The Forest High School Relocation

Geotechnical Investigation Report

Department of Education NSW

Reference: 754-SYDGE284698-AB

31 May 2021

THE FOREST HIGH SCHOOL

Geotechnical Investigation Report

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PREPARED FOR

Department of Education
(School Infrastructure) NSW
Level 8, 259 George Street
Sydney NSW 2000 Australia

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
00	First Issue	31/05/2021	Alex Condor	Rob Turner	Alex Condor

Distribution

Report Status	copies	Format	Distributed to	Date
First Issue	1	PDF	Ryan Thoroughgood - SINSW	31/05/2021

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Northern Beaches Council is proceeding with the new Hospital Precinct Structure Plan which incorporates the existing The Forest High School located north of Warringah Road in Frenches Forest, NSW. Hence, the Forest High School is proposed to relocate to a 4.5-hectare site at 189 Allambie Road, Allambie Heights NSW.

This report documents the results and interpretation of the geotechnical investigation conducted by Tetra Tech Coffey (Coffey) for the proposed relocation site of The Forest High School. The geotechnical investigation was commissioned by Schools Infrastructure NSW (SINSW) on behalf of the Department of Education NSW and was conducted generally in accordance with Coffey proposal (Ref No. SYDGE284698-AA, dated 15 February 2021).

Coffey has also conducted a Land Contamination investigation together with a Hazardous Building Material Survey for the site. The results of which are presented in separate reports, referenced as 754-SYDGE284698-AC and AD respectively.

1.2 SUPPLIED DATA

The following documents were supplied by SINSW to assist our assessments:

- A site survey plan prepared by C.M.S Surveyors Pty Ltd (Ref. 19939detail-1, Sheets 1 to 10, Issue I, dated 27 January 2021).
- The Concept Design Report prepared by Architectus Australia Pty Ltd (Issue B, dated 12 April 2021).
- Preliminary bulk earthworks plan prepared by Enstruct Group Pty Ltd (Ref. CV-0200, Rev B, dated March 2021).

1.3 PROPOSED DEVELOPMENT

The concept design report indicates that the proposed high school development will involve:

- Demolition of the existing site structures including McLeod House.
- Construction of structures within the northern and eastern portion of the site including:
  - **Buildings A and B** each two-storeys, orientated east-west at the eastern boundary of the site.
  - **Building C,** a four-storey building along the southern boundary**.**
  - **Building D**, a two-storey gymnasium/hall in the central northern part of the site**.**
  - **Building E,** a two-to-three storey structure located along the northern boundary.
- Construction of a playing field in the central portion of the site. The northern half of the field will be constructed at grade, with the southern half of the field constructed over a single level partial-basement carpark.
- Construction of up to six games courts in the western portion of the site.
- Construction of an access road into the lower ground carpark from the Arranounbai School access road to the west.

Figure 1 below provides a general layout of the proposed development, which was sourced from the Concept Design Report.

Figure 1: Proposed development layout from the Concept Design Report

1.4 OBJECTIVES

The objective of this report is to provide geotechnical information on the site for design of the proposed development. This report describes the geotechnical site investigation results together with:

- An interpreted geotechnical ground model including expected stratigraphy, identified soil and rock units, and encountered groundwater levels.
- Geotechnical engineering advice for pavement design, retaining walls and slopes, footing options and foundation design parameters of proposed structures and durability of the foundations.
- General earthworks construction advice for site preparation, excavation, filling works, temporary and permanent batter slopes and ground preparation.

2. SITE DESCRIPTION AND OBSERVATIONS

The site is irregular in shape with an approximate area of 4.5 hectares and is legally identified as Lot 11 in DP 1194177 and Lot 12 in DP 1112906, located at 189 Allambie Road, Allambie Heights NSW.

The site is bounded by Allambie Road to the east, Allambie Road and Aquatic Drive to the north, The Cerebral Palsy Alliance (CPA) building to the south and the Arranounbai School with accompanying access road to the west and south-west. Figure 2 below illustrates the site boundaries and current surface conditions.

Figure 2: The Forest High School relocation site

The site is situated on the southern-facing slopes of an east-west trending ridgeline to the north, with the site slopes generally falling towards the south. The site survey plan indicates that elevations across the site range from approximately 156m AHD in the north-east corner, down to 141m AHD in the south-west corner of the site adjacent to Arranounbai School access road.

During site walkover, Coffey observed the following site features:

- The former McLeod House is situated in the north-eastern portion of the site, fenced off and apparently derelict. The building comprises a crescent-shaped frontage with three attached wings, with evidence of a fourth demolished wing to the north.
- The western portion of the site generally comprises dense vegetation with large mature trees around a central grassed area located over a large south-facing fill embankment with a maximum height of approximately 4m. The central area has some demolition debris including boulders, concrete and tile fragments at surface. Groundwater seepage was observed along the toe of the large fill embankment in the western portion of the site.

- Two high-voltage transmission lines orientated north east to south west cross the western portion of the site. A third overhead transmission orientated north-south crosses the central portion of the site, adjacent to an existing carpark.
- This carpark occupies the central southern portion of the site. It appears in poor condition with extensive crocodile cracking in the asphalt surface, depressions and large potholes. Several concrete slabs were also observed within the central carpark area which is gently sloping to the south-west. The carpark is accessed by an asphalt surfaced roadway from Allambie Road.
- A fill mound about 2m high, with a footprint about 30m square, is located north-west of (and encroaching onto) the carpark. It is grass covered with evidence of demolition debris (concrete and tiles fragments).
- A concrete crib retaining wall with upper batter slope is situated along the southern boundary with a maximum wall and batter height of approximately 3m. A suspended slab and walkway connect the carpark to the CPA building to the south. The batter above the wall is vegetated with small shrubs and trees.
- Beneath the walkway connecting the carpark to the CPA building is a rock cutting (see Figure 3). The profile of this cutting generally comprised approximately 1.0-1.5m of extremely weathered siltstone/laminite, overlying high weathered siltstone/laminite.

Figure 3: Exposed rock cutting below walkway

- A south-facing batter is situated in the western portion of the site, along the southern boundary. This batter appears to be built in cut and approximately 2.5m from toe to crest. The ground here was heavily vegetated and difficult to observe natural surface.
- A drainage swale appears to the constructed within the northern portion of the western area of the site within the dense bushland. The swale is orientated east to west and discharges to the access road to the west of the site. Behind this swale to the north is a high-voltage transmission tower.

3. PUBLISHED DATA AND BACKGROUND INFORMATION

3.1 SOIL LANDSCAPE MAPS

The Office of Environment and Heritage, Electronic Soil Profiling Maps (eSPADE) V2.1 [1] indicates that the site locality bisects two distinct soil landscapes.

The northern half of the site and surrounding area is identified as Disturbed Terrain (9130xx) described typically as level to hummocky terrain extensively disturbed by human activity including complete disturbance, removal or burial of soil and/or landfill waste.

The southern half of the site is situated within the Lambert Soil Landscape (9130la) and generally comprises undulating terrain on Hawkesbury Sandstone formation. Typically, slopes may be up to 20% gradient with common rock outcrops. Soils generally comprise loose stony sandy loams and sandy clay loams over shallow bedrock. The soils are identified to have generally poor drainage with localised perched groundwater tables and high erodibility.

3.2 GEOLOGICAL MAPS

The Geological Survey of NSW, 1:100,000 Sydney Geological Map [2] indicates that the site locality is situated within an exposure of a significant Shale and Laminite lens (Rhs) that is located within the larger Hawkesbury Sandstone (Rh) formation. The lens extends to the north and west, with eastern boundary of the site corresponding to the mapped boundary of the shale / laminate inclusion within the Hawkesbury Sandstone formation. Little information is provided on the shale / laminate lens however the typical Hawkesbury Sandstone formation generally comprises medium to coarse grained quartz sandstone, with very minor shale and laminite lenses.

3.3 ACID SULFATE SOIL RISK MAPS

A review of the Office of Environment and Heritage, Electronic Soil Profiling Maps (eSPADE) V2.1 [1] indicates that the site is in an area of no known occurrence of Acid Sulfate Soils.

3.4 LOCAL GROUNDWATER BORES

A review of the Local Groundwater Bore Map from Water NSW [3] indicates that there are three groundwater wells within 500m of the proposed site. A review of GW Well work summary reports indicate that these wells are relatively short, between 4-6m and do not record any standing water levels. The drillers summary indicates that the ground profile generally comprised 1.8-2.2m of sandy clay over weathered sandstone.

4. INVESTIGATION METHODOLOGY

4.1 GROUND INVESTIGATION

Prior to the intrusive investigation, Coffey cross-referenced the proposed investigation locations with documented services and easements supplied by DBYD. A service locater was also engaged to check each location prior to intrusive investigation.

Coffey's site investigation was conducted between 27 April and 5 May 2021 and comprised the following:

- Site walkover and observations by a geotechnical engineer from Coffey to delineate significant site features.
- Drilling of twelve boreholes across the site using a track mounted drill rig. This included:
  - Drilling of eight cored boreholes (BH01-BH08) using auger and NMLC rock coring methods to identify and sample soil and rock stratigraphy.
  - Drilling of one auger borehole (BH09) to provide information on fill material in the western area of the site and install a gas well.
  - Drilling of three additional auger boreholes for the installation of groundwater and gas wells for further sampling and analysis (GW01-GW03).
  - Conducting Standard Penetration Tests (SPT) at nominal 1.5m intervals in the boreholes to assess soil strength.
- Excavation of fourteen test pits (TP01-TP14) using a 5T excavator for further geotechnical and contamination sampling. Dynamic Cone Penetrometer (DCP) testing was undertaken adjacent to selected test pits to assess material consistency.
- Excavation of three Hand Auger (HA01-HA03) boreholes in the western portion of the site in areas that were deemed inaccessible by plant to obtain shallow soil samples.

A site plan is provided in Figure B1 in Appendix B which plots approximate test locations at the site. Test locations and elevations were set out and recorded by measuring from features identified on the site survey plan.

A geotechnical/environmental engineer from Coffey located the test sites, logged subsurface profiles interpreted during drilling, collected samples and constructed groundwater and gas wells.

Standpipe Piezometer (groundwater) wells were installed in GW01 – GW03 following completion of the boreholes. Each standpipe was constructed with a 3m screen placed at the toe of the well, with solid casing up to surface. A gravel annulus was placed around the screened section to allow groundwater inflows into the standpipe. The groundwater wells were then purged of drilling fluids and groundwater to allow the wells to develop.

Landfill gas wells were also installed in BH09 and in separate holes identified as GW02a and GW03a, adjacent to the GW02 and GW03 standpipe piezometer wells. These wells were constructed in a similar manner to the piezometer wells, but only targeted upper fill material.

Following the site investigation, an environmental engineer from Coffey attended the site on several occasions to take groundwater readings from the installed piezometer wells and collect water and gas samples for further analysis. A summary of the groundwater levels and the dates recorded are summarised in Section 5.2.

4.2 LABORATORY TESTING

Geotechnical laboratory testing was undertaken on selected samples from the boreholes and testpits. Table 1 below provides the testing schedule that Coffey submitted to NATA accredited geotechnical laboratories.

Table 1: Geotechnical Testing Schedule

Laboratory Test	Quantity	Method
Soil Moisture Content	20	AS 1289.2.1.1
Atterberg Limits	5	AS 1289.3.1.1/2/3/4.1
Linear Shrinkage	5	AS 1289
Shrink / Swell Index	2	AS 1289.7.1.1
Emerson Crumb	5	AS 1289.3.8.1
Soil Aggressivity	6	AS 1141.51
4-day soaked CBR	4	AS 1289.2.1.1
Point Load Strength Index	80	AS 4133.4.1
Unconfined Compressive Strength	3	AS 4133.4.2

Additional samples were collected from the investigation locations for the purpose of the land contamination assessment, which is presented in a separate Coffey Report (ref. 754-SYDGE284698-AC).

5. RESULTS OF GEOTECHNICAL INVESTIGATION

Appendix C provides the borehole and test pit logs, together with the explanatory notes, rock core photographs and well construction details. Appendix D provides the laboratory test certificates with the rock Point Load Strength Index results shown on the borehole core logs.

The following discussion provides a summary of the data from these logs and testing results.

5.1 GEOTECHNICAL UNITS

The soil and rock profiles identified in the various boreholes and test pits have been characterised into the Geotechnical Units shown below in Table 2.

Table 2: Generalised Geotechnical Units

Origin	Unit	Description (USC Group)	Soil Consistency *Rock Strength*	Moisture Condition *Rock Weathering*
TOPSOIL	T1	CL – ML [(1)] Sandy CLAY, Silty CLAY, Sandy SILT of low plasticity with some root fibres	Firm	Dry - Moist
FILL	F1	PAVEMENT MATERIALS Gravelly SAND, Silty SAND of fine to coarse grained, sub-angular gravels	-	Dry
	F2	UNCONTROLLED FILL CLAY, Sandy CLAY and Clayey SAND, low to medium plasticity, fine to medium grained, some sandstone gravels and building rubble (brick, terracotta, glass, steel, refuse). Some possible reworked or disturbed natural soil	Variable	Variable

Origin	Unit	Description (USC Group)	Soil Consistency *Rock Strength*	Moisture Condition *Rock Weathering*
RESIDUAL	R1	CL – CI (1) CLAY and Sandy CLAY of medium to high plasticity	Stiff to Very Stiff	Less than or equal to Plastic Limit (Dry-Moist)
	R2	CL – CI (1) CLAY, Sandy CLAY and Clayey SAND and extremely weathered interbedded SANDSTONE and SILTSTONE Inferred Rock Class: Class V SANDSTONE and Class V SHALE (2)	Hard clays interbedded with *Very Low Strength Bedrock* *some local low or medium strength rock bands*	Less than Plastic Limit (Dry-Moist) *Extremely to Highly Weathered*
BEDROCK	H1	Fine to coarse grained SANDSTONE with some interbedded SILTSTONE bands Inferred Rock Class: Class IV Sandstone and Class III SHALE (2)	*Low to Medium Strength*	*Highly to Moderately Weathered*
	H2	Fine to coarse grained SANDSTONE bedrock Inferred Rock Class: Class III Sandstone or better (2)	*Medium to High Strength*	*Slightly Weathered to Fresh*

Notes to table:
(1) Refer to AS 1726-2017 [4], Table A1 for group symbols.
(2) Rock classification is based on P.J.N. Pells et al, Classification of Sandstones and Shales in the Sydney Region: A Forty Year Review, 2019 [5]

Table 3 provides a summary of the depth of base of each unit encountered in the borehole and test pits.

Table 3: Summary of Depth to Base of Geological Units

Location	Surface Level (m) AHD	Depth to Base of Unit (m) BGL						
		T1	F1	F2	R1	R2	H1	H2
BH01	151	-	0.15	-	4.5	11.4	>14.34	-
BH02	149.75	-	0.25	-	4.6	8.3	10.0	>14.00
BH03	150	-	0.6	-	2.2	7.7	8.3	>12.90
BH04	152.5	0.3	-	-	1.5	10.2	11.2	>11.80
BH05	155	0.3	-	-	4.0	9	10.5	>14.00
BH06	150.75	-	0.25	-	2.5	11.9	14.0	>15.75
BH07	153	0.4	-	-	3.8	9.8	12	>12.95
BH08	153.5	0.3	-	-	2.0	10.7	12.8	>13.00
BH09	148	0.3	-	4.5	-	>8.0	-	-
GW01	156	0.25	-	-	4.5	>10.5	-	-
GW02	148	0.3	-	4.5	-	>8.5	-	-
GW03	148	-	0.75	-	2.0	>9.5	-	-
TP01	148	-	-	2.5	-	>3	-	-
TP02	148.5	-	-	>2.6	-	-	-	-
TP03	148.5	-	-	0.8	1.6	>2.1	-	-
TP04	151.5	-	1.8 (1)	1.3 (1)	-	>2.5	-	-
TP05	151.5	-		0.8	1.5	>2.1	-	-

Location	Surface Level (m) AHD	Depth to Base of Unit (m) BGL						
		T1	F1	F2	R1	R2	H1	H2
TP06	152	0.15	-	-	1.2	>1.5	-	-
TP07	151	-	0.15	-	>1.5	-	-	-
TP08	149	-	0.35	-	1.5	-	-	-
TP09	151.5	-	-	0.9	>1.5	-	-	-
TP10	152.5	0.25	-	-	>1.8	-	-	-
TP11	151	-	-	0.8	1.2	>1.6	-	-
TP12	153.5	-	-	>1.8	-	-	-	-
TP13	155	-	-	0.5	>1.7	-	-	-
TP14	155	-	-	0.5	1.4	>1.5	-	-
HA01	149	-	-	>1.15	-	-	-	-
HA02	143.5	-	-	0.5	>0.8	-	-	-
HA03	144.5	-	-	1.5 (2)	>1.8 (2)	-	-	-

Notes to table:
(1): In TP04, Unit F2 sits above unit F1 as a fill mound was placed over the existing pavement.
(2): HA03 terminated at 1.2m in unit F2, Inferred profile below 1.2m by DCP and surrounding topography.

5.2 GROUNDWATER

A summary of the groundwater levels observed during the investigation are summarised below in Table 4 together with the ongoing readings taken after well construction and development. Groundwater inflows during drilling were not observed in some borehole/test pit locations, and not observable where drilling fluids were used for rock coring. It should be noted that groundwater levels can be influenced by changes in site and climatic conditions.

Table 4: Summary of Groundwater Observations

Location	Ground Surface Elevation (mAHD)	Total Depth of Well (mBGL)	Groundwater Level observed at time of investigation		Groundwater level measured (17/05/2021)		Groundwater levels measured (30/05/2021)	
			(mAHD)	(mBGL)	(mAHD)	(mBGL)	(mAHD)	(mBGL)
GW01	156	10.2	147	9.0	151.48	4.52	150.9	5.1
GW02	148	8.5	N/O	-	143.88	4.12	143.7	4.3
GW03	148	9.5	139.5	8.5	144.28	3.72	143.1	4.9
BH09	148	4.5	145.2	2.8	145.5	2.5	-	-
TP01	148	-	145.6	2.4	-	-	-	-
TP02	148.5	-	146.3	2.2	-	-	-	-
TP12	153.5	-	152.3	1.2		-	-	-

5.3 LABORATORY TEST RESULTS

5.3.1 Soil Testing Results

The results of the geotechnical soil classification results are presented in **Table 5** below, with the pavement CBR and durability soil test results presented in Table 6 and **Table 7** respectively. Complete laboratory test results are provided in Appendix D.

