Site Based Stormwater Management Plan

LIVERPOOL BOYS AND GIRLS HIGH SCHOOL UPGRADE PROJECT

February 2025 – Revision D

Prepared for:	**NSW Department of Education via Colliers**
Address:	**18 Forbes St, Liverpool NSW 2170**
Council:	**Liverpool City Council**
PROJECT NUMBER:	**132574**

Prepared by:

Meinhardt Pty ltd
Brisbane Office
135 Wickham Terrace,
Brisbane QLD 4000
P. 07 3018 5031
www.meinhardtgroup.com

LIVERPOOL BOYS AND GIRLS HIGH SCHOOL UPGRADE PROJECT

18 Forbes St, Liverpool NSW 2170

Stormwater Management Plan

Document Status

Revision	Author	Approved for Issue	Date
A	A. Malabuyoc / Y.Cooper	Y. Cooper / L.Melville	08 11 2024
B	A. Malabuyoc / Y.Cooper	Y. Cooper	04 02 2025
C	A. Malabuyoc / Y.Cooper	Y. Cooper	14 02 2025
D	A. Malabuyoc / Y.Cooper	Y. Cooper	28 02 2025

This report is certified for issue by:

Yolandi Cooper

Date Certified: 11 11 2024

This report has been prepared for the project stated and described in this document for the purpose of the REF Lodgement and must not be used or relied upon by any other person for any other purpose, unless permission has been provided by Meinhardt Pty Ltd.

The assessment, conclusions or recommendations in this report are based on conditions encountered and information received at the time of preparing the report and may not be relied upon as site conditions or operations vary over time.

Contents

List of Appendices

List of Figures

1. Introduction

Project name

The project is to be referred to as “Liverpool Boys and Girls High School Upgrade Project”.

Background information (FYI)

The project is seeking approval for a development without consent application under Part 5 of the EP&A Act, which requires a Review of Environmental Factors (REF).

This Stormwater Management Plan has been prepared by Meinhardt on behalf the NSW Department of Education (the Applicant) to assess the potential environmental impacts that could arise from the redevelopment of the Liverpool Boys High School and Liverpool Girls High School, at 18 Forbes Street, Liverpool NSW, 2170 (the site).

This report has been prepared to provide evidence that the upgrade/redevelopment works at Liverpool Boys and Girls does not negatively impact on the surrounding environment.

This report accompanies a Review of Environment Factors that seeks approval for redeveloping the Liverpool Boys and Liverpool Girls High Schools into a single co-educational school, including:

- Construction and operation of a six-storey school building, including school hall and gymnasium;
- Associated parking and building services;
- Tree removal;
- Associated landscaping and play spaces;
- Augmentation of service infrastructure; and
- Associated off-site infrastructure works to support the school, including (but not limited to) services, kiss and drop point and pedestrian crossings.

Refer to the Review of Environmental Factors prepared by Ethos Urban for a full description of works. Please refer to Appendix E for the Civil REF Checklist items.

The site is a large urban block in the suburb of Liverpool within the Liverpool Health and Academic State Significant Precinct. The site is located approximately 25 km south-west of the Sydney central business district (CBD) and approximately 12 km south of the Parramatta CBD.

2. Site Description

2.1 Location and Land Use

The site is located at 18 Forbes Street, Liverpool, within the Liverpool Local Government Area (LGA). The site is legally described as Lot 1 DP1137425 and has a total area of approximately 74,973m2.

The site comprises a broadly rectangular portion of land which currently contains the existing Liverpool Boys High School, Liverpool Girls High School, and the Gulyangarri Public School, which commenced operations in January 2024 and is located to the east of the wider site.

The site's western portion contains Liverpool Boys High School and Liverpool Girls High School. Liverpool Girls High School in the site's southwest comprises three, two-storey buildings. Liverpool Boys High School in the site's northwest, comprises approximately four, two-storey buildings, with adjacent at-grade carparking and various sports courts.

Currently about 3.28ha is being considered in this proposed development.

The building site is bound by Forbes Street on the West, Lachlan Street on the North and Liverpool Hospital on the South and Gulyangarri Public School (New Liverpool Public School) on the East.

The lot has been divided with the east portion of the site bound by Burnside Drive, comprising the new, completed and operational Gulyangarri Public School.

The LBHS and LGHS are being consolidated into one co-educational high school with the remaining site to be retained for potential future educational development. Refer to site survey by John Lowe and Associates, 13/08/2024 Revision 2, Job No. 101526 – 38252.

Refer to Figure 1 for an indicative site location and Appendix A for the proposed architectural site layout.

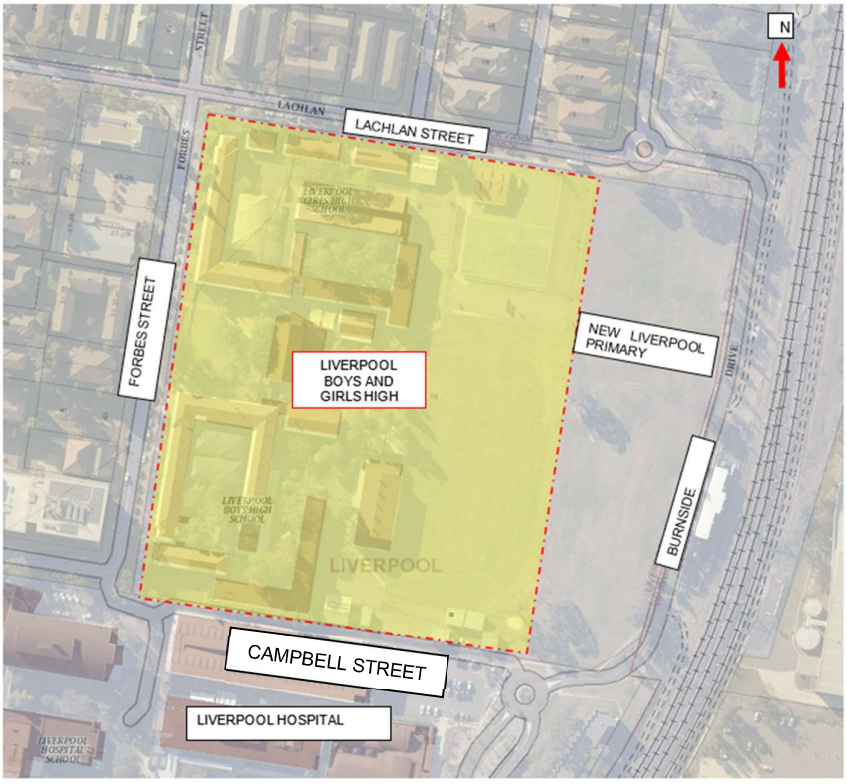


Figure 1 – Location [Source: MetroMap]

Statement of Significance

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- The extent and nature of potential impacts are low and will not have significant adverse effect on the locality, community and the environment;

- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal effect on the locality, community.

2.2 Flooding

Liverpool City Council (LCC) was approached to confirm the PMF level for the school. LCC confirmed the PMF at 10.8 AHD and FFLs were determined accordingly.

A copy of the Council confirmation is attached in Appendix B of this report.

In summary the PMF flood level is stated as 10.8 (mAHD). The Finished Floor Level of the building is currently proposed at 11.0 (mAHD).

The flood extent can be seen in Figure 2 and 2a below.

Figure 2 – Existing Site Survey and Nearmap

[Source: Nearmap Image]

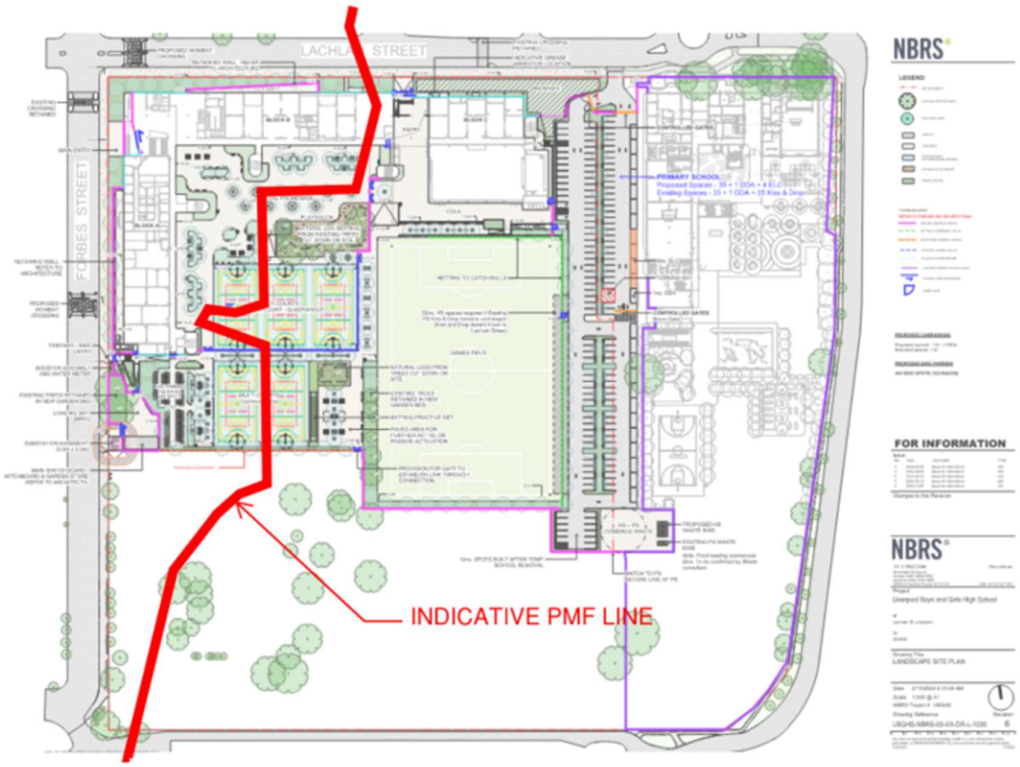


Figure 2a – PMF - As provided by LCC

[Source: NBRS Latest Site Plan and & LCC PMF]

