JBS&G 66181 | 156,286

L01 – Peer Review of SCA, Liverpool Boys and Girls High School (Rev 0)

13 December 2023

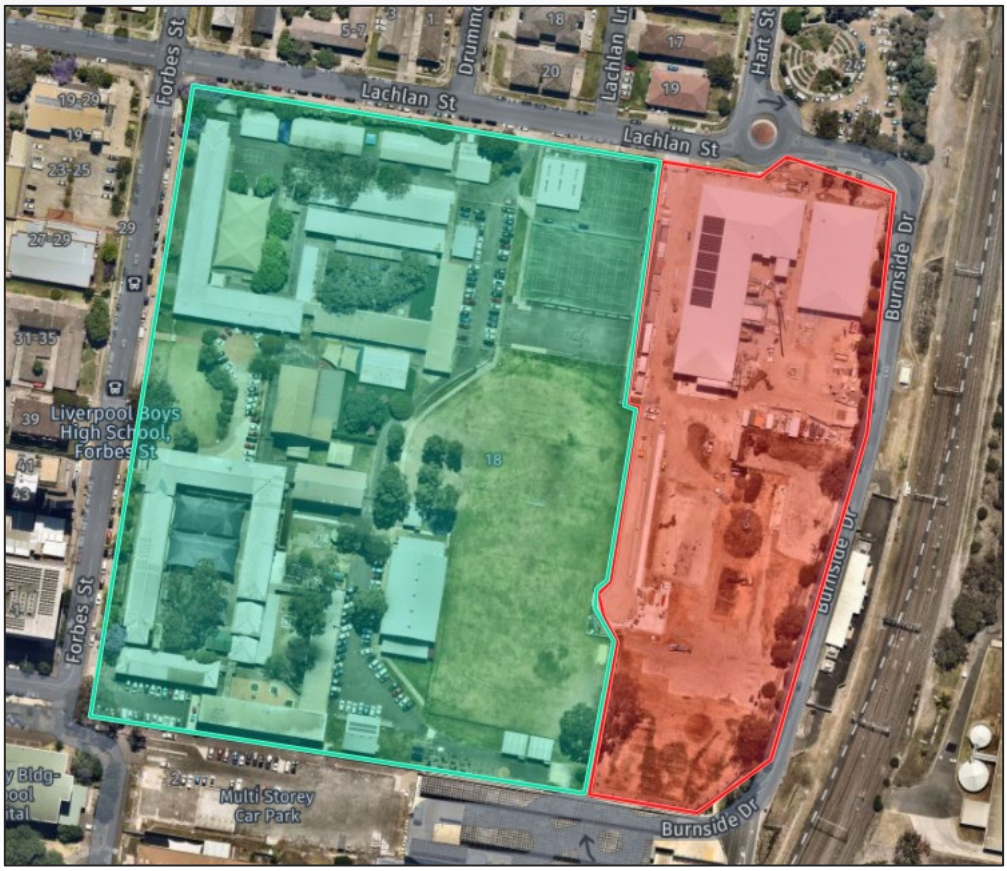
Kristian Illic
School Infrastructure NSW c/o Colliers
Via email: Kristian.illic@colliers.com

Environmental Peer Review and Strategic Advice – Liverpool Boys and Girls High School, Liverpool, NSW, 2170

Dear Kristian,

JBS&G Australia Pty Ltd (JBS&G) was engaged by School Infrastructure NSW (SINSW), care of Colliers, for the provision of environmental/contamination peer review and strategic advice to facilitate the redevelopment of Liverpool Boys and Girls High School (LBHS and LGHS, respectively, located at Forbes Street, Liverpool (collectively referred to as the site). It is understood that LBHS and LGHS form part of the Liverpool Education Precinct Development (which also includes the newly constructed Liverpool Primary School). The site location and layout are shown on **Figures 1** and **2** attached (and **Image 1**, below)**.**

Image 1: The site (shown in green) and the newly constructed Liverpool Primary School which is excluded from 'the site'. The site area (green area) covers an area of approximately 5.2 hectares (ha).



This advice follows JBS&G's review of the Site Contamination Assessment (SCA) completed by Coffey (2019[1]) to assist with future contaminated land management (CLM) investigations and strategic planning for the redevelopment of the LBHS and LGHS.

The investigation area undertaken as part of the SCA covers the entire Liverpool Education Precinct site, as shown in the figure provided in **Attachment 3.**

Based on the review of the site design plans, provided in **Attachment 3**, it is understood that the proposed redevelopment area (i.e., the site) is split into a northern area proposed for the redevelopment of the school facilities and a southern area designated for future development. The proposed school facilities include a multi-storey educational structure with associated outdoor recreational and sporting areas as well as a single storey underground basement carpark located in the central northern boundary of the site.

A detailed summary of the SCA (Coffey 2019) is not warranted for the advice herein. Rather, key SCA findings as applicable to this advice are outlined and then commented on below, including a discussion of data gaps identified by JBS&G, before recommendations are presented.