Table 5: Geotechnical Soil Classification Test Results

Location	Details			Atterberg Limits and Linear Shrinkage				MC (%)	EM	SS (%)
	Depth (m)	Origin (Unit)	Material	LS (%)	LL (%)	PL (%)	PI (%)			
BH01	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	-	6	-
	1.5-1.95	Residual (R1)	Sandy CLAY	-	-	-	-	16.1	-	-
BH02	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	14.1	-	-
	3.0-3.1	Residual (R1)	Sandy CLAY	-	-	-	-	16.9	-	-
BH03	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	19	-	-
	1.5-1.95	Residual (R1)	CLAY	-	-	-	-	-	6	-
	3.0-3.45	Residual/XW Rock (R2)	CLAY	-	-	-	-	13.8	-	-
BH04	0.5-0.95	Residual (R1)	Sandy CLAY	10.5	41	17	24	17.2	-	-
BH05	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	-	6	-
	1.1-1.5	Residual (R1)	CLAY	-	-	-	-	24.1	-	1.8
	1.5-1.95	Residual (R1)	CLAY	11.5	62	23	39	21.4	-	-
BH06	0.5-0.95	Residual (R1)	CLAY	9.5	45	19	26	16.6	-	-
	1.5-1.95	Residual/XW Rock (R2)	Extremely Weathered sandstone	-	-	-	-	-	6	-
BH07	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	21.6	-	-
	1.5-1.95	Residual (R1)	CLAY	8	44	21	23	16.8	-	-
BH08	0.5-0.95	Residual (R1)	CLAY	-	-	-	-	20.5	-	-
	1.0-1.45	Residual (R1)	CLAY	-	-	-	-	20.9	-	1.7
	1.5-1.95	Residual (R1)	CLAY	-	-	-	-	16.6	-	-
BH09	0.5-0.95	FILL (F2)	Sandy CLAY	-	-	-	-	9.8	4	-
	1.5-1.95	FILL (F2)	CLAY	-	-	-	-	19.8	-	-
	6.0-6.45	Residual/XW Rock (R2)	Clayey SAND	-	-	-	-	13.3	-	-
GW01	1.5-1.95	Residual (R1)	CLAY	-	-	-	-	27.5	-	-
	3.0-3.45	Residual (R1)	CLAY	-	-	-	-	22.1	-	-
	4.5-4.95	Residual/XW Rock (R2)	CLAY	-	-	-	-	17.1	-	-
GW02	4.5-4.95	Residual/XW Rock (R2)	LAMINITE	-	-	-	-	11.0	-	-
GW03	1.5-1.95	Residual (R1)	Silty CLAY	7	39	21	8	14.5	-	-

Notes to table:
LS: Linear Shrinkage **LL**: Liquid Limit **PL**: Plastic Limit **PI**: Plasticity Index
MC: Moisture Content **EM**: Emerson Class **SS**: Shrink Swell

Table 6: California Bearing Ratio and Compaction Test Results

Location	Details			Soaked CBR and Compaction Test				
	Depth (m)	Origin	Material	MC (%)	SOMC (%)	SMDD (%)	Swell (%)	CBR (%)
TP07	0.2-1.0	Residual (R1)	CLAY	18.3	18.3	1.72	1.0	6
TP10	0.5-1.0	Residual (R1)	Sandy CLAY	17.1	12	1.84	2.0	6
TP11	0.3-1.0	Residual (R1)	Sandy CLAY	19.6	18.2	1.72	1.0	5
TP13	0.8-1.5	Residual (R1)	Sandy CLAY	26.3	25.7	1.51	2.0	3.5

Notes to table:
MC: Moisture Content **SOMC**: Standard Optimum Moisture Content **SMDD**: Standard Maximum Dry Density
CBR: California Bearing Ratio (4 day soaked)

Table 7: Soil Aggressivity and Durability Test Results

Location	Details		Soil Type and (Groundwater Condition)	pH	EC (µs/cm)	Resistivity (Ωcm)	Sulphate (ppm)	Chloride (ppm)	MC (%)
	Depth (m)	Origin (Unit)							
BH03	2.0-2.1	Residual (R1)	CLAY (B)	5.3	150	6,800	36	69	17
BH04	1.0-1.1	Residual (R1)	Sandy CLAY (B)	4.4	120	8,700	87	8.8	19
BH05	0.95-1.0	Residual (R1)	CLAY (B)	4.5	93	11,000	89	< 5	20
BH06	2.0-2.1	Residual (R1)	SANDSTONE (B)	5.1	120	8,600	< 30	42	11
BH08	6.1-6.1	XW Rock (R2)	SANDSTONE (B)	4.6	19	54,000	16	<10	8.6
TP08	1.0-1.1	Residual (R1)	Sandy CLAY (B)	4.6	85	12,000	88	52	16

Notes to table:
EC: Electrical Conductivity **MC**: Moisture Content

5.3.2 Rock Testing Results

The results of the laboratory UCS test results undertaken on selected rock samples is summarised below in **Table 8**.

Table 8: Rock Test Results

Location	Details		Uniaxial Compressive Strength		
	Depth (m)	Rock Type and Structure (Unit)	Density (t/m^3)	UCS (MPa)	Moisture Content (%)
BH01	10.75 – 10.9	LAMINITE, highly weathered (R2)	2.2	0.501	15.8
BH03	8.34 – 8.55	SANDSTONE, slightly weathered (H2)	2.3	12	9.8
BH08	5.1 – 5.35	SANDSTONE, highly weathered (R2)	2.2	0.392	13.9

The following should be considered with the above UCS and point load test results:

- The UCS test on the sample from BH03 was a generally homogenous and intact sample with no weathered seams.
- A suitable UCS test sample was difficult to obtain in the highly weathered bedrock, as most sections were weakly bedded and very low strength.
- Similar to the above, difficulty obtaining reliable Point Load Strength Index results occurred as samples tended to shear along beddings rather than through the intact rock structure.

6. DISCUSSIONS AND RECOMMENDATIONS

6.1 INFERRED GEOTECHNICAL MODELS

Review of the geotechnical information suggests that the site can broadly be characterised into two distinct areas:

- **Area A** - the central and eastern portions of the site, and
- **Area B** - the western portion of the site.

These areas are outlined in the Figure B1 Site Plan in Appendix B. Interpreted geological sections A-A' (through Area A) and B-B' (through Area B) are presented as Figures B2 and B3 in Appendix B of this report. Below is a generalised summary of the expected geotechnical units and depths in each area based on the investigation findings.

6.1.1 Area A

Geotechnical Units

Area A encompasses the central and eastern portions of the site including Buildings A-D and the proposed games field. Grassed areas within Area A encountered 0.25-0.4m of Unit T1 – TOPSOIL. Paved areas encountered 0.15-0.75m of Unit F1 – FILL, generally attributed to pavement formations.

Uncontrolled fill of Unit F2 comprising building rubble and general refuse was encountered sporadically across the Area A portion of the site, including:

- Around the existing McLeod House to depths of up to 0.5m BGL within the demolished portion of the northern wing ,0.9m in TP11 to the south and at depths greater than 1.8m in TP12, adjacent to the central two wings.
- To depths up to 0.8-1.3m below ground within the existing fill mound at TP04 and TP05 in the central portion of the site; and
- Up to 0.8m in TP03 to the south of the existing mound, near the boundary with Area B.

Units T1, F1 and F2 are generally underlain by Unit R1 – Residual Soil encountered between 1.5-4.5m (average of 2.5m) below existing ground levels. This is underlain by a deeper residual and extremely weathered sandstone and laminite (Unit R2) profile to a depth of typically 8-12m below ground.

A band of low to medium strength and interbedded sandstone/laminate (Unit H1) was encountered below the residual profile, of approximately 1-2m thick, and underlain by medium strength or better sandstone bedrock.

Groundwater

Groundwater Levels in Area A were observed to be relatively deep during investigation, up to 8.5-9m below ground level in GW01 and GW03, however this is likely due to the very small inflows due to the clay soils. Following instillation of the groundwater wells, the groundwater levels were measured between 3.7-5.1m below ground level. For the purpose of site characterisation, a design groundwater level generally following the site topography at approximately 4.5m below ground level could be adopted.

6.1.2 Area B

Geotechnical Units

Area B encompasses the western portion of the site (future games courts and access road) which is heavily vegetated. This area is assessed to have extensive uncontrolled filling (Unit F2) as evident from ground surface profile and the building rubble, glass, pipe, brick and other fragments encountered within the area.

Unit F2 Fill was generally observed up to 4.5m thick at the crest of the fill batter at BH09 and GW02, and up to approximately 1m thick towards the northern portion of the site near HA01.

A man-made creek/swale was observed within the northern portion of the site with nearby boggy soils. Groundwater seepage was observed at the toe of the fill batter to the south at the time of investigation.

Reference to the indicative geological section of Area B in Appendix B (Figure B3) indicates that hard residual clays and extremely weathered rock is expected below the fill at depths between 2.5-4.5m. Due to the depth of fill, not all investigation location were able to penetrate the fill material and as such, fill may be deeper than what is shown in Figure B3. It is evident that the depth of fill varies substantially across the site in this area, with likely removal or reworking of the historical upper residual profile prior to fill placement.

Groundwater

Groundwater levels within Area B were inferred at depths from 2.2-2.8m below ground level at time of investigation in TP01, TP02 and BH09, with no observable water inflows in GW02. In addition, saturated ground conditions were observed in the hand auger holes (HA01-HA03 which were situated above and below the fill embankment. Following the investigation, groundwater levels in BH09 were measured between 2.5-2.8m and between 4.1-4.3m below ground level in GW02. Considering that both wells are at the same approximate elevation, it is likely that there are several perched groundwater levels with multiple flow paths through the fill, making groundwater levels remote from test locations difficult to predict.

For the purpose of site characterisation, a design groundwater level generally following the site topography at approximately 2.5m below ground level in BH09 and increasing to the west up to 4.1m below ground level at GW02 could be adopted. During wet periods, this would likely intercept the invert of the upstream creek/swale within the northern portion of Area B, and daylight at the toe of the fill embankment.

6.2 EARTHWORKS

The bulk earthworks plan supplied by Enstruct indicates the following maximum fill and cut depths relative to current grades:

Area A:

- Cutting to 2.5m depth in the central portion of the site for the carpark below the games field.
- Filling up to 3m depth in the central part of the games field to create a level platform.
- Cutting to 2.0m depth in the eastern portion of the site, to the east of Building C and adjacent to Allambie Road; and
- Nominal cut/fill across the site around buildings typically up to 1m for landscaping.

Area B:

- Filling to 2.5m depth in the northern games courts and 2m along the southern boundary of the lower games courts.
- Filling up to 3.5m depth along the access road toward to proposed intersection with the games field.
- Nominal cutting of less than 1.0m around the games courts and access road

The impacts of cutting into and filling over the current Area B landform, which already contains substantial Unit F2 uncontrolled filling are discussed below in Section 6.2.3.

6.2.1 General Site Traffickability

The following general site preparation measures are recommended during the earthworks:

- Considering the clayey site soils encountered within the site investigation, it is recommended to limit the amount of time shallow excavations are left open to limit moisture ingress.
- Loss of strength in residual clays are expected following repetitive trafficking of heavy machinery or over areas with elevated moisture conditions. Tracked machinery would likely be required if clays become wetted and boggy.
- The existing paved areas on the site could be used as a temporary construction platform to limit movement on exposed subgrades. If this isn't possible, a temporary construction platform may be required.
- It is recommended to slightly grade the floor of any excavations to the south, and appropriately bund or capture any runoff to avoid sediments spilling over site boundaries. This may require earth bunds or sediment traps that discharge to sediment basins/tanks for treatment prior to discharge.
- Any exposed batters should be hydroseeded or protected from erosion and runoff.

6.2.2 Earthworks Construction – General Guidance

Earthworks construction should generally apply the procedures and follow the inspection and testing regimes outlined in AS 3798-2007 Guidelines for Earthworks for Commercial and Residential Developments [6]. A technical specification for earthworks construction should be developed during detailed design. Coffey would expect the following general advice to be appropriate.

Where controlled filling is required to form the foundation for floor slabs, pavements and playing fields, the ground should be prepared by stripping topsoil, existing fill (i.e. Units T1, F2 and perhaps F1) and other unsuitable materials to expose competent natural ground. The natural ground surface should be benched so that fill can be placed in near horizontal layers.

Each bench should be proof rolled with at least 4 passes of smooth single-drum, non-vibratory roller of minimum weight 12 tonnes. An experienced earthworks practitioner should observe the proof rolling to detect soft, wet or heaving zones. Where these zones are encountered the affected area should be improved by appropriate methods, such as:

- Excavation of the affected soil and replacement with Controlled Fill.
- Tyning and moisture conditioning of the insitu material and compaction to achieve specified fill compaction criteria.

Controlled fill supporting structures or pavements should be compacted to at least 98% Standard Maximum Dry Density (SMDD). Fill material should be spread in layers of prescribed thickness appropriate for the plant being used and moisture conditioned to Standard Optimum Moisture Content (SOMC) ± 2% then compacted without delay with appropriate compaction plant. Fill within 0.3 m depth of floor slab/pavement subgrade level should be compacted to at least 100% SMDD.

Preparation for, and construction of Controlled Fill should be carried out under Level 1 Geotechnical Inspection and Testing as defined in Section 8.2 of AS 3798 – 2007 Guidelines on earthworks for commercial and residential developments [6].

6.2.3 Earthworks Construction in Areas of Existing Unit F2 Fill

The footprints of the proposed games courts and access road in Area B coincides generally with the inferred fill embankment and other areas where Unit F2 uncontrolled fill was encountered in the investigation. The proposed court levels are generally above the level at which natural ground was encountered, and in some areas close to the existing uncontrolled fill levels.

Leaving uncontrolled fill in the future landform may cause differential settlements across areas such as games courts which may have strict settlement requirements. In addition, there is a risk of instability when increasing the height of an existing fill embankment constructed over a potentially wet subgrade.

The preferred geotechnical solution to limit future differential settlement (and perhaps downslope creep movements) of the courts would be to remove the existing uncontrolled and replace it with controlled fil, which could comprise excavated soil from the proposed carpark. Alternatively, if structures are to be built over the uncontrolled fill, further analysis would need to be undertaken such as detailed settlement and slope stability analysis.

In addition, soft soils, were encountered around HA01 in the north where two games courts are proposed. This soft soil is likely attributed to the swale/creek along the northern portion of this area causing the underlying material to become moisture affected. This zone may require significant ground improvement works (e.g. excavation and replacement, mechanical or chemical stabilisation) to provide a suitable subgrade.

Local zones of stockpiled or deeper fill in the landform may also be encountered in Area A.

6.2.4 Excavatability

Based on the subsurface profile encountered, excavations to bulk earthworks levels are expected to be readily undertaken using conventional earthmoving equipment. Excavations within the upper Fill (Unit F1 and F2) units as well as Unit R1 residual soils up to 4.5m could be undertaken with a 5T or larger excavator with toothed bucket.

Excavations into the deeper portions of the games field and between Building C and Allambie Road is likely to encounter hard clays and extremely weathered bedrock at depths typically below 2.5m. This may require harder digging with a larger excavator (15T+) and toothed bucket.

6.2.5 Batter Slopes

The batter gradients presented below in Table 9 are recommended for the design of unsupported exposed excavations up to 3.0m in height and above the groundwater table. Temporary batters must be regularly inspected for signs of instability and groundwater seepage. Temporary batters that are required for more than three months may need to be flatter than indicated in Table 9.

Table 9: Recommended Unsupported Maximum Batter Slopes (maximum 3m height)

Unit	Material	Temporary Batter	Permanent Batter
T1, F1, F2	Topsoils and fill materials	1.5H:1V	2.5H:1V
R1	Stiff to very stiff residual soils	1H:1V	2H:1V
R2	Class V Sandstone and Siltstone (Shale)	0.5H:1V(1)	2H:1V

Notes to table:
(1) Limited to a height of 1.5m, otherwise batter at 1H:1V

The recommended maximum batter slopes presented above assume that no surcharge or structures are located at or near the crest of the cuts. Permanent batters in soils will require topsoiling, or provision of

surface protection. It is recommended to install diversion drains above all batter crests to direct upslope runoff away from the batter face. The batter slopes or benches should be scaled following excavation to remove loose material that could slide or topple from the face during construction and pose a risk to construction personnel.

Where steeper or taller slopes than those presented above are required, or where surcharge is expected at the crest of batters, a slope stability analysis would need to be undertaken.

6.2.6 Soil Dispersion

Emerson class test results indicate that the clay samples tested were Class 6 – non-dispersive. One sample tested in the Unit F2 fill was found to be Class 4 that indicates the soil may be moderately dispersive.

6.2.7 Material Re-use and Disposal

All excavated material except for Unit T1 – Topsoil could be used as controlled fill on the site subject to appropriate moisture reconditioning and compaction control. Unit F2 – Uncontrolled Fill may be used as controlled fill, however it would need to undergo appropriate sieving and reconditioning (i.e. removal of waste material) prior to reuse on site.

Classification of the site in-situ material in accordance with EPA guidelines “Waste Classification Guidelines, Part 1: Classifying Waste [7]” will be required prior to removal off site. In addition, this should consider the results of the Detailed Site Investigation report prepared by Coffey (SYDGE284698-AC) regarding the requirements of off-site disposal.

6.3 PAVEMENTS

The proposed flexible pavements expected for the project are to comprise the access road along the southern portion of Area B, and a potential small carpark in Area A between Building C and Allambie Road. These pavements are expected to be lightly trafficked with conventional light vehicles and sporadic heavy delivery vehicles throughout their lifecycle.