2.3 Lawful point of discharge

Stormwater run-off currently appears to discharge to the eastern (and re-routed to the nearest discharge point in Lachlan Street on the primary school northern boundary) and southern boundary.

For the new proposed development, a small catchment is discharging to the 450mm diameter Council pipe in Lachlan Street, and the majority of the flow is proposed to discharge at the legal point of discharge towards the existing Liverpool Council 1200mm diameter stormwater pipe in Campbell Street.

Refer Appendix C for the Stormwater Layout plan for the proposed development.

3. Stormwater Quantity Management

The stormwater quantity analysis of the existing and developed site conditions has been undertaken with reference to the requirements and procedure outlined by:

- Liverpool City Council Planning Policy
- Tailwater Level is set to the grate surface/lid level of the existing downstream pit if the hydraulic grade line is unknown. – Stormwater Drainage Design, Chapter D5.08
- Australian Rainfall and Run-off Volumes 1 & 2 (Aust R&R)

The following section of the report discusses the proposed development's impact on peak stormwater run-off from the site and compares the existing site condition to ensure a no worsening effect to downstream properties.

The hydrological model adopted was the Extended Rational Method with hyetograph input as specified in Australian Rainfall and Run-off (AR&R) Volumes 1 and 2.

The following design parameters were used in the stormwater drainage calculations:

- Design storm (minor) is 1 in 20-year ARI as per Stormwater Drainage Design, Chapter D5.04.
- The Major storm considered is 1 in 100 ARI.
- Rainfall data is from BOM.
- The proposed site grade is at approximately 0.5% falling east which is towards the proposed carpark, while the proposed carpark is at 0.5% fall towards south.
- Site area ± 3.28ha 70% impervious

3.1 Existing Catchment

Catchment Area

The existing site consists of one lot with an area of biodiversity on the northern boundary of the site, and we are aiming to retain as much of the existing trees where possible. The site is consisting of existing buildings, concrete pavement and landscape areas.

The site area is approximately 3.28 ha. The site assumed to be draining towards. south and east. The existing area of approximately 1.62 ha which is draining towards east at an average grade of approximately 0.5% has an impervious factor of 40%. While the existing stormwater system is assumed to be draining towards the south and is catering for approximately 1.66 ha of 95% impervious area.

Time of Concentration (tc)

The time of concentration used is 15 and 20 minutes.

3.1.1 Stormwater Calculation Results for Existing Site

The existing site catchment is summarised in Table 1 below:

Table 1 – Existing Catchment Characteristics

Catchment Characteristics	Catchment	
	East	South
Area	1.62	1.66
Total time of concentration	20 min	15 min
Percent Impervious	40%	95%

As a no-worsening is required to be demonstrated for flows existing peak flows for at the point of discharge have been determined by calculating various storm durations for each ARI storm.

Catchment Area

The development involves the construction of a school. The catchment area remains unchanged and is approximately 3.28 ha.

The proposed lawful point of discharge for the developed site is an existing road pit south of Burnside Drive. Stormwater run-off from the roof and ground level areas shall be captured on site and directed here via new on-site drainage.

3.1.2 Stormwater Compliance

The developed site catchment is summarised below:

- Area – 3.28 Ha
- Total time of concentration (t_c) – 15 and 20 minutes
- Percent Impervious – 70%

This site is governed by the following two documents:

- [1]Liverpool City Council Planning Policy
- [2]Tailwater Level is set to the grate surface/lid level of the existing downstream pit if the hydraulic grade line is unknown. – Stormwater Drainage Design, Chapter D5.08

The following Tailwater Levels have been assumed due to the confirmation from LCC that data is not available for the two LPoD council assets.

Table 2 – Assumed Council Asset Tailwater Levels

Storm Event	Tailwater Level (Assumptions)[1,2]
100yr	9.57
50yr	9.57
20yr	9.57
10yr	9.42
5yr	9.42
2yr	9.42

3.1.3 Drains Configuration

The Drains Program was used in modelling the various stages of the project, i.e, pre-development, post-development and mitigated flows required not to impact surrounding areas with the proposed development.

Please refer to Figure 4 below for the Drains Configuration.

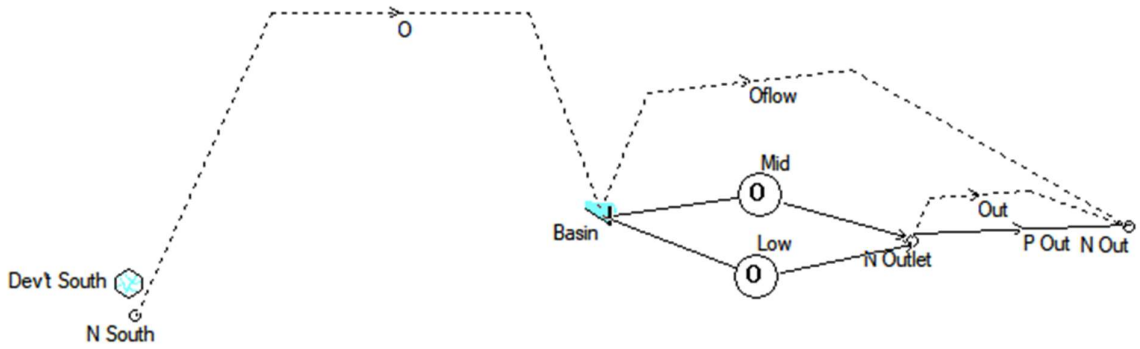


Figure 3 – Drains Configuration - Developed Site

3.1.4 Stormwater Quantity Comparison

Peak flow rates from the developed site were determined by modelling various storm durations for each ARI storm. The Pre-Developed, Post-Developed and Mitigated flows are also provided are outlined in the table below:

Table 3 – Pre, Post and Mitigated Flows

ARI Storm Event	Pre-Developed Flow Rate (L/s)	Post-Developed Flow Rate (L/s)	Mitigated Flow (L/s)
Q_2	338	395	338
Q_5	554	569	425
Q_{10}	669	692	455
Q_{20}	775	804	441
Q_{50}	918	952	508
Q_{100}	1023	1062	569

As shown in Table 3, the peak flow rate of stormwater run-off has decreased through the formalised stormwater system and mitigation measures as discussed below.

3.2 Stormwater Detention

The existing site does not have a Stormwater Detention system. To be compliant with the council requirements and to ensure that the proposed development is not flooded by any surrounding run-off, as well as the existing Tailwater Level, an on-grade basin is proposed in the Oval or sports field area and presented in the Drains model as a basin.

The on-grade basin is designed to spread the effective volume required to be detained, 300m^3, across the field of 8200m^2 area and has a series of sub-soil pipes to ensure the water drains away as fast as possible to be able to maintain the use of the field within generally a few hours depending on the rain event.

The outlet pit of the basin has 2 orifice plates to control the outflow that eventually discharges into the 1200mm diameter council stormwater asset in Campbell Street.

The on-grade basin is in accordance with the ESFG requirements that on-grade detention is preferred by SINSW.

The water depth contained on the field is up to 250mm, hence does not require any fencing.

3.3 Bulk Earthworks and Retaining Walls

The Finished Floor Level as per the Architectural drawings are FFL 11.00. Bulk Earthworks have been balanced as much as possible to ensure that minimal excavated material is exposed off site. The other consideration is to ensure that the site can drain be drained via a pit and pipe system towards the 2 LPoD with sufficient cover over piped drainage system.