1. Summary of Key Findings – SCA (Coffey 2019)

Item	Media Type	Comment
1a	Soil	1. Soil investigations were completed across the entire site and including the area of the newly constructed Liverpool Public School (LPS), however observations and results from five sample locations (BH02, TP01 and TP03 to TP05) were not reported as part of the SCA as these were in an area indicated as being the proposed LPS, which differs from the actual newly constructed LPS area. It is noted BH02 and TP04 are in the northeast of the proposed HS development area. 2. Soil sample locations across the site comprised 27 sample locations including testpits, boreholes and surface sample locations, advanced utilising a systematic and targeted sample design pattern. 3. JBS&G consider that the sampling design pattern was consistent with the Sampling Design Guidelines (NSW EPA 1995), however the number of samples advanced (27 sample locations) does not satisfy the recommended minimum number of samples outlined in Sampling Design Guidelines (NSW EPA 2022) for a site of this size. It is noted that implementation of targeted sampling patterns do not necessarily need to satisfy the recommended minimum number of samples and therefore the reduced number of sample locations may be sufficient to develop a remedial strategy, however additional data would provide a more robust dataset for the site to which remediation and strategic planning decisions can be made with more confidence. 4. The sample locations completed by Coffey (2019) were determined by access and surface material type, with test pits being the preferred methodology but limited to unsealed areas accessible for excavation equipment. Where hardstand material was encountered boreholes were advanced by mechanical boring, and where restrictions prevented plant access a hand auger was utilised. Surface soil samples were collected from sub-floor voids beneath some building areas.

[1] *Liverpool Boys and Girls High School – Site Contamination Assessment.* Prepared for Department of Education (School Infrastructure) NSW by Coffey Services Australia Pty Ltd. Ref: 754-SYDEN231101-R02-Rev0. Dated 7 November 2019 (Coffey 2019).

Item	Media Type	Comment
		5. Fill materials were noted to be present at generally shallow depths across the site. The deepest area of filling was identified in the central portion of the site/investigation area, up to 0.6 m below ground surface. Fill materials were observed to generally consist of a gravelly sand or clayey sand material. In some sample locations trace anthropogenic inclusions were noted consisting of glass and plastic. BH27 was noted to contain ash. 6. Soil contamination (i.e. concentrations exceeding the applicable land use criteria, pursuant to NEPC 2013) from heavy metals and asbestos impacts were identified in some fill materials. 7. Friable asbestos was reported in a subfloor surface soil sample (A08526) collected in the subfloor void underlying Bock A of the LBHS. 8. Arsenic at one location (TP07_0.1-0.2) was reported in exceedance of the health investigation level for residential with accessible soils, representing a potentially unacceptable human health risk for the future development scenario. It is noted that this sample location is located just outside of the site boundary (in the newly constructed LPS site), however additional sampling within the site in proximity to this location may be warranted to assess any risks to the site. 9. JBS&G has provided further comment on data gaps associated with soils in **Section 2.2.1**.
1b	Acid Sulfate Soils (ASS)	10. The site is located in an area with "no known occurrences of acid sulfate soils". 11. The site is noted to be located 0.4 km north of the Georges River where there are Class 1 ASS, and with disturbed terrain lying almost 500 m to the east of the site. 12. JBS&G has provided further comment on data gaps associated with ASS in **Section 2.2.2**.
1c	Per- and Polyfluorinated Substances (PFAS)	13. A search of the NSW Government PFAS Investigation Program did not identify any significantly impacted PFAS sites within 2 km of the site. 14. Given the site usage as a school since approximately 1953 it was considered unlikely that PFAS had been used or stored at the site.
2	Groundwater	15. Assessment of groundwater conditions was not included as part of the SCA. 16. Groundwater was not encountered at any environmental sample location. 17. JBS&G note that no information is provided on the inferred direction of groundwater flow. 18. JBS&G has provided further comment on data gaps associated with groundwater in **Section 2.2.3**. 19. JBS&G note that as part of the geotechnical investigation completed by DP (2019[2]), three groundwater monitoring wells were installed for groundwater level monitoring purposes. Groundwater levels were measured at least 6 m below ground surface (m bgs).
3	Conclusions and Recommendations	20. The SCA recommended: a. Further investigations to assess the extent of arsenic contamination within surface soils adjacent to TP07.

[2] *Report on Geotechnical Investigation, Proposed Redevelopment of Liverpool Boys and Girls High Schools, Forbes Street, Liverpool*, prepared by Douglas Partners, December 2019 (DP 2019).

Item	Media Type	Comment
		b. Further characterisation and sampling of subfloor soils beneath Bock A to assess the potential risk to site users from asbestos, including the appropriate sampling of soils to allow for assessment against relevant land-use NEPC (2013) criteria.

2. Data Gaps

2.1 Data Gaps – SCA (Coffey 2019)

The SCA identified several data gaps that are recommended to be addressed:

1. Further characterisation and systematic sampling to assess the extent of arsenic contamination within surface soils adjacent to sample location TP07. This will determine the level of remediation and/or management required prior to development.
    a. **JBS&G Comment**: JBS&G agree that further assessment of the extent of arsenic contamination in soils in proximity to sample location TP07 would be required.
2. Further characterisation and systematic sampling of the subfloor soils beneath Block A to be undertaken to further assess the potential risks to site users and contractors from asbestos. This should include sieving of soils to allow for assessment against relevant land-use NEPC (2013) criteria.
    a. **JBS&G Comment**: JBS&G agree that further assessment of subfloor soils beneath Block A should be undertaken. Similarly, it is agreed that further sampling methodology should allow for the assessment of results against relevant NEPC (2013) criteria as is yet to be done.

