North Sydney Public School

Geotechnical Desktop Study

NSW Department of Education

Reference: SYDG290593AB

13 August 2021

NORTH SYDNEY PUBLIC SCHOOL

Geotechnical Desktop Study

Report reference number: SYDG290593AB
13 August 2021

PREPARED FOR

NSW Department of Education
Level 8, 259 George Street
Sydney NSW 2000

PREPARED BY

Tetra Tech Coffey
Level 19, Tower B, Citadel Tower, 799 Pacific Highway
Chatswood
NSW 2067 Australia
p: +61 2 9406 1000
f: +61 2 9415 1678
ABN 55 139 460 521

QUALITY INFORMATION

Revision history

Revision	Description	Date	Author	Reviewer	Approver
V01	Final	30/07/2021	AM	RMT	STP
V02	Final – Incorporate comments from town planner	13/08/2021	AM	STP	STP

Distribution

Report Status	No. of copies	Format	Distributed to	Date
V01	1	PDF	Alfred Jury / Tarini Pathak	30/07/2021
V02	1	PDF	Alfred Jury / Tarini Pathak	13/08/2021

CONTENTS

LIST OF TABLES

APPENDICES

1. INTRODUCTION

Tetra Tech Coffey Pty Ltd (Coffey) was engaged by NSW Department of Education (DoE) in response to RFT SINSW01975/21 for Geotechnical & Contamination investigations at North Sydney Public School. The purpose of this report is to present a desktop review of available geotechnical information and provide preliminary geotechnical discussions and recommendations to support DoE in their State Significant Development Application (SSDA) and respond to the Secretary's Environmental Assessment Requirements (SEARs) for SSD-11869481 dated 24 December 2020. This have been completed in general accordance with our fee proposal, reference SYDGE29053AA_Rev 3, dated 23 June 2021.

Coffey has previously conducted geotechnical and contamination investigations at the North Sydney Public School as documented in our site investigation report ref SYDGE232786AD. However, at the time of this investigation, it was proposed that the new building would be located within the playground area to the north of the existing School Hall. As a result, no borehole investigations were carried out within the current development footprint.

An SSDA Design has now been prepared (presented in Appendix A). This SSDA seeks consent for alterations and additions to the existing North Sydney Public School. The proposal entails:

- Demolition of the existing hall (building B), haven building (building C) and six temporary buildings;
- Construction of a three storey building comprising:
    - staff administration rooms;
    - 16 homebases;
    - a new library;
    - hall;
    - out of school hours care facilities;
    - covered outdoor learning area;
    - bicycle parking and end of trip facilities for staff; and
    - services, amenities and access.
- New entry gate and forecourt from Bay Road;
- Internal refurbishment of building G ground floor from the existing library to 3 homebases;
- Capacity for an increase in student numbers from 869 to 1,012; and
- Associated tree removal, landscaping and excavation.

The proposal maintains:

- The gates and fence of former Crows Nest House including the entrance from Pacific Highway and Bay Road;
- Existing gate along McHatton Street;
- The outdoor play area to the east of Building A;
- Existing covered outdoor learning area adjacent to Building A;
- The basketball courts and staff carpark in the western portion of the site;
- The significant tree planting on all school boundaries;
- Buildings A, D and F noting minor internal refurbishments are being undertaken outside of the SSDA scope of work (exempt development) to improve student amenities and canteen; and
- Building G noting ground floor internal refurbishment is proposed in the SSDA.

This report addresses identifies and discusses perceived geotechnical issues and constraints for this proposed development.

2. DESKTOP REVIEW

2.1 SITE DESCRIPTION

The site is located within the existing North Sydney Public School, 182 Pacific Highway, North Sydney. The site includes an at-grade parking area, basketball courts, school buildings and demountables. The school is bounded by Pacific Highway to the east, McHatton Street to the north, a pedestrian and cycle path to the west, and Bay Road to the south. A site plan illustrating the project boundary is presented in Appendix B.

The site slopes to the south with a series of benches, reducing from an RL of approximately 89 m AHD on the McHatton Street boundary to 83 m AHD at the Bay Road boundary. A sandstone block retaining wall separates the site from Bay Road with an elevation difference of approximately 1 m to Bay Road.

A site visit by Coffey on 21 June 2021 noted within the footprint of the proposed development footprint a stepped synthetic area, a grassed play area with play equipment, several existing school buildings including demountables, concrete paths and steps, planters and several established trees. No rock outcropping was observed nor any major cracking of existing structures. Concrete paths appeared in good condition. The asphalt shade cloth area immediately west of the School Hall showed signs of potential settlement, with cracking up to 10 mm wide, up to 2 m long and depressions up to 20 mm.

Surface water was noted as flowing south into drains or a gutter above the Bay Road retaining wall.

2.2 REGIONAL GEOLOGY

Reference to the NSW Seamless Geology (March, 2020) database indicates the site is underlain by Ashfield Shale of the Wianamatta Group, characterised by dark-grey to black claystone-siltstone and fine sandstone-siltstone laminite. Hawkesbury Sandstone (which underlies Ashfield Shale), is a medium to very coarse-grained quartz sandstone with very minor shale and laminite lenses outcropping at lower elevation approximately 160 m south-west of the site.

2.3 SOILS LANDSCAPE

Reference to the Soil Landscapes of Sydney 1:100,00 Sheet 9030 Map and report indicates the soil landscape of the site locality is on the boundary of the ‘Blacktown Residual Soil’ and ‘Gymea Erosional Soil’ units.

The Blacktown soils are generally brown-black clay and loam residual soils derived from the underlying Ashfield Shale. They typically range from slightly acid (pH 6.5) to strongly acid (pH 4.0), increasing acidity with depth. Blacktown residual soils are typically moderately reactive and moderately to highly plastic. The potential erosion hazard varies from low to high, often dependant on topography.

Gymea soils are generally yellow-brown clayey sand and sandy clay loams. Derived from the erosion of the Hawkesbury Sandstone, Gymea soil landscapes display undulating to rolling rises and low hills, with localised rock outcropping and benches. The soils typically range from slightly acid (pH 6.5) to strongly acid (4.5 pH), are low to moderately reactive, with high to extreme potential erosion hazard.

2.4 GROUNDWATER

Reference to the NSW Water All Groundwater Map (2021) indicates there are no registered groundwater bores within 500 m of site.

2.5 ACID SULPHATE SOILS

Reference to NSW Department of Planning, Industry and Environment eSPADE resource indicates the site has “no known occurrences of acid sulfate soils”. This is consistent with the site geology and therefore no impact is expected by the proposed development. Hence, an Acid Sulfate Soils Management Plan is not required.

2.6 PREVIOUS INVESTIGATIONS

Coffey previously completed five boreholes at the site in 2019 (Ref: SYDGE232786AD). The borehole locations are shown on the Site Plan in Appendix B. These boreholes encountered a thin layer of Fill, typically less than 300 mm, underlain by low to medium residual clay 0.75 to 1.8 m thick. The residual soil was underlain by very low to medium strength Ashfield Shale. Groundwater was not encountered in any borehole location.

Coffey has been provided a detailed survey plan of the site as part of the current scope of works. Using this plan and referencing the 2019 boreholes, Table 1 has been produced to approximate the top elevation of Class V Shale. The previous investigation logs are provided in Appendix C.

Table 1 Approximate Rock Levels from 2019 Coffey Investigation

Borehole	Approximate Surface RL(m AHD)	Approximate Top of Class V Shale (m AHD)[1]
BH01	85.0	83
BH02	86.5	84.1
BH03	88.3	85.8
BH04	86.6	84.1
BH05	86.8	84.3

1. Classification based on Pells et al. (2019) Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review.

The Site Plan in Appendix B also shows the locations of other nearby Coffey projects. Coffey conducted a geotechnical investigation at 225-235 Pacific Highway in 2014 (Ref: GEOTLCOV25162AA). This investigation observed Fill, typically 0.5 to 2.0 m thick, overlying residual clay typically to a depth of 2.4 to 3.0 m below ground level (m BGL). Boreholes encountered sandstone at an upper elevation of approximately 78.5 m AHD with minor siltstone interbeds, very low strength grading to high strength with depth.

Groundwater was not encountered at 225-235 Pacific Highway investigations during borehole drilling. Two groundwater monitoring wells were installed, with subsequent recording of groundwater levels between 68.5 to 73.2 m AHD.

3. PRELIMINARY DISCUSSIONS AND RECOMMENDATIONS FOR PROPOSED DEVELOPMENT

3.1 GEOTECHNICAL GROUND MODEL

Based on the outcomes of this desktop study, the preliminary geotechnical model for the development site is presented in Table 2.

Table 2 Preliminary Geotechnical Model

Unit	Origin	Description	Approximate Top of Unit (m AHD)	Range of Unit Thickness (m)	Rock Classification[1]
1	Fill	Concrete, asphalt, and sandy gravel	Surface	0.05 – 0.25	N/A
2	Residual Soil	CLAY, low to medium plasticity, trace fine to coarse gravel, stiff to very stiff	84.7 – 87.8	0.75 – 2.0	N/A
3A	Shale	Grey-brown, highly to moderately weathered, very low to low strength	83.0 – 85.8	1.9 – >3.3	Class V/IV
3B		Pale brown and grey, slightly weathered to fresh, medium strength	81.0 – 82.5	-	Class III
4	Sandstone	Pale grey with red bands, fine to medium grained, highly weathered to moderately weathered, very low to low strength	Unproven for this site, potentially near 78.5	--	Unproven though potentially Class V/IV based on nearby site

1. Classification based on Pells et al. (2019) Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review.

3.2 SITE CLASSIFICATION

Where there is less than 0.4 m depth of fill, the site is expected to be classed as Class M – moderately reactive with respect to AS 2870 – 2011 Residential Slabs and Footings site classification.

3.3 FOUNDATIONS

For the design of the proposed new structures it is expected that shallow pad or pile footings on weathered shale bedrock would be practicable.

3.3.1 Shallow Foundations

Considering the proposed development and ground conditions, Coffey consider shallow footings on class V shale may be feasible for the main building structure but expect that a deeper bored pile solution would be more suitable. Where ancillary structures be required, they should be founded on competent natural material and may be designed using a maximum allowable bearing pressure of 200 kPa for stiff to very stiff Residual Soil. To reduce the risk of excessive differential settlement, we recommended that all footing should be founded on similar material.

3.3.2 Deep Foundations

Bored pile footings are considered suitable the proposed development at this site. For preliminary assessment of piles, the parameters in Table 4 could be adopted.

Table 3 Preliminary Pile Foundation Design Parameters

Geotechnical Unit (1)	Ultimate End Bearing (MPa) (2)	Serviceability (allowable) End Bearing (MPa)	Ultimate Shaft Adhesion (kPa)	Elastic Modulus (MPa) (3)
Class V Shale	2	0.7	50	50
Class IV Shale	3	1	150	250
Class III Shale	6 (4)	3 (4)	500	700

Notes:

1. Rock classified using Pells et al. (2019) Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review.
2. Assumes a minimum embedment depth of at least 0.5 m into the relevant bearing stratum.
3. For limit state design, serviceability should be assessed using the Young's modulus value to check that settlements are within tolerable limits.
4. There is a risk that Class III Shale could be underlain by lower strength sandstone at about 78.5 m AHD. This could affect pile performance (depending on pile depth and diameter). Further investigation may be required.