Generally, CBR testing was carried out on samples taken within the upper 0.2-1.5m of the soil profile as these materials likely to be the reworked subgrade level for the fill below the access road.

CBR testing summarised in Table 6 was undertaken on remoulded samples compacted to a target 100% standard maximum dry density (SMDD) and soaked for four days. It should be noted that subgrade strength is moisture and density dependant and where materials are compacted to less than 100% SMDD, CBR values may be less than the below values.

Based on the results of the CBR test undertaken on the site clayey soils, CBR values ranged from 3.5% to 6%. At this stage we suggest a Design CBR of 4% for pavement design. This correlates to a short-term Young’s Modulus of 30MPa and a long-term modulus of 18MPa. CBR swell values were generally 1-2% which is generally not critical for pavement construction.

Higher CBR values may be achieved through improvement of the existing subgrade by subgrade replacement or stabilisation. The most common method of stabilisation typically comprises soil mixing with either lime or a cement binder to increase the strength and workability of the material as well as reducing the plasticity index of the soil to control shrink/swelling. If required, it is recommended that appropriate mix design with the preferred binder be undertaken prior to construction to ensure that the required subgrade CBR and modulus values (if applicable) are obtained.

6.4 RETAINING STRUCTURES

The location and height of permanent retaining structures is not known at the time of reporting; however, it is likely that retaining structures up to 4m high will be required around the lower portion of the games field, along the access road and within the eastern carpark between Building C and Allambie Road.

The subsurface profile in likely to be retained in cut areas is generally expected to comprise:

- Surficial Unit T1 and F1 units to a depth of 0.5m;
- Unit R1 residual clayey soils to a depth of 2.5m with thicker areas up to 4.5m; over
- Unit R2 residual hard clays and Class V rock.

Retaining structures likely to be built for fill embankments generally comprise the access road and upper games filed structure. These structures will likely be constructed with reconstituted residual soils excavated from cut areas on site.

6.4.1 Design Criteria

The following design criteria should be adopted for the design of retaining structures:

- AS 4678-2002 – Earth Retaining Structures [8];
- AS 3798-2007 – Guidelines on Earthworks for Commercial and Residential Developments [6];
- An accepted industry practice for global stability factors of safety (FOS) of 1.5 for long-term conditions and 1.3 for short term construction conditions.

Typical permanent retaining structures that may be used on site could include:

- Gravity retaining walls (Crib walls, gabion walls, etc);
- Cantilever retaining structures (Reinforced concrete wall, Dincell, soldier pile with infill panels, etc); and
- Reinforced earth slopes (Geogrid or similar).

Where insufficient space is available for unsupported, open excavations or batter slopes, excavation support such as a temporary retaining walls comprising sheet or soldier piles can be considered during construction. The designer should reference the requirements of AS 4678-2002 Earth Retaining Structures [8] for the selection of appropriate groundwater level for design purposes.

6.4.2 Design Parameters

The table below presents recommended geotechnical design parameters (shear strength and lateral earth pressure coefficients) for the design of retaining structures where there is a level ground surface behind the wall.

Table 10: Retaining Wall Design Parameters

Unit	Material	Unit Weight (kN/m^3)	Effective Friction Angle ϕ' (deg)	Effective Cohesion c' (kPa)	Undrained Cohesion Cu (kPa)	At Rest Earth Pressure Coefficient K_0
T1, F2	Topsoils and uncontrolled fill	18	24	0	25	0.5
F1	Granular fill material	18	28	0	0	0.5
R1 (1)	Stiff to very stiff residual clays	20	25	5	100	0.5

Unit	Material	Unit Weight (kN/m^3)	Effective Friction Angle ϕ' (deg)	Effective Cohesion c' (kPa)	Undrained Cohesion Cu (kPa)	At Rest Earth Pressure Coefficient K_0
R2	Hard residual clays and Class V rock	21	25	10	200	0.5

Notes to table:
(1) These parameters may be adopted for recompacted R1 or R2 material when placed as controlled fill in accordance with Section 6.2.2 of this report.

The recommended K_0 values assume that the wall is not rigid, and some wall movement occurs with consequent change in the horizontal stress acting on the wall occurs due to excavation. Retaining wall analyses will need to consider surcharges, footing loads from adjacent structures, roads and hydrostatic pressure.

The following construction recommendations are provided to assist with the design and construction of retaining structures:

- Retaining wall backfill should comprise granular free-draining material with appropriate separation geofabric between the wall and backfill.
- Wall foundations should be founded on similar strata to limit the effects of differential settlement. Foundation material should be inspected by an experienced geotechnical engineer.
- Subsurface drainage lines should be placed behind the permanent and temporary (depending on type) retaining structures to direct seepage to appropriate points of discharge. Subsurface lines should be installed with consideration of maintenance and flush-out points.

6.5 SOIL AND ROCK ANCHORS

The design of soil and rock anchors should generally be undertaken in accordance with the guidelines set out in AS 4678-2002 – Earth Retaining Structures [8] for both serviceability and strength.

Design parameters for soil anchors can be adopted from the values presented in Table 10 of this report together with the design equations presented in Clause B4.3 of AS 4678 based on the type of soil anchor selected for design. These values would need to be modified for uncertainty factors in accordance with Section 5.2 of AS 4678.

Preliminary design bond stresses (working load) for Unit H1 and H2 rock could be adopted based on the below values.

Table 11: Rock Anchor Design Bond Stresses

Unit	Description	Design Bond Stress (kPa)
H1	Low strength sandstone and laminite bedrock	200
H2	Medium strength sandstone bedrock or better	600

The design of vertical anchors should consider the uplift resistance equated to the weight of an inverted cone of soil/rock in accordance with Clause B4.2.2 of AS 4678. Anchors in Unit H1 or H2 rock could adopt a 90° cone whereas unit R2 residual soils and extremely weathered rock should adopt a cone angle of 60°.

Proof load testing of anchors should be undertaken in accordance with Table B1 of AS 4678 based on the structure classification and potential consequence of failure.

6.6 FOOTINGS

A review of the borehole logs, proposed concept design and expected geotechnical conditions at the foundation levels across the site indicate that the proposed foundations may comprise a combination of at-grade slab, shallow footings, and piles where necessary.

6.6.1 Shallow Footings

Shallow footing systems may be applicable to small structures including the two-three storey structures identified as Buildings A, B, D and E, as well as the central playing field.

In the proposed games courts in Area B, light structures are expected. These structures could be proportioned on at-grade slabs or similar but will need to consider the effects of uncontrolled fill with sporadic areas of soft soils which may cause differential settlement and is discussed further in Section 6.2.1. This could be mitigated with a stiffened raft or waffle slab. Where structural footings are to be placed in Area B, they should generally extend through the fill and into the underlying residual soils.

The design of shallow footings should generally be undertaken in accordance with AS2870-2011 [9] and typical industry standard engineering principles.

Design values for shallow pad or strip footings, or on-grade slabs presented below in Table 12 assume that:

- Pad and strip footings comprise centrally loaded footings with a minimum footing diameter of 1.0m and embedded a minimum 0.5m into the bearing stratum.
- Serviceability limit state design is undertaken for the foundation to consider the settlement of the various footing types and structural tolerances.
- A geotechnical reduction factor (ϕ_g) has not been applied to the below values. This needs to be calculated based on the type of footing and general importance category of the overall structure. For preliminary design a factor of 0.4 may be applied.
- Footings for each structure must be found on the same geotechnical unit to limit differential ground movement and settlement.

Table 12: Design Values for Shallow Footings

Unit	Description	Serviceability Bearing Pressures (kPa)	Ultimate Bearing Capacity (kPa)	Elastic Modulus (MPa)
T1, F1, F2	Topsoil and fill	Not recommended as a foundation	-	-
R1	Residual Clays	175	500	10
R2	Residual Clays and Class V Sandstone or Shale	300	800	50

These recommendations assume that Unit R2 material exposed by site excavations are properly protected against exposure. Unit R2 soils would quickly deteriorate to an equivalent Unit R1 soil prior to footing construction if not protected, resulting in a lower bearing capacity. Foundations should be assessed by a geotechnical engineer prior to footing construction to confirm material suitability for the appropriate bearing capacity.

Short (elastic) and long term (consolidation) settlement values are highly dependent on the loading condition, pore pressures within the soil and size/shape of the overall footing. A settlement analysis should be undertaken once preliminary design of the footing has been completed to ascertain expected short and long-term settlements. As a guide using the provided parameters, short term (elastic) settlements for footings up to

2.5m wide and embedded 1m below ground would be of the order of 10-15mm when subject to the above serviceability loads.

Shallow footings could be constructed using conventional excavation methods. Due to the site clayey soils, shoring and temporary retention of shallow footing excavations are likely not required. Following excavation to the proposed foundation level, a geotechnical engineer should verify the bearing stratum to ensure it meets the design parameters set out in this report. Large slabs on ground may require proof-rolling with a 12T+ roller or similar to identify any soft or yielding areas prior to placement on reinforcement and concrete.

6.6.2 Piled Footings

Building C is a four-storey structure situated at the crest of the retaining structure along the southern boundary of the site. Based on the proposed earthworks and site survey plan, there is approximately 6m in height elevation from the proposed floor level of Building C to the toe of the crib wall. At the time of this report, it is unknown what surcharge loading, if any the existing wall was designed for, or what foundation loads will be placed from the proposed structure. Therefore, it is recommended that the foundations for Building C comprise pile footing embedded below the toe of the crib wall (Approx. RL 144.7m AHD) to eliminate additional surcharge loading. If shallow footings are adopted, a detailed slope stability analysis should be undertaken to assess wall movement and potential instability.

6.6.2.1 Geotechnical Reduction Factor (ϕ_g)

The design of piles should be undertaken in accordance with the requirements of AS 2159-2009 – Piling: Design and Installation [10]. The design geotechnical strength is calculated as the ultimate geotechnical strength ($R_{d,ug}$) multiplied by a geotechnical strength reduction factor (ϕ_g).

The value of the geotechnical strength reduction factor is influenced by the assessment of individual risk ratings for risk factors (as set out in Table 4.3.2 (A) of AS 2159-2009 [10]) by the pile designer. An assessment of a typical average risk rating was undertaken using the following factors and assumptions:

- The geotechnical investigation undertaken to date which includes in-situ and laboratory testing on the weathered rock profile.
- A low-redundancy foundation system (i.e. isolated piles set out at large spacings);
- No pile testing undertaken during construction.
- Local experience with the design of foundations into residual soils and weathered bedrock; and
- A competent and experienced piling contractor to install the piles.

For these assumptions, an Average Risk Rating (ARR) for the design of the foundations into the weathered bedrock of 2.75 could be adopted.

Based on Table 4.3.2 (C) of AS 2159-2009 [10], an ARR of 2.75 is low to moderate risk. The basic geotechnical strength reduction factor (ϕ_{gb}) for single isolated piles founded into the residual soil and weathered bedrock profile within the site is assessed to be 0.5.

An increase in the geotechnical strength reduction factor could be adopted by adopting the following procedures:

- Inspection of the foundation conditions by a geotechnical engineer
- Pile testing regime depending on the type and extent of the testing.

6.6.2.2 Foundation Parameters

Design values for isolated piled footing presented in Table 13 below assume that:

- Pile foundations comprise centrally loaded piles suitably embedded into Unit R2 or better stratum and constructed using appropriate construction practice considering socket roughness and cleaning of pile base.
- Serviceability limit state design is undertaken for the foundation to consider the settlement of the various foundation types and structural tolerances.
- A geotechnical reduction factor has not been applied to the below factors.
- All foundations are placed in material of similar strata to limit differential ground movement and settlement.
- Piles extend a minimum 3m below ground level for suitable overburden strength.

No structural loads are known at the time of this report, as such a settlement analysis cannot be accurately undertaken for the proposed pile foundations. Therefore, the serviceability values presented below are provided to limit settlement to <1% of pile diameter.

Table 13: Design Values for Piled Foundations

Unit	Inferred Rock Class (1) / Soil Consistency	Serviceability End Bearing Pressure (2) (MPa)	Ultimate End Bearing Pressure (3) (MPa)	Ultimate Shaft Adhesion (4) (Compression 5) within layer (MPa)	Elastic Modulus (MPa)
R2	Class V Sandstone and/or Shale	0.7	2	0.05	50
H1	Class IV Sandstone and/or Class III Shale	2	12	0.5	400
H2	Class III or better Sandstone	5	30	1.2	1000

Notes:
(1) The inferred rock classifications are based on P.J.N Pells et al [11].
(2) Serviceability bearing pressure is expected to cause settlement of <1% of footing dimension for foundations embedded in weathered rock. Serviceability end bearing pressure may be increased subject to specific foundation settlement analyses and assessment of tolerable settlement and differential settlement.
(3) At ultimate bearing pressure large settlements greater than 5% of the minimum foundation dimensions are expected.
(4) The shaft adhesion value is based on clean socket roughness of R2 [11] or better which must comprise grooves of depth 1-4mm, width greater than 2mm at spacing 50mm to 200mm
(5) For uplift loads, reduce the ultimate shaft adhesion values by 30% subject to confirmation of shaft roughness and cleanness by geotechnical engineer during the construction. Pile uplift design should also take into consideration the cone pull-out failure assuming a cone angle of 90˚ in rock utilising submerged unit weight for long-term. This should also consider the pile group affect and reduced cone volume.

Pile foundations drilled through the site residual soils and weathered bedrock could be undertaken using conventional bored pile methods. Pile socket material should be verified by a geotechnical engineer prior to placement of concrete to confirm the design parameters presented in this report.

6.6.3 Durability and Aggressivity

An assessment of aggressivity and durability of buried concrete and steel foundations has been undertaken in accordance with AS2159-2009 Piling – Design and Instillation [10]. The results obtained for soil aggressivity presented in **Table 7** were interpreted based on Tables 6.4.2(C) and 6.5.2(C) from AS2159-2009. The results are presented below in Table 14.

In general, it was concluded that the site R1 and R2 soils are generally non-aggressive to steel elements, and mildly aggressive to buried concrete elements, with some areas potentially showing moderate aggressivity due to a low pH.

Table 14: Aggressivity to Buried Concrete and Steel Elements

Location	Details			Soil Type and (Groundwater Condition)	Aggressivity to Concrete Elements	Aggressivity to Steel Elements
	Depth (m)	Origin	Unit			
BH03	2.0-2.1	Residual	R1	CLAY (B)	Mild	Non-Aggressive
BH04	1.0-1.1	Residual	R1	Sandy CLAY (B)	Moderate	Non-Aggressive
BH05	0.95-1.0	Residual	R1	CLAY (B)	Mild	Non-Aggressive
BH06	2.0-2.1	Residual	R1	SANDSTONE (B)	Mild	Non-Aggressive
BH08	6.0-6.1	XW Rock	R2	SANDSTONE (B)	Mild	Non-Aggressive
TP08	1.0-1.1	Residual	R1	Sandy CLAY (B)	Mild	Non-Aggressive

6.6.4 Site Classification

Australian Standard AS 2870-2011 [9] establishes performance requirements and specific designs for residential scale structures on various foundation conditions as well as providing guidance on the design of footing systems using engineering principles.

Area A

Area A is interpreted to generally comprise surficial filling and topsoil underlain by residual clays. No abnormal moisture conditions, loose sands/soft clays or identified landslide instability was observed within this portion of the site.

The characteristic Surface movement was calculated for depth of seasonal moisture variation of 1.8m in the typical soil profile in Area A which generally comprises up to 2.5m of Residual (Unit R1) clay soils. Based on the results of the Shrink Swell tests presented in **Table 5**, a Shrink Swell Index (I_{ss}) of 1.8% has been adopted for the residual clay profile.

The building platforms foundations will typically be constructed by cutting to a nominal depth of 1.0m; or by controlled filling with site-won clayey soils. On this basis we assumed a theoretical crack depth of soil of zero.

As such, a **Characteristic Surface Movement of 35-40mm** has been calculated for the typical site conditions in Area A, or areas constructed from controlled fill derived from Unit R1 material. This results in a Site Classification of **M – Moderately Reactive**.

Area B

Area B generally comprises extensive uncontrolled filling with some locations found to comprise very soft soils that have been significantly moisture affected. Therefore, in accordance with AS 2870-2011, Area B within the site would be classified as **Class P**. No characteristic surface movement can be calculated for the Class P site due to the variable uncontrolled filling.

6.6.5 Earthquake Sub-Soil Class

An assessment of the site sub-soil classification has been undertaken in accordance with AS1170.4-2007 Structural Design Actions – Earthquakes in Australia [12]. Based on the investigation findings, earthquake design may assume:

- A hazard factor of 0.08; and
- A site class of Class C_e – Shallow Soil Site.