2.2 Additional Data Gaps

2.2.1 Sampling Design

- JBS&G notes that 27 sample locations were positioned within the site (i.e. the proposed development area) which comprises an area of approximately 5.2 hectares.
- NSW EPA (2022) *Contaminated Land Guidelines: Sampling Design, Part 1 – Application,* recommends approximately 63 sample locations to adequately characterise a site of this size using a systematic sampling pattern. With consideration to the 27 sample locations advanced as part of the SCA, there is a balance of 36 sample locations. However, JBS&G notes that due to the presence of structures and associated split-level walkways/retaining walls which may impede access, advancement of an additional 36 sample locations is not likely to be feasible, and given the relatively low risk for wide-spread soil contamination at the site based on existing SCA data, JBS&G consider that a reduced number of samples advanced utilising a targeted sample design pattern should sufficiently characterise the site such that a remedial strategy can be developed.
- Noting the identification of friable asbestos within the subfloor area of Block A, JBS&G recommend additional sampling of subfloor soils to assess risks to future workers and inform future remedial decisions.
- Given the limited sampling that has historically occurred within these areas JBS&G recommend additional sampling be undertaken in order to adequately characterise the proposed development areas and inform the remedial strategy as well as other future decision-making processes.
- It is further noted that limited test pitting has been conducted across the western portion of the site due to restricted access. This would have reduced the potential to observe anthropogenic inclusions including potential asbestos contamination within fill material, particularly in proximity to current and

historical site structures where the risk of such inclusions would be considered higher. JBS&G recommend that additional testpitting be conducted at a greater number of sample locations as part of future data gap investigation works, after which appropriate rectification works are undertaken to reinstate the surface finishes where required.

2.2.2 Potential Acid Sulfate Soils (P/ASS)

- JBS&G note that no assessment for ASS within deeper soils across the site was completed as part of the SCA.
- Douglas Partners completed a Geotechnical Investigation (DP 2019) in which P/ASS was assessed at one location, BH26, which is located within proximity to the proposed basement carpark location (central northern boundary, off Lachlan Street).
- The assessment of P/ASS was completed utilising field testing techniques (it is noted that Envirolab also conducted field sPOCAS tests, however it does not appear that full sPOCAS analysis was completed).
- The results indicated that whilst actual ASS was not identified, there is the potential for P/ASS to exist in the natural lithology of the site, noting that following oxidation of samples using hydrogen peroxide, some samples had a pH of less than 4 (the action criteria for PASS).
- Given the proposed underground parking facilities and the site proximity to the Georges River and disturbed terrain it is recommended that future sampling would include sampling and analysis for P/ASS within the proposed basement excavation area to confirm whether P/ASS or acidic soils are present and require management.

2.2.3 Assessment of Groundwater

- JBS&G note that chemical assessment of groundwater has not been undertaken at the site as part of previous investigations.
- However, given that there has been no wide-spread soil contamination identified at the site, and that the site is underlain by clays (low hydraulic conductivity), groundwater is not likely to be a receptor or source of contamination to the site. As such, further investigation of groundwater conditions at the site is not considered necessary.

3. Recommendations

It is recommended that some additional intrusive investigations are conducted to address the data gaps identified in **Section 2** to adequately characterise the condition of the site such that a robust remedial strategy can be developed for the site.

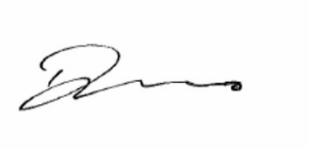
Following these investigations it is recommended that a remedial action plan (RAP) be prepared to outline the remediation of the arsenic contamination historically identified and any further contamination that may be identified as part of any future in-ground investigations.

Should you require clarification, please contact the undersigned on 02 8245 0300 or by email ilee@jbsg.com.au/ddenaro@jbsg.com.au.

Yours sincerely:

Isaac Lee
Project Consultant
JBS&G Australia Pty Ltd

Reviewed by:



Daniel Denaro
Associate
JBS&G Australia Pty Ltd

Reviewed/Approved by:

Matthew Bennett
Senior Principal
JBS&G Australia Pty Ltd

Attachment A Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

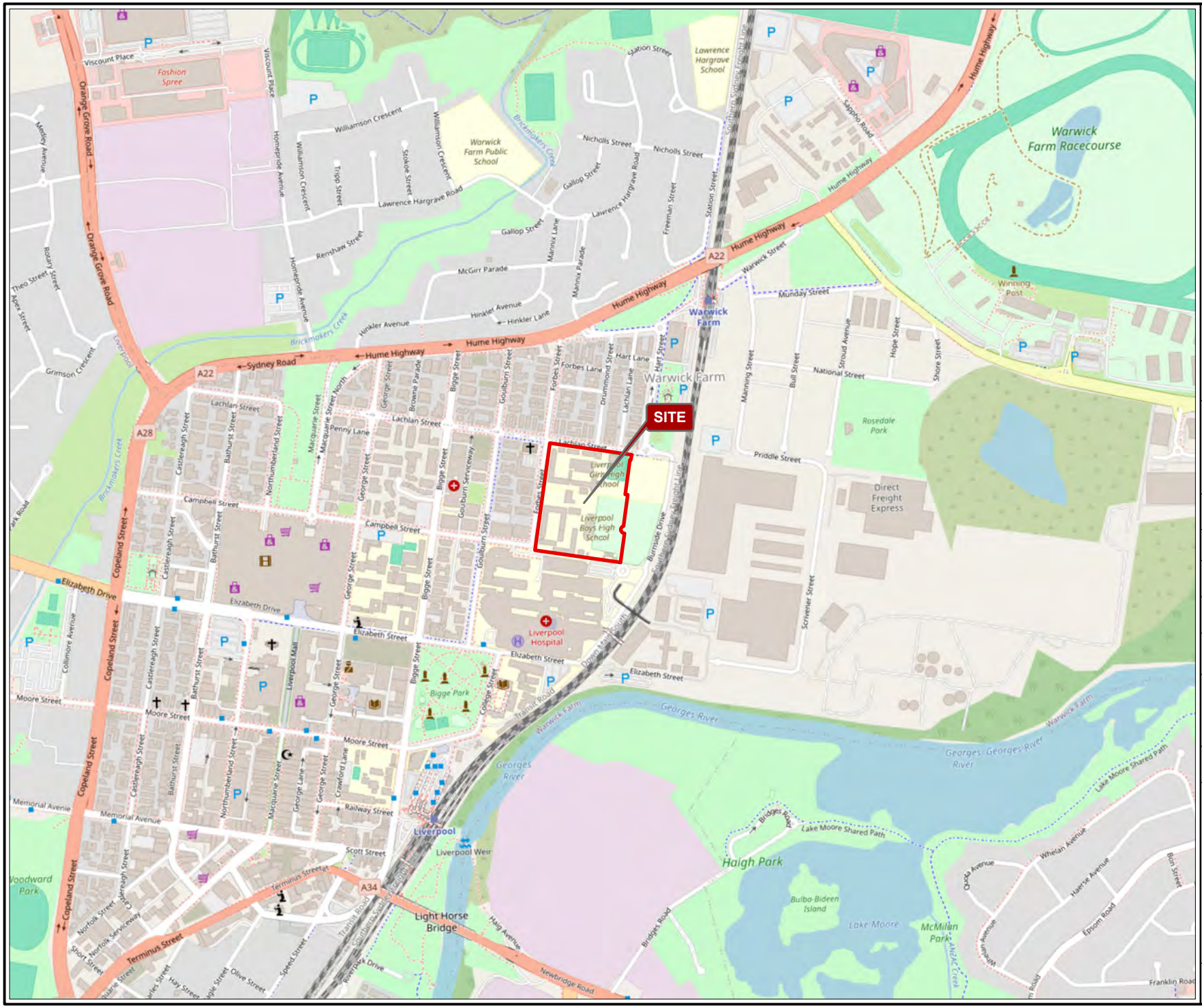
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Attachment B Figures