All Bulk Earthworks volumes are estimated, and it was requested to consider to re-use excavated material for filling purposes as much as possible. The latest Geotechnical Report advised that the first 1m of excavated material is not to be used as structural fill. We would recommend Level 1 supervision on site to confirm what type of material could be stockpiled for future use and what material to cart off site in accordance with the required procedures.

Retaining walls vary on site from up to 3m high on the western boundary of the site, and up to 1.8m on the eastern boundary of the site. Retaining walls do not prevent water the natural flow of stormwater drainage/run-off on the site, but it protects the neighbouring school from being impacted by any stormwater run-off generated by the new activities created on the Liverpool Boys and Girls High School.

The retaining walls mainly contributes to the stormwater drainage strategy and to provide the required levels and grading on site for water to be captured in the pit and pipe systems and discharge ultimately at the LPoD.

4. Water Quality Management

4.1 Operational Phase

The proposed development must address the Liverpool Development Control Plan 2008 Part 1: General Controls for all development. The guidelines requires any commercial, retail, industrial and/ or mixed use development involving new or additional gross floor area greater than 100 sq.m to meet post development stormwater run-off quality identified below. The development shall ensure that environmental values of receiving waters downstream of the development are maintained or enhanced during the construction and operation of the development in accordance with State Legislation and Local Government requirements.

The stormwater quality management proposed for this portion of the development are required to achieve the following pollutant load reduction objectives in accordance with Liverpool City Council (LCC):

- 85 % reduction in total suspended solids load (TSS)
- 65 % reduction in total phosphorus load (TP)
- 45 % reduction in total nitrogen load (TN)
- 90 % reduction in gross pollutant load

The following Greenstar targets

- 90 % reduction in total suspended solids load (TSS)
- 60 % reduction in total phosphorus load (TP)
- 45 % reduction in total nitrogen load (TN)
- 90 % reduction in gross pollutant load

Pollutants typically generated during the operational phase of the development include:

- Litter/gross pollutants
- Sediment
- Nutrients (N & P)
- Hydrocarbons (oils and grease); and
- Heavy metals.

In order to meet these pollutant reduction targets; stormwater treatment measures are required. These treatment measures (located on site as indicated in Figure 4 below) are detailed in the attached stormwater layout plan in Appendix C and are summarised as follows:

1. The Northern Outfall comprises:
    a. A portion of the northern driveway,
    b. The northern garden,
    c. Raingarden/bio-basin with a filter area of 50m^2 and 300mm thick,
    d. Two Ocean Guard or similar pit filters for the driveway pits.
2. The Southern Outfall comprises:
    a. Buildings A, B, C, Cola, Rainwater Tank,

b. The southern paved area, field and driveway,

c. Field and swale,

d. OceanSave GPT Unit (Model 1618 or equivalent), and 35 x 690 PSorb Stormfilters or equivalent.

Stormwater modelling has been carried out using MUSIC modelling software to determine the required infrastructure needed to meet the Water Quality Objectives (WQOs) above.

4.1.1 MUSIC Model

MUSIC modelling for this development was carried out using the MUSIC program and data collected from Bureau of Meteorology. The developed site catchment details from the MUSIC model are outlined in Table below.

Table 4 - Developed Site MUSIC Catchment Details

Catchment	Area (ha)	% Effective Impervious
NORTHERN CATCHMENT		
Roof Area	0	0
Driveway Area	0.1550	53 % Impervious 47 % Pervious
Landscape	0.1390	
Paved	0	0
SOUTHERN CATCHMENT		
Roof Area	0.7242	71 % Impervious 29 % Pervious
Landscape	0.8597	
Driveway Area	0.1698	
Paved	1.2422	
Overall Area [ha]	3.2899	

The layout for the music model, including the treatment train effectiveness is detailed in Figure 4.

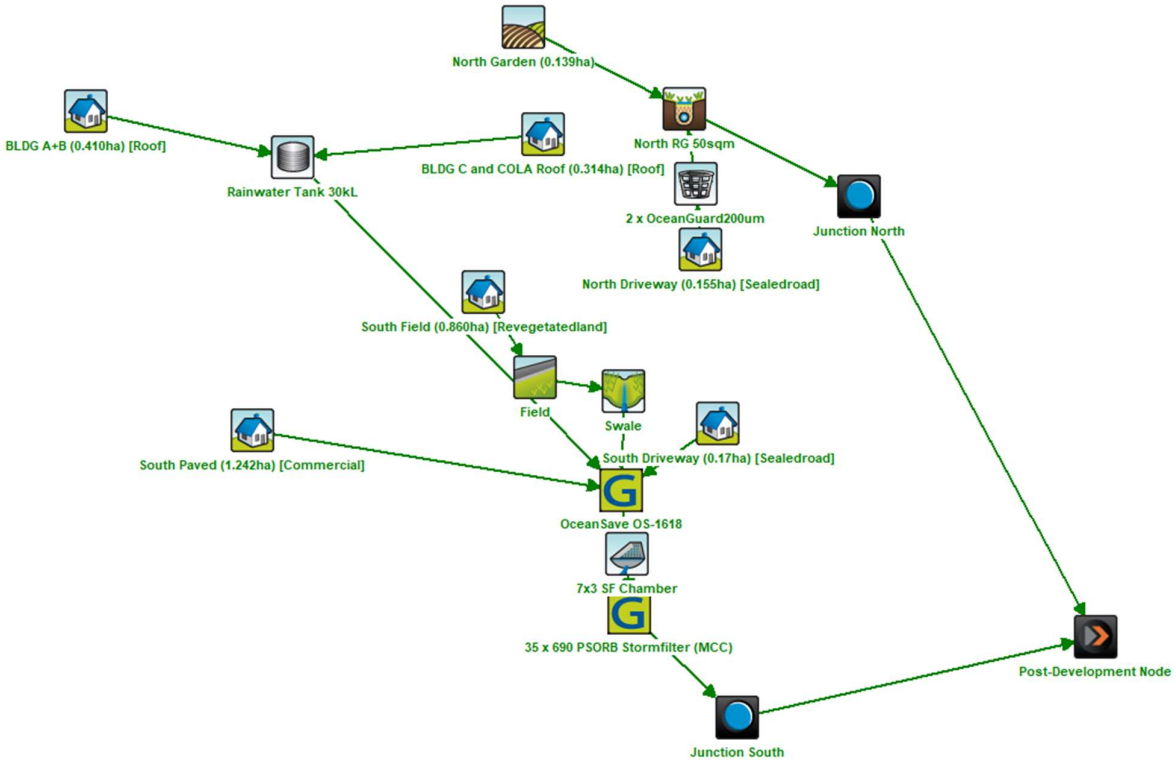
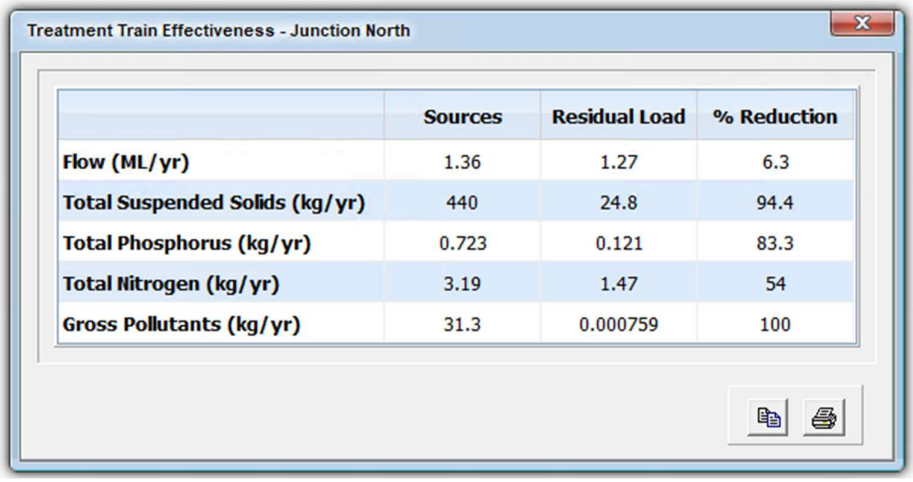


Figure 4 - MUSIC Layout and Treatment Effectiveness for Developed Site

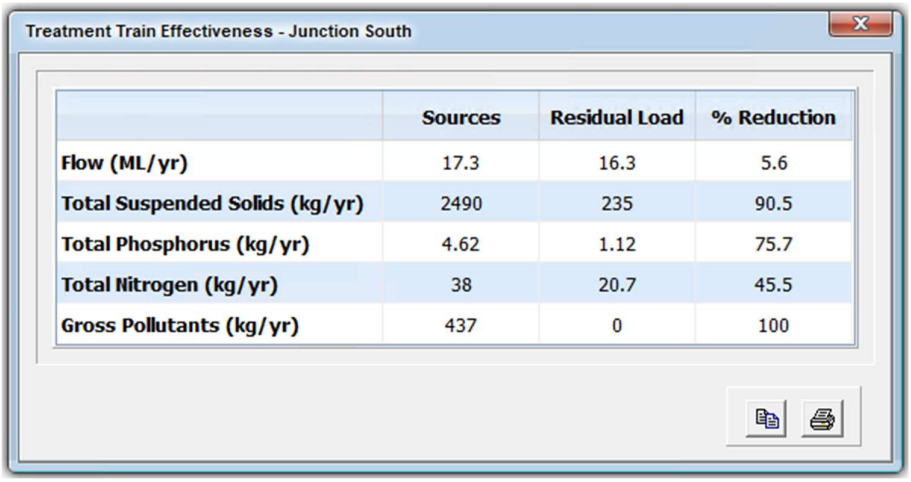
The results for each of the outfalls are presented below:

