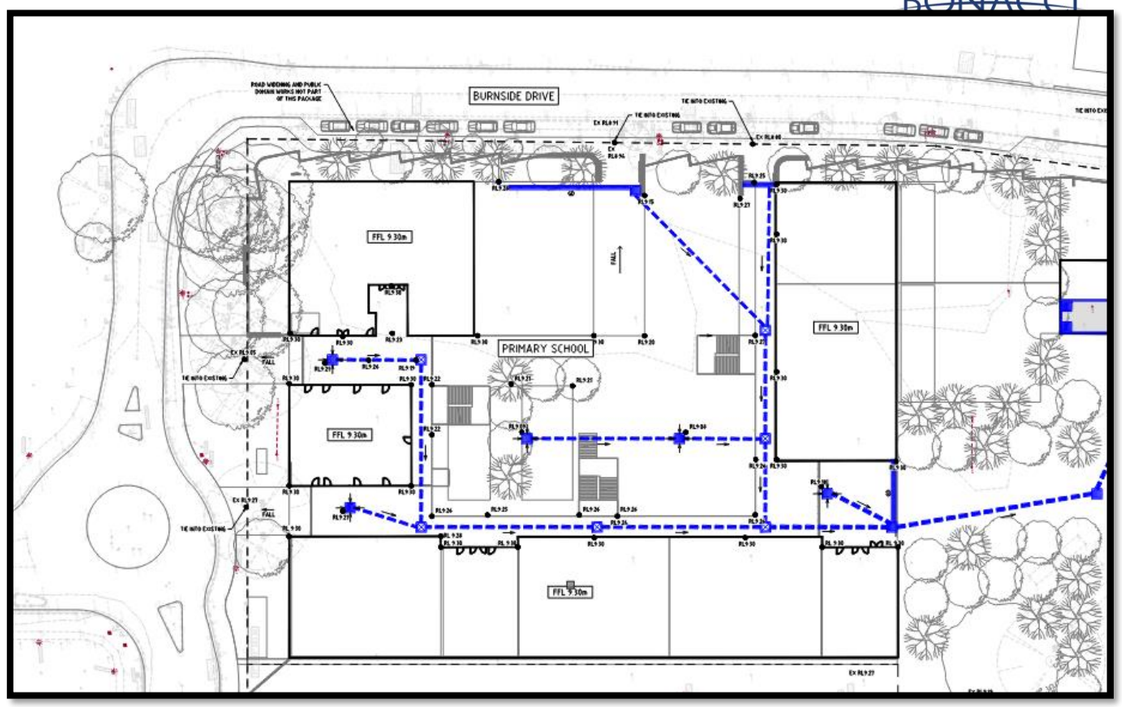

Figure 4-4: Proposed Stormwater Layout

4.4. SEARs Requirements

Item No.	SEARs Requirements	Relevant Section of Report
DRAINAGE		
	Detail measures to minimise operational water quality impacts on surface waters and groundwater.	See Section 4.2
	Stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties.	See Section 4.1 and 4.3
FLOODING		
	Identify flood risk on-site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (DIPNR, 2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.	See Section 3
WSUD		
	Prepare an Integrated Water Management Plan detailing any proposed water sensitive urban design.	See Section 4.2
SEDIMENT AND EROSION CONTROL		
	Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.	See Section 5

5. Erosion & Sediment Control (During Construction)

The erosion and sediment control measures for the site will be implemented during construction. The design of these measures are to be in accordance with the Landcom “Blue Book”.

For erosion and sediment control of the site, the following measures are provided to minimise the risk of sediments laden runoff being discharged from the site:

- *A sediment fence/hoarding to be provided around the site*
- *Catch drain (or diversion bund) diverting external catchment away from site*
- *Temporary access to site with shaker pad*
- *An indicative stockpile area with sediment fence around it during construction. The stockpile must be located out of water flow paths (and be protected by earth banks/drains as required).*
- *Geotextile inlet pit filters or sandbags to be placed around existing stormwater pits.*
- *Water cart to spray excavated surfaces to reduce dust pollution.*
- *All disturbed areas are to be stabilised within 14 working days of the completion of earthworks. All disturbed areas are to be protected so that the land is permanently stabilised within six months.*
- *Sediment removed from any sediment trapping device shall be relocated where further pollution to downslope lands and waterways cannot occur.*
- *Water shall be prevented from entering the permanent drainage system unless it is sediment free. Drainage pits are to be protected in accordance with the final approved Sediment and Erosion Control Plan.*
- *Trapped sediment shall be removed immediately from areas subject to runoff or concentrated flow.*
- *Trapped sediment shall be removed where the capacity of sedimentation trapping devices fall below 60%.*
- *Revegetation schemes are to be adhered to and any grass coverings are kept healthy, including watering and mowing.*

5 May 2021

Project Reference: 12954 – Southern Cluster Schools

Nicholas Lawler | Senior Project Manager
CBRE I Project Management
Level 21, 363 George Street
Sydney, NSW 2000

Dear Sir/Madam,

Rail derailment risk analysis

This is to confirm that the multi-storey buildings construction as part of proposed Liverpool primary school development are more than 20mm away from the existing rail corridor and assets, including closest rail track. Hence the risk of train derailment and impact is considered negligible when assessed in accordance with AS5100.2 standard requirements.