Legend

Approximate Site Boundary

JBS&G

Job No: 66181	
Client: School Infrastructure	
Version: L01 Rev 0	Date 13/12/2023
Drawn By: AB	Checked By: IL
Scale 1:12,500	

0 110 220

metres

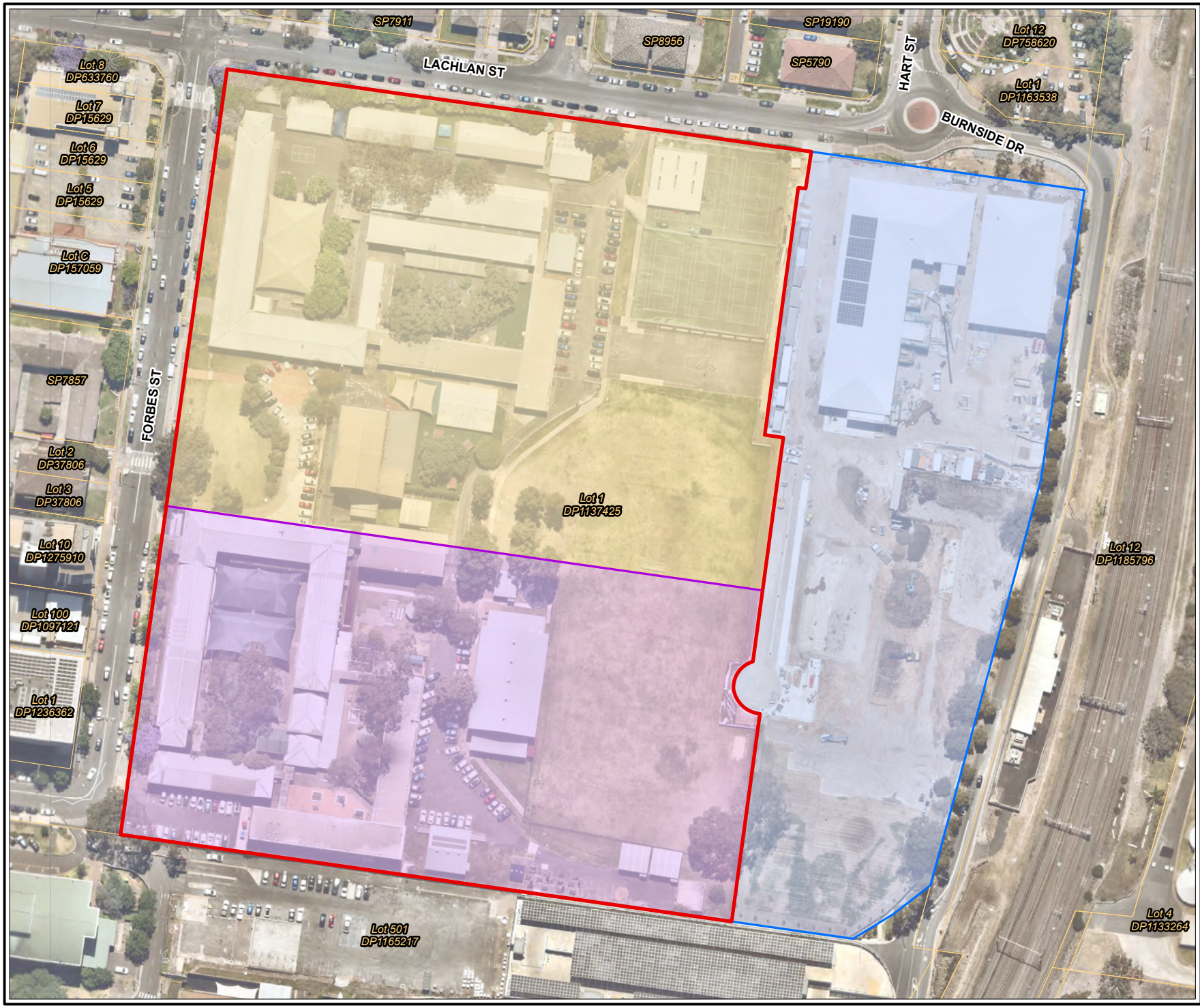
Coord. Sys. GDA2020 MGA Zone 56

Forbes Street
Liverpool, NSW

SITE LOCATION

FIGURE 1

File Name: 66181_LiverpoolBoysAndGirlsHS_L01_Rev0



Legend

- Approximate Site Boundary
- NSW Cadastre

Site Division

- Liverpool High School Redevelopment Area
- Future Development Site
- New Liverpool Primary School