1. Northern Outfall Reduction Results



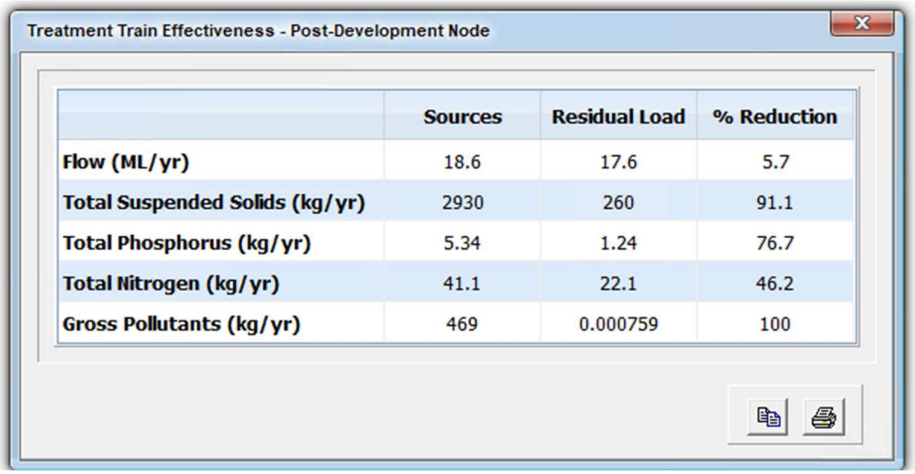
	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.36	1.27	6.3
Total Suspended Solids (kg/yr)	440	24.8	94.4
Total Phosphorus (kg/yr)	0.723	0.121	83.3
Total Nitrogen (kg/yr)	3.19	1.47	54
Gross Pollutants (kg/yr)	31.3	0.000759	100

2. Southern Outfall Reduction Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	17.3	16.3	5.6
Total Suspended Solids (kg/yr)	2490	235	90.5
Total Phosphorus (kg/yr)	4.62	1.12	75.7
Total Nitrogen (kg/yr)	38	20.7	45.5
Gross Pollutants (kg/yr)	437	0	100

3. Overall Combined Summary Reduction Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	18.6	17.6	5.7
Total Suspended Solids (kg/yr)	2930	260	91.1
Total Phosphorus (kg/yr)	5.34	1.24	76.7
Total Nitrogen (kg/yr)	41.1	22.1	46.2
Gross Pollutants (kg/yr)	469	0.000759	100

The developed site treatment train effectiveness is also outlined in the table below.

Table 5 - Treatment train effectiveness

Pollutants	Reduction Targets (%)		Results (%)		
	Council	Green Star (B)	North Outfall	South Outfall	Overall
Total Suspended Solids (kg/yr) **TSS**	85.0	90.0	94.4	90.5	91.1
Total Phosphorus (kg/yr) **TP**	65.0	60.0	83.3	75.7	76.7
Total Nitrogen (kg/yr) **TN**	45.0	45.0	54.0	45.5	46.2
Gross Pollutants (kg/yr)	90	90	100	100	100

Based on the MUSIC modelling results in the table above, the proposed treatment train achieves the required pollutant load reduction objectives for all pollutants. The treatment train is considered adequate for the development including compliance with Greenstar (B).

4.2 Construction Phase

Pollutants typically generated during construction phase are described in Table 6 below.

Table 6 - Pollutants typically generated during the construction phase.

Pollutant	Sources
Litter (Gross Pollutants)	Paper, construction packaging, food packaging, cement bags.
Sediment	Unprotected exposed soils and stockpiles during earthworks and building.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment.
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters.
pH altering substances	Acid sulphate soils, cement slurry and wash waters.

5. Erosion and Sediment Control

Management of stormwater run-off during construction is necessary to avoid pollution of downstream waterways from sediment and gross pollutant loading. Please refer to Appendix D for the initial Erosion and Sediment Control Plan. This plan will be used as a live document as construction progress on site by the contractor.

Impacts of inadequate erosion and sediment control downstream from the site include:

- traffic safety problems;
- blocked drains;
- local flooding problems;
- aesthetic pollution of drainage paths; and
- damage to local ecosystems.

Best practice erosion and sediment controls must be installed to minimise the discharge of sediment laden run-off during construction. Erosion and sediment control plans shall be developed during detailed design phase and must be continually maintained and amended as required to minimise environmental harm.

Erosion and sediment control plans are based on three sets of control measures:

- drainage control;
- erosion control; and
- sediment control.

These control measures must be maintained in an effective operational condition. Sediment disposal from site is to occur to the satisfaction of LCC. Defects in erosion and sediment control devices, such as sediment fences, are to be inspected and documented. Upon Inspection, the Contractor is to determine whether the device should be replaced or repaired. Documentation is to include how the damage was caused and what measures can be implemented to reduce the possibility of repeat occurrences. Any damage to either permanent or temporary water quality control structures or devices is to be immediately rectified at the contractor's expense.

The effectiveness of the erosion and sediment control devices can be monitored by visual audits. All ESC measures are to be inspected:

- at least daily (when work is occurring on site) or weekly (when work is not occurring on site);
- within 24 hours of expected rain; and
- within 18 hours of a rainfall event (i.e. an event of sufficient intensity and duration to mobilise sediment on site).

Drainage paths are to be inspected to ensure the sediment fences are not being bypassed as a result of soil erosion.

Sediment laden run-off shall be prevented from entering neighbouring properties. This shall be achieved by landscaping disturbed areas immediately after and prior to a rainfall event.

6. Maintenance and Monitoring Requirements

Periodic maintenance and monitoring of stormwater devices proposed in this report is crucial to ensure effective operation and design life.

Inspect field inlet grates, pits and underground pipes for blockage or damage at least 6 monthly or after significant rainfall event. The gross pollutant filter baskets within inlet pits and bioretention basin shall be inspected and maintained preferably by the manufacturer to avoid damage to units and to ensure adequate cleaning and record keeping. For the first 12 months routine inspections of treatment devices shall be carried out monthly with routine clean out at alternate months. Results of the initial 12 months maintenance program shall be used to determine future maintenance intervals. Refer to manufactures maintenance and monitoring methodology for specific details.

Maintenance of ESC measures must occur in accordance with Table 7 where applicable.

Table 7 - ESC Maintenance Requirements

ESC Measure	Maintenance Trigger	Timeframe for Completion of Maintenance
Sediment basins (where applicable)	When settled sediment exceeds the volume of the sediment storage zone	Within 7 days of the inspection.
Other ESC measures	The capacity of ESC measures falls below 75%.	By the end of the day.

Sediment accumulation on ESC devices is to be removed and disposed of to the satisfaction of LCC.

7. Mitigation Measures

Mitigation measures are required for a Review of Environmental Factors (REF) and are actions or measures to avoid, minimise, rectify (by repairing, rehabilitating or restoring) and/or reduce or eliminate over time (by preservation and maintenance) the adverse environmental impacts of a Division 5.1 Activity under the EP&A Act.

The following mitigation measures discussed throughout this report are summarised as follows:

Mitigation Number/Name	Aspect/Section	Mitigation Measure	Reason for Mitigation Measure
Stormwater Quality Management	Section 3.5	Stormwater runoffs generated by the proposed development activity will be collected through the proposed drainage system and will then be treated in a chamber with 35 x 690 PSorb Stormfilters or equivalent.	The proposed development activity generated an increase in pollutants, so it is required to reduce them to meet Greenstar B Pollutant Load reduction targets before the stormwater runoff leaves the property.
Stormwater Quantity Management	Section 3.4	The proposed development activity flow rate is mitigated through implementing the use of On-site Detention as noted.	Liverpool City Council requires a Permissible Site Discharge for new/additional developments, and it is specified in On-Site Stormwater Detention Handbook, Appendix Q. Therefore, the use of OSD is required to temporarily detain stormwater runoff and limit the discharge flow rate leaving the site.
Erosion and Sediment Control	Section 4	Construction pollutants will be mitigated by installing erosion and sediment control devices such as hay bales, sediment fences and geotextile pit filters in the site.	It is necessary to manage stormwater runoff during construction to avoid pollution of downstream waterways from sediment and gross pollutant loading.
Overland Flow Management	Appendix A (Civil Siteworks) Stormwater Surface Flows	The whole site is assessed to identify the runoff flow directions during minor and major storm events. Stormwater runoff will be collected through a pit and pipe drainage system and will be mitigated by using OSD. External catchment flows will be diverted by a diversion channel and will not be catered for by the proposed development activity's piped system.	The proposed development activity requires design and diversion of surface flows to keep water away from the building.