If a design of bored piles is adopted, particular attention needs to be given to ensuring the socket is cleaned and roughened using a suitable scraper such as a tooth, oriented perpendicular to the auger shaft prior to pouring of concrete.

For limit state design a geotechnical reduction factor (φg) is to be applied to the ultimate geotechnical pile capacity assessed using the ultimate shaft resistance and end bearing values to derive the design ultimate geotechnical pile capacity. In accordance with AS2159-2009, φg is dependent on assignment of an Average Risk Rating (ARR) which takes into account various geotechnical uncertainties, redundancy of the foundation system, construction supervision, and the quantity and type of pile testing. The assessment of φg therefore depends on the structural design of the foundation system as well as the design and construction method, and testing (if any) to be employed by the designer and piling contractor. Where no pile load testing is undertaken, a φg value of 0.6 should be adopted.

For all footing design, where a Serviceability End Bearing Pressure of greater than 1,000kPa is adopted, the rock quality across the building footprint must be assessed by a cored borehole investigation.

All footings should be inspected by a geotechnical engineer to confirm that a suitable founding stratum has been reached.

3.4 EXCAVATIONS

While no basement levels are proposed, some excavations into sloping ground at the proposed new building site may be required for the construction of a sub-floors.

3.4.1 Bench / Batter Slopes

Batter slopes or bench excavations may be possible where excavations are set back sufficiently from adjacent structures and the site boundary. The batter slopes or benches should be scaled following excavation to remove loose materials which could slide or topple from the face during construction and pose a risk to construction personnel. A summary of the recommended maximum batter slopes for the natural geotechnical units is presented in Table 4. Flatter batter slopes and/or erosion controls and surface drainage may be required depending on local conditions.

Table 4 Recommended Batter Slopes

Unit	Short-term Batter Slope (up to 2-month)	Long-term Batter Slope
Unit 2 – CLAY	1H:1V	2H:1V
Unit 3A – Shale	1H:1V	2H:1V
Unit 3B - Shale	0.5H:1V	1.5H:1V

3.4.2 Excavation Support

Where insufficient space is available for unsupported, open excavations, excavation support such as shoring or other temporary retaining structures can be employed in excavations in soils or highly weathered rock. However, given the expected site conditions, excavations up to 3m deep are not expected to encounter Unit 3B or better bedrock.

Table 5 presents recommended design parameters for the design of the temporary retaining structures where there is a level retained ground surface. The recommended K_0 values assume that some wall movement and relaxation of horizontal stress will occur due to excavation. Retaining wall analyses will need to consider surcharges, footing loads from adjacent structures and roads and hydrostatic pressure.

Table 5 Earth Pressure Coefficients for Retaining Wall Design

Unit	Bulk Density γ (kN/m3)	Effective Cohesion c' (kPa)	Effective Friction Angle φ' (degrees)	Coefficient of Active Earth pressure, K_a	Coefficient of Earth pressure at rest, Ko	Coefficient of Passive Earth pressure, K_p	Elastic Modulus (MPa) E_h
2	17	0	25	0.4	0.5	2.5	2
3A	20	5	25	0.4	0.5	2.5	7.5
3B	22	10	25	0.4	0.5	2.5	100

3.5 GROUNDWATER IMPACTS

Based on our understanding of the site development and given an approximate reduced level for groundwater of 68.5 to 73.2 m AHD, Coffey do not expect the proposed development would encounter or adversely impact the groundwater environment or groundwater quality.

3.6 SOIL SALINITY

There is no information at present to suggest that soil salinity would pose a significant risk to the development or surrounds. Accordingly, a Salinity Management Plan is not required.

4. RECOMMENDATIONS FOR FURTHER INVESTIGATION

Though existing borehole locations are not within the development footprint, the site conditions appear horizontally consistent. Depending on the final design details beyond the SSDA, there may not be a need for significant further investigation. However, this should be assessed when the final design is more advanced and footing/column loads are known.

We expect that it would also be prudent to drill some boreholes within the building footprint to ground truth pile locations and confirm expected bedrock conditions. This would also allow for more accurate pile-cage construction and increased confidence in the anticipated ground conditions.

We also recommend additional chemical testing of soils for aggressivity to concrete and steel structures to inform the concrete selection for piles.

We note that additional geotechnical investigations addressing these recommendations are currently planned by DoE to be carried out in the near future.

5. PROJECT FEASIBILITY

Based on our site observations, the preliminary geotechnical model, and experience on similar projects, the proposed development is considered feasible from a geotechnical perspective. In our opinion, the proposed development would present a low risk to surrounding structures and the groundwater environment, provided that appropriate site-specific investigation, design assessments, and construction monitoring normally associated with this type of development are carried out.

6. CLOSURE

The preliminary geotechnical assessment and recommendations of this report are based on a desk study limited to regional information and existing subsurface investigation data that is not located within the development footprint.

Subsurface conditions can be complex and vary over relatively short distances – and over time. Site specific investigations will be required to support detailed design. Detailed design and construction should not proceed based on this desk study report without further advice from us.

The attached document entitled “Important information about your Coffey report” forms an integral part of this report and presents additional information about it uses and limitations.

APPENDIX A: SSDA DESIGN

NORTH SYDNEY PUBLIC SCHOOL

FOR NSW DEPARTMENT OF EDUCATION

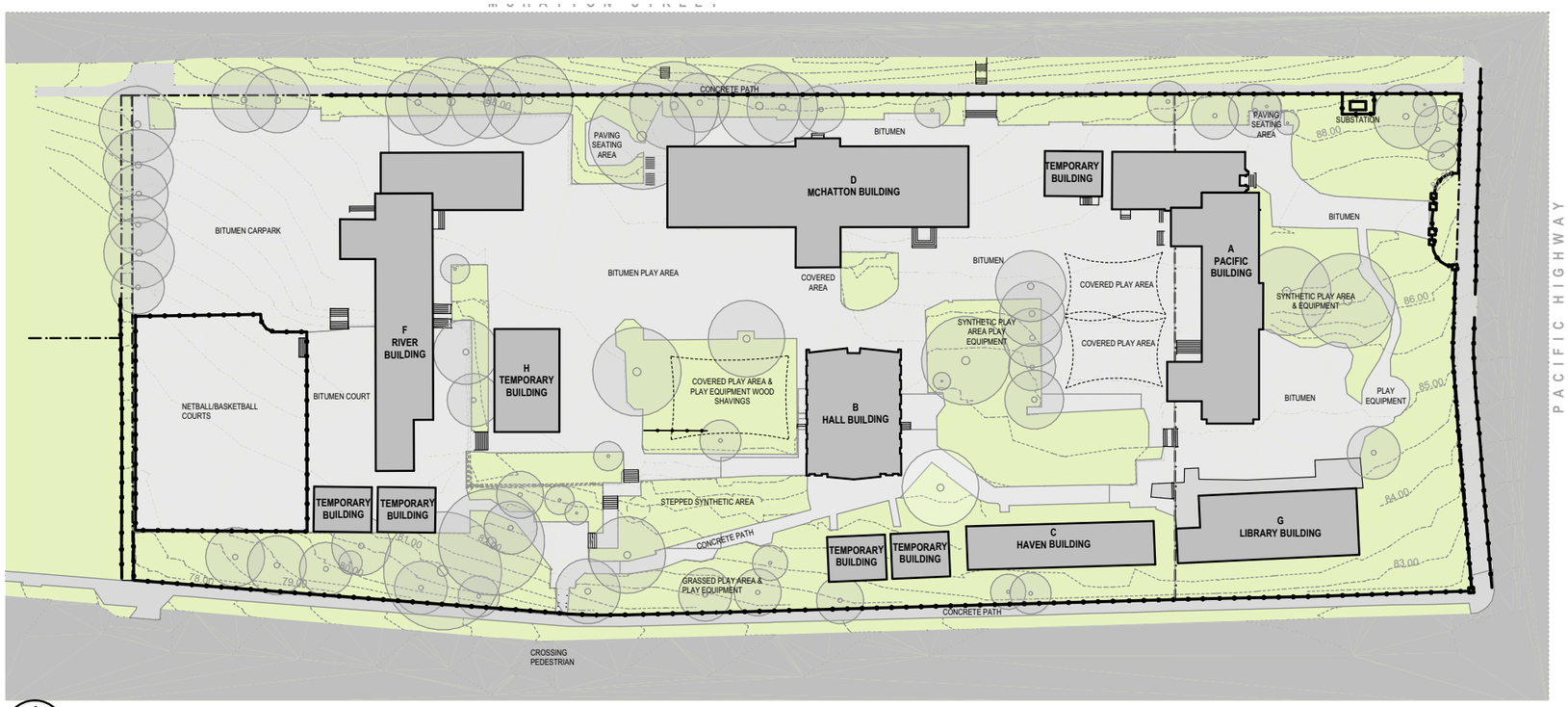
7068WA01

CD-000	Title Page	B
CD-001	Site Analysis 01	B
CD-002	Site Analysis 02	B
CD-003	Site Analysis 03	B
CD-004	Site Analysis 04	B
CD-005	Site Analysis 05	B
CD-006	Site Analysis 06	B
CD-101	Existing Site Plan	B
CD-102	Demolition Plan	C
CD-103	Proposed Site Plan - Level 1 / Street Level	B
CD-104	Proposed Site Plan - Level 2 / Courtyard Level	B
CD-105	Proposed Site Plan - Level 3	B
CD-106	Perspectives	C
CD-201	Level 1 / Street Level - Hall	C
CD-202	Level 1 / Street Level - Admin_Home Bases	C
CD-203	Level 2 / Courtyard Level - Hall	C
CD-204	Level 3 - Hall_Plant	C
CD-205	Level 3 - Home bases	C
CD-206	Proposed Plans - Building F	B
CD-207	Proposed Plans - Building F	B
CD-208	Proposed Plans - Building D	B
CD-209	Proposed Plans - Buildings A & G	B
CD-210	Roof Plan - Home Bases	B
CD-211	Roof Plan - Hall	B
CD-301	Elevations	B
CD-302	Elevations	B
CD-303	Elevations	B
CD-304	Elevations	B
CD-901	Level 1 - Administration FF+E Plan	B
CD-902	Home Base Cluster - FF+E Plan	B
CD-903	Library - FF+E Plan	C

fulton trotter
ARCHITECTS

plot date: Tuesday, 27 July 2021, 8:50 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**
EXISTING SITE PLAN
SCALE: 1:1000