JBS&G

Job No: 66181	
Client: School Infrastructure	
Version: L01 Rev 0	Date 13/12/2023
Drawn By: AB	Checked By: IL

Scale 1:1,750

0 10 20
metres

Coord. Sys. GDA2020 MGA Zone 56

Forbes Street
Liverpool, NSW

CURRENT SITE LAYOUT

FIGURE 2

File Name: 66181_LiverpoolBoysAndGirlsHS_L01_Rev0
Reference: Nearmap - www.nearmap.com (Capture Date: 24/10/2023)

Legend

- Approximate Site Boundary
- NSW Cadastre

Historical Sample Locations (Coffey, 2019)

- Borehole
- Hand-augered Borehole
- Sub Floor Grab Sample
- Test Pit

JBS&G

Job No: 66181	
Client: School Infrastructure	
Version: L01 Rev 0	Date 13/12/2023
Drawn By: AB	Checked By: IL
Scale 1:1,750	

0 10 20
metres

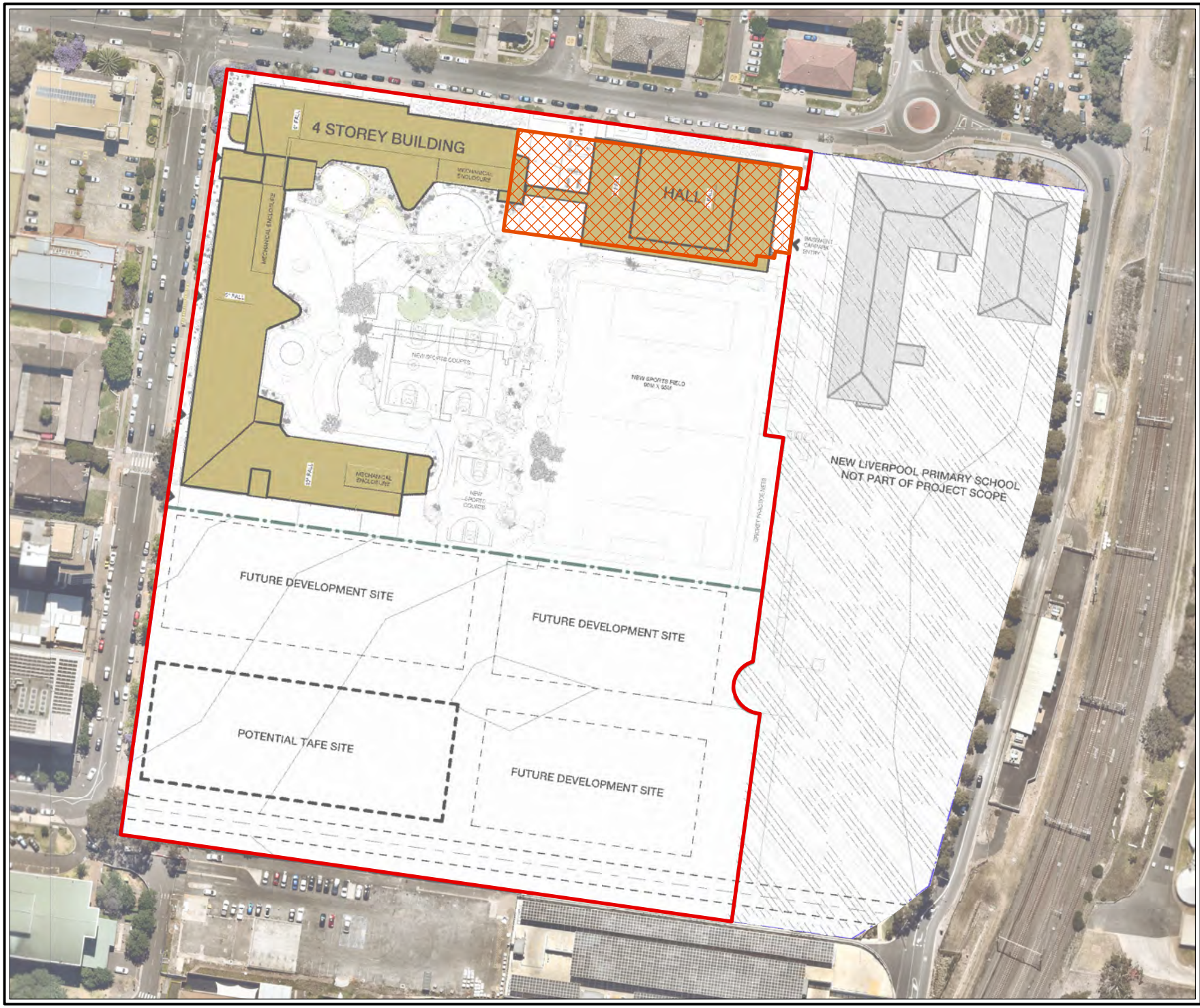
Coord. Sys. GDA2020 MGA Zone 56

Forbes Street
Liverpool, NSW

HISTORICAL SAMPLE LOCATIONS

FIGURE 3

File Name: 66181_LiverpoolBoysAndGirlsHS_L01_Rev0
Reference: Nearmap - www.nearmap.com (Capture Date: 24/10/2023)



Legend

- Approximate Site Boundary
- Underground Car Park

JBS&G

Job No: 66181	
Client: School Infrastructure	
Version: L01 Rev 0	Date 13/12/2023
Drawn By: AB	Checked By: IL
Scale 1:1,750	