8. Conclusion

This SWMP outlines how the stormwater quality will be managed on site in accordance with LCC's requirements.

The lawful point of discharge for the development shall be the two council assets, the 450mm diameter pipe to the north in Lachlan Street and the 1200mm diameter to the south in Campbell Street, as confirmed by LCC.

An on-grade basin is provided as a mitigation measure. Considering Table 3, it is evident that the mitigated flows are less than the pre-development and post-developed flows, to ensure the surrounding sites are not impacted by the proposed development.

Stormwater quality will be managed on site by the installation of various stormwater quality treatment devices, ultimately achieving Greenstar B and Liverpool City Council requirements.

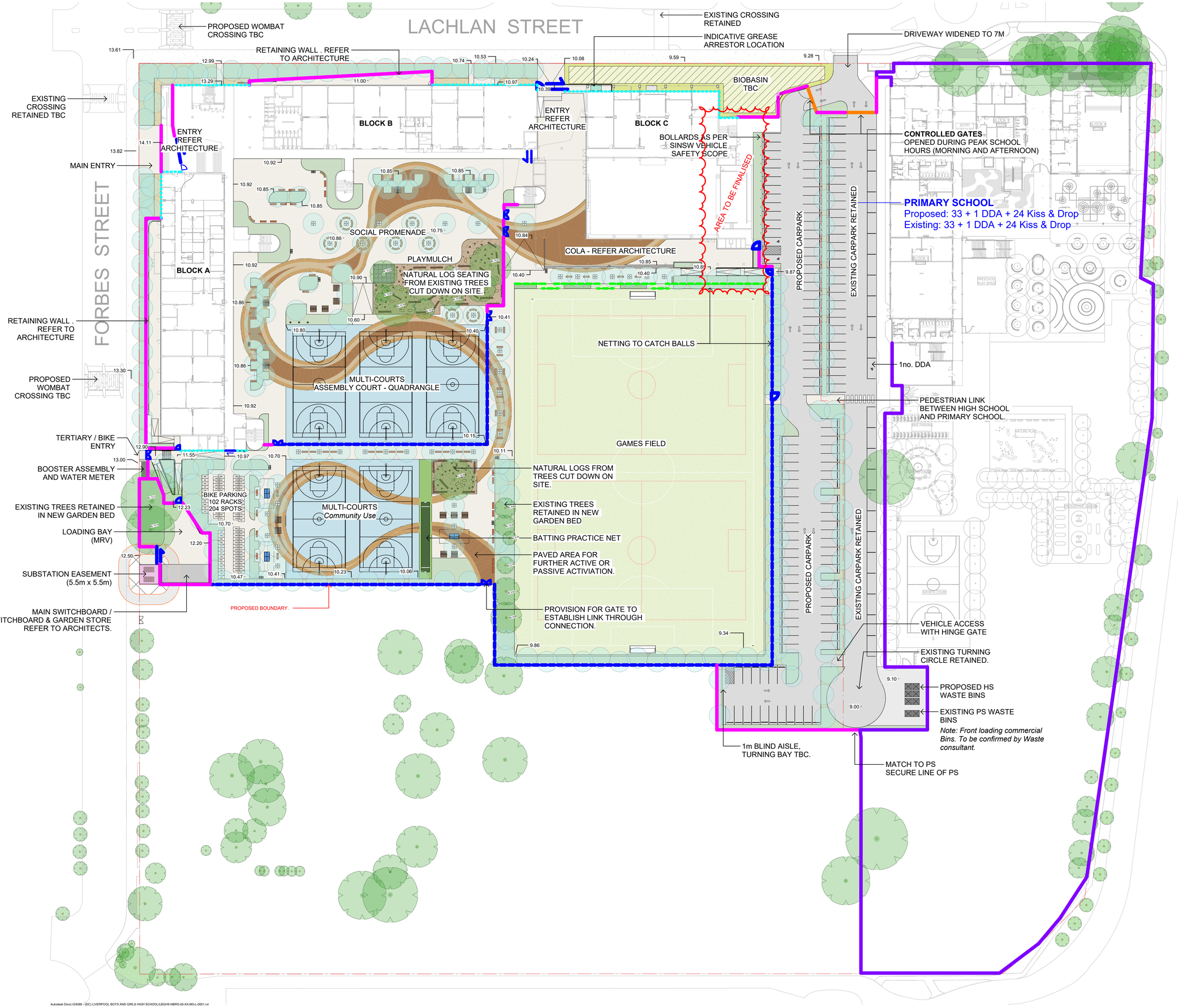
Based on the scale of the proposed development, and typical pollutants produced, these measures are considered adequate. This has been demonstrated via the MUSIC model outputs provided in this report.

By implementing the proposed stormwater management system, and providing adequate maintenance, the downstream environment and neighbouring properties will not experience any adverse deterioration of water quality or an increase in flooding because of the proposed upgrade.

The activity would not be likely to have significant environmental impacts as a result of stormwater management with mitigation measures.

9. Appendices

Appendix A – Architectural Site Plan



NBRS

LEGEND

- SITE BOUNDARY
- EXISTING TREE RETAINED
- PROPOSED TREE
- ASPHALT
- CONCRETE
- DECOMPOSED GRANITE GRAVEL
- SPORTSCOURT (CONCRETE EMBLISHMENT)
- PLAYMULCH OR SIMILAR
- MASS PLANTING

FENCING AND GATES

REFER TO FENCING AND SECURITY PLAN

- SECURE FENCING 2.15M (H)
- NETTING / SCREENING
- SPORTS FENCING 3.6M (H)
- BUILDING AS SECURELINE
- EXISTING PRIMARY SCHOOL FENCE
- SLIDING / CANTILEVER GATE
- SWING GATE

PROPOSED CARPARKING

Proposed spaced: 110 + 2 DDA
Required spaces: 112

PROPOSED BIKE PARKING

204 BIKE SPOTS (102 RACKS)

FOR INFORMATION

Issue

No.	Date	Description	Chkd
3	2024.09.04	Issue for Information	LM
4	2024.09.10	Issue for Information	LM
5	2024.09.12	Issue for Information	LM
6	2024.10.02	Issue for Information	LM
7	2024.10.15	Issue for information	LM

Changes to this Revision

NBRS
+61 2 9922 2344 nbrs.com.au
Nominated Architects:
Andrew Duffin NSW 5602
Jonathan West NSW 9899
NBRS & Partners Pty Ltd VIC 51197 ABN 16 002 247 565

Project
Liverpool Boys and Girls High School

at
Lachlan St Liverpool

for
SINSW

Drawing Title
LANDSCAPE SITE PLAN

Date 15/10/2024 4:53:41 PM
Scale 1:500 @ A1
NBRS Project # LBGHS
Drawing Reference
LBGHS-NBRS-00-XX-DR-L-0002
Revision 7

0 5m 10m 15m 20m 25m 30m 35m 40m 1:500

Appendix B – Liverpool City Council PMF Confirmation

Yolandi Cooper

From: Zeaul Hoque <HoqueZ@liverpool.nsw.gov.au>
Sent: Tuesday, 15 August 2023 9:34 AM
To: Yolandi Cooper
Subject: Liverpool Boys High School & Girls High School (18-20 Forbes Street, Liverpool)

Hi Yolandi

Please find the flood level of the subject site below.

PMF level = 10.8m AHD

Kind Regards

Zeaul Hoque
Acting Senior Floodplain Engineer

LIVERPOOL CITY COUNCIL

02 8711 7747 | | HoqueZ@liverpool.nsw.gov.au
Customer Service: 1300 36 2170 | 3 Hoxton Park Road Liverpool, NSW 2170, Australia
www.liverpool.nsw.gov.au

We acknowledge the traditional custodians of the land that now resides within Liverpool City Council's boundaries, the Darug and Dharaw

---

From: Zeaul Hoque
Sent: Monday, August 14, 2023 6:40 PM
To: YOLANDI.COOPER@MEINHARDPGROUP.COM
Subject: Liverpool Boys High School & Girls High School (18-20 Forbes Street, Liverpool)

Hello Yolandi

I hope this email finds you well.

I have been informed by Council's Customer Service team that you are interested in obtaining information regarding flooding. Kindly provide me with the details of your request, and I will respond with the relevant information you are seeking.

Thank you for reaching out, and I look forward to assisting you further.