fulton trotter
ARCHITECTS

0 5 10 20 30 Scale 1:1000 @ A3 50m

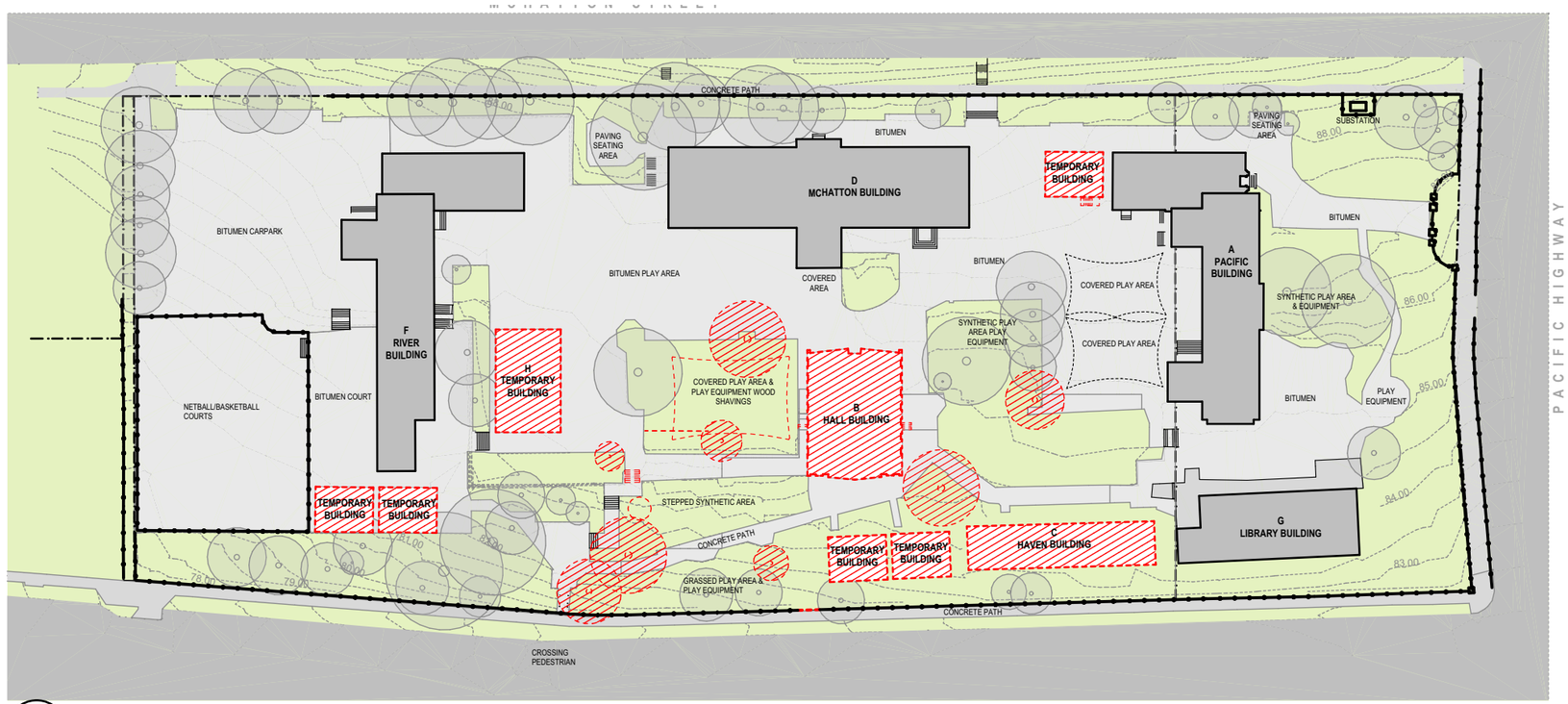
EXISTING SITE PLAN

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-101 Rev: B

plot date: Tuesday, 27 July 2021, 8:50 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**
DEMOLITION SITE PLAN
SCALE: 1:1000

SITE PLAN LEGEND

- EXISTING
- DEMOLISHED
- TREE TO BE REMOVED

fulton trotter
ARCHITECTS

0 5 10 20 30 Scale 1:1000 @ A3 50m

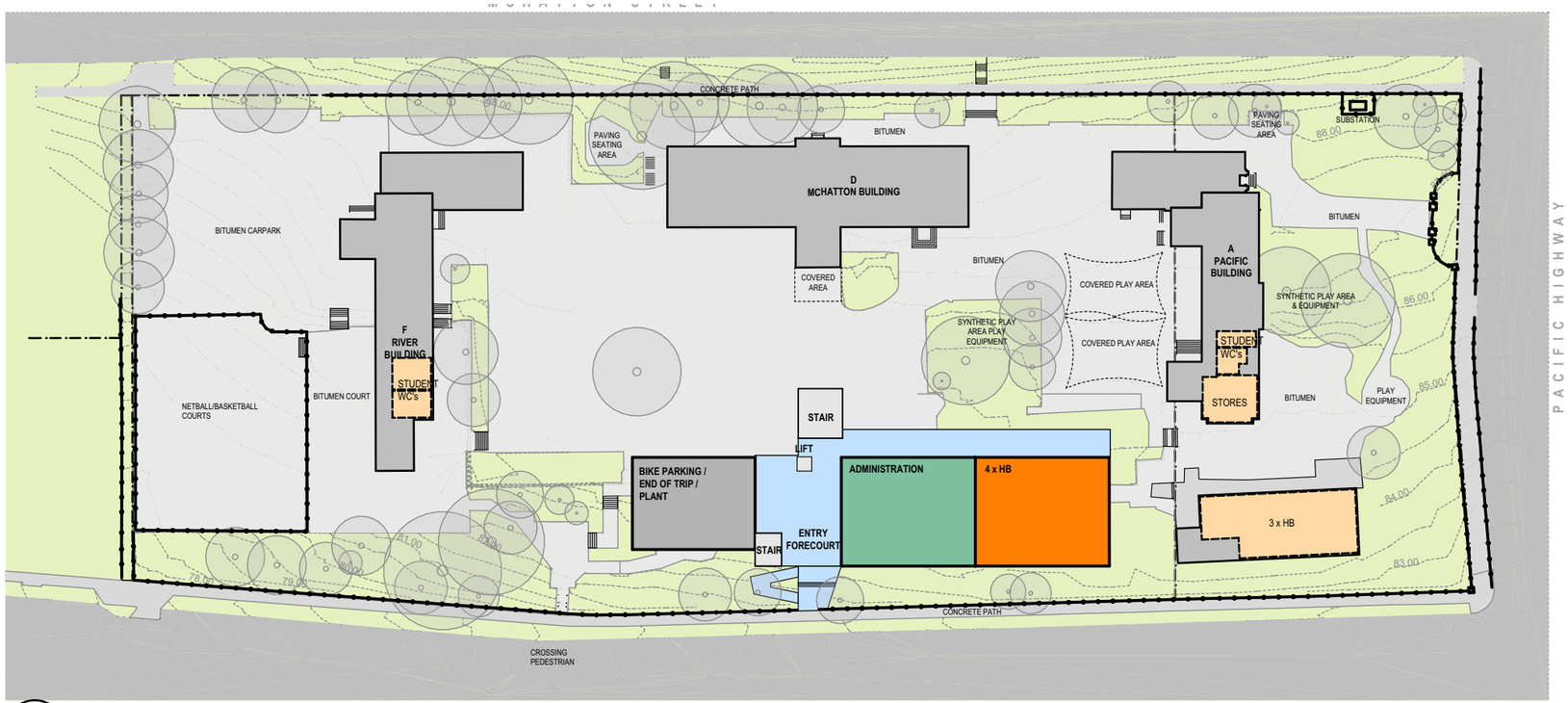
DEMOLITION PLAN

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-102 Rev: C

plot date: Tuesday, 27 July 2021, 8:50 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**

PROPOSED SITE PLAN - LEVEL 1/STREET LEVEL

SCALE: 1:1000

fulton trotter
ARCHITECTS

0 5 10 20 30 Scale 1:1000 @ A3 50m

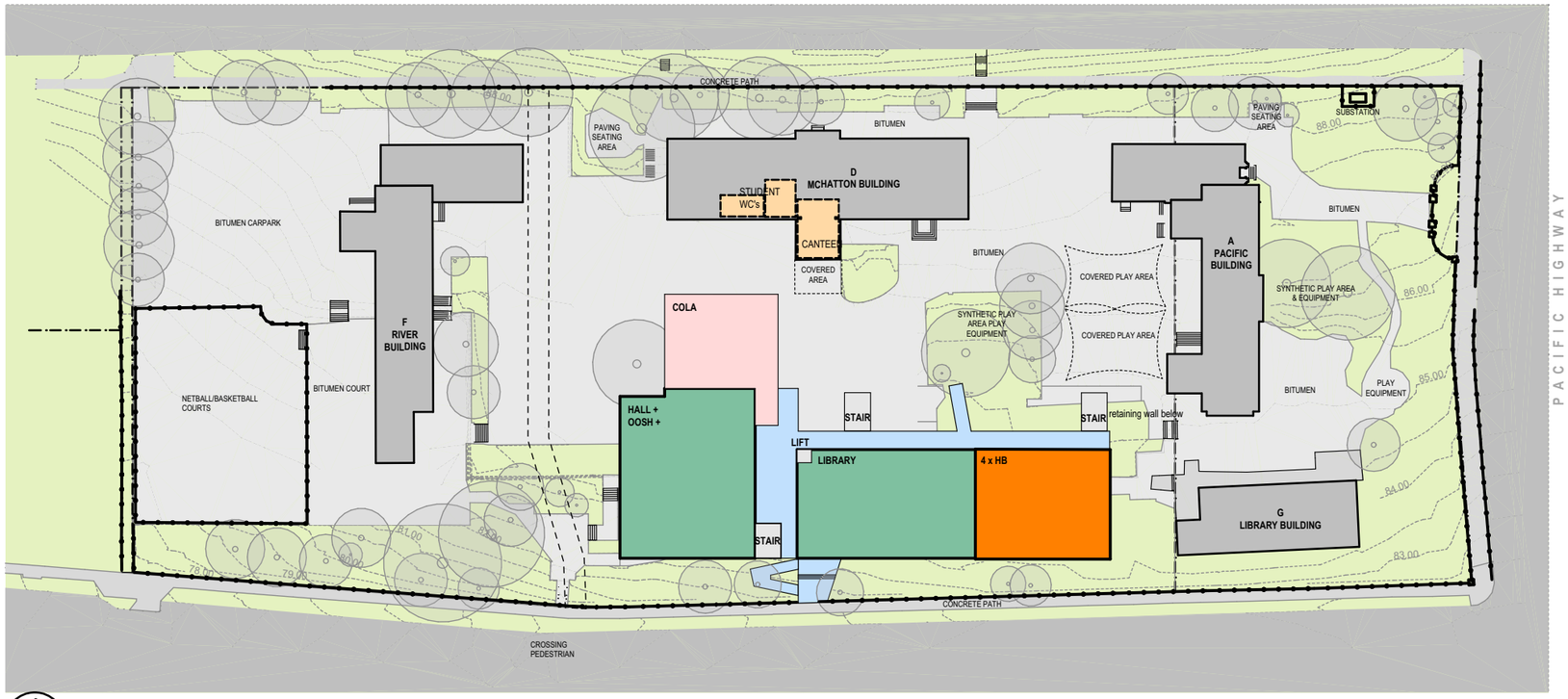
PROPOSED SITE PLAN - LEVEL 1 / STREET LEVEL

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-103 Rev: B

plot date: Tuesday, 27 July 2021, 8:50 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**