0 10 20
metres

Coord. Sys. GDA2020 MGA Zone 56

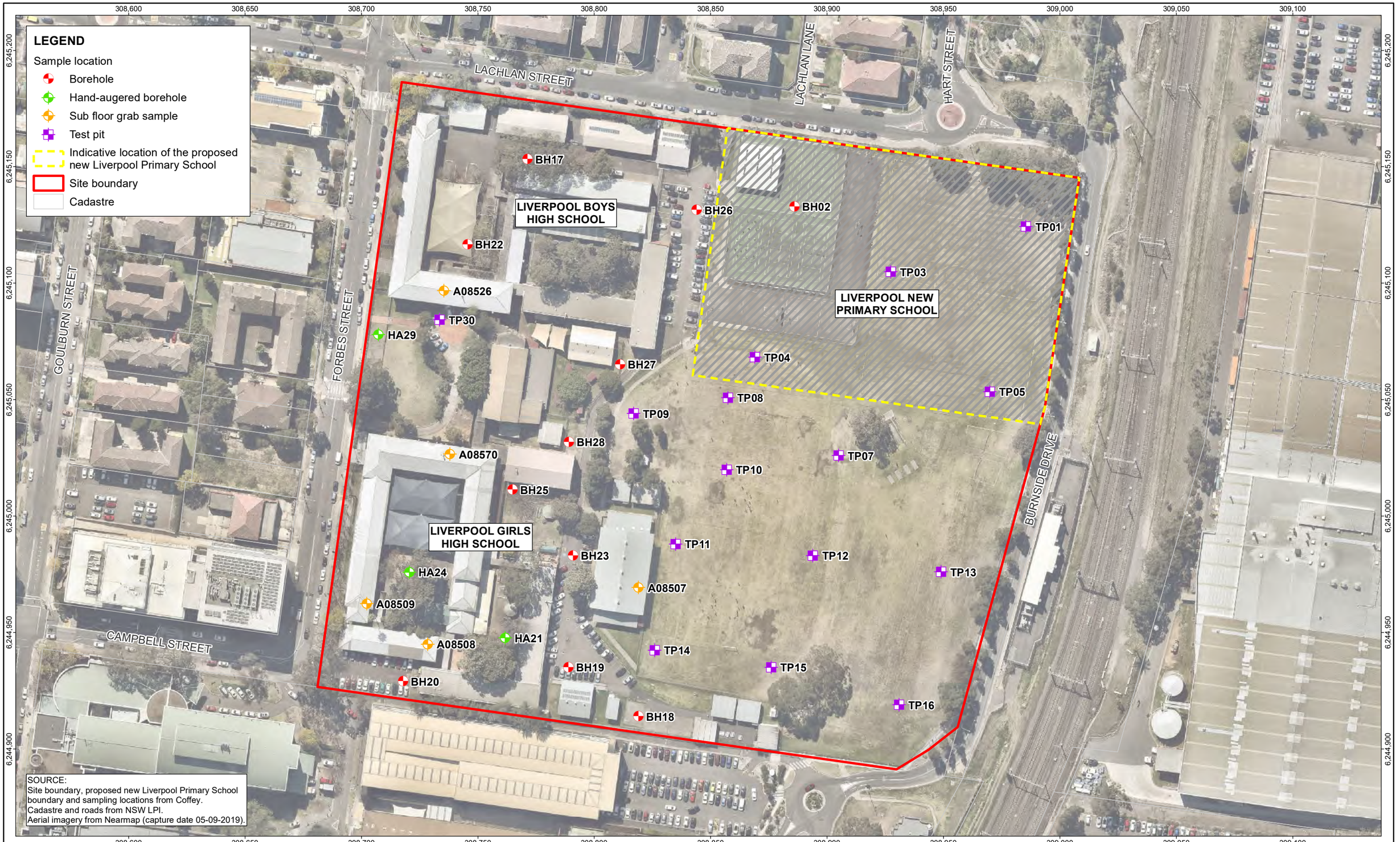
Forbes Street
Liverpool, NSW

PROPOSED LAYOUT

FIGURE 4

File Name: 66181_LiverpoolBoysAndGirlsHS_L01_Rev0
Reference: Nearmap - www.nearmap.com (Capture Date: 24/10/2023)

Attachment C SCA (Coffey 2019) Sample Location Figure



SOURCE:
Site boundary, proposed new Liverpool Primary School boundary and sampling locations from Coffey.
Cadastre and roads from NSW LPI.
Aerial imagery from Nearmap (capture date 05-09-2019).

MXD ref: SYDEN231101_R02_GIS003_v0_3

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	GH	DM	06.11.19

N

0 15 30 45 60
SCALE 1:1,500 (A3) METRES

Projection: GDA 1994 MGA Zone 56

drawn	GH
approved	DM
date	06.11.2019
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