Structural drawings NLPS-ST-DRG-SD-0100(P2) & NLPS-ST-DRG-SD-0105(P1) have been produced in relation to the derailment assessment and have been attached to this structural statement (Refer to Appendix A).

Yours sincerely,

Meinhardt-Bonacci Group Pty Ltd

Daniel Rajabi
Senior Structural Engineer
MIEAust, CPEng, NER, RPEQ
B.Sc, M.Sc, MEng

Appendix A – Derailment Assessment Structural Drawings

ISSUED FOR REVIEW ONLY

Rev	Description	Date	By	App
P2	REVISED AS CLOUDED	04.05.21	CL	DR
P1	ISSUED FOR SCHEMATIC DESIGN	08.04.21	CL	DR

NSW Department of Education
School Infrastructure NSW

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Project Name: NEW LIVERPOOL PRIMARY SCHOOL
FORBES STREET,
LIVERPOOL NSW 2170

Drawing Title: SITE PLAN

SCHEMATIC DESIGN

Designed	DR	Project Director Approved	Date
Drawn	CL		
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Date	07/04/21		
Sheet	A0		

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Project Ref.	Drawing No.	Rev
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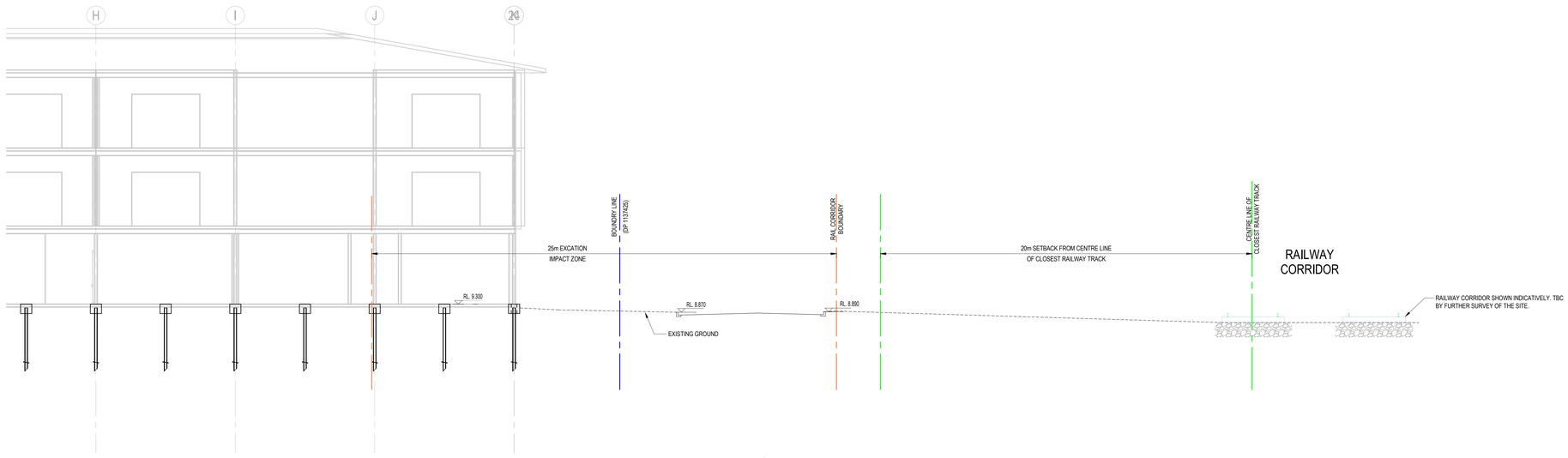

SECTION S.01
SCALE 1 : 100 0100

ISSUED FOR REVIEW ONLY

Rev	Description	Date	By	App
P1	ISSUED FOR SCHEMATIC DESIGN	04.05.21	CL	DR

NSW Department of Education
School Infrastructure NSW

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Drawing Title: SITE PLAN SECTIONS

SCHEMATIC DESIGN

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