Kind Regards

Zeaul Hoque
Acting Senior Floodplain Engineer

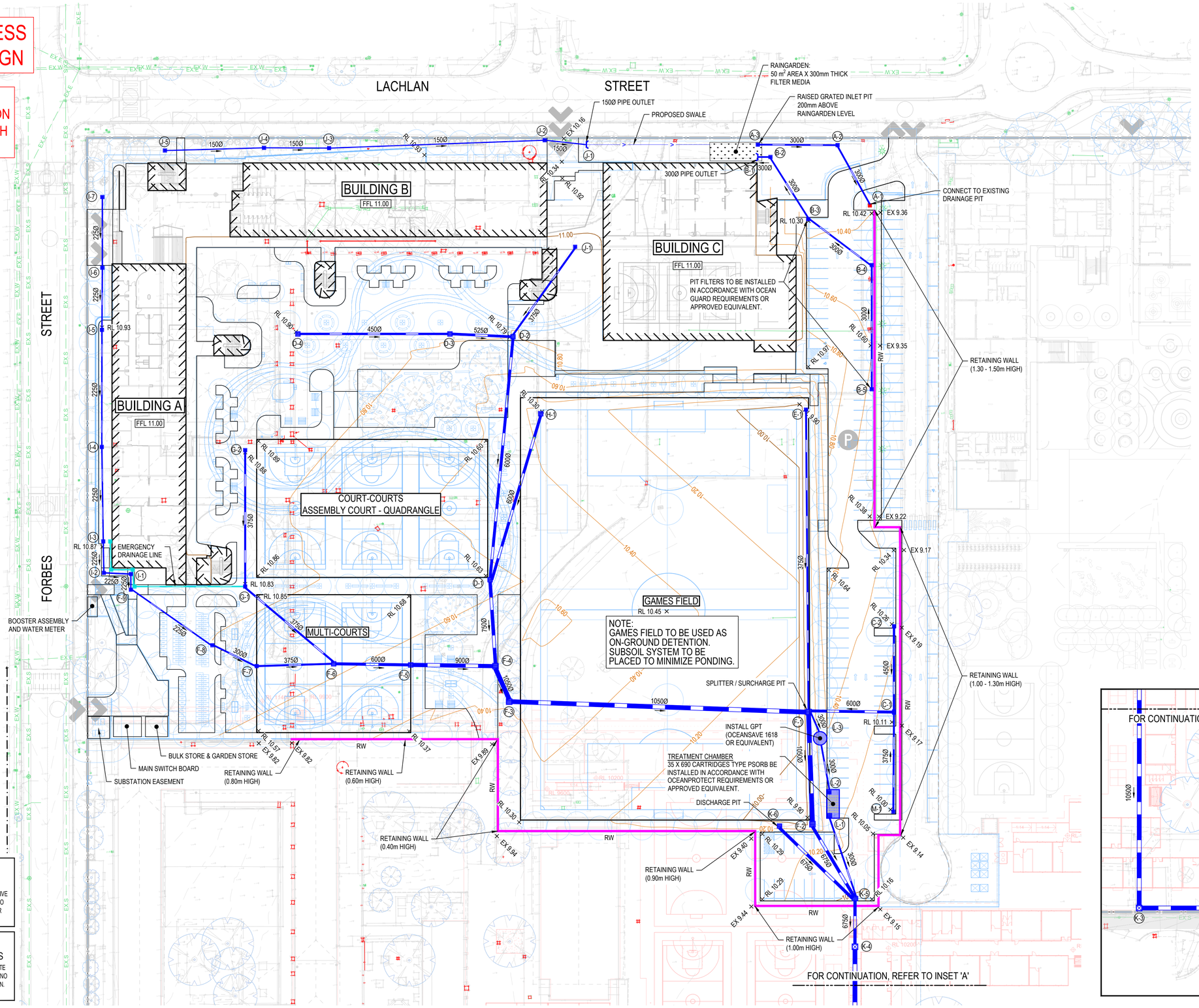
LIVERPOOL CITY COUNCIL

02 8711 7747 | | HoqueZ@liverpool.nsw.gov.au
Customer Service: 1300 36 2170 | 3 Hoxton Park Road Liverpool, NSW 2170, Australia
www.liverpool.nsw.gov.au

Appendix C – Proposed Stormwater Layout Plan

WORK IN PROGRESS
SCHEMATIC DESIGN

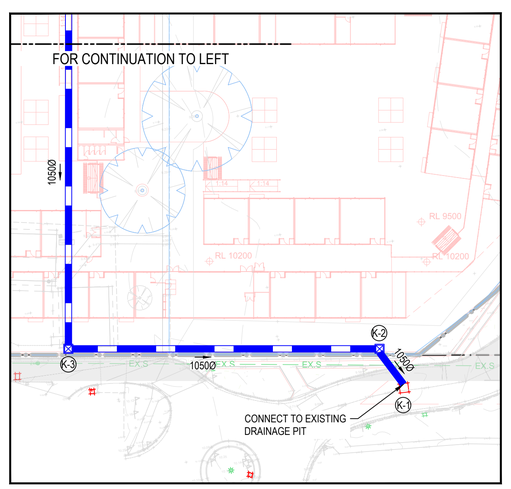
ON-SITE DETENTION OUTLET CONFIGURATION TO BE CONFIRMED WITH DETAILED DESIGN.



LEGEND

ITEM	DESCRIPTION
156.6	EXISTING SURFACE CONTOURS
156.6	PROPOSED SURFACE CONTOURS
+156.60	EXISTING SURFACE SPOT LEVELS
+ RL 156.600	PROPOSED SURFACE SPOT LEVELS
+ TW 156.600	TOP OF WALL LEVEL
+ BW 156.600	BOTTOM OF WALL AT GROUND LEVEL
CL 156.600	PIT COVER LEVEL
	TITLE BOUNDARY
B2 B3	PROPOSED CONCRETE KERB AND CHANNEL
CE CE	PROPOSED CONCRETE EDGE STRIP
M2 M2	PROPOSED CONCRETE SPOONDRAIN
SM2 SM3	PROPOSED CONCRETE KERB AND CHANNEL
RW	PROPOSED RETAINING WALL
EX.D	EXISTING STORMWATER DRAIN
RM	PROPOSED RISING MAIN PIPE
225Ø	PROPOSED STORMWATER DRAIN AND FLOW DIRECTION
225Ø	EMERGENCY STORMWATER DRAIN AND FLOW DIRECTION
	SYPHONIC CONNECTION (REFER HYDRAULIC ENGINEERS DRG'S)
AG	PROPOSED 100Ø UPVC AGRICULTURAL DRAIN CLASS 400
EX1	EXISTING STORMWATER PIT
EX1	EXISTING STORMWATER PIT TO BE MODIFIED
1	PROPOSED STORMWATER PIT
GI	100Ø GRATED INLET (UNLESS NOTED OTHERWISE)
DP	DOWNPIPE
IO	INSPECTION OPENING
TG	TRENCH GRATE
	OVERLAND FLOW ARROW
EX.S	EXISTING SEWER
EX.G	EXISTING GAS
EX.W	EXISTING WATER
EX.W(R)	EXISTING RECYCLED WATER
EX.E	EXISTING ELECTRICITY
EX.E O/H	EXISTING OVERHEAD ELECTRICITY
EX.E LV	EXISTING LOW VOLTAGE ELECTRICITY
EX.E H/V	EXISTING HIGH VOLTAGE ELECTRICITY
EX.T	EXISTING TELECOM CABLE
EX.FO	EXISTING FIBRE OPTIC CABLE
EX.NBN	EXISTING NBN COMMS CABLE
X X	EXISTING FEATURES TO BE REMOVED
	PROPOSED TEMPORARY SCHOOLS (AS PER LANDSCAPE LBGHS-NBRS-TEMP SCHOOL-SD05)
	PROPOSED LANDSCAPE LAYOUT (AS PER LANDSCAPE DRG NO. LBGHS-NBRS-00-XX-DR-L-0002)

THESE PLANS ARE BASED UPON THE EXISTING CONDITIONS SURVEY PREPARED BY JOHN LOWE & ASSOCIATES (LIVERPOOL) PTY LTD, REFERENCE No 101526-38252 DATED 29 AUGUST 2024.