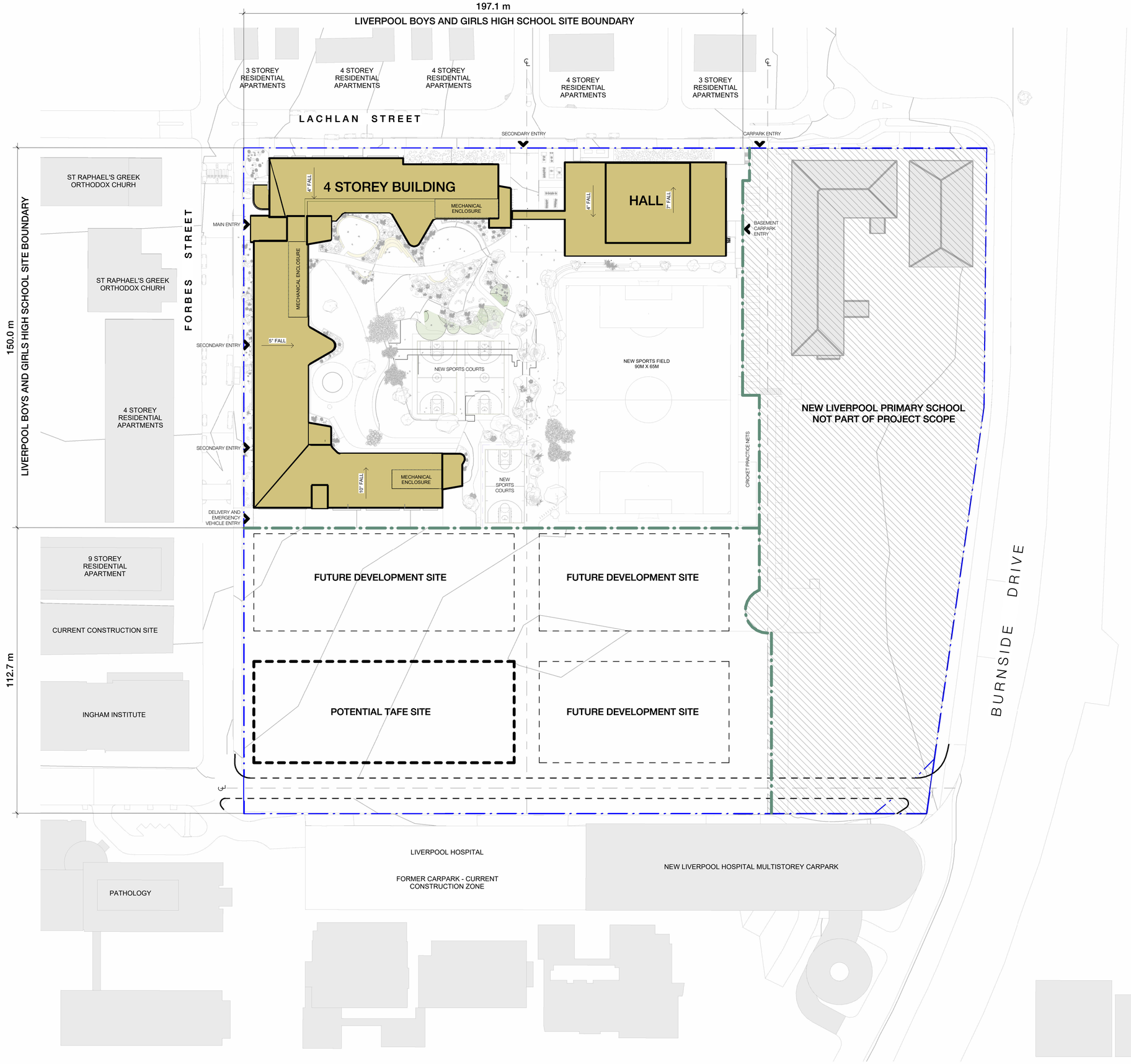
client: DEPARTMENT OF EDUCATION: SCHOOL INFRASTRUCTURE NSW

project: SITE CONTAMINATION ASSESSMENT
LIVERPOOL BOYS AND GIRLS HIGH SCHOOL
LIVERPOOL NSW

title: SAMPLING LOCATION PLAN

project no: 754-SYDEN231101-R02 | figure no: FIGURE 3 | rev: A

Attachment D Relevant Design Plans



CLIENT
NSW Department of Education | School Infrastructure NSW

LEGEND

- SITE BOUNDARY
- BOUNDARY BETWEEN HIGH SCHOOL AND PRIMARY SCHOOL
- EXISTING BUILDINGS
- PROPOSED BUILDINGS

NSW Nominated Architects: Robert Denton Reg. No. 5782, Alex Kibble Reg. No. 6015
Do not scale drawings. Verify all dimensions on site. Notify architect of all discrepancies

Rev	Date	Description	Chkd	Auth
P1	08.09.23	Issue for Concept Design		JCR
A	10.10.23	Issue for Concept Design	AH	HC