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APPENDIX A: IMPORTANT INFORMATION ABOUT YOUR REPORT

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

APPENDIX B: TEST LOCATION PLAN & INTERPRETED GEOLOGICAL SECTIONS

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	AC	RT	31-05-2020

MAP PROJECTION: GDA2020 MGA ZONE 56

10 0 10 30 50

Scale (metres) 1:1000

SOURCE: NEARMAP IMAGE - 25/01/2021

drawn	AC / AW
approved	RT
date	31-05-2021
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

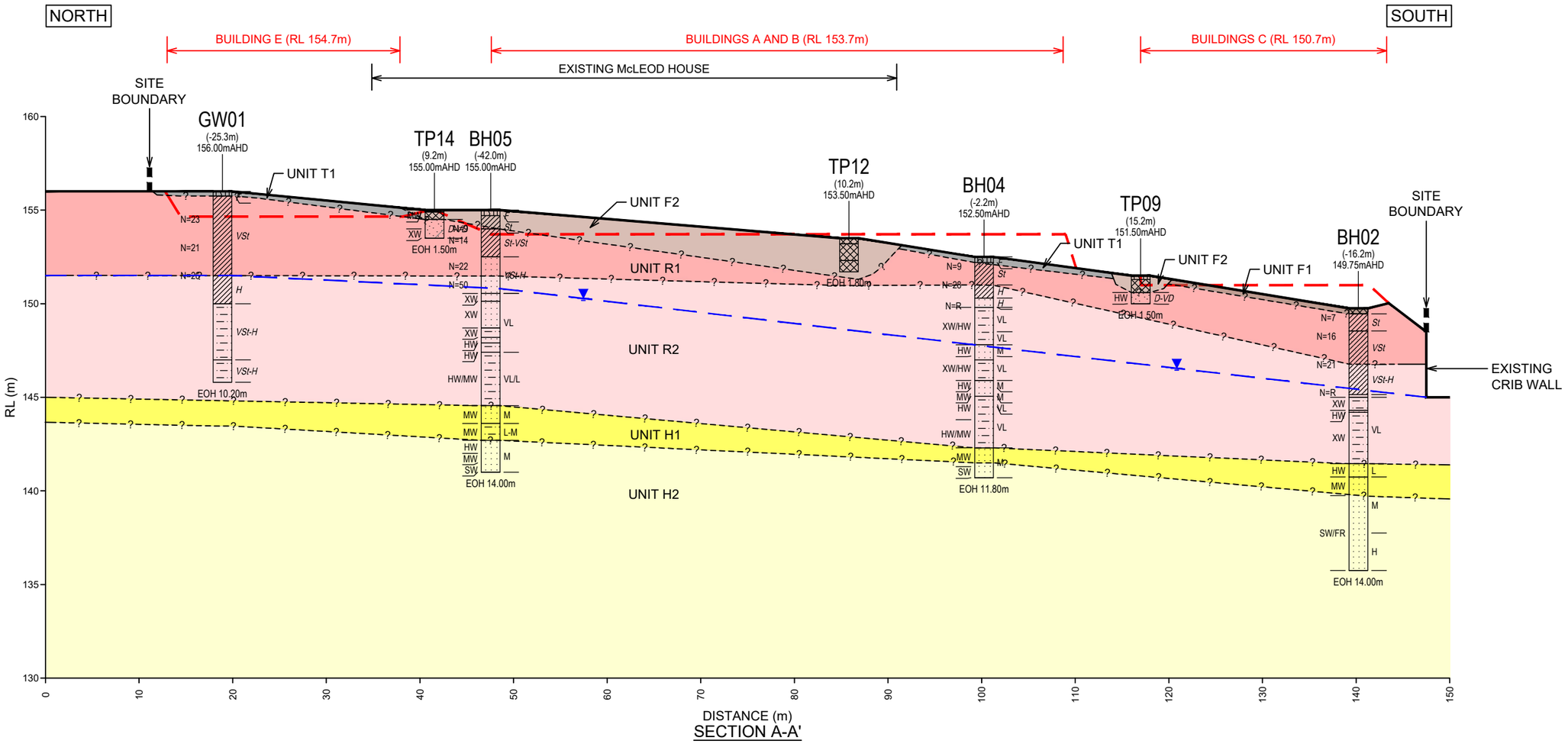
client: SCHOOLS INFRASTRUCTURE NSW - DEPARTMENT OF EDUCATION

project: THE FOREST HIGH SCHOOL
189 ALLAMBIE ROAD, ALLAMBIE HEIGHTS NSW

title: SITE INVESTIGATION LOCATIONS

project no: 754-SYDGE284698-AB | figure no: FIGURE B1 | rev: A

PLOT DATE: 31/05/2021 10:36:00 AM DWG FILE: F:\1. PROJECTS\4. SYD-GEOTECH\NCS\12. SYDGE280000\SYDGE284698 THE FOREST HIGH SCHOOL RELOCATION\12. CAD\754-SYDGE284698-AB.DWG



SECTION A-A'

LEGEND

- ASPHALT
- FILL
- CLAY
- SANDY CLAY
- NO CORE
- SILTY CLAY
- CLAYEY SAND
- SILTSTONE
- SANDSTONE
- TOPSOIL
- SANDY SILT

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- INFERRED WATER LEVEL
- APPROXIMATE BULK EARTHWORKS LEVEL

UNIT LEGEND

- UNIT T1 - TOPSOIL
- UNIT F1 - FILL
- UNIT F2 - FILL
- UNIT R1 - STIFF-VERY STIFF RESIDUAL SOIL
- UNIT R2 - HARD RESIDUAL SOIL AND EXTREMELY WEATHERED ROCK
- UNIT H1 - LOW-MEDIUM STRENGTH, MODERATELY WEATHERED SANDSTONE AND LAMINITE
- UNIT H2 - MEDIUM-HIGH STRENGTH, SLIGHTLY WEATHERED SANDSTONE

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	AC	RT	31-05-2020

Horizontal Scale (metres) 1:500

Vertical Scale (metres) 1:250

drawn	AC / AW
approved	RT
date	31-05-2021
scale	AS SHOWN
original size	A3

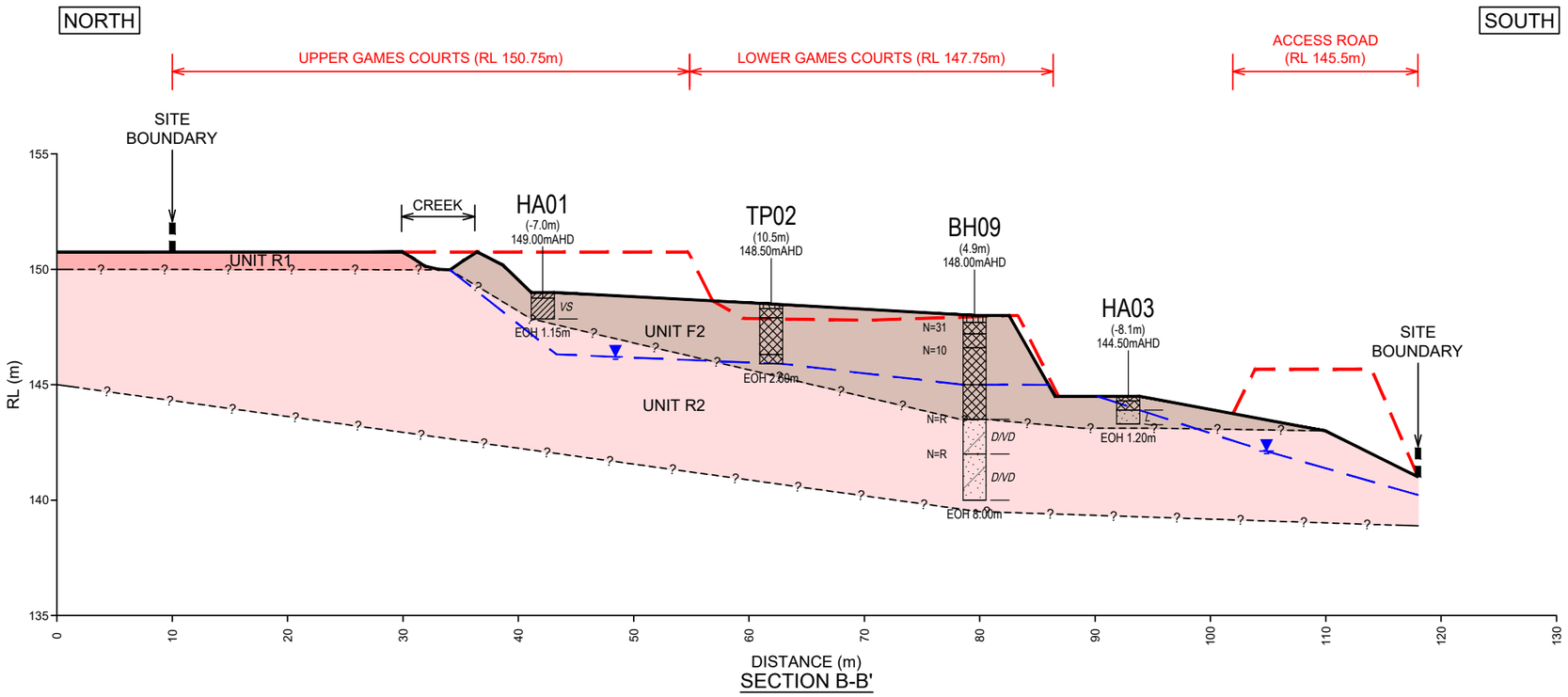
TETRA TECH COFFEY

client: SCHOOLS INFRASTRUCTURE NSW - DEPARTMENT OF EDUCATION

project: THE FOREST HIGH SCHOOL
189 ALLAMBIE ROAD, ALLAMBIE HEIGHTS NSW

title: SECTION A-A'

project no: 754-SYDGE284698-AB | figure no: FIGURE B2 | rev: A



SECTION B-B'

LEGEND

- ASPHALT
- FILL
- CLAY
- SANDY CLAY
- NO CORE
- SILTY CLAY
- CLAYEY SAND
- SILTSTONE
- SANDSTONE
- TOPSOIL
- SANDY SILT

SECTION LEGEND

- EXISTING GROUND SURFACE
- INFERRED GEOLOGICAL BOUNDARY
- INFERRED WATER LEVEL
- APPROXIMATE BULK EARTHWORKS LEVEL

UNIT LEGEND

- UNIT T1 - TOPSOIL
- UNIT F1 - FILL
- UNIT F2 - FILL
- UNIT R1 - STIFF-VERY STIFF RESIDUAL SOIL
- UNIT R2 - HARD RESIDUAL SOIL AND EXTREMELY WEATHERED ROCK
- UNIT H1 - LOW-MEDIUM STRENGTH, MODERATELY WEATHERED SANDSTONE AND LAMINITE
- UNIT H2 - MEDIUM-HIGH STRENGTH, SLIGHTLY WEATHERED SANDSTONE

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	AC	RT	31-05-2020

5 0 5 15 25
Horizontal Scale (metres) 1:500

2.5 0 5 10
Vertical Scale (metres) 1:250

drawn	AC / AW
approved	RT
date	31-05-2021
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: SCHOOLS INFRASTRUCTURE NSW - DEPARTMENT OF EDUCATION

project: THE FOREST HIGH SCHOOL
189 ALLAMBIE ROAD, ALLAMBIE HEIGHTS NSW

title: SECTION B-B'

project no: 754-SYDGE284698-AB | figure no: FIGURE B3 | rev: A

APPENDIX C: GEOTECHNICAL LOGS

SOIL DESCRIPTION EXPLANATION SHEET

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disaggregated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with AS 1726:2017 as shown in the table on Sheet 2.

PARTICLE SIZE DEFINITIONS

Components	Subdivision	Size (mm)
Boulders Cobbles		>200 63 - 200
Gravel	Coarse Medium Fine	19 - 63 6.7 - 19 2.36 - 6.7
Sand	Coarse Medium Fine	0.6 - 2.36 0.210 - 0.6 0.075 - 0.21
Silt Clay		0.002 – 0.075 < 0.002

MOISTURE CONDITION

Coarse Grained Soil

Dry (D)	Non-cohesive and free-running
Moist (M)	Soil feels cool, darked in colour. Soil tends to stick together.
Wet (W)	As for moist, with free water forming when handled.

Fine Grained Soil

Moist, dry of plastic limit ($w<W_P$)	Hard and friable or powdery
Moist, near plastic limit ($w\approx W_P$)	Can be moulded at a moisture content approximately equal to the plastic limit.
Moist, wet of plastic limit ($w>W_P$)	Soils usually weakened and free water forms on hands when handling.
Wet, near liquid limit ($w\approx W_L$)	Near liquid limit.
Wet, wet of liquid limit ($w>W_L$)	Wet of liquid limit.

CONSISTENCY OF COHESIVE SOILS

Term (Abbreviation)	Indicative undrained shear strength s_u (kPa)	Field guide
Very Soft (VS)	<12	Soil exudes between fingers when squeezed in hand.
Soft (S)	12 – 25	Soil can be moulded by light finger pressure.
Firm (F)	25 – 50	Soil can be moulded by strong finger pressure.
Stiff (St)	50 – 100	Soil cannot be moulded by fingers.
Very Stiff (VSt)	100 – 200	Soil can be indented by thumb nail.
Hard (H)	>200	Soil can be indented with difficulty by thumb nail.
Friable (Fb)	–	Soil can be easily crumbled or broken into small pieces by hand.

RELATIVE DENSITY OF NON-COHESIVE SOILS

Term (Abbreviation)	Density index (%)
Very Loose (VL)	Less than 15
Loose (L)	15 – 35
Medium Dense (MD)	35 – 65
Dense (D)	65 – 85
Very Dense (VD)	Greater than 85

MINOR COMPONENTS

Term	Assessment Guide	Proportion of minor component in:
Trace	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: Fines - <5%, Accessory coarse fraction - <15% Fine grained soils: sand/gravel <15%
With	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: Fines - 5 to 12%, Accessory coarse fraction – 15 to 30% Fine grained soils: sand/gravel 15 to 30%

SOIL STRUCTURE AND CEMENTATION

Zoning		Cementation	
Layer	Zone is continuous across exposure or sample.	Weakly cemented	Easily disaggregated by hand in air or water.
Lense	Discontinuous layer of different material, with lenticular shape.	Moderately cemented	Effort is required to disaggregate the soil by hand in air or water.
Pocket	Irregular inclusion of different material.		

GEOLOGICAL ORIGIN

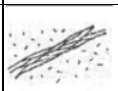
Residual soil	Structure and fabric of parent rock not visible.
Extremely weathered material	Structure and/or fabric of parent rock is visible.
Alluvial soil	Deposited by streams and rivers.
Estuarine soil	Deposited in coastal estuaries, including sediments carried by inflowing rivers and streams, or tidal currents.
Marine soil	Deposited in a marine environment
Lacustrine soil	Deposited in freshwater lakes
Aeolian soil	Carried and deposited by wind
Colluvial soil	Deposited on slopes (transported downslope by gravity, with or without assistance of water).
Topsoil	Mantle of surface or near surface material, often defined by high levels of organic material.
Fill	Any material which has been placed by anthropogenic processes. Fill may be significantly more variable between tested locations than naturally occurring soils.

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)							GROUP SYMBOL	SOIL NAME
COARSE GRAINED SOIL More than 65% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVEL More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVEL (Fines less than 5%)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength.			GW	GRAVEL
				Predominantly one size or a range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength.			GP	GRAVEL
			GRAVEL with FINES (Fines greater than 12%)	'Dirty' materials with excess of non-plastic fines (for identification procedures see ML below).			GM	Silty GRAVEL
				'Dirty' materials with excess of plastic fines (for identification procedures see CL below).			GC	Clayey GRAVEL
		SAND More than half of coarse fraction is smaller than 2.36	CLEAN SAND (Fines less than 5%)	Wide range in grain sizes and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength.			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength.			SP	SAND
			SAND with FINES (Fines greater than 12%r)	'Dirty' materials with excess of non-plastic fines (for identification procedures see ML below).			SM	Silty SAND
				'Dirty' materials with excess of plastic fines (for identification procedures see CL below).			SC	Clayey SAND
FINE GRAINED SOIL More than 35% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm					
		SILT & CLAY Liquid limit less	DRY STRENGTH	DILATANCY	TOUGHNESS			
			None to low	Slow to rapid	Low		ML	SILT
			Medium to high	None to slow	Medium		CL, CI	CLAY
			Low to medium	Slow	Low		OL	Organic SILT
		SILT & CLAY Liquid limit	Low to medium	None to slow	Low to medium		MH	SILT
			High to very high	None	High		CH	CLAY
			Medium to high	None to very slow	Low to medium		OH	Organic CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				PT	Peat

● Low plasticity – Liquid Limit W_L less than 35%. ● Medium plasticity –W_L between 35% and 50%. ● High plasticity – W_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
Parting	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (e g. bedding). May be open or closed.	
Fissure	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. May include desiccation cracks.	
Sheared Seam	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
Sheared Surface	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect	

TERM	DEFINITION	DIAGRAM
Softened Zone	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere	
Tube	Tubular cavity. May occur singly or as one of a large number of separate or interconnected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter. Origins include root holes, animal burrows, tunnel erosion.	
Tube cast	An infilled tube. The infill may be uncemented or weakly cemented soil or have rock properties.	
Infilled Seam	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open defects.	

ROCK DESCRIPTION EXPLANATION SHEET

The descriptive terms used by Tetra Tech Coffey are given below. They are broadly consistent with Australian Standard AS1726:2017.

DEFINITIONS: Rock material, defect, structure and rock mass are defined as follows:

Rock material	In engineering terms rock material is any naturally occurring aggregate of minerals and/or organic materials that cannot be disaggregated by hand in air or water without prior soaking. Rock material is intact rock that is bounded by defects. Material which can be disaggregated or remoulded should be described as a soil.
Defect	Discontinuity, fracture, break or void in the material or materials across which there is little or no tensile strength.
Structure	Nature and configuration of the different defects within the rock mass and their relationship with each other.
Rock mass	It is the entirety of the system formed by all of the rock material and all of the defects. That is, it is a body of material which is not effectively homogeneous.

MATERIAL DESCRIPTIVE TERMS:

Rock name	Simple rock names are used rather than precise geological classification.
Particle size	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
Fabric	When grains show an alignment, a preferred orientation or a layering (e.g. bedding or lamination for sedimentary rocks, and foliation or cleavage for metamorphic rocks) the terms used are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on strength properties.
Distinct	Layering or fabric is easily visible. Rock may break more easily parallel to the fabric.

CLASSIFICATION OF MATERIAL WEATHERING

Term	Abbreviation	Definition
Residual Soil	**RS**	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible. Soil has not been significantly transported.
Extremely Weathered	**XW**	Material is weathered to such an extent that it has soil properties, i.e. it either disaggregates or can be remoulded in water. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered[1]	**HW**	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of weathering products in pores.
Moderately Weathered[1]	**MW**	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is no longer recognisable. Little or no change of strength from fresh rock.
Slightly Weathered	**SW**	Rock is partially discoloured with staining or bleaching adjacent to defects, but shows little or no change of strength from fresh rock.
Fresh	**FR**	Rock shows no sign of decomposition of individual minerals or colour changes.