PROPOSED SITE PLAN - LEVEL 2/COURTYARD LEVEL

SCALE: 1:1000

fulton trotter
ARCHITECTS

0 5 10 20 30 Scale 1:1000 @ A3 50m

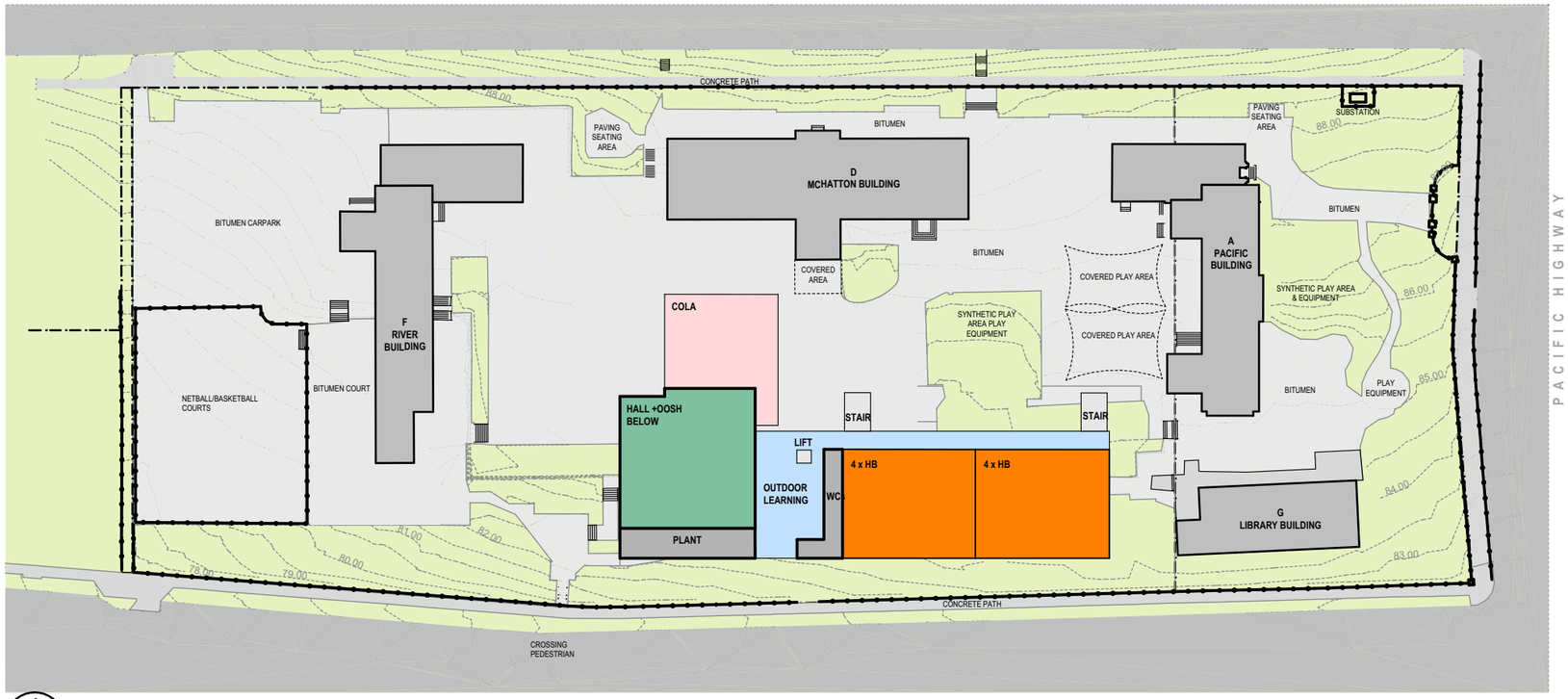
PROPOSED SITE PLAN - LEVEL 2 / COURTYARD LEVEL

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-104 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**
PROPOSED SITE PLAN - LEVEL 3
SCALE: 1:1000

fulton trotter
ARCHITECTS

0 5 10 20 30 Scale 1:1000 @ A3 50m

PROPOSED SITE PLAN - LEVEL 3

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-105 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade

OVERVIEW

EDWARD STREET

BAY ROAD

PACIFIC HIGHWAY

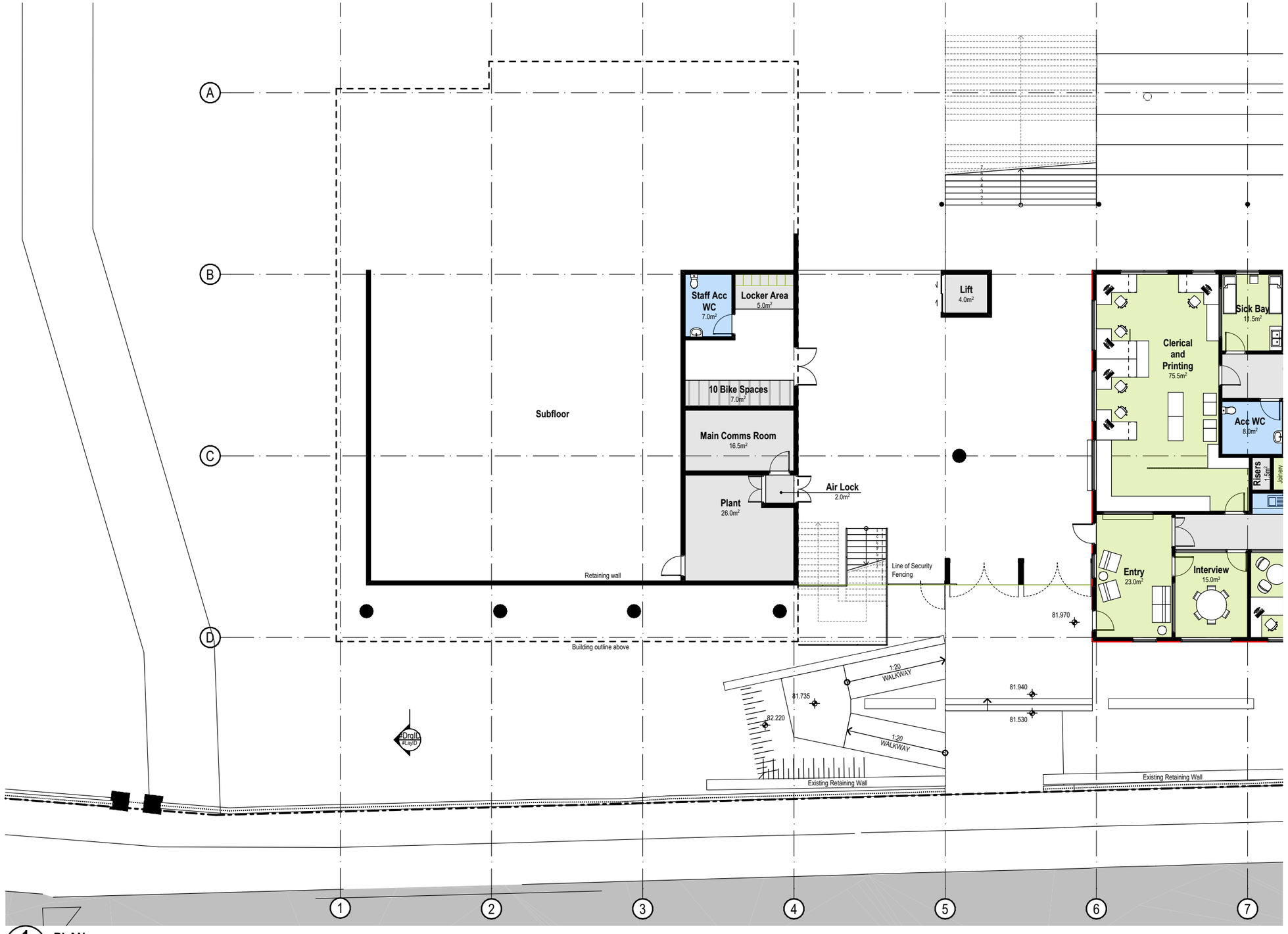
fulton trotter
ARCHITECTS

PERSPECTIVES

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-106 Rev: C

plot date: Tuesday, 27 July 2021, 5:12 PM file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 PLAN
LEVEL 1 - BIKE PARKING / END OF TRIP / PLANT
SCALE: 1:200