INSET A

BEFORE YOU DIG www.byda.com.au

WARNING
PROPOSED SERVICES
THE LOCATION AND EXTENT OF PROPOSED SERVICES IS INDICATIVE ONLY AND ARE NOT TO BE USED FOR CONSTRUCTION. REFER TO AUTHORISED DOCUMENTATION BY RELEVANT AUTHORITY FOR CONSTRUCTION DETAILS

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

REV	DESCRIPTION	BY	DES	CHKD	DATE
P1	SCHEMATIC DESIGN	D.H	-	-	23.10.24
P2	FOR COORDINATION	D.H	-	-	29.10.24
P3	FOR COORDINATION	M.D	-	-	30.10.24
P4	FOR COORDINATION	M.D	-	-	11.11.24

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE (A1)

MEINHARDT
Meinhardt Infrastructure and Environment PTY. LTD.
A.C.N. 051 627 591
Level 4, 66 Clarence Street
Sydney NSW 2000
Australia
T: +61 2 9699 3088
F: +61 2 9319 7518
info@meinhardtgroup.com
http://www.meinhardtgroup.com

CLIENT: NSW GOVERNMENT School Infrastructure NSW

TITLE: CIVIL SITEWORKS PLAN

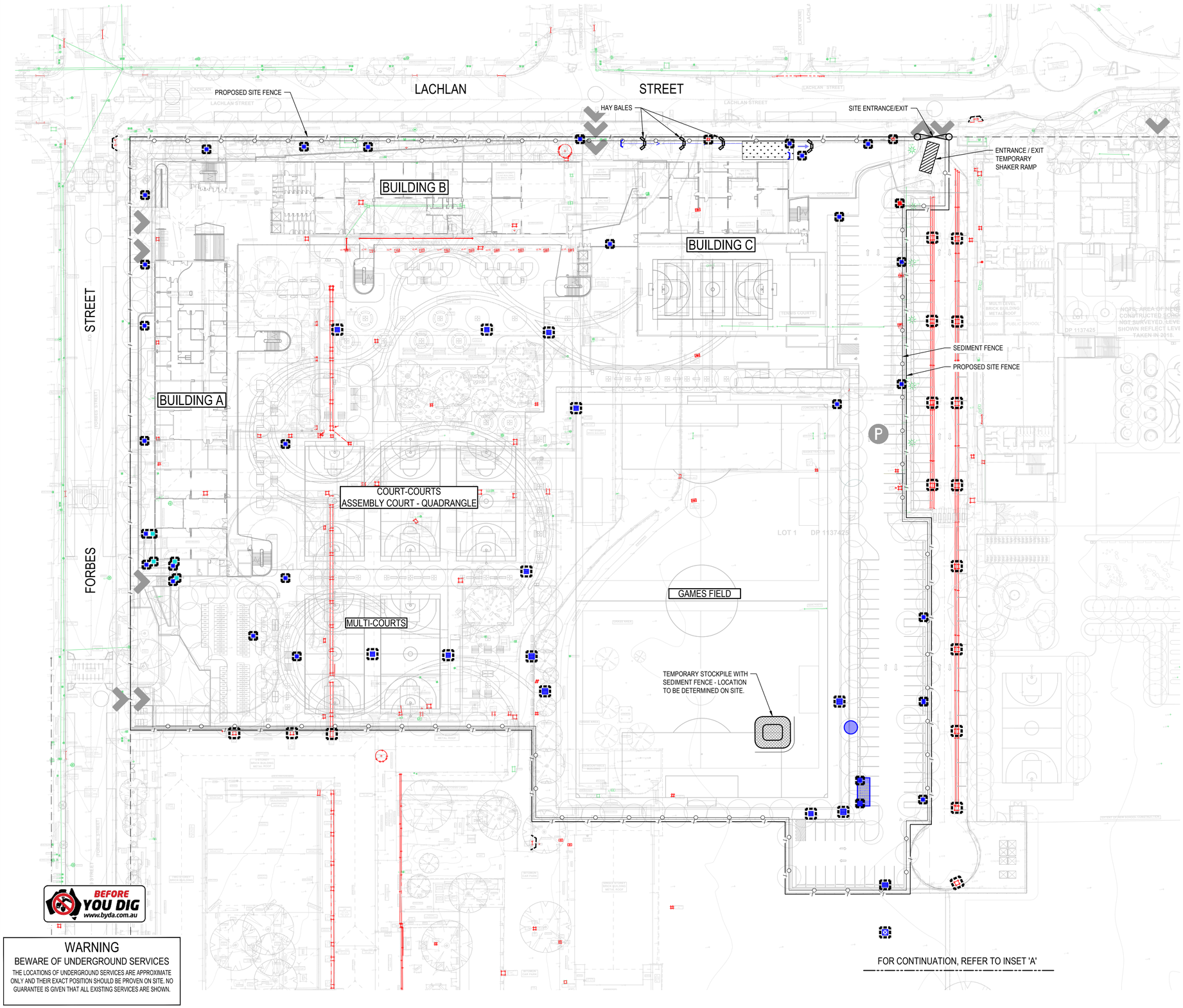
PROJECT: LIVERPOOL BOYS AND GIRLS HIGH SCHOOL
FORBES STREET, LIVERPOOL NSW 2170

STATUS: **SCHEMATIC DESIGN**
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED	DATE	SCALE @ A1
D.H	-	-		SEP. 2024	1:500

PROJECT No 132574 | DRAWING No C101 | REV P4

Appendix D – Proposed Erosion Sediment Control Layout Plan



SEDIMENT AND EROSION CONTROL NOTES

1. IT HAS BEEN ASSUMED THAT HOARDINGS/SILT FENCING WILL BE PROVIDED TO THE STAGE BOUNDARY SUFFICIENT TO PREVENT SEDIMENT RUNOFF FROM LEAVING SITE (EXCEPT IN THE CASE OF ENTRY/EXIT LOCATIONS WHERE TEMPORARY CONSTRUCTION ENTRY/EXIT SEDIMENT TRAP ARE PROVIDED). IF THIS IS NOT THE CASE, PROVIDE SEDIMENT FENCE TO STANDARD DETAIL BELOW AS REQUIRED TO PREVENT SEDIMENT FROM LEAVING SITE, DIRECT RUNOFF TO SEDIMENT BASIN.
2. ALL SEDIMENT CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH LANDCOM MANAGING URBAN STORMWATER "BLUE BOOK".

SEDIMENT CONTROL CONDITIONS

1. SEDIMENT FENCES AND STRAW BALES WILL BE INSTALLED AS SHOWN AND ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER TO CONTAIN COARSER SEDIMENT FRACTIONS INCLUDING AGGREGATED FINES) AS NEAR AS POSSIBLE TO THEIR SOURCE.
2. SEDIMENT REMOVED FROM ANY TRAPPING DEVICE WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS & WATERWAYS CANNOT OCCUR.
3. STOCKPILES WILL BE PLACED WHERE SHOWN ON DRAWING OR ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER AND NOT WITHIN 5m OF HAZARD AREAS INCLUDING LIKELY AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS & DRIVEWAYS.
4. WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM WITH INLET FILTERS (SEE DETAILS) UNLESS IT IS SEDIMENT FREE.
5. TEMPORARY SEDIMENT TRAPS WILL BE RETAINED UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.

SITE INSPECTION & MAINTENANCE CONDITIONS

THE SITE MANAGER WILL INSPECT THE SITE AT LEAST WEEKLY AND WILL:

1. ENSURE THAT DRAINS OPERATE PROPERLY & TO EFFECT ANY NECESSARY REPAIRS
2. REMOVE SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS, INCLUDING LANDS CLOSER THAN 5m FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY WATERWAYS & PAVED AREAS.
3. REMOVE TRAPPED SEDIMENT WHENEVER LESS THAN DESIGN CAPACITY REMAINS WITHIN THE STRUCTURE
4. ENSURE REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND TO INITIATE UPGRADING OR REPAIR AS APPROPRIATE.
5. CONSTRUCT ADDITIONAL EROSION AND/OR SEDIMENT CONTROL WORKS AS MIGHT BECOME NECESSARY TO ENSURE THE DESIRED PROTECTION IS GIVEN TO DOWNSLOPE LANDS AND WATERWAYS.
6. MAINTAIN EROSION & SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED.
7. REMOVE TEMPORARY SOIL CONSERVATION STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

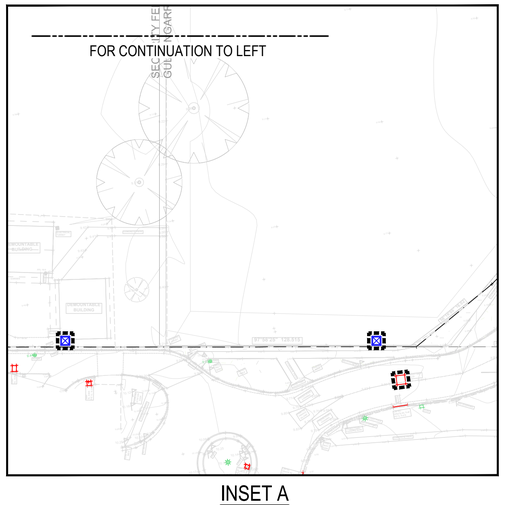
AS PART OF THE STATUTORY 'DILIGENCE OF CARE' RESPONSIBILITIES, THE SITE MANAGER WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE:

1. THE VOLUME & INTENSITY OF ANY RAINFALL EVENTS
2. THE CONDITION OF ANY SOIL & WATER MANAGEMENT WORKS
3. THE CONDITION OF VEGETATION & ANY NEED TO IRRIGATE
4. THE NEED FOR DUST PREVENTION STRATEGIES
5. ANY REMEDIAL WORKS TO BE UNDERTAKEN

THE BOOK WILL BE KEPT ONSITE & MADE AVAILABLE TO ANY AUTHORISED PERSON ON REQUEST. IT WILL BE GIVEN TO THE PROJECT MANAGER AT THE CONCLUSION OF WORKS.