Notes on Weathering:

1. The term 'Distinctly Weathered' (DW) may be used where it is not practicable (or it is judged that there is no advantage in making such a distinction) to distinguish between 'Highly Weathered' and 'Moderately Weathered'. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'.
2. Where physical and chemical changes of the rock material are caused by hot gases or liquids at depth (process called alteration) the term 'altered' may be substituted for 'weathering' to give the abbreviations XA, HA, MA, SA and DA.

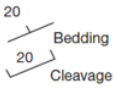
ROCK MATERIAL STRENGTH TERMS

Term (Abbreviation)	Guide to Strength: Point Load Strength Index, $I_{s(50)}$ (MPa)	Guide to Strength: Field Assessment
Very Low (VL)	0.03 - 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; too hard to cut a triaxial sample by hand; pieces up to 30mm thick can be broken by finger pressure.
Low (L)	0.1 - 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium (M)	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High (H)	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High (VH)	3 to 10	Hand specimen breaks after more than one blow; rock rings under hammer.
Extremely High (EH)	More than 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes on Rock Material Strength:

1. Material with strength less than 'Very Low' should be described using soil characteristics.
2. The method of measuring the $I_{s(50)}$ should be in accordance with AS 4133.4.2.
3. The rock strength should be determined perpendicular to any anisotropy in the rock. High strength anisotropic rocks may readily break parallel to the planar anisotropy.
4. Although AS1726:2017 provides a basis for rock strength terms based on Unconfined Compressive Strength (UCS), the ratio between UCS and $I_{s(50)}$ may vary from less than 10 to over 30 depending on the rock type and overall strength. The UCS/$I_{s(50)}$ strength ratio should be determined for each rock material.
5. The rock strength classification using $I_{s(50)}$ above should be considered indicative only. The rock strength classified in accordance with AS1726:2017 may be higher or lower if UCS results are available.

COMMON ROCK DEFECT TYPES

Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering (e.g. bedding) or a planar anisotropy in the rock material (e.g. cleavage). May be open or closed.			 (Note 2)
Joint	A surface or crack with no apparent shear displacement and across which the rock has little or no tensile strength, but which is not parallel or sub-parallel to layering or to planar anisotropy in the rock material. May be open or closed.			 (Note 2)
Sheared Zone/Seam (Note 3)	Zone of rock material with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided and which shows evidence of shear displacement.			
Crushed Seam (Note 3)	Seam of soil material with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock material which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil material usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams up to 1mm thick may be described as veneer or coating on a joint surface.			
Extremely Weathered Seam	Seam of soil material, often with gradational boundaries. Formed by weathering of the rock material in place.			

Notes on Defects:

1. Usually borehole logs show the true dip of defects, and face sketches and sections show the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones/seams, sheared surfaces and crushed seams are generally faults in geological terms.

DEFECT SHAPE TERMS

Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

DEFECT ROUGHNESS TERMS

Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Smooth	Smooth to touch. Few or no surface irregularities.
Polished	Shiny smooth surface.
Slickensided	Grooved or striated surface, usually polished.

DEFECT COATING TERMS

Clean	No visible coating.
Stained	No visible coating but surfaces are discoloured.
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy.
Coating	A visible coating up to 1mm thick. Thicker soil material should be described using appropriate defect terms (e g. infilled seam). Thicker rock strength material should be described as a vein.

DIMENSION OF DEFECTS

Spacing, length, openness and thickness

The spacing, length, aperture (openness), and seam thickness should generally be described directly in millimetres or metres.

Block Shape

Where it is considered significant, block shape (e.g. tabular, prismatic, columnar) should be described using the terms in Table 23 of AS 1726:2017.

C.1 BOREHOLE LOGS, CORE PHOTOS AND WELL DETAILS

coffey
A TETRA TECH COMPANY

Engineering Log - Borehole

Borehole ID.	**BH01**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**AC**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,331; N: 6,263,387 (MGA94) | surface elevation: 151.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 mm

drilling information | **material substance**

method & support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
AD/T CASING	1 2 3		E	151			GM	**ASPHALT**: 50mm thick.	D				**WEARING COURSE**
							CL	**FILL: Gravelly SAND**: fine to coarse grained, grey, gravels are fine grained, sub-angular with silt.	<Wp	St			**FILL**
			SPT 3, 4, 6 N*=10					**CLAY**: medium plasticity, pale grey-pale brown, trace fine to medium grained sand.					**RESIDUAL SOIL** PID: 0.1 ppm
			E	150	1.0		CL	**Sandy CLAY**: medium plasticity, pale grey, sand is fine to medium grained.	<Wp	St - VSt	>>		PID: 0.7 ppm
			SPT 5, 11, 12 N*=23				CL	**Sandy CLAY**: medium plasticity, pale grey mottled brown, sand is fine to medium grained.	<Wp	VSt - H	>>		**EXTREMELY WEATHERED SANDSTONE**
			D	149	2.0						>>		
								Borehole BH01 continued as cored hole					
				148	3.0								
				147	4.0								
				146	5.0								
				145	6.0								
				144	7.0								

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH01**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**AC**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,331; N: 6,263,387 (MGA94) | surface elevation: 151.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	100% return	151									
		150	1.0								
		149	2.0		started coring at 2.50m						
					NO CORE: 1.14 m				24%		
		148	3.0		**Silty CLAY**: low to medium plasticity, pale grey, trace fine grained sand, (XW laminite), stiff to very stiff.	XW					HP 125 kPa HP 250 kPa
		147	4.0		**CLAYEY SAND**: brown mottled grey-red, sand is fne to medium grained, (XW sandstone lens).	XW			100%		HP 550 kPa HP 425 kPa
		146	5.0		**Silty CLAY**: low to medium plasticity, pale grey, trace fine grained sand, laminated at 0°-3°, (XW laminite), very stiff to hard.	XW					HP >600 kPa HP 600 kPa HP 475 kPa HP 550 kPa
		145	6.0						100%		HP 600 kPa HP 375 kPa
		144	7.0								HP 425 kPa
					Silty CLAY: low plasticity, pale grey mottled red-brown, with fine grained sand, very stiff to hard (XW laminite).	XW					SM, Clayey sand, 20 mm

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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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH01**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**AC**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,331; N: 6,263,387 (MGA94) | surface elevation: 151.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	100% return	143			**Silty CLAY**: low plasticity, pale grey mottled red-brown, with fine grained sand, very stiff to hard (XW laminite). *(continued)* 8.00 m: becoming brown	XW					HP 450 kPa HP 600 kPa
		142	9.0		**LAMINITE**: dark grey, very thinly bedded at 0°-5°.	HW		a=0.02	100%		PT, IR, RO, VN - Clay, 1 mm
		141	10.0					a=0.03 d=0.03			
		140	11.0					a=0.03 d=0.05 a=0.03 d=0.05			
					SANDSTONE: fine to medium grained, brown-red-grey mottling, distinctly bedded at 0°-10°.	HW					SM, 0°, PL, Sandy clay SM, 45°, PL, Clay, 10 mm SM, 0°, PL, Sandy clay, 15 mm PT, 0°, UN, RO, VN PT, 0°, UN, RO, VN
		139	12.0		**SANDSTONE**: medium grained, pale grey, distinctly bedded at 0°-10°.	MW / SW		a=0.15 d=0.05 a=0.06 d=0.06 a=0.56 d=0.35			SM, 5°, PL, Sandy clay, 10 mm
		138	13.0						78%		PT, 0°, UN, RO, VN - Sandy clay SM, 0°, Sandy clay, 20 mm PT, 0°, PL, RO, CN
		137	14.0					a=0.29 d=0.12 a=0.16 d=0.10 a=0.09 a=0.07 d=0.07			PT, 5°, PL, RO, CN PT, 15°, PL, RO, CN PT, 10°, UN, RO, CN PT, 0°, UN, VN - Sandy clay
		136	15.0		Borehole BH01 terminated at 14.34 m Target stratum						

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)
HA hand auger

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 - 12.00 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH01

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH01 12.00 - 14.34 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH01

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH02**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,395; N: 6,263,360 (MGA94) | surface elevation: 149.8 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 mm

drilling information | **material substance**

method & support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
AD/T CASING	1 2 3	Not Observed	E					**ASPHALT**: 20mm thick.	D				**WEARING COURSE**
			E				CI	**FILL: SILTY SAND**: fine to medium grained, mottled brown, trace fine gravel, sub-angular.	<Wp	St			**FILL** PID: 0.4 ppm
			SPT 2, 4, 3 N*=7	149				**CLAY**: medium plasticity, pale grey mottled brown, sand is fine to medium grained, trace rootlets and fine gravel (sub-angular extremely weathered sandstone) minor sand lenses.					**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL** PID: 0.2 ppm
			E		1.0								PID: 0.1 ppm
							CL	**Sandy CLAY**: medium plasticity, pale grey, sand is fine to medium grained, trace fine gravel (extremely weathered sandstone).	<Wp	VSt			
			SPT 7, 6, 10 N*=16	148									
			E		2.0								PID: 0 ppm
				147									
					3.0					VSt - H			
			SPT 4, 8, 13 N*=21	146									
					4.0								
			SPT 16, 30 HB N*=R	145				**LAMINITE**: grey-pale grey.	D				**EXTREMELY WEATHERED MATERIAL**
								Borehole BH02 continued as cored hole					
					5.0								
				144									
					6.0								
				143									
					7.0								
				142									

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH02**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,395; N: 6,263,360 (MGA94) | surface elevation: 149.8 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		149	1.0								
		148	2.0								
		147	3.0								
		146	4.0								
					started coring at 4.75m						
NMLC	Not Observed	145	5.0		**LAMINITE**: dark grey.	XW			85%		SM, 15°, PL, RO, CO, 10 mm
		144	6.0		**SANDSTONE**: fine to medium grained, pink-brown, silt lenses. **LAMINITE**: dark grey, minor silt lenses, distinct bedding ~10°, with some carbonacous laminations.	HW XW					JT, 10°, PL, SO, VN, <1 mm JT, 10°, PL, SO, CO, 2 mm JT, 10°, CU, RO, CO, 2 mm
		143	7.0						80%		HP 600 kPa
		142									HP 250 kPa
											JT, 10°, PL, SO, VN, <1 mm

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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH02**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**27 Apr 2021**
principal:	
date completed:	**27 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,395; N: 6,263,360 (MGA94) | surface elevation: 149.8 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	141	9.0		XW		a=0.04 d=0.05		HP 550 kPa HP 550 kPa
					SANDSTONE: fine to medium grained, grey, distinct bedding ~10°.	HW		a=0.14	80%		JT, 5°, PL, RO, VN, closed
		140	10.0		**SANDSTONE**: fine to medium grained, grey, indistinct bedding 0-10°.	MW		a=0.68 d=0.62			PT, 10°, PL, RO, CO - Sandy clay, 5 mm PT, 10°, PL, RO, SN, closed PT, 5°, PL, RO, SN, closed
						SW / FR		a=0.80 a=0.96	90%		PT, 5°, PL, RO, SN, closed JT, 15°, PL, RO, VN, closed
		139	11.0					a=0.69 d=0.75			PT, 10°, PL, RO, SN, closed PT, 5°, PL, RO, VN, 2 mm
		138	12.0					a=1.16 d=1.15			PT, 5°, PL, RO, SN, closed
		137	13.0					a=1.03 d=1.20	98%		PT, 5°, PL, RO, SN, closed
								a=1.02 d=1.33			JT, 5°, PL, VR, VN, 2 mm
		136	14.0		Borehole BH02 terminated at 14.00 m Target stratum			a=1.26 d=0.83			
		135	15.0								
		134									

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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)
HA hand auger

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

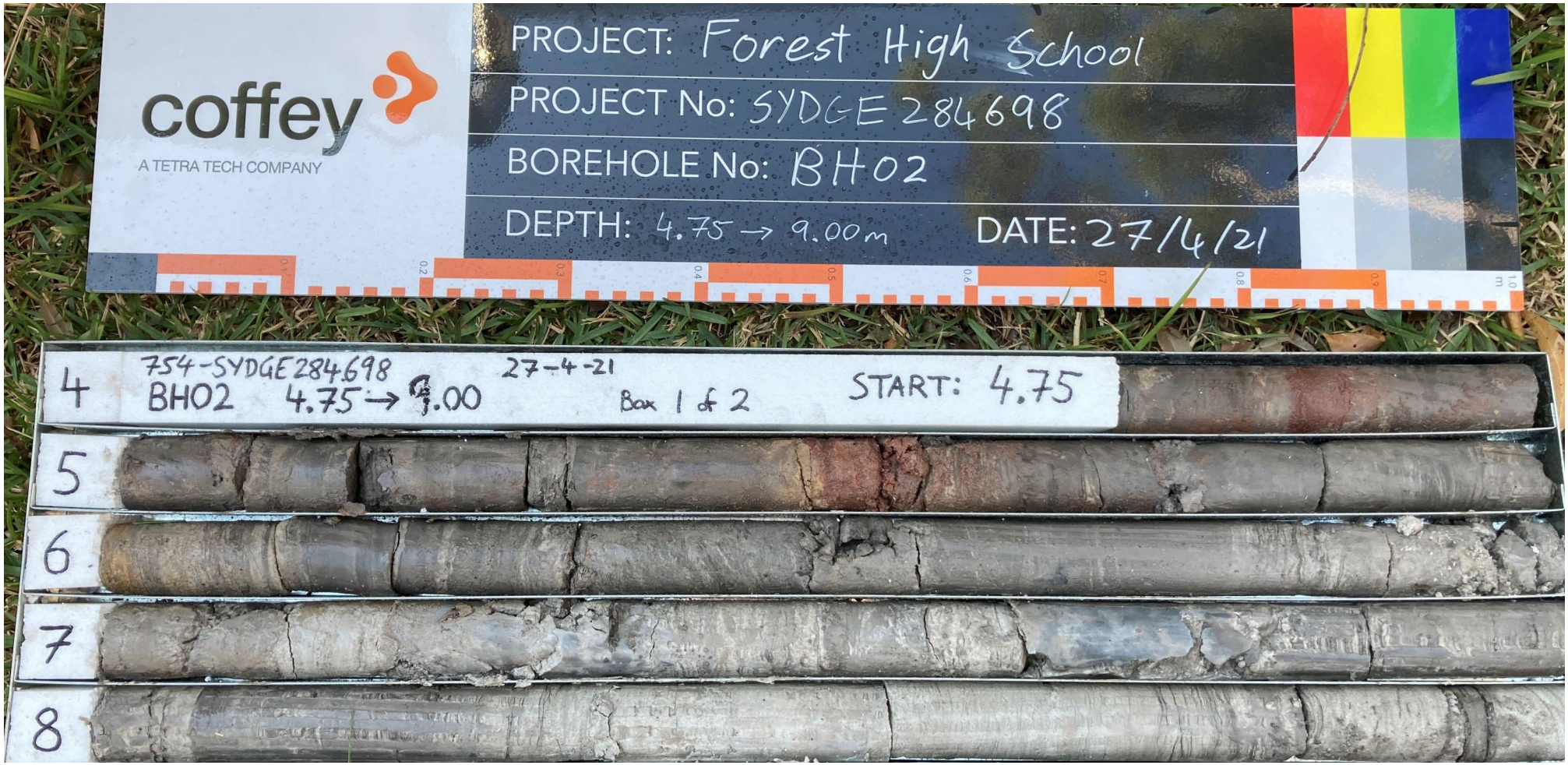
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

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 4.75 - 9.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH02

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH02 9.00 - 14.00 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH02

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH03**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,440; N: 6,263,375 (MGA94) | surface elevation: 150.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T		Not Observed	E	150			SM	**ASPHALT**: 30mm thick.	D				**WEARING COURSE**
								FILL: SILTY SAND: fine to medium grained, grey, trace fine gravel (siltstone), no staining, no odour.	D				**FILL** PID: 0.6 ppm No odour or staining
			E SPT 3, 4, 6 N*=10				CL	**CLAY**: medium plasticity, grey, trace fine to medium grained sand, trace extremely weathered sandstone/laminite, no staining, no odour.	<Wp	St	×		**RESIDUAL SOIL**
				149	1.0								No odour or staining
			SPT 6, 15, 18 N*=33							H			
			E	148	2.0						×		PID: 0 ppm
			E SPT 8, 23, 30/100mm HB N*=R	147	3.0			3.0 m: increasing XW sandstone/laminite			×		PID: 0 ppm
				146	4.0								
CASING			SPT 17, 30/50mm HB N*=R					Borehole BH03 continued as cored hole					
				145	5.0								
				144	6.0								
				143	7.0								

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH03**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	***The Forest High School***
logged by:	**PP**
location:	***189 Allambie Road, Allambie Heights, NSW***
checked by:	**RT**

position: E: 337,440; N: 6,263,375 (MGA94) | surface elevation: 150.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		150									
		149	1.0								
		148	2.0								
		147	3.0								
		146	4.0		started coring at 4.70m						
NMLC	Not Observed	145	5.0		**LAMINITE**: pale grey mottled brown, indistinct bedding, interbedded fine to medium grained sandstone, remoulds to silty clay low plasticity with fine to medium grained sand.	XW		a=0.05 a=0.05 d=0.05 a=0.04 d=0.01 a=0.04 d=0.05 a=0.02 d=0.26	100% 93%		HP 350 kPa HP 500 kPa JT, 60°, PL, RO, CO, <1 mm
		144	6.0								
		143	7.0								
					SANDSTONE: fine to medium grained, pale grey to red-brown, distinctly bedded.	HW / MW			95%		

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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH03**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,440; N: 6,263,375 (MGA94) | surface elevation: 150.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	142			**SANDSTONE**: fine to medium grained, pale grey to red-brown, distinctly bedded. *(continued)*	HW / MW					SM, 15°, PL, RO, 100 mm
					SANDSTONE: fine to medium grained, pale grey, indistinctly bedded at 0-15°.	SW / FR		a=0.66 d=0.64 a=0.60 d=0.58			
		141	9.0						95%		SM, 5°, PL, RO, 5 mm
								a=0.39 d=0.25			PT, 5°, PL, RO, VN, closed
		140	10.0								PT, 10°, PL, RO, SN, closed
								d=0.33 a=0.64			
		139	11.0								
								a=1.03 d=1.07	100%		PT, 5°, PL, RO, SN, closed
		138	12.0								
								a=1.25 d=1.05			
		137	13.0		Borehole BH03 terminated at 12.90 m Target depth						
		136	14.0								
		135	15.0								