fulton trotter
ARCHITECTS

0 1 2 4 6 Scale 1:200 @ A3 10m

LEVEL 1 / STREET LEVEL - HALL

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-201 Rev: C

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade

1 PLAN

LEVEL 1 - ADMINISTRATION + HOME BASE

SCALE: 1:200

fulton trotter ARCHITECTS

0 2.5 5 10 15 Scale 1:500 @ A3 25m

LEVEL 1 / STREET LEVEL - ADMIN_HOME BASES

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-202 Rev: C

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade

1 **PLAN**
LEVEL 2 - HALL
SCALE: 1:200

fulton trotter
ARCHITECTS

0 2.5 5 10 15 Scale 1:500 @ A3 25m

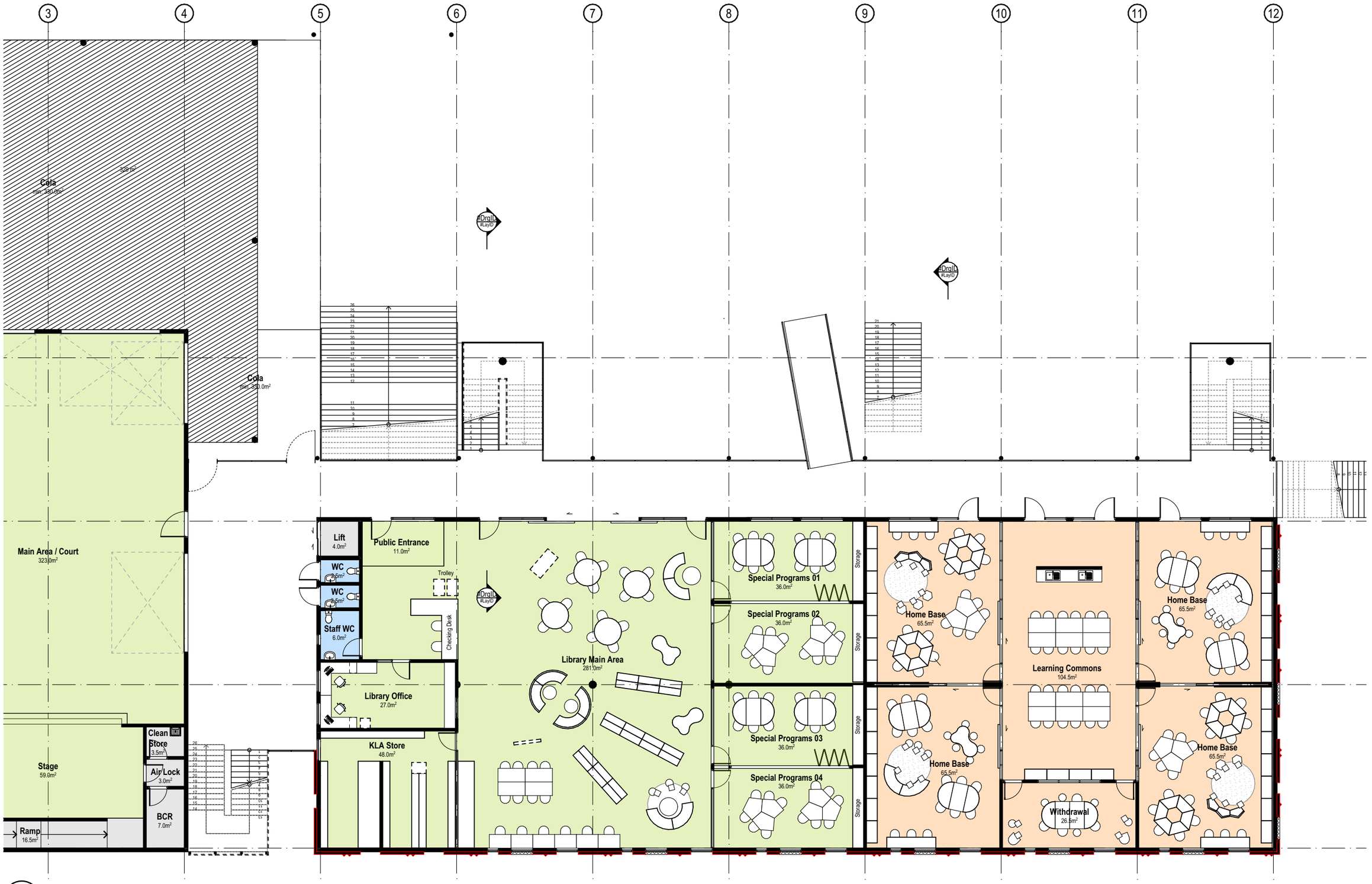
LEVEL 2 / COURTYARD LEVEL - HALL

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-203 Rev: C

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **PLAN**
LEVEL 2 - LIBRARY
SCALE: 1:200

fulton trotter
ARCHITECTS

0 2.5 5 10 15 Scale 1:500 @ A3 25m

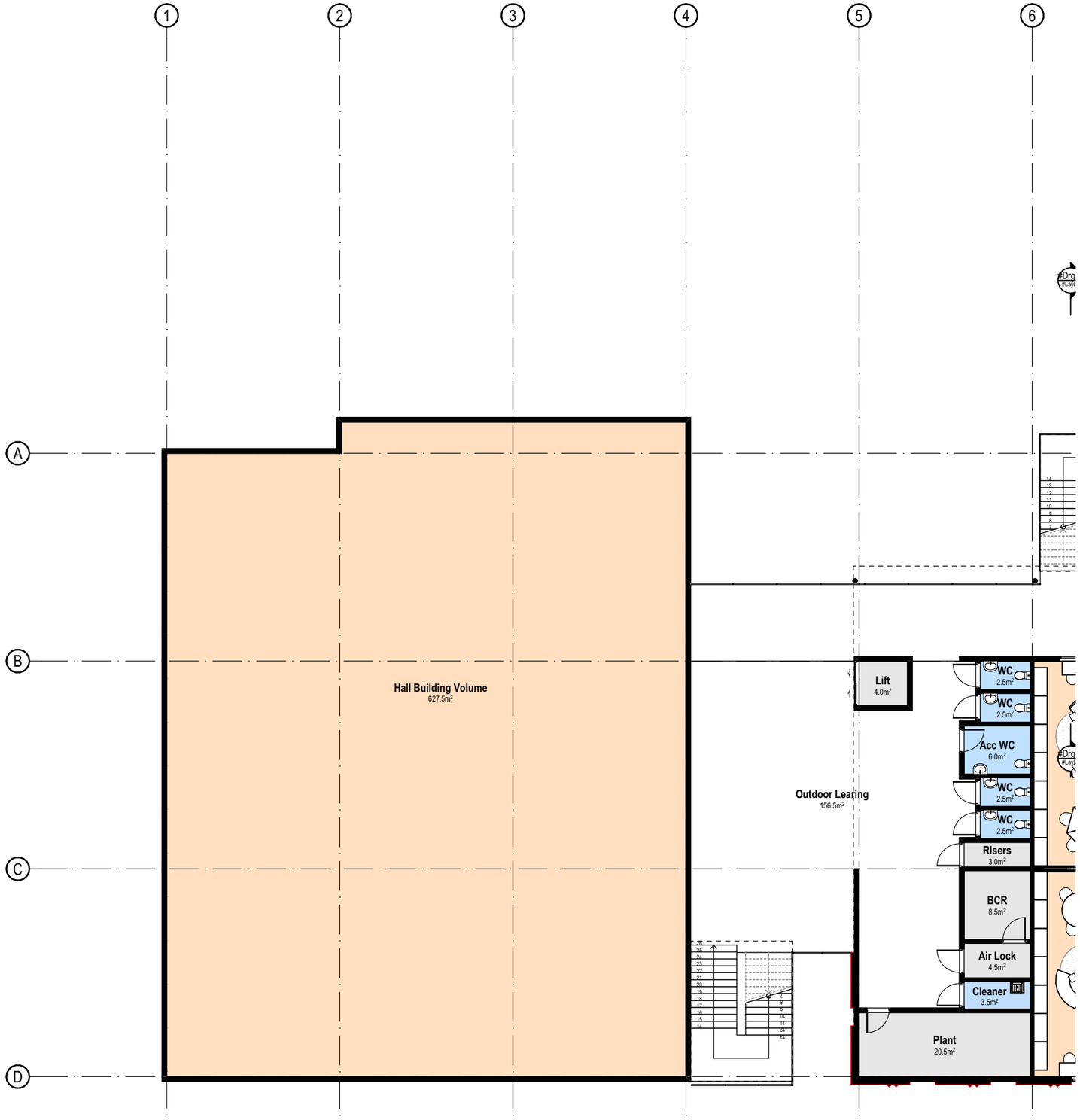
LEVEL 2 / COURTYARD LEVEL - LIBRARY

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-204 Rev: A

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 PLAN
LEVEL 3 - HALL + PLANT
SCALE: 1:200

fulton trotter
ARCHITECTS

0 2.5 5 10 15 Scale 1:500 @ A3 25m

LEVEL 3 - HALL_PLANT

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)
7068WA01 - CD-205 Rev: C

plot date: Tuesday, 27 July 2021, 8:51 AM
file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade

1 PLAN
LEVEL 3 - HOME BASE
SCALE: 1:200

fulton trotter
ARCHITECTS

0 2.5 5 10 15 Scale 1:500 @ A3 25m

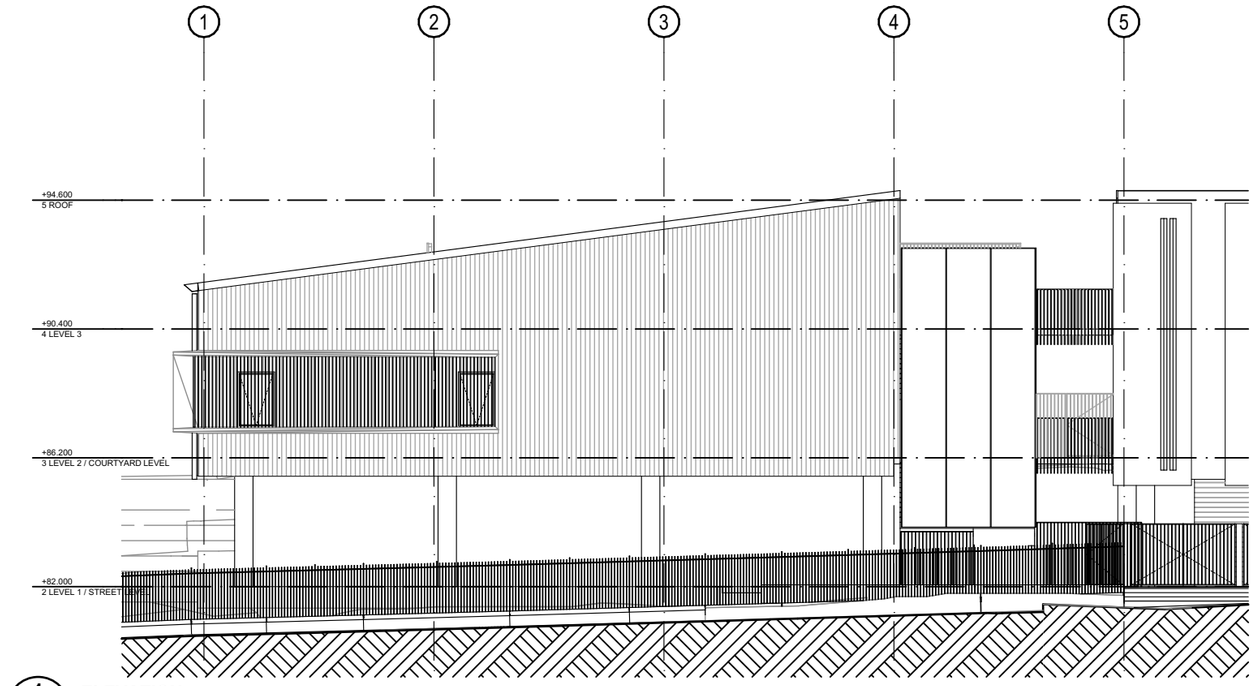
LEVEL 3 - HOME BASES

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

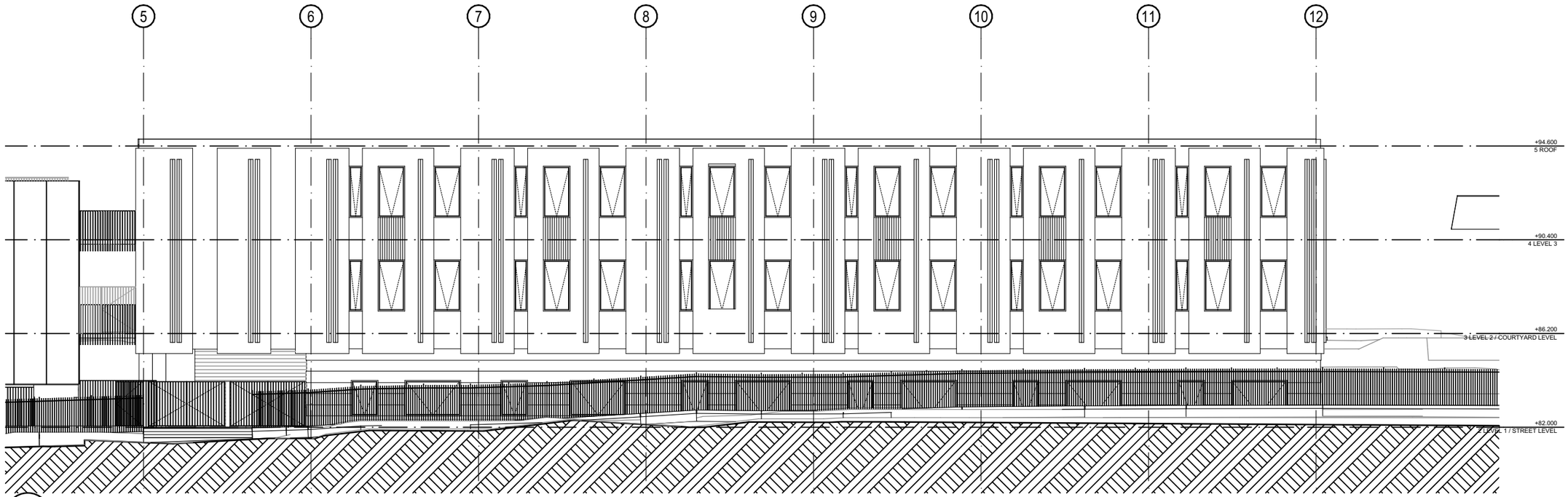
7068WA01 - CD-206 Rev: C

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 ELEVATION
SOUTH ELEVATION
SCALE: 1:200