LEGEND

ITEM	DESCRIPTION
156.6	EXISTING SURFACE CONTOURS
+156.60	EXISTING SURFACE SPOT LEVELS
	TITLE BOUNDARY
EX.D	EXISTING STORMWATER DRAIN
EXP	EXISTING STORMWATER PIT
EXP	EXISTING STORMWATER PIT TO BE MODIFIED
1	PROPOSED STORMWATER PIT
TG	TRENCH GRATE
	OVERLAND FLOW ARROW
	PROPOSED SEDIMENT FENCE
	PROPOSED FENCE
	TEMPORARY SHAKER RAMP FOR ENTRY/EXIT
	SEDIMENT BASIN (LOCATION TBC ON-SITE)
	TEMPORARY STOCKPILE (LOCATION TBC ON-SITE)
	GEOTEXTILE PIT FILTER / FILTER SURROUND INSTALLED ON EXISTING PIT
	SANDBAGS INSTALLED ON EXISTING PIT
	HAY BALES
EX.S	EXISTING SEWER
EX.G	EXISTING GAS
EX.W	EXISTING WATER
EX.W(R)	EXISTING RECYCLED WATER
EX.E	EXISTING ELECTRICITY
EX.E OH	EXISTING OVERHEAD ELECTRICITY
EX.E LV	EXISTING LOW VOLTAGE ELECTRICITY
EX.E HV	EXISTING HIGH VOLTAGE ELECTRICITY
EX.T	EXISTING TELECOM CABLE
EX.FO	EXISTING FIBRE OPTIC CABLE
EX.NBN	EXISTING NBN COMMS CABLE
X X	EXISTING FEATURES TO BE REMOVED



INSET A

BEFORE YOU DIG www.byda.com.au

WARNING

BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

REV	DESCRIPTION	BY	DES	CHKD	DATE
P1	FOR COORDINATION	D.H	-	-	11.11.24

0 5 10 15 20 25m

SCALE 1:500 AT ORIGINAL SIZE (A1)

MEINHARDT

Meinhardt Infrastructure and Environment PTY. LTD.
A.C.N. 051 627 591

Level 4, 66 Clarence Street
Sydney NSW 2000
Australia
T: +61 2 9699 3088
F: +61 2 9319 7518
info@meinhardtgroup.com
http://www.meinhardtgroup.com

CLIENT: NSW GOVERNMENT School Infrastructure NSW

PROJECT: LIVERPOOL BOYS AND GIRLS HIGH SCHOOL
FORBES STREET, LIVERPOOL NSW 2170

TITLE: SEDIMENT AND EROSION CONTROL PLAN

STATUS: **SCHEMATIC DESIGN**
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED	DATE	SCALE @ A1
D.H	-	-		SEP. 2024	1:500

PROJECT No	DRAWING No	REV
132574	C030	P1

Appendix E – REF Checklist – Civil

Requirement	Y	N	N/A	Comments
Does the REF broadly set out how the proposal will be serviced by necessary services and utilities?	☐	☐	☐	
Does the REF assess any works required to provide necessary services and utilities and conclude that these would not have significant environmental affects?	☐	☐	☐	
If on site water treatment is required, does the REF include an on-side waste water management plan / land capability assessment that concludes that the site would be capable of accommodating wastewater without significant affects on the environment?	☐	☐	☐	
If temporary arrangements are required (i.e. generator), does the REF assess any potential temporary environmental effects as a result of the arrangements and conclude that significant effects would not be likely?	☐	☐	☐	
Stormwater drainage				
Has a stormwater management plan been prepared that: • considers and complies with council's applicable engineering specifications, including requirement for on-site detention and water quality treatment?	☒	☐	☐	Section 3
• demonstrates that the proposed stormwater management system would not increase runoff from the site (i.e. that post-development flows do not exceed pre-development flows)?	☒	☐	☐	Section 3.1
• demonstrates that the stormwater management system would discharge to a legal point of discharge?	☒	☐	☐	Refer to Stormwater Layout Plan
• conclude that stormwater would be managed so that the proposal would not be likely to have significant environmental affects?	☒	☐	☐	Section 4
Does the REF summarise the proposed stormwater management strategy and conclude that the activity would not be likely to have significant environmental impacts as a result of stormwater management with or without mitigation measures?	☒	☐	☐	Section 7
Soil and water				
If the site is mapped as, or has otherwise been identified, as having salinity potential, does the geotechnical report consider impacts from salinity and set out measures to mitigate impacts (i.e. Salinity Management Plan) so that they would not be significant?	☐	☐	☐	
If the site is mapped as, or has otherwise been identified as having acid sulfate soils (ASS) potential, does the geotechnical report consider impacts from ASS and set out measures to mitigate impacts (i.e. ASS Management Plan) so that they would not be significant?	☐	☐	☐	
If the site is mapped as being in an area of groundwater vulnerability, does the REF include an Integrated Water Management Plan that assess the potential of the activity to impact groundwater and does it conclude that the activity would not be likely to have significant environmental impacts with or without mitigation measures?	☐	☐	☐	
If the site is mapped as being in an area of landslide risk, does the REF assess the potential of the activity and does it conclude that the activity would not be likely to have significant environmental impacts with or without mitigation measures?	☐	☐	☐	
Has an Erosion and Sediment Control plan been prepared to inform the REF that includes: • a plan(s) detailing: ○ property boundaries, existing levels of the land in relation to the building, roads and where stormwater surface flows enter and leave the site?	☒	☐	☐	Refer to drawing C030.

Requirement	Y	N	N/A	Comments
○ the location of stabilised construction access points?	☐	☐	☒	
○ the location of perimeter sediment/erosion controls?	☒	☐	☐	
○ any 'no-go' areas that are not to be disturbed?	☐	☐	☒	By others if relevant.
○ location of stockpile areas?	☒	☐	☐	
○ location of proposed temporary and permanent site drainage?	☒	☐	☐	
• specific measures to be implemented to prevent pollution of stormwater off the site?	☒	☐	☐	Section 5 & 6
Does the REF summarise the proposed controls and incorporate any mitigation measures identified in the above documents?	☒	☐	☐	Section 7
Waste management				
Has a preliminary Construction Waste Management Plan been prepared that informs the REF that considers: • the likely type and volume of waste generated by the activity?	☐	☐	☐	
• opportunities to reuse and recycle waste in order to reduce waste sent to landfill?	☐	☐	☐	
• set out measures to handle and dispose of the waste?	☐	☐	☐	
• conclude that appropriate arrangements can be put in place such that there would not be likely to have significant environmental affects?	☐	☐	☐	
Has a preliminary Operational Waste Management Plan been prepared to inform the REF that considers: • the likely type and volume of waste generated by the activity?	☐	☐	☐	
• opportunities to reuse and recycle waste in order to reduce waste sent to landfill?	☐	☐	☐	
• set out measures to handle and dispose of the waste including the number of bins, siting and size of the waste storage area, and truck access arrangements (including swept path diagrams to demonstrate access can be achieved in a forward direction)?	☐	☐	☐	
• Council's waste management policies, if applicable?	☐	☐	☐	
• conclude that appropriate arrangements can be put in place such that there would not be likely to have significant environmental affects?	☐	☐	☐	
Does the REF summarise outcomes of the above and incorporate any mitigation measures identified in the above documents?	☐	☐	☐	
Aviation				
If the proposal is located within the Obstacle Limitation Surface (OLS) or is in close proximity to an aviation facility, including helicopter landing sites, has a statement from a suitably qualified person assessing the proposed activity been prepared to inform the REF?	☐	☐	☐	
Does the statement: • describe the nearby aviation facility?	☐	☐	☐	
• any relevant policies, procedures or controls that apply to development works on the site?	☐	☐	☐	
• assess any potential impacts from the activity, including proposed buildings, on aviation operations?	☐	☐	☐	
• assess any potential impacts of the proposed construction activities, including use of cranes, on aviation operations?	☐	☐	☐	
• describe any consultant with the relevant airport, CASA or other relevant aviation authority?	☐	☐	☐	
• advise if any approvals are required under aviation legislation?	☐	☐	☐	
• conclude that the proposal is appropriate and would not	☐	☐	☐	