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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)
HA hand auger

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

BH03 4.70 - 9.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH03

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH03 9.00 - 12.90 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH03

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH04**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	**The Forest High School**
logged by:	**PP/RF**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,385; N: 6,263,402 (MGA94) | surface elevation: 152.5 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T CASING		Not Observed	E E SPT 1, 4, 5 N*=9 E SPT 6, 12, 16 N*=28 E E SPT 30/100mm N*=R	152 151 150 149 148 147 146 145	1.0 2.0 3.0 4.0 5.0 6.0 7.0		CL	**TOPSOIL: Sandy CLAY**: low plasticity, dark brown, with rootlets and fine to medium sand, trace fine gravel, sub-angular to angular, moderately weathered sandstone/laminite fragments. **Sandy CLAY**: medium plasticity, pale brown mottled grey, sand is fine to medium grained, trace rootlets and extremely weathered sandstone. 1.5 m: increasing sand and extremely weathered sandstone with depth **SANDSTONE**: fine to medium grained, pale grey, remoulds to sandy clay, low plasticity, sand is fine to medium grained. Borehole BH04 continued as cored hole	<Wp ~Wp <Wp	F St H H			**TOPSOIL / FILL** PID: 0.9 ppm **RESIDUAL SOIL** No odour or staining PID: 0.3 ppm PID: 0.3 ppm No odour or staining PID: 0.4 ppm **EXTREMELY WEATHERED MATERIAL**

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH04**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	***The Forest High School***
logged by:	**PP/RF**
location:	***189 Allambie Road, Allambie Heights, NSW***
checked by:	**RT**

position: E: 337,385; N: 6,263,402 (MGA94) | surface elevation: 152.5 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		152	1.0		started coring at 2.70m						
NMLC	Not Observed	151	2.0		**LAMINITE**: grey mottled red-brown, indistinct bedding 5°-10°, with fine to medium grained red sandstone lenses.	XW / HW		a=0.10 d=0.07 a=0.04 d=0.05 a=0.04 d=0.04	98%		
		150	3.0								
		149	4.0								
		148	5.0		**SANDSTONE**: fine to medium grained, red-brown, indistinct bedding 5°.	HW		a=0.67 d=0.41			PT, 5°, PL, RO, VN, closed
		147	6.0		**LAMINITE**: grey with dark grey, laminations, indistinct bedding 5°, with fine to medium grained sandstone lenses.	XW / HW		a=0.03 d=0.03			
		146	7.0		**SANDSTONE**: fine to coarse grained, grey, red-brown, indistinct bedding 5°.	HW / MW		a=1.43 d=0.98	96%		JT, 5°, PL, RO, VN, closed JT, 60 - 90°, IR, RO, SN JT, RO, SN, curved JT, 15°, PL, RO, SN
		145			**LAMINITE**: grey with dark grey, laminations, indistinct bedding 5°.	HW					

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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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH04**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**28 Apr 2021**
principal:	
date completed:	**28 Apr 2021**
project:	**The Forest High School**
logged by:	**PP/RF**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,385; N: 6,263,402 (MGA94) | surface elevation: 152.5 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	144	9.0		**LAMINITE**: grey with dark grey, laminations, indistinct bedding 5°. *(continued)*	HW		a=0.03 d=0.04	96%		
						HW / MW		a=0.03 d=0.03			
		143			9.70 m: increasing sand			a=0.08 d=0.03			PT, 5°, PL, SO, VN, closed
			10.0								PT, 5°, PL, RO, VN, closed
					SANDSTONE: fine to medium grained, grey with dark grey, laminations, indistinct bedding 5°.	MW		a=0.62 d=0.10	90%		PT, 5°, PL, RO, VN, closed PT, 5°, PL, SO, VN, closed
		142						a=0.37 d=0.45			SM, 5°, PL, SO, Silty clay, 20 mm
			11.0								PT, 5°, PL, RO, VN, closed PT, 5°, PL, RO, VN, closed
		141				SW		a=0.91 d=0.70			
								d=0.68			
			12.0		Borehole BH04 terminated at 11.80 m Target stratum						
		140									
			13.0								
		139									
			14.0								
		138									
			15.0								
		137									

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)
HA hand auger

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 2.70 - 7.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH04

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH04 7.00 - 11.80 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH04

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH05**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP/MR**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,429; N: 6,263,450 (MGA94) | surface elevation: 155.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 mm

drilling information | **material substance**

method & support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
AD/T, CASING	1 2 3	Not Observed		155				**TOPSOIL: Silty CLAY**: low plasticity, dark brown, with rootlets and organic fibres.	<Wp	F			**TOPSOIL**
							Cl	**CLAY**: medium plasticity, brown mottled grey, trace rootlets, fine to medium sand and fine gravel, moderately weathered laminite/sandstone.	<Wp	St			**RESIDUAL SOIL** PID: 0.6 ppm no odours or staining
			SPT 3, 4, 5 N*=9	154	1.0		Cl	**CLAY**: high plasticity, brown mottled grey, trace rootlets, fine to medium sand and fine gravel, extremely weathered sandstone.	~Wp	St - VSt			PID: 1.4 ppm PID: 0.3 ppm
			SPT 4, 6, 8 N*=14	153	2.0								no odours or staining
			SPT 5, 10, 12 N*=22	152	3.0			**SANDSTONE**: red-brown mottled grey, very low strength, remoulds low plasticity sandy clay, fine to medium grained sand.	<Wp	VSt - H			**EXTREMELY WEATHERED MATERIAL** no odours or staining
			SPT 10, 20, 30 N*=50	151	4.0								
				150	5.0			Borehole BH05 continued as cored hole					
				149	6.0								
				148	7.0								

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH05**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
date started:	***29 Apr 2021***
principal:	
date completed:	***29 Apr 2021***
project:	***The Forest High School***
logged by:	***PP/MR***
location:	***189 Allambie Road, Allambie Heights, NSW***
checked by:	***RT***

position: E: 337,429; N: 6,263,450 (MGA94) | surface elevation: 155.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		155			started coring at 4.45m						
NMLC	Not Observed	154	1.0		**SANDSTONE**: fine to medium grained, pale grey, remoulds to low plasticity sandy clay.	XW					HP >400 kPa
		153	2.0		**SANDSTONE**: fine to medium grained, red-brown, indistinct bedding 5°, interbedded siltstone.	XW	X OX	a=0.04 a=0.11 d=0.05	95%		5°, PL, RO, VN, closed SM, 10°, PL, RO, 20 mm SM, 10°, PL, RO, 30 mm
		152	3.0		**LAMINITE**: grey-brown to red-brown, indistinct bedding 5°, minor sand lenses.	XW	X	a=0.04 d=0.05			PT, 5°, PL, SO, VN, closed
		151	4.0		**SANDSTONE**: fine to medium grained, red-brown, indistinct bedding 5°, interbedded siltstone.	HW					JT, 10°, PL, RO, VN, <1 mm
		150	5.0		**LAMINITE**: red-brown, indistinct bedding 5°, minor sand lenses.	HW					PT, 10°, PL, RO, VN, 2 mm
		149	6.0				X	a=0.06 d=0.06	100%		
		148	7.0		**LAMINITE**: grey, distinct bedding 5°, with moderately weathered sandstone lenses.	HW / MW	X	a=0.08 d=0.11			

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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH05**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP/MR**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,429; N: 6,263,450 (MGA94) | surface elevation: 155.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	147			**LAMINITE**: grey, distinct bedding 5°, with moderately weathered sandstone lenses. *(continued)*	HW / MW		a=0.04 d=0.03 a=0.14 d=0.03			
		146	9.0					a=0.11 d=0.05			PT, 5°, PL, RO, VN
		145	10.0								
		144	11.0		**SANDSTONE**: fine to medium grained, pale grey with, dark grey siltstone lenses. 10.50 m: increasing sand	MW		a=0.58	100%		JT, 10°, CU, RO, VN
					LAMINITE: grey, distinctly bedded at 5°, with grey moderately weathered sandstone lenses.	MW					SM, 5°, 50 mm
		143	12.0					a=0.71 d=0.06			PT, 5°, PL, SO, SN PT, 5°, PL, RO, VN
					SANDSTONE: fine to medium grained, pale grey, indistinct bedding 10°, minor silt lenses.	HW					
		142	13.0			MW		a=0.63 d=0.70			SM, 5 - 10°, PL, 110 mm
						SW					PT, 100°, PL, RO, VN
		141	14.0					a=0.98 d=1.04			
					Borehole BH05 terminated at 14.00 m Target depth						
		140	15.0								

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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)
HA hand auger

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 4.45 - 9.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH05

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH05 9.00 - 14.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH05

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH06**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,310; N: 6,263,409 (MGA94) | surface elevation: 150.8 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
AD/T CASING			E					**ASPHALT**: 30mm thick.	D				**WEARING COURSE**
			E				CI	**FILL: SILTY SAND**: fine to medium grained, dark grey-brown, traces medium plasticity clay and fine gravel (angular to subangular, moderately weathered siltstone).	<Wp	St / VSt			**FILL** PID: 0.3 ppm
			SPT 3, 7, 9 N*=16	150				**CLAY**: medium plasticity, pale grey mottled brown, traces fine to medium sand and extremely weathered sandstone.					**RESIDUAL SOIL** PID: 0.2 ppm
			E		1.0								
			SPT 4, 14, 17 N*=31	149				**SANDSTONE**: fine to medium grained, pale grey mottled red-brown, extremely weathered, very low strength, remoulds to clayey sand.	<Wp	H			**EXTREMELY WEATHERED MATERIAL** PID: 0.6 ppm
			E		2.0								
				148									
			SPT 17, 30 N*=R		3.0								
				147									
					4.0								
								Borehole BH06 continued as cored hole					
				146									
					5.0								
				145									
					6.0								
				144									
					7.0								
				143									

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH06**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
date started:	***29 Apr 2021***
principal:	
date completed:	***29 Apr 2021***
project:	***The Forest High School***
logged by:	***PP***
location:	***189 Allambie Road, Allambie Heights, NSW***
checked by:	***RT***

position: E: 337,310; N: 6,263,409 (MGA94) | surface elevation: 150.8 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		150	1.0								
		149	2.0								
		148	3.0								
		147	4.0		started coring at 4.12m						
NMLC		146	5.0		**SANDSTONE**: fine to medium grained, red-brown mottled grey, remoulds to low plasticity sandy clay.	XW		a=0.07 d=0.08	90%		
		145	6.0		**LAMINITE**: grey-brown, minor sand lenses, indistinct bedding 5°, remoulds to low plasticity silty clay.	XW / HW		a=0.05 d=0.10	100%		JT, 5°, PL, RO, VN
		144	7.0		**LAMINITE**: grey, minor sand lenses, indistinct bedding 5°, remoulds to low plasticity silty clay.	HW		a=0.06 d=0.06 a=0.05 d=0.04	100%		
		143									

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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)
HA hand auger

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

coffey
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Engineering Log - Cored Borehole

Borehole ID.	**BH06**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,310; N: 6,263,409 (MGA94) | surface elevation: 150.8 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC		142	9.0		**LAMINITE**: grey, minor sand lenses, indistinct bedding 5°, remoulds to low plasticity silty clay. *(continued)*	HW		a=0.06 d=0.07	100%		
		141						d=0.10			
			10.0					a=0.07 d=0.10			
		140							100%		
			11.0								
		139						a=0.04 d=0.06			
			12.0		**SANDSTONE**: fine to medium grained, pale grey, indistinct bedding 5°.	XW HW MW		a=0.13 d=0.16			JT, 5°, PL, RO, VN JT, 5 - 15°, CU, RO, VN PT, 5°, PL, RO, VN
		138									
			13.0								SM, 5°, PL, RO, 25 mm SM, 5°, PL, RO, 10 mm
								a=0.33 d=0.23			JT, 5°, PL, RO, VN
		137						a=0.37 d=0.28			
			14.0			SW / FR			97%		
								a=0.46 d=0.53			
		136									JT, 10°, UN, RO, VN PT, 5°, PL, RO, VN
			15.0					a=1.23 d=1.04			
		135			Borehole BH06 terminated at 15.75 m Target depth						

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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)
HA hand auger

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

BH06 4.12 - 9.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH06

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH06 9.00 - 14.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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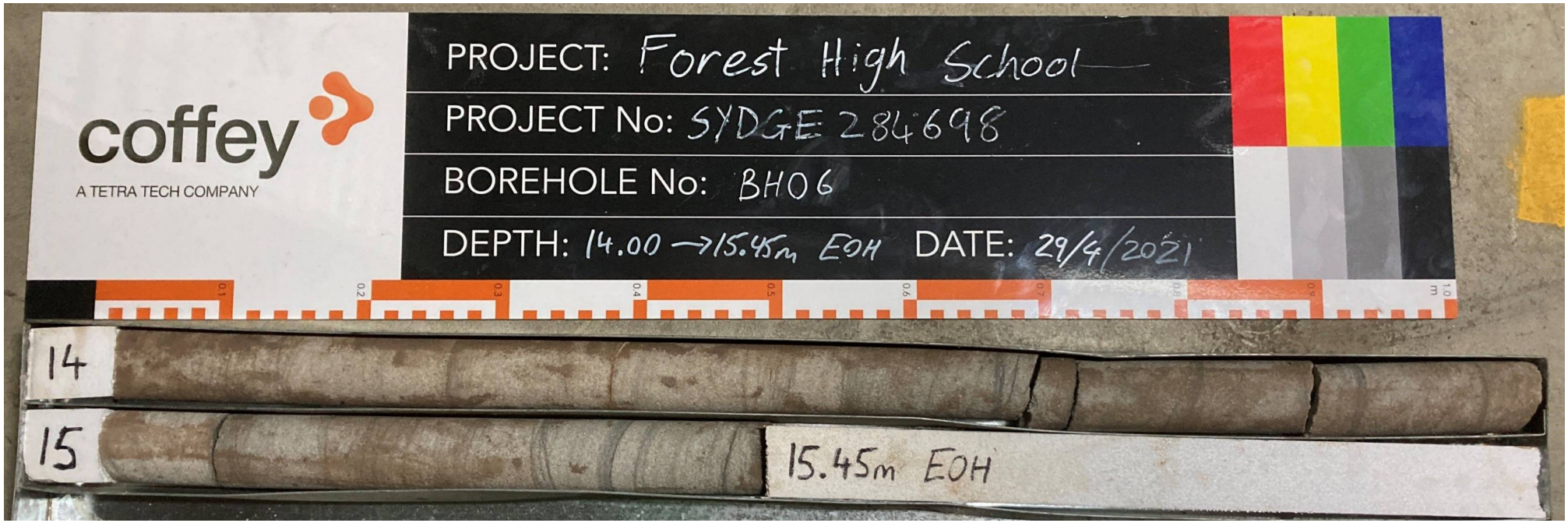
client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH06

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:



BH06 14.00 - 15.45 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH06

project no: 754-SYDGE284698 | fig no: **FIGURE 3** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH07**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**30 Apr 2021**
principal:	
date completed:	**30 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,304; N: 6,263,487 (MGA94) | surface elevation: 153.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
AD/T		Not Observed	E	153				**TOPSOIL: Sandy SILT**: low liquid limit, dark grey-brown, sand is fine to medium grained, traces of low plasticity clay, rootlets and fine gravel present.	<Wp	F			**TOPSOIL** no odour, black staining PID: 0.1 ppm
			E				Cl	**CLAY**: medium plasticity, grey-brown, traces of fine sand.	~Wp	St			**RESIDUAL SOIL** PID: 0.2 ppm
			SPT 2, 3, 5 N*=8										
			E	152	1.0								PID: 0.1 ppm
							CL	**CLAY**: medium plasticity, pale grey, traces of fine sand and extremely weathered sandstone.	<Wp	VSt			
			SPT 3, 5, 7 N*=12										
				151	2.0								PID: 0.7 ppm
										H			PID: 0.6 ppm
			SPT 5, 13, 16 N*=29	150	3.0								
				149	4.0			**SANDSTONE**: fine to medium grained, pale red-brown, extremely weathered, very low strength.	<Wp	H			**EXTREMELY WEATHERED MATERIAL**
			SPT 8, 24, 22 N*=46										
				148	5.0			Borehole BH07 continued as cored hole					
				147	6.0								
				146	7.0								

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH07**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
principal:	
project:	***The Forest High School***
location:	***189 Allambie Road, Allambie Heights, NSW***
date started:	**30 Apr 2021**
date completed:	**30 Apr 2021**
logged by:	**PP**
checked by:	**RT**

position: E: 337,304; N: 6,263,487 (MGA94) | surface elevation: 153.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
		153									
		152	1.0								
		151	2.0								
		150	3.0								
		149	4.0		started coring at 4.95m						
NMLC	Not Observed	148	5.0		**SANDSTONE**: fine to medium grained, grey-brown, indistinct bedding 20°, occasional silt lenses.	XW	O X	a=0.08 d=0.02	92%		
		147	6.0		**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-10°.	MW	X	a=0.29 d=0.24			
		146	7.0		**SANDSTONE**: medium to coarse grained, red-brown, indistinct bedding 20°, pale grey banding.	HW	O		100%		SM, PL, RO, 15 mm

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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH07**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**30 Apr 2021**
principal:	
date completed:	**30 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,304; N: 6,263,487 (MGA94) | surface elevation: 153.0 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	145				HW		a=0.24 d=0.26			PT, 20°, PL, RO, VN
					LAMINITE: grey-brown, indistinct bedding 10°, minor sandstone lenses.	HW					
		144	9.0					a=0.06 d=0.12			
					SANDSTONE: fine to medium grained, pale grey, indisinct bedding 40°.	HW - MW		a=0.04 d=0.06			
		143	10.0						100%		SM, 10°, PL, RO, 60 mm
								a=0.24 d=0.13			PT, 10°, PL, VR, CO PT, 10°, PL, RO, VN
		142	11.0					a=0.17 d=0.16			SM, 10°, PL, RO, 10 mm SM, 10°, PL, RO, 20 mm
		141	12.0			MW		a=0.36 d=0.33			JT, 20°, PL, SO, VN
								a=0.48 d=0.50			JT, 10°, PL, RO, VN SM, 10°, PL, RO, 10 mm
		140	13.0		Borehole BH07 terminated at 12.95 m Target depth						
		139	14.0								
		138	15.0								