FOR INFORMATION

Project
LIVERPOOL BOYS & GIRLS HIGH SCHOOL
FORBES STREET,
LIVERPOOL NSW 2170

Drawing Title
SITE PLAN - BASEMENT CARPARK

Proj. Dir	Proj. Arch	Drawn	Sheet
AK	AH	HC	A1

Job No.	Phase	Date	Scale	Revision
210051	CO	10.10.23	1 : 750	A

Drawing No.
LBGHS-TKD-DR-AR-1000

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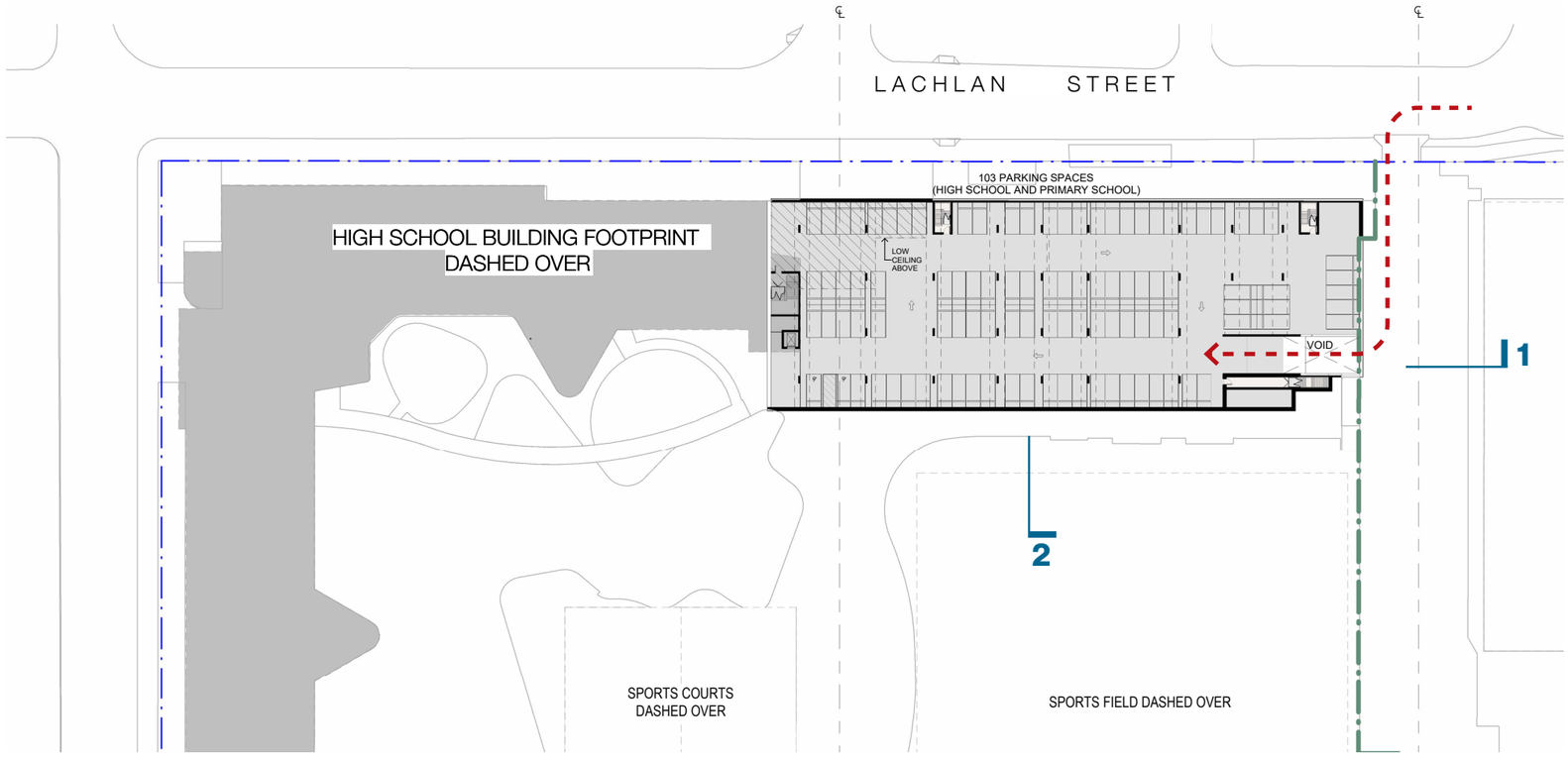
Surry Hills NSW 2010 Australia
T +61 2 9281 4399
www.tkda.com.au
TKDArchitects
Tanner Kibble Denton

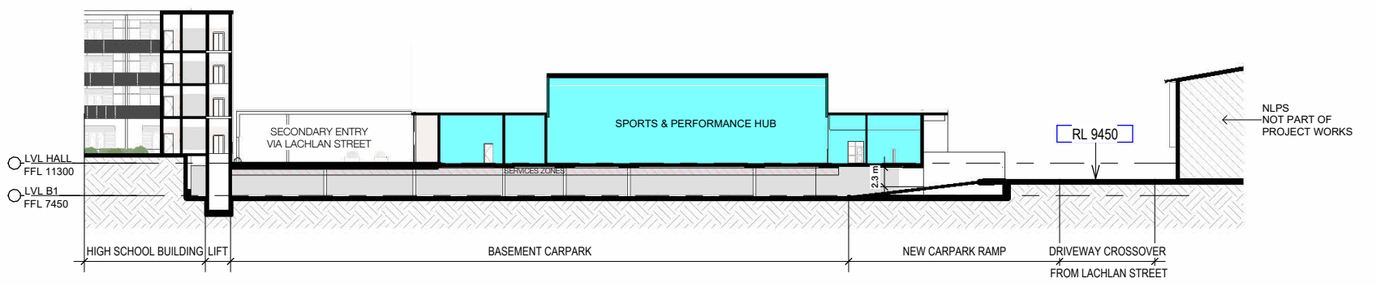
Concept Design Development

CARPARK OPTION 2A

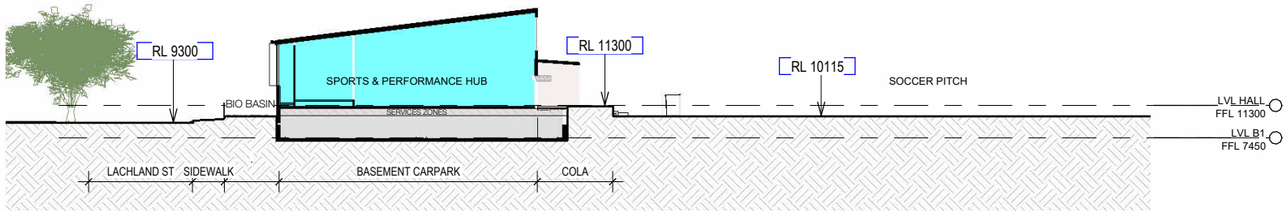
BASEMENT CARPARK OPTION

- Approximately 103 car spaces for high school and primary school staff parking
- Staff bicycle parking
- Mechanically assisted ventilation
- Sprinklers required
- Electronic Vehicle charging required
- Access via New Liverpool Primary School crossover





SECTION 1



SECTION 2