2 ELEVATION
SOUTH ELEVATION
SCALE: 1:200

fulton trotter
ARCHITECTS

0 1 2 4 6 Scale 1:200 @ A3 10m

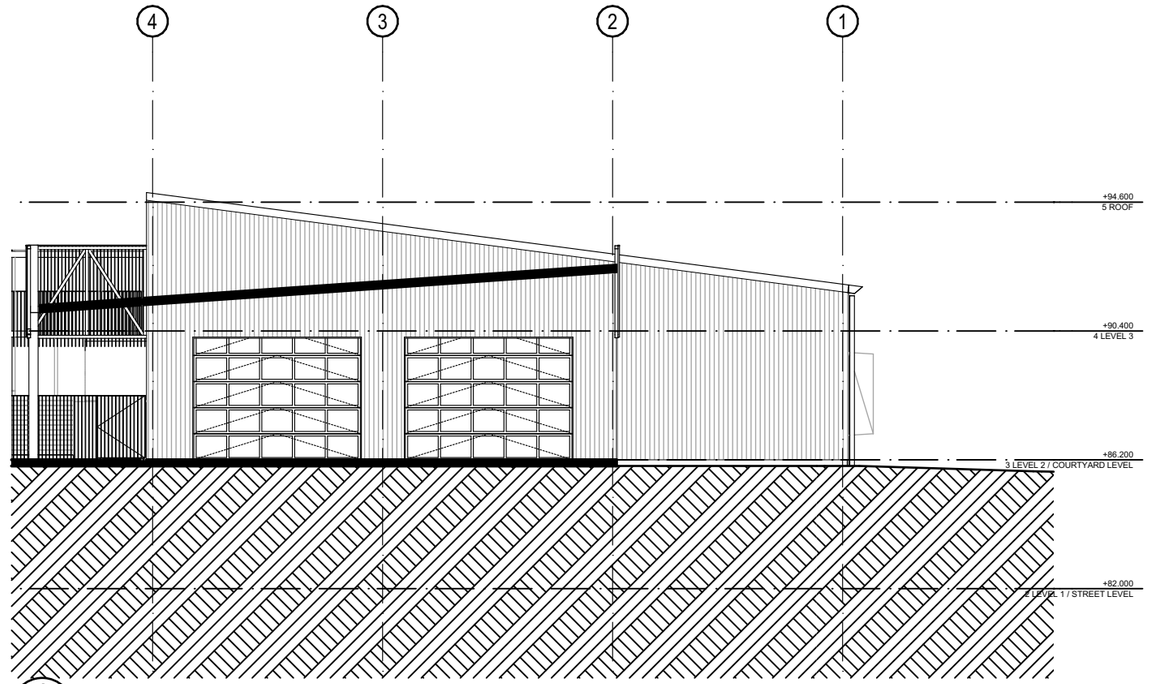
ELEVATIONS

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

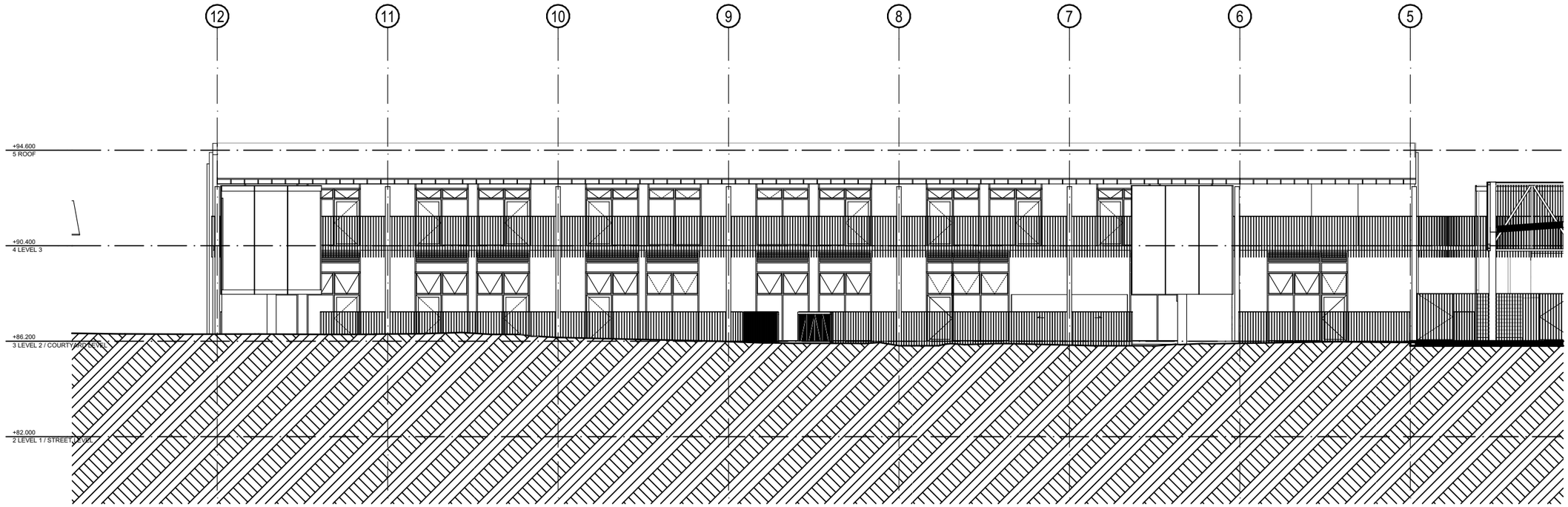
7068WA01 - CD-301 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **ELEVATION**
NORTH ELEVATION
SCALE: 1:200



2 **ELEVATION**
NORTH ELEVATION
SCALE: 1:200

fulton trotter
ARCHITECTS

0 1 2 4 6 Scale 1:200 @ A3 10m

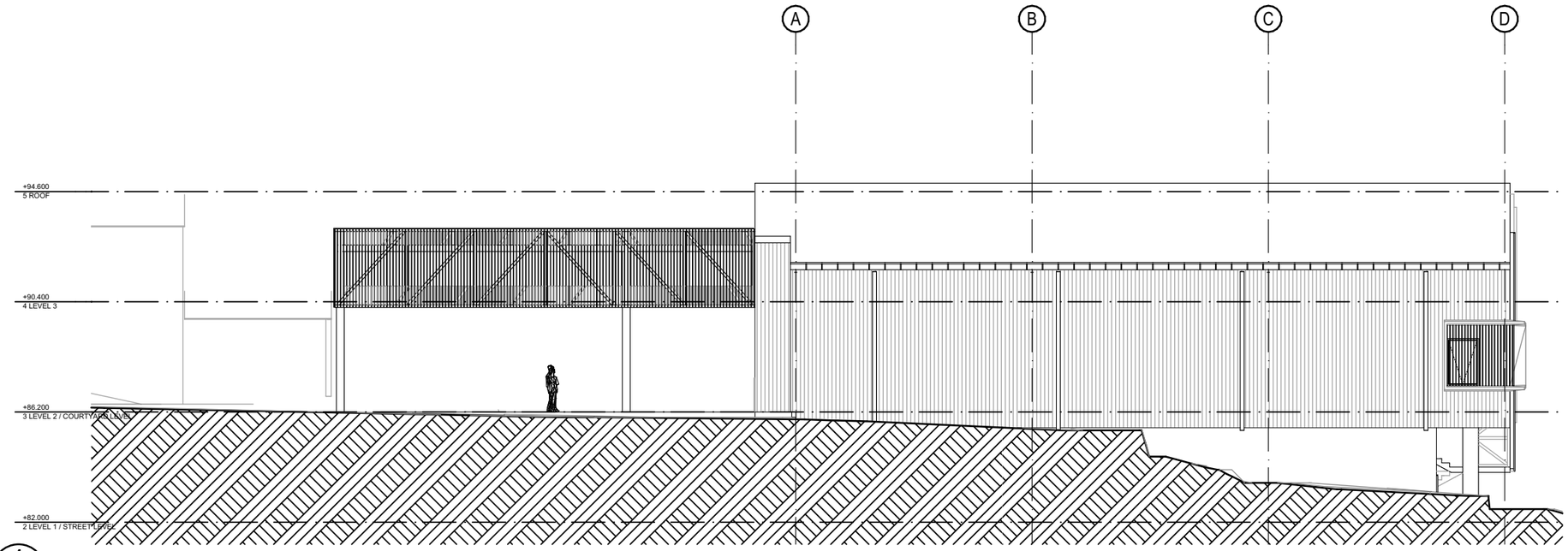
ELEVATIONS

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

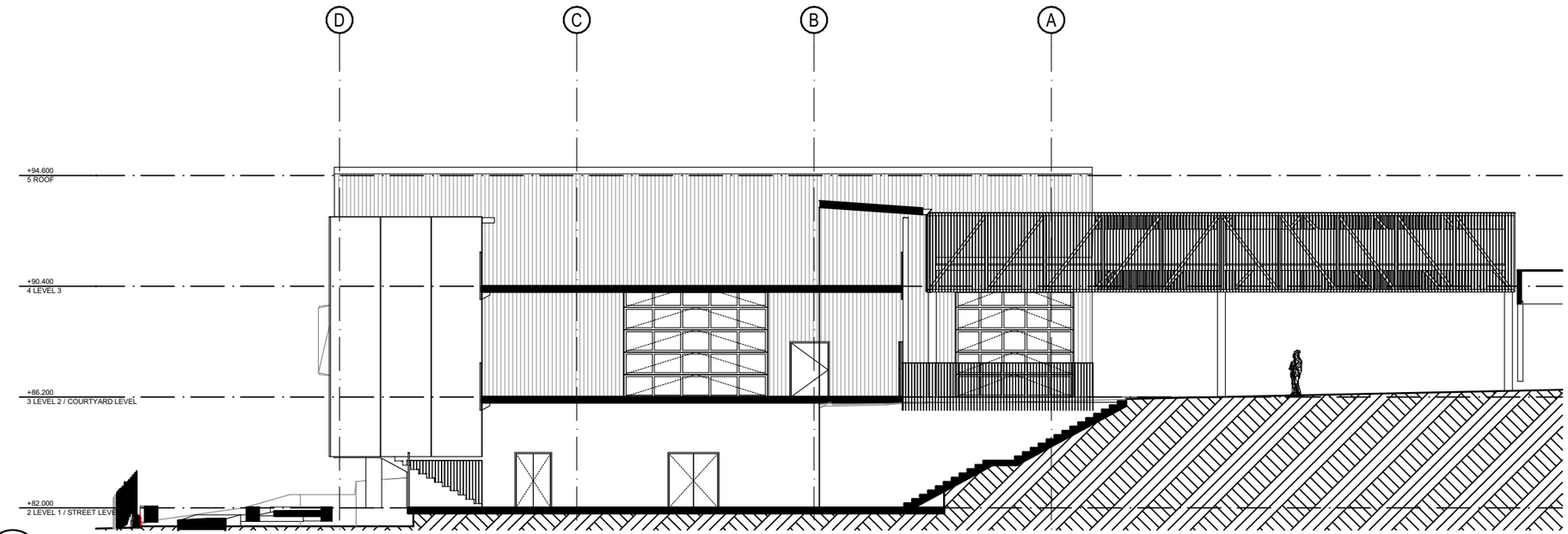
7068WA01 - CD-302 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **SECTION**
WEST ELEVATION
SCALE: 1:200