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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)
HA hand auger

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

BH07 5.00 - 10.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH07

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:

BH07 10.00 - 12.95 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH07

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH08**
sheet:	1 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**30 Apr 2021**
principal:	
date completed:	**30 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,331; N: 6,263,488 (MGA94) | surface elevation: 153.5 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T CASING		Not Observed	SPT 2, 4, 6 N*=10	153	1.0		CI	**TOPSOIL: CLAYEY SAND**: fine to coarse grained, dark grey-black, clay is medium plasticity with rootlets and fine gravel (subangular, comprising of moderately weathered laminite).	M ~Wp	MD St			**TOPSOIL** **RESIDUAL SOIL**
							CL	**CLAY**: medium plasticity, grey-brown mottled dark grey, fine to medium grained sand, traces of fine gravel (moderately weathered sandstone).	<Wp	St			
			SPT 6, 12, 20 N*=32	152	2.0			**CLAY**: medium plasticity, grey, trace of fine grained sand.		H			
				151				2.5 m: increasing sand					
			SPT 6, 16, 19 N*=35	150	3.0								slight organic odour
					4.0								
			SPT 7, 9, 30 N*=39	149				Borehole BH08 continued as cored hole					
				148	5.0								
					6.0								
				147									
					7.0								
				146									

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

* 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

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Engineering Log - Cored Borehole

Borehole ID.	**BH08**
sheet:	2 of 3
project no.	**754-SYDGE284698**
client:	***Schools Infrastructure NSW - Department of Education***
principal:	
project:	***The Forest High School***
location:	***189 Allambie Road, Allambie Heights, NSW***
date started:	***30 Apr 2021***
date completed:	***30 Apr 2021***
logged by:	***PP***
checked by:	***RT***

position: E: 337,331; N: 6,263,488 (MGA94) | surface elevation: 153.5 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	153	1.0		started coring at 4.55m						
		152	2.0								
		151	3.0								
		150	4.0								
		149	5.0		**Sandy CLAY**: white mottled red, fine grained sand, (extremely weathered sandstone).	XW					HP 225 kPa
		148	6.0		**SANDSTONE**: fine grained, red, fine grained white laminations, indistinct bedding 5°, minor silt lenses.	HW		a=0.05 d=0.04 a=0.00 d=0.02			SM, 5°, PL, RO, 40 mm SM, 5°, PL, RO, 15 mm
		147	7.0		7.32 m: white			a=0.05 d=0.06			SM, 5°, PL, RO, 22 mm PT, PL, RO, VN PT, PL, RO, VN SM, 5°, PL, RO, 50 mm SM, 5°, PL, RO, 12 mm SM, 5°, PL, RO, 100 mm
		146			**SANDSTONE**: fine grained, pale grey, indistinctly bedded 5°.	HW / MW		a=0.37 d=0.01			SM, 5°, PL, RO, 4 mm

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)
HA hand auger

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

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Engineering Log - Cored Borehole

Borehole ID.	**BH08**
sheet:	3 of 3
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**30 Apr 2021**
principal:	
date completed:	**30 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,331; N: 6,263,488 (MGA94) | surface elevation: 153.5 m (AHD) | angle from horizontal: 90°

drill model: Hanjin DB 8D, Track mounted | drilling fluid: bentonite and water | hole diameter : 125 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
NMLC	Not Observed	145			**SANDSTONE**: fine to medium grained, brown-grey, dinstinctly bedded at 0-10°. 8.20 m: red regular orange silt, (1-2mm) laminations	HW		a=0.13 d=0.04			SM, 5°, PL, RO, 10 mm PT, PL, VR, VN JT, PL, SO, VN JT, PL, SO, VN PT, PL, RO, CO
			9.0		**LAMINITE**: dark brown-grey, indistinct bedding 5°, dark grey laminations, remoulds to low plasticity clay.	XW / HW					
		144						a=0.07 d=0.05			
			10.0					a=0.05 d=0.04			
		143			10.20 m: with interbedded sandstone lenses	MW					
					SANDSTONE: fine grained, white-orange, indistinct bedding 5°, orange laminations.	MW					
			11.0								SM, 5°, PL, RO, 20 mm
		142						a=0.15 d=0.14			PT, 5°, PL, RO, CO, 4 mm
			12.0								SM, 5°, PL, RO, 80 mm
		141						d=0.52			
			13.0			MW / SW					
					Borehole BH08 terminated at 13.00 m Target depth						
		140									
			14.0								
		139									
			15.0								
		138									

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)
HA hand auger

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

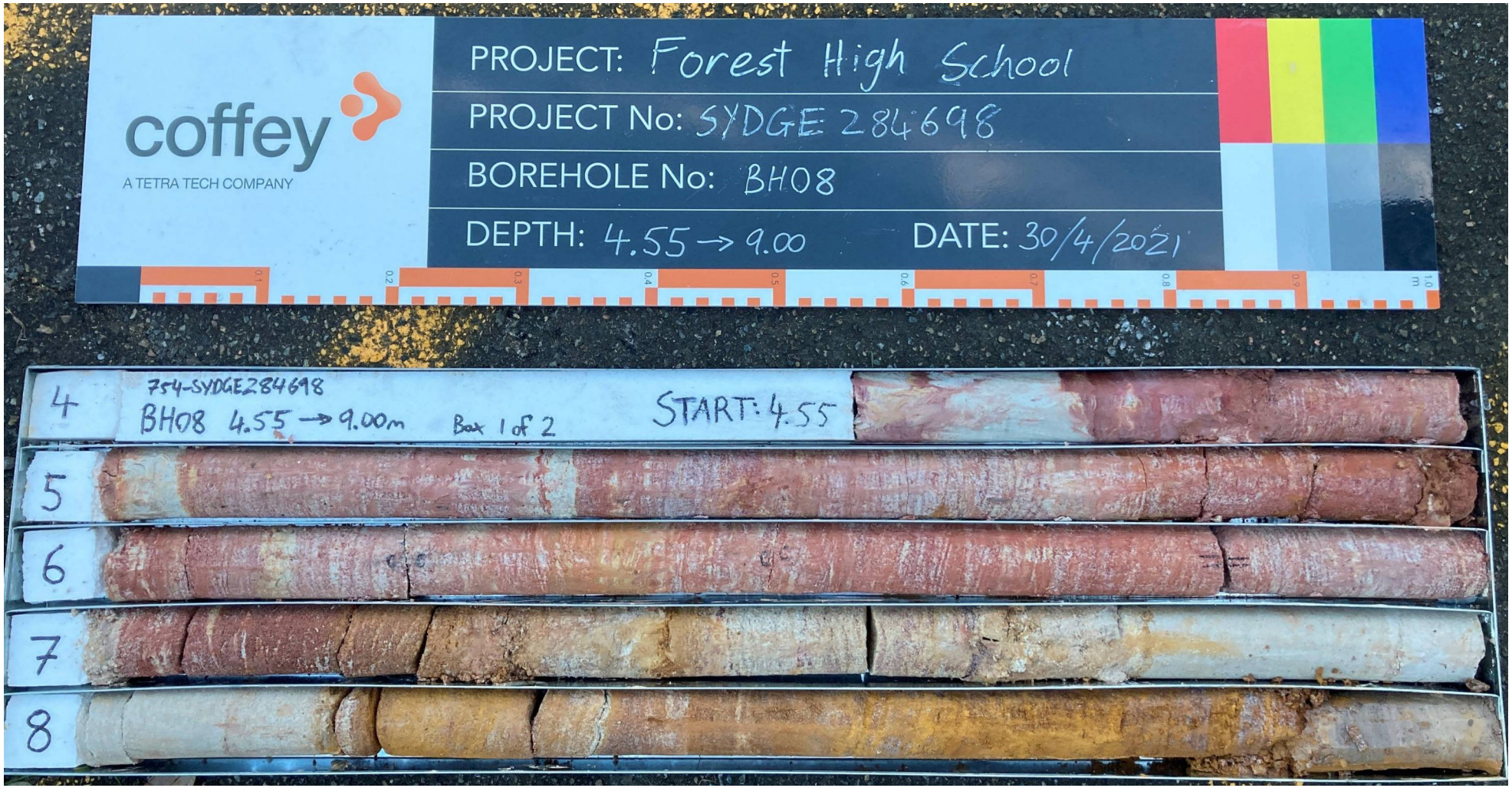
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

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



BH08 4.55 - 9.00 m

drawn	AC
approved	AC
date	12/05/2021
scale	N.T.S.
original size	A4

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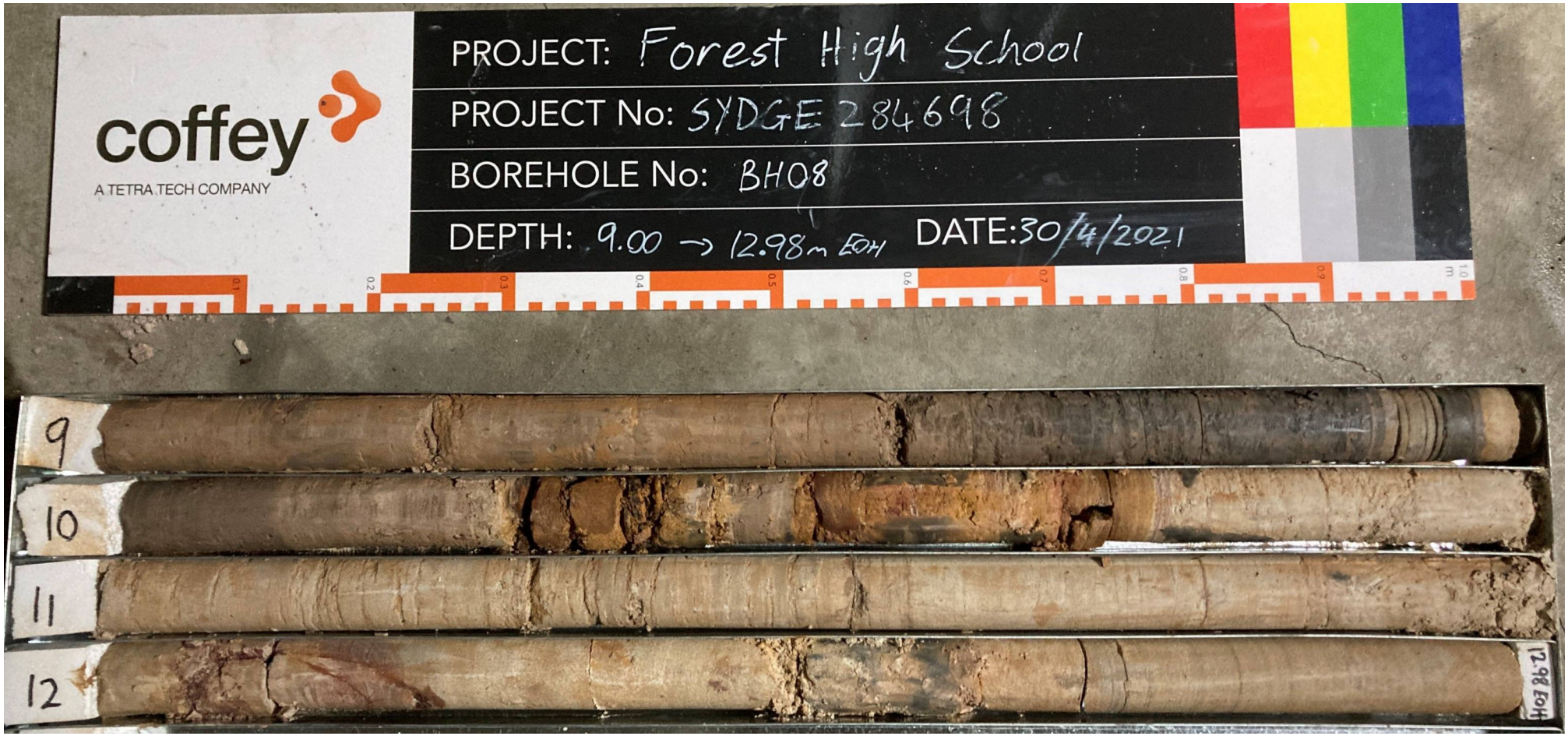
client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH08

project no: 754-SYDGE284698 | fig no: **FIGURE 1** | rev:



BH08 9.00 - 12.98 m

drawn	**AC**
approved	**AC**
date	**12/05/2021**
scale	**N.T.S.**
original size	**A4**

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client: Schools Infrastructure NSW - Department of Education

project: The Forest High School
189 Allambie Road, Allambie Heights, NSW

title: **CORE PHOTOGRAPH**
BH08

project no: 754-SYDGE284698 | fig no: **FIGURE 2** | rev:

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Engineering Log - Borehole

Borehole ID.	**BH09**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,211; N: 6,263,489 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | casing diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T		30/04/21	E	148				**TOPSOIL: SILTY SAND**: dark brown, low plasticity silt with some root material.	D				**TOPSOIL / FILL** PID: 0.4 ppm
			E					**FILL: Sandy CLAY**: low plasticity, orange, medium grained sand, some fine to medium grained gravels (sandstone).	M				**FILL** No odour or staining PID: 0.2 ppm
			SPT 9, 14, 17 N*=31										
			E	147	1.0			**FILL: Sandy CLAY**: low plasticity, dark brown, medium grained sand.	M				No odour or staining PID: 0.5 ppm
			E					**FILL: CLAY**: medium plasticity, pale grey mottled red, with some fine to medium grained gravels.	<Wp				No odour or staining PID: 0.8 ppm
			SPT 2, 4, 6 N*=10	146	2.0								
				145	3.0			**FILL: CLAY**: medium plasticity, pale grey, with some fine to medium grained gravels and fine shards of glass and brick gravels (fine to medium grained).	<Wp				steel reinforcement picked up by auger PID: 1.2 ppm
				144	4.0								
			SPT 16, 21/40mm N*=R				SC	**CLAYEY SAND**: medium grained, pale grey - white, low plasticity clay with some fine to medium grained gravels (extremely weathered sandstone).	M	D / VD			**RESIDUAL SOIL**
				143	5.0								
			SPT 10, 28/50mm N*=R	142	6.0		SC	**CLAYEY SAND**: medium grained, pale grey, low plasticity clay with some black silt lenses (lamination) (extremely weathered sandstone).	M	D / VD			**EXTREMELY WEATHERED MATERIAL**
				141	7.0			Borehole BH09 terminated at 8.0 m Refusal					

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

* 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

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Engineering Log - Borehole

Borehole ID.	**GW01**
sheet:	1 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,415; N: 6,263,480 (MGA94) | surface elevation: 156.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance**

method & support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
AD/T			E	156				**TOPSOIL: Sandy SILT**: low liquid limit, dark brown, sand is fine to medium grained, with rootlets and organic fines.	<Wp	F			**TOPSOIL** No odour or staining
			E				Cl	**CLAY**: medium plasticity, red-brown mottled grey, trace fine to medium grained sand and extremely weathered sandstone.	>Wp	VSt			**RESIDUAL SOIL** PID: 0 ppm
			E	155	1.0								PID: 0 ppm No odour or staining
			SPT 7, 11, 12 N*=23										
				154	2.0								PID: 0 ppm
			E										
			E	153	3.0								PID: 0.6 ppm
			SPT 4, 8, 13 N*=21										
			E	152	4.0								PID: 0.4 ppm
			SPT 5, 11, 15 N*=26					4.5 m: increasing extremely weathered sandstone		H			
				151	5.0								
				150	6.0			**LAMINITE**: grey-brown, extremely weathered, minor sand lenses, remoulds to silty clay, low plasticity, trace fine to medium grained sand.	~Wp	VSt - H			**EXTREMELY WEATHERED MATERIAL**
				149	7.0								

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

* 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

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Engineering Log - Borehole

Borehole ID.	**GW01**
sheet:	2 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**29 Apr 2021**
principal:	
date completed:	**29 Apr 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,415; N: 6,263,480 (MGA94) | surface elevation: 156.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T		29/04/21		148				**LAMINITE**: grey-brown, extremely weathered, minor sand lenses, remoulds to silty clay, low plasticity, trace fine to medium grained sand. *(continued)* 8.2 m: increasing moisture content, increasing sand	~Wp	VSt - H			**EXTREMELY WEATHERED MATERIAL**
				147	9.0			**LAMINITE**: grey-brown, extremely weathered, minor sand lenses, remoulds to silty clay, low plasticity, trace fine to medium grained sand.	>Wp	VSt - H			
				146	10.0			Borehole GW01 terminated at 10.20 m Target stratum					
				145	11.0								
				144	12.0								
				143	13.0								
				142	14.0								
				141	15.0								

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

* 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
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Piezometer Installation Log