2 **ELEVATION**
EAST ELEVATION - HALL
SCALE: 1:200

fulton trotter
ARCHITECTS

0 1 2 4 6 Scale 1:200 @ A3 10m

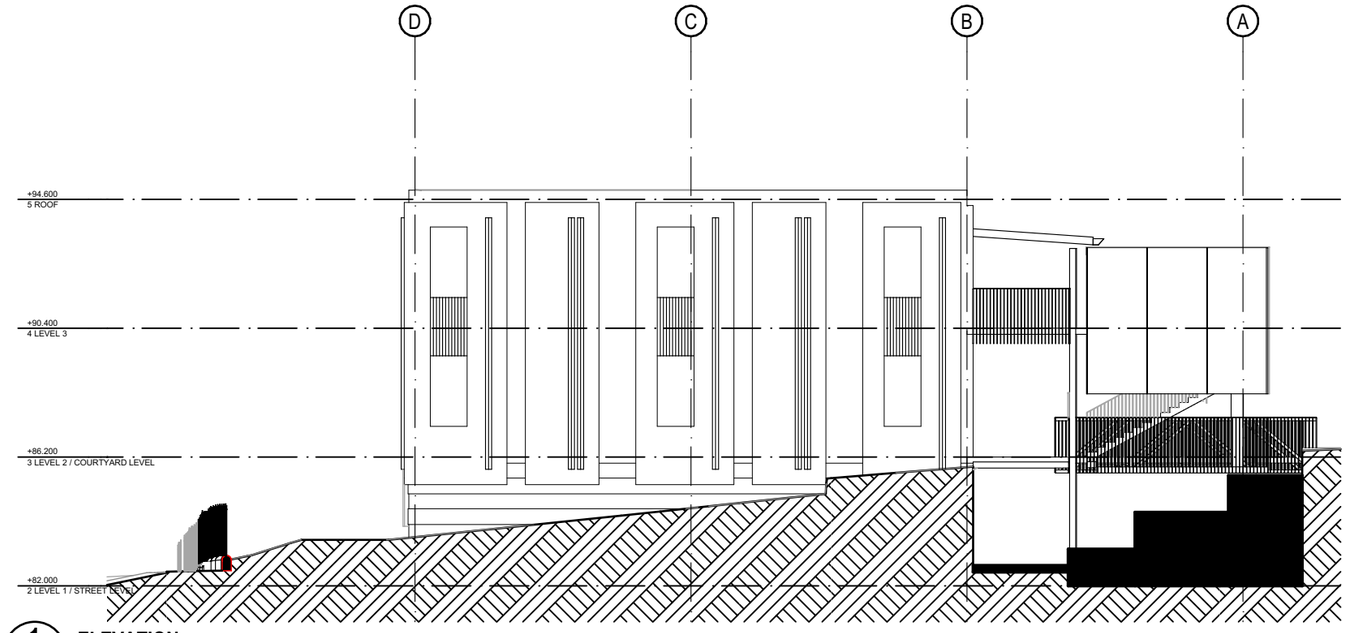
ELEVATIONS

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-303 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade



1 **ELEVATION**
EAST ELEVATION
SCALE: 1:200

fulton trotter
ARCHITECTS

0 1 2 4 6 Scale 1:200 @ A3 10m

ELEVATIONS

NORTH SYDNEY PUBLIC SCHOOL FOR NSW DEPT OF EDUCATION (SCHOOLS INFRASTRUCTURE)

7068WA01 - CD-304 Rev: B

plot date: Tuesday, 27 July 2021, 8:51 AM

file location: BIMcloud: SYDBIM23 - BIMcloud Basic for ARCHICAD 23/7068WA01 - North Sydney Public School Upgrade

APPENDIX B: SITE PLAN

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	AW	AM	30/07/2021

25 0 50 100

Scale (metres) 1:2500

AERIAL IMAGERY COPYRIGHT: ©Land and Property Information (7/04/2018)
SOURCED FROM WEBSITE: http://www.lpi.nsw.gov.au/mapping_and_imagery/lpi_web_services
LICENSED UNDER CC BY 3.0 AU (https://creativecommons.org/licenses/by/3.0/au/legalcode)

drawn	AM / AW
approved	AM
date	28/07/2021
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SCHOOL INFRASTRUCTURE NSW

project: NORTH SYDNEY PUBLIC SCHOOL
DESKTOP STUDY
PACIFIC HIGHWAY, NORTH SYDNEY, NSW

title: SITE PLAN

project no: 754-SYDGE290593 | figure no: FIGURE 1 | rev: A

PLOT DATE: 28/07/2021 3:50:12 PM DWG FILE: \\TTS779FS1.TT-LOCAL\DATA\1. PROJECTS\4. SYD-GEOTECH\NICS\13. SYDGE290000\SYDGE290593\ NORTH SYD PS\12. CAD\754-SYDGE290593.DWG

APPENDIX C: PREVIOUS INVESTIGATION (2019) BOREHOLE LOGS

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH01**
sheet:	1 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**02 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**02 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T, CASING		Not Encountered	E E E SPT 5, 13, 10/70mm HB N=R		0.0			**CONCRETE**.				**CONCRETE**
							CI	**FILL: ROAD BASE**.	~Wp	S		**FILL**
								CLAY: medium plasticity, brown, dark brown, with fine to coarse grained sand, trace fine grained, sub-rounded gravel. 0.7 m: becoming medium to high plasticity, pale brown.		F		**RESIDUAL SOIL**
					1.0		CL-CH	**CLAY**: medium - high plasticity, pale brown, grey, trace fine to coarse grained sand.		St - VSt		
					2.0			**SHALE**: pale brown, pale grey, recovered as sandy clay, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH01 continued as cored hole				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:03

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	**BH01**
sheet:	2 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**02 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**02 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
			1.0								
			2.0		started coring at 2.50m						
NMLC	Not Encountered		3.0		**SHALE**: pale brown, pale grey, distinctly laminated at 0° - 10°, with iron staining.	HW - MW		a=0.11 d=0.06			CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN SZ, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN Defects are: PT, 0 - 20°, PL, SO, CN, unless otherwise described
			4.0		4.0 m: becoming dark grey, pale grey.	MW - SW		a=0.10 d=0.12			
			5.0					a=0.35 d=0.44			
			6.0		Borehole BH01 terminated at 5.89 m Target depth						
			7.0								

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:04

method & support
AS auger screwing
AD auger drilling
CB claw or blade bit
W washbore
RR rock roller
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS shear surface
SZ shear zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

BH01 2.50 - 5.89 m

drawn	
approved	
date	17-10-2019
scale	N.T.S.
original size	A4

coffey
A TETRA TECH COMPANY

client:	NSW Department of Education
project:	North Sydney Public School North Sydney
title:	**CORE PHOTOGRAPH** **BH01**
project no: SYDGE232786	fig no: **FIGURE 1** rev:

CDF_0_9_06_LIBRARY.GLB GrfcTbl COF PHOTO CORE PHOTO 1 PER PAGE SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 17-10-2019 13:24

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH02**
sheet:	1 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**02 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**02 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T, CASING		Not Encountered	E				CL-Cl	**ASPHALT**.				**ASPHALT**
								FILL: ROAD BASE.	<Wp	S		**FILL**
			D + E				Cl	**CLAY**: low - medium plasticity, brown, grey, with fine to coarse grained sand, trace fine to medium sub-angular to sub-rounded gravel.				**RESIDUAL SOIL**
			SPT 19, HB N=R		1.0			**CLAY**: medium plasticity, brown, pale brown, with fine to coarse grained sand, trace fine to medium sub-rounded gravel.		F		
							Cl	**CLAY**: medium plasticity, brown, pale brown, grey, trace fine to coarse grained sand.	~Wp			
					2.0					St - VSt		
			SPT 11, 18/110mm, HB N=R					**SHALE**: grey to dark grey, recovered as sandy clay, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH02 continued as cored hole				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:03

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	**BH02**
sheet:	2 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**02 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**02 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
			1.0								
			2.0		started coring at 2.80m						
NMLC	Not Encountered		3.0		**SHALE**: grey to dark grey, distinctly laminated at 0º - 10º, with some iron staining.	MW - SW		a=0.03 d=0.01			
			4.0			SW		a=0.34 d=0.07			CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN
			5.0			FR		a=0.59 d=1.02			JT, 45°, PL, SO, CN JT, 30 - 40°, PL, SO, CN JT, 20 - 25°, PL, SO, CN Defects are: PT, 0 - 20°, PL, SO, CN, unless otherwise described
			6.0		Borehole BH02 terminated at 5.65 m Target depth						
			7.0								

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:04

method & support
AS auger screwing
AD auger drilling
CB claw or blade bit
W washbore
RR rock roller
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

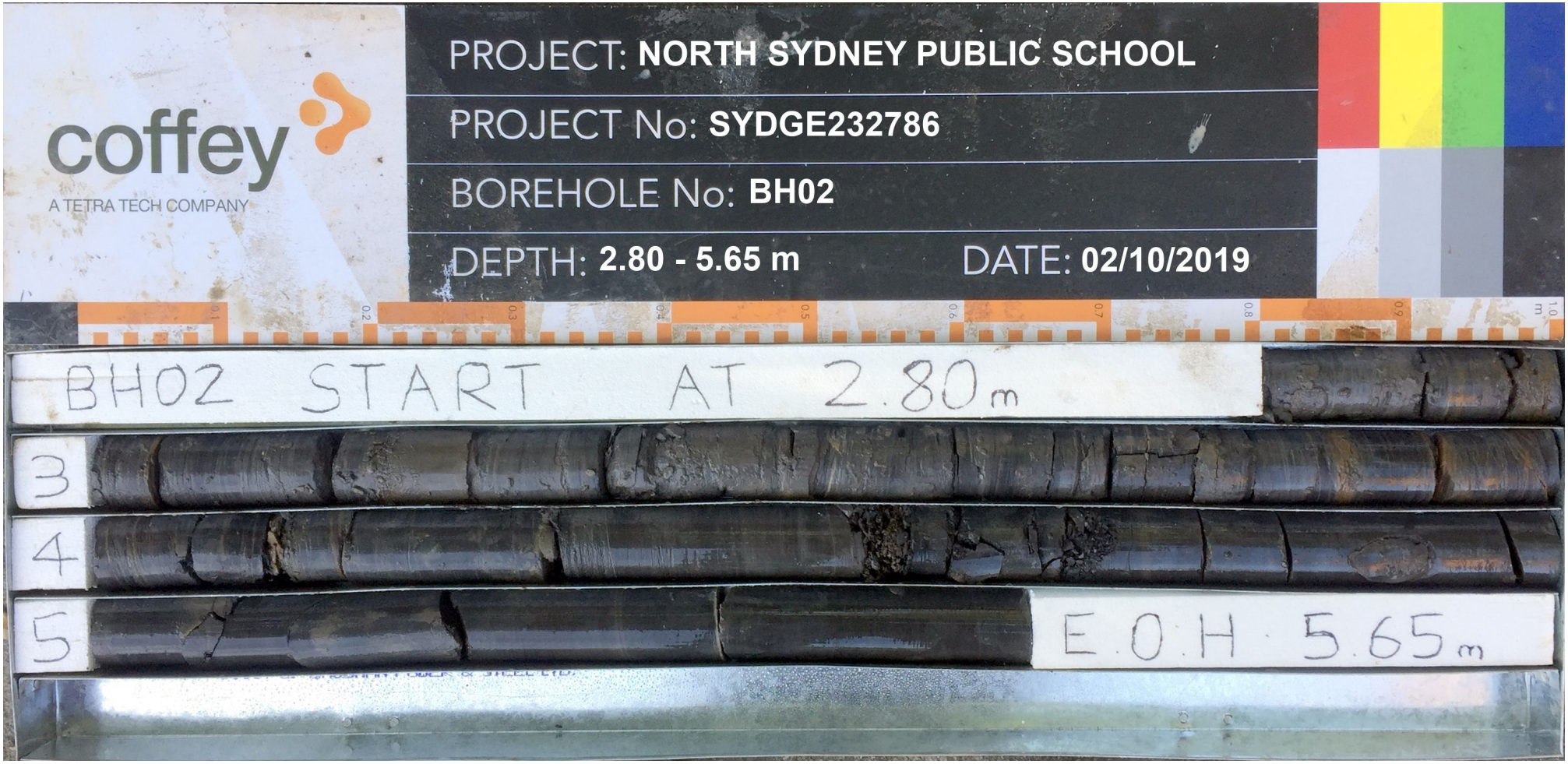
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS shear surface
SZ shear zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating



BH02 2.80 - 5.65 m

drawn	
approved	
date	17-10-2019
scale	N.T.S.
original size	A4

coffey
A TETRA TECH COMPANY

client:	NSW Department of Education
project:	North Sydney Public School North Sydney
title:	**CORE PHOTOGRAPH** **BH02**
project no: SYDGE232786	fig no: **FIGURE 1** rev:

CDF_0_9_06_LIBRARY.GLB GrfcTbl COF PHOTO CORE PHOTO 1 PER PAGE SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 17-10-2019 13:27

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH03**
sheet:	1 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**04 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**04 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T, CASING		Not Encountered	E				CL	**ASPHALT**.				**ASPHALT**
								FILL: ROAD BASE.	<Wl	S		**FILL**
			D + E				CL-Cl	**CLAY**: low plasticity, brown, with fine to coarse grained sand, trace fine to medium, sub-angular to sub-rounded gravel.	~Wl	S - F		**RESIDUAL SOIL**
			E		1.0		Cl	**Sandy CLAY**: low - medium plasticity, brown, red, grey, with fine to medium grained gravel; sand is fine to medium grained.		F		
			SPT 4, 5, 15 N=20					**CLAY**: medium plasticity, brown, grey, trace fine to coarse sand.		St		
					2.0							
			SPT 14, 5/120mm, HB N=R					**SHALE**: grey, dark grey, recovered as sandy clay, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
					3.0			Borehole BH03 continued as cored hole				
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:03

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	**BH03**
sheet:	2 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**04 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**04 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 X = axial; O = diametral VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
			1.0								
			2.0		started coring at 2.80m						
NMLC	Not Encountered		3.0		**SHALE**: grey, dark grey, indistinctly laminated at 0º - 10º.	MW - SW					SM, 0°, 50 mm, clay
			4.0			SW		a=0.03 d=0.01 a=0.01 d=0.01			CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN
			5.0					a=0.04 d=0.02			PT, 0 - 25°, IR, RO, CN CS, 0°, IR, RO, CN Defects are: PT, 0 - 20°, PL, SO, CN, unless otherwise described
			6.0		Borehole BH03 terminated at 5.78 m Target depth						
			7.0								

method & support
AS auger screwing
AD auger drilling
CB claw or blade bit
W washbore
RR rock roller
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS shear surface
SZ shear zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:04

BH03 2.80 - 5.78 m

drawn	
approved	
date	17-10-2019
scale	N.T.S.
original size	A4

coffey
A TETRA TECH COMPANY

client:	NSW Department of Education
project:	North Sydney Public School North Sydney
title:	**CORE PHOTOGRAPH** **BH03**
project no: SYDGE232786	fig no: **FIGURE 1** rev:

CDF_0_9_06_LIBRARY.GLB GrfcTbl COF PHOTO CORE PHOTO 1 PER PAGE SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 17-10-2019 13:30

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH04**
sheet:	1 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**03 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**03 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T, CASING		Not Encountered	E				CL	**ASPHALT**.	<Wp	S		**ASPHALT**
								FILL: ROAD BASE.				**FILL**
			D + E				CL-Cl	**CLAY**: low plasticity, brown, grey, with fine to coarse grained sand, trace fine to medium, sub-angular to sub-rounded gravel.		F		**RESIDUAL SOIL**
			E		1.0			**CLAY**: low - medium plasticity, brown, with fine to coarse grained sand, trace fine to medium sub-rounded gravel.				
			SPT 4, 4, 7 N=11				Cl	**CLAY**: medium plasticity, brown, grey, trace fine sand.		St		
					2.0				~Wp			
			SPT 6 HB N=R					**SHALE**: grey, pale grey, recovered as sandy clay, estimated very low to low strength.		St - VSt		**INFERRED WEATHERED BEDROCK**
								Borehole BH04 continued as cored hole				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:03

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

soil group symbol & soil description
based on AS 1726:2017

moisture condition
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	**BH04**
sheet:	2 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**03 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**03 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
			1.0								
			2.0		started coring at 2.80m						
NMLC	Not Encountered		3.0		**SHALE**: grey, pale grey, indistinctly laminated at 0º - 10º.	HW - MW					CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN
			4.0			SW		a=0.01 d=0.00 a=0.02 d=0.03			Defects are: PT, 0 - 20°, PL, SO, CN, unless otherwise described
			5.0		Borehole BH04 terminated at 4.92 m Target depth						
			6.0								
			7.0								

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:04

method & support
AS auger screwing
AD auger drilling
CB claw or blade bit
W washbore
RR rock roller
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS shear surface
SZ shear zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

BH04 2.80 - 4.92 m

drawn	
approved	
date	**17-10-2019**
scale	**N.T.S.**
original size	**A4**

coffey
A TETRA TECH COMPANY

client:	NSW Department of Education
project:	North Sydney Public School North Sydney
title:	**CORE PHOTOGRAPH** **BH04**
project no: SYDGE232786	fig no: **FIGURE 1** rev:

CDF_0_9_06_LIBRARY.GLB GrfcTbl COF PHOTO CORE PHOTO 1 PER PAGE SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 17-10-2019 13:32

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH05**
sheet:	1 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**03 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**03 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T, CASING		Not Encountered	E				CL	**ASPHALT**.				**ASPHALT**
								FILL: ROAD BASE.	<Wp	S		**FILL**
			D + E					**CLAY**: low plasticity, brown, with fine to coarse grained sand, trace fine to coarse, sub-angular to sub-rounded gravel.				**RESIDUAL SOIL**
			E		1.0		CI	**CLAY**: medium plasticity, brown, pale brown, with fine to coarse grained sand, trace fine grained, sub-rounded gravel.	~Wp	F		
			SPT 5, 7, 17 N=24				CI	**CLAY**: medium plasticity, pale brown, grey.				
					2.0					St - VSt		
			SPT 12, 14/200mm HB N=R					**SHALE**: grey, dark grey, recovered as sandy clay, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH05 continued as cored hole				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:03

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

soil group symbol & soil description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

coffey
A TETRA TECH COMPANY

Engineering Log - Cored Borehole

Borehole ID.	**BH05**
sheet:	2 of 2
project no.	**SYDGE232786**
client:	**NSW Department of Education**
date started:	**03 Oct 2019**
principal:	**Coffey Services Australia Pty Ltd**
date completed:	**03 Oct 2019**
project:	**North Sydney Public School**
logged by:	**RN**
location:	**North Sydney**
checked by:	**RR**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Delta Base, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance** | **rock mass defects**

method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular	general
			1.0									
			2.0		started coring at 2.80m							
NMLC	Not Encountered		3.0		**SHALE**: grey, dark grey, indistinctly laminated at 0º - 10º.	MW / SW		a=0.21 d=0.31			CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN CS, 0°, IR, RO, CN	Defects are: PT, 0 - 20°, PL, SO, CN, unless otherwise described
			4.0					a=0.03 d=0.05			PT, 25°, PL, SO, CN CS, 0°, IR, RO, CN	
			5.0		Borehole BH05 terminated at 5.00 m Target depth						JT, 35°, PL, SO, CN	
			6.0									
			7.0									

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 19/11/2019 17:04

method & support
AS auger screwing
AD auger drilling
CB claw or blade bit
W washbore
RR rock roller
NMLC NMLC core (51.9 mm)
NQ wireline core (47.6mm)
HQ wireline core (63.5mm)
PQ wireline core (85.0mm)

support
C casing M mud N none

water
10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

graphic log / core recovery
core recovered (graphic symbols indicate material)
no core recovered

core run & RQD
barrel withdrawn
RQD = Rock Quality Designation (%)

weathering & alteration*
RS residual soil
XW extremely weathered
HW highly weathered
MW moderately weathered
SW slightly weathered
FR fresh
*W replaced with A for alteration

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
PT parting
JT joint
SS shear surface
SZ shear zone
CO contact
CS crushed seam
SM seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR Irregular

roughness
VR very rough
RO rough
SO smooth
POL polished
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

BH05 2.80 - 5.00 m

drawn	
approved	
date	17-10-2019
scale	N.T.S.
original size	A4

coffey
A TETRA TECH COMPANY

client:	NSW Department of Education
project:	North Sydney Public School North Sydney
title:	**CORE PHOTOGRAPH** **BH05**
project no: SYDGE232786	fig no: **FIGURE 1** rev:

CDF_0_9_06_LIBRARY.GLB GrfcTbl COF PHOTO CORE PHOTO 1 PER PAGE SYDGE232786 (NORTH SYDNEY).GPJ <<DrawingFile>> 17-10-2019 13:35

This page has been left intentionally blank