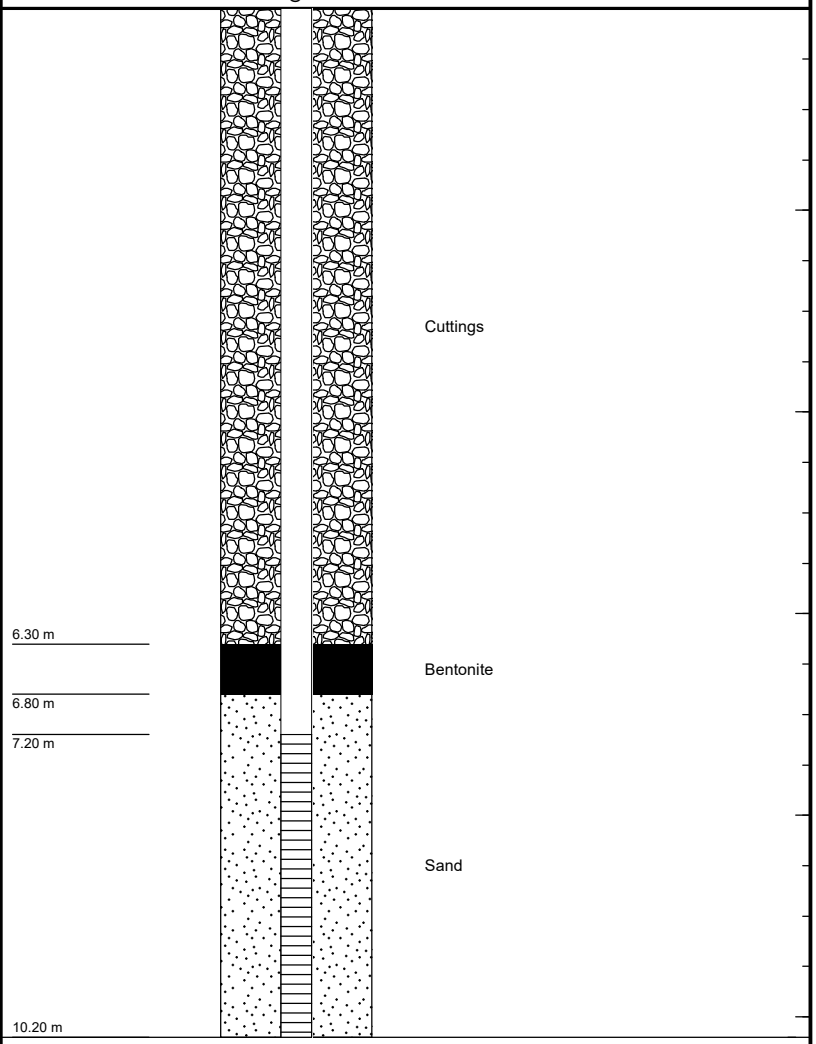
		Hole ID.	**GW01**
		sheet:	1 of 1
		project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**	date started:	**29 Apr 2021**
principal:		date completed:	**29 Apr 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,415; N: 6,263,480 (MGA94) | surface elevation: 156.0 m (AHD) | angle from horizontal: 90°

equipment type: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance** | **piezometer construction details**

method & support	water	RL (m)	depth (m)	graphic log	material name
AD/T	29/04/21	156	0		
			1		**TOPSOIL**
					RESIDUAL SOIL
		154	2		
			3		
		152	4		
			5		
		150	6		
					EXTREMELY WEATHERED MATERIAL
		148	8		
			9		
		146	10		
			11		



method & support
see engineering log for details

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

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

ID	type	installation date	stickup (m)	tip depth (m)	water level (m)	Relative Levels (AHD) stickup	tip	water level
GW01	standpipe	29/04/2021		10.20 m			145.80	

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Engineering Log - Borehole

Borehole ID.	**GW02**
sheet:	1 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,167; N: 6,263,457 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
AD/T, N		Not Observed		148				**TOPSOIL: SILTY SAND**: fine to coarse grained, dark grey-brown, with rootlets and organic fines, trace fine to medium gravel, sub-angular, comprising moderately weathered sandstone.	D <Wp				**TOPSOIL / FILL**
			SPT 5, 8, 11 N*=19	147	1.0			**FILL: CLAYEY SAND**: fine to coarse grained, dark brown mottled orange-brown, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone.	<Wp				**FILL** PID: 0.2 ppm
			SPT 8, 10, 14 N*=24	146	2.0			**FILL: CLAYEY SAND**: fine to coarse grained, red-brown, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone. **FILL: CLAYEY SAND**: fine to coarse grained, pale grey, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone.	<Wp				PID: 0.4 ppm
			SPT 4, 2, 2 N*=4	145	3.0								treated timber offcuts encountered
				144	4.0								
			SPT 21, 31, 29 N*=60	143	5.0			**LAMINITE**: low plasticity, pale grey, extremely weathered, very low strength.	<Wp ~Wp				**EXTREMELY WEATHERED MATERIAL**
				142	6.0								
				141	7.0								

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

* 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

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Engineering Log - Borehole

Borehole ID.	**GW02**
sheet:	2 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,167; N: 6,263,457 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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 penetro-meter (kPa) 100 200 300 400	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T N				140				**LAMINITE**: low plasticity, pale grey, extremely weathered, very low strength. *(continued)*	~Wp				**EXTREMELY WEATHERED MATERIAL**
				139	9.0			Borehole GW02 terminated at 8.5 m Refusal					
				138	10.0								
				137	11.0								
				136	12.0								
				135	13.0								
				134	14.0								
				133	15.0								

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

* 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

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Piezometer Installation Log

		Hole ID.	**GW02**
		sheet:	1 of 1
		project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**	date started:	**03 May 2021**
principal:		date completed:	**03 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,167; N: 6,263,457 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90°

equipment type: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance** | **piezometer construction details**

method & support	water	RL (m)	depth (m)	graphic log	material name
AD/T	Not Observed	148	0		**TOPSOIL / FILL**
					FILL
			1		
		146	2		
			3		
		144	4		
			5		**EXTREMELY WEATHERED MATERIAL**
		142	6		
			7		
		140	8		
			9		
		138	10		
			11		

bore construction license:
drilling company:
driller:
driller's permit no.:

GW02

1.50 m
2.00 m
2.50 m
8.50 m

Cuttings
Bentonite
Sand

method & support
see engineering log for details

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

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

ID	type	installation date	stickup (m)	tip depth (m)	water level (m)	Relative Levels (AHD) stickup	tip	water level
GW02	standpipe piezo.	03/05/2021		8.50 m			139.50	

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Engineering Log - Borehole

Borehole ID.	**GW02a**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,167; N: 6,263,457 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
AD/T — N		Not Observed		148				**TOPSOIL: SILTY SAND**: fine to coarse grained, dark grey-brown, with rootlets and organic fines, trace fine to medium gravel, sub-angular, comprising moderately weathered sandstone.	D				**TOPSOIL / FILL**
			SPT 5, 8, 11 N*=19						<Wp				**FILL**
				147	1.0			**FILL: CLAYEY SAND**: fine to coarse grained, dark brown mottled orange-brown, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone.	<Wp				PID: 0.2 ppm
			SPT 8, 10, 14 N*=24					**FILL: CLAYEY SAND**: fine to coarse grained, red-brown, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone.	<Wp				
				146	2.0			**FILL: CLAYEY SAND**: fine to coarse grained, pale grey, clay is low plasticity, trace fine to coarse gravel, highly weathered sandstone.					PID: 0.4 ppm
			SPT 4, 2, 2 N*=4	145	3.0								treated timber offcuts encountered
				144	4.0			Borehole GW02a terminated at 3.5 m Refusal					
			SPT 21, 31, 29 N*=60										
				143	5.0								
				142	6.0								
				141	7.0								

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

* 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

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Piezometer Installation Log

		Hole ID.	**GW02a**
		sheet:	1 of 1
		project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**	date started:	**03 May 2021**
principal:		date completed:	**03 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,167; N: 6,263,457 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90°

equipment type: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance** | **piezometer construction details**

method & support	water	RL (m)	depth (m)	graphic log	material name
AD/T	Not Observed	148	0.0		
					TOPSOIL / FILL
			0.5		**FILL**
		147	1.0		
			1.5		
		146	2.0		
			2.5		
		145	3.0		
			3.5		

bore construction license:
drilling company:
driller:
driller's permit no.:

GW02a

0.20 m — Cuttings
0.40 m — Bentonite
0.50 m
Sand
3.50 m

method & support
see engineering log for details

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

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

ID	type	installation date	stickup (m)	tip depth (m)	water level (m)	Relative Levels (AHD) stickup	tip	water level
GW02a	standpipe piezo.	03/05/2021		3.50 m			144.50	

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Engineering Log - Borehole

Borehole ID.	**GW03**
sheet:	1 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,268; N: 6,263,375 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
AD/T, N			E	148				**ASPHALT**: 30mm thick.	D				**WEARING COURSE**
								FILL: SILTY SAND: fine to coarse grained, dark grey-brown, trace asphalt and fine to coarse gravels.	<Wp				**FILL** PID: 0.4 ppm PID: 0.4 ppm
			SPT 1, 2, 3 N*=5				ML	**FILL: CLAY**: medium plasticity, dark grey mottled brown, trace fine to medium gravel, and asphalt.	<Wp	VSt			**RESIDUAL SOIL**
				147	1.0			**Silty CLAY**: low plasticity, pale grey, with dark grey laminations, trace extremely weathered laminite.					PID: 1.1 ppm
			SPT 2, 10, 23 N*=33							H			
				146	2.0								PID: 0.1 ppm
			SPT 12, 16, 30 HB N*=46	145	3.0								PID: 0 ppm
				144	4.0								
			SPT 30/50mm N*=R					**LAMINITE**: low plasticity, pale grey, extremely weathered, very low strength.	<Wp				**EXTREMELY WEATHERED MATERIAL**
				143	5.0								
				142	6.0								
				141	7.0								

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

* 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

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Engineering Log - Borehole

Borehole ID.	**GW03**
sheet:	2 of 2
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,268; N: 6,263,375 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 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)	DCP (blows/100 mm) (2 4 6 8 10)	structure and additional observations
AD/T N		▶		140				**LAMINITE**: low plasticity, pale grey, extremely weathered, very low strength. *(continued)*	<Wp				**EXTREMELY WEATHERED MATERIAL**
				139	9.0			**LAMINITE**: low plasticity, pale grey, extremely weathered, very low strength.	W				
								Borehole GW03 terminated at 9.5 m Target depth					
				138	10.0								
				137	11.0								
				136	12.0								
				135	13.0								
				134	14.0								
				133	15.0								

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

* 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

Piezometer Installation Log

		Hole ID.	**GW03**
		sheet:	1 of 1
		project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**	date started:	**03 May 2021**
principal:		date completed:	**03 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,268; N: 6,263,375 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90°

equipment type: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance** | **piezometer construction details**

method & support	water	RL (m)	depth (m)	graphic log	material name
AD/T		148	0		**WEARING COURSE** / **FILL**
			1		**RESIDUAL SOIL**
		146	2		
			3		
		144	4		
N			4.5		**EXTREMELY WEATHERED MATERIAL**
			5		
		142	6		
			7		
		140	8		
	▶		9		
		138	10		
			11		

bore construction license:
drilling company:
driller:
driller's permit no.:

GW03

Cuttings

5.50 m

Bentonite

6.00 m

6.50 m

Sand

9.50 m

method & support
see engineering log for details

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

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

ID	type	installation date	stickup (m)	tip depth (m)	water level (m)	Relative Levels (AHD) stickup	tip	water level
GW03	standpipe piezo.	03/05/2021		9.50 m			138.50	

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Engineering Log - Borehole

Borehole ID.	**GW03a**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**03 May 2021**
principal:	
date completed:	**03 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,268; N: 6,263,375 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance**

method & support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
AD/T, N	1 2 3		E	148				**ASPHALT**: 30mm thick.	D		100 200 300 400	2 4 6 8 10	**WEARING COURSE**
								FILL: SILTY SAND: fine to coarse grained, dark grey-brown, trace asphalt and fine to coarse gravels.	<Wp				**FILL** PID: 0.4 ppm PID: 0.4 ppm
			SPT 1, 2, 3 N*=5	147	1.0		CL	**FILL: CLAY**: medium plasticity, dark grey mottled brown, trace fine to medium gravel, and asphalt.	<Wp	VSt			**RESIDUAL SOIL**
								Silty CLAY: low plasticity, pale grey, with dark grey laminations, trace extremely weathered laminite.					PID: 1.1 ppm
			SPT 2, 10, 23 N*=33	146	2.0					H			PID: 0.1 ppm
			SPT 12, 16, 30 HB N*=46	145	3.0								PID: 0 ppm
				144	4.0			Borehole GW03a terminated at 4.0 m Target depth					
			SPT 30/50mm N*=R	143	5.0								
				142	6.0								
				141	7.0								

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

* 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

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Piezometer Installation Log

		Hole ID.	**GW03a**
		sheet:	1 of 1
		project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**	date started:	**03 May 2021**
principal:		date completed:	**03 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,268; N: 6,263,375 (MGA94) | surface elevation: 148.0 m (AHD) | angle from horizontal: 90°

equipment type: Hanjin DB 8D, Track mounted | drilling fluid: none | hole diameter : 125 mm

drilling information | **material substance** | **piezometer construction details**

bore construction license:
drilling company:
driller:
driller's permit no.:

method & support	water	RL (m)	depth (m)	graphic log	material name
AD/T		148	0.0		**WEARING COURSE**
					FILL
			0.5		
					RESIDUAL SOIL
		147	1.0		
			1.5		
N		146	2.0		
			2.5		
		145	3.0		
			3.5		

GW03a

1.00 m
1.50 m
2.00 m
4.00 m

Cuttings
Bentonite
Sand

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method & support
see engineering log for details

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

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

ID	type	installation date	stickup (m)	tip depth (m)	water level (m)	Relative Levels (AHD) stickup	tip	water level
GW03a	standpipe piezo.	03/05/2021		4.00 m			144.00	

C.2 TEST PIT AND HAND AUGER LOGS

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Engineering Log - Hand Auger

Borehole ID.	**HA01**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**05 May 2021**
principal:	
date completed:	**05 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,228; N: 6,263,483 (MGA94) | surface elevation: 149.0 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | drilling fluid: none | 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	E	149			CL	**TOPSOIL: Silty CLAY**: low plasticity, dark grey, black, moderate organic odour, trace of fine to medium sand with rootlets and organic fines.	>Wp	VS			**TOPSOIL/FILL** 0-1.1m: DCP sunk under own weight.
			E				Cl	**FILL: Sandy CLAY**: medium plasticity, pale grey, brown, sand is fine to medium, trace of rootlets and extremley weathered sandstone, possibly reworked natural material.	>Wp	VS			**FILL**
			E		0.5				>Wp	VS			
			E	148	1.0					VSt - H			
								Hand Auger HA01 terminated at 1.15 m Refusal					
					1.5								

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

* 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

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Engineering Log - Hand Auger

Borehole ID.	**HA02**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**05 May 2021**
principal:	
date completed:	**05 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,178; N: 6,263,433 (MGA94) | surface elevation: 143.5 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | drilling fluid: none | hole diameter :

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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	E				MH	**TOPSOIL: Sandy SILT**: pale grey-brown, with rootlets and organic fines, wet.	>Wp	VS - S			**TOPSOIL** 0-0.5m: DCP sunk under own weight.
							CI	**Sandy CLAY**: medium plasticity, grey, brown, sand is fine to medium with trace of rootlets and organic fines. traces extremely weathered sandstone, possibly reworked natural material.	>Wp	VS - S			**RESIDUAL SOIL**
			E	143	0.5				<Wp	VSt - H			
								Hand Auger HA02 terminated at 0.8 m Refusal					
					1.0								
				142	1.5								

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

* 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

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Engineering Log - Hand Auger

Borehole ID.	**HA03**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date started:	**05 May 2021**
principal:	
date completed:	**05 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,222; N: 6,263,433 (MGA94) | surface elevation: 144.5 m (AHD) | angle from horizontal: 90° | DCP id.:

drill model: Hand Auger | drilling fluid: none | hole diameter :

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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
HA		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, sand is fine to medium with rootlets and organic fines, traces of glass.	>Wp				**FILL**
							Cl	**FILL: Sandy CLAY**: medium plasticity, pale grey, mottled brown, highly weathered sandstone fragments and traces of rootlets.	>Wp				
			E	144	0.5								
			E		1.0		SC	**CLAYEY SAND**: fine - medium grained, pale grey, mottled brown, clay is medium plasticity with extremely weathered sandstone fragments, possibly reworked natural material.	M - W	L			**RESIDUAL SOIL**
				143	1.5			Hand Auger HA03 terminated at 1.2 m Refusal					

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

* 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

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Engineering Log - Excavation

		Excavation ID.	***TP01***
		sheet:	1 of 1
		project no.	***754-SYDGE284698***
client:	***Schools Infrastructure NSW - Department of Education***	date excavated:	***04 May 2021***
principal:		date completed:	***04 May 2021***
project:	***The Forest High School***	logged by:	***PP***
location:	***189 Allambie Road, Allambie Heights, NSW***	checked by:	***RT***

position: E: 337,156; N: 6,263,481 (MGA94) | surface elevation: 148.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.8 m long 0.6 m wide

excavation 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, sand is fine to medium grained, with rootlets and organic fines.	<Wp				**TOPSOIL**
				E				SM	**FILL: SILTY SAND**: fine to medium grained, dark brown, with brick and concrete fragments, plastic, PVC pipe, terracotta, glass bottles, aluminum cans, geo fabric and steel reinforcement bars.	D - M				**FILL** PID: 0.6 ppm
				E	147.5	0.5								PID: 0.8 ppm
				E	147.0	1.0								PID: 0.4 ppm
					146.5	1.5		CL	**FILL: Sandy CLAY**: low plasticity, pale grey, sand is fine to medium grained, slight organic and sewage odour.	<Wp				
				E	146.0	2.0								PID: 1.8 ppm 2.2-2.4m: Asphalt in northern excavation face
					145.5	2.5		CL	**Sandy CLAY**: low plasticity, pale grey, increasing stiffness, possible residual soil.	~Wp	VSt - H			**RESIDUAL SOIL**
					145.0	3.0			Test pit TP01 terminated at 3.0 m Refusal					
					144.5	3.5								

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HT hand tools

support
N none
S shoring

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
D disturbed sample
B bulk disturbed sample
E environmental sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	**TP02**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date excavated:	**04 May 2021**
principal:	
date completed:	**04 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,208; N: 6,263,466 (MGA94) | surface elevation: 148.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.9 m long 0.7 m wide

excavation 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey, sand is fine to medium with rootlets and organic fines, traces of fine to medium gravel (highly weathered sandstone).	<Wp				**TOPSOIL**
				E				SC	**FILL: CLAYEY SAND**: fine - medium grained, pale grey-brown, sand is medium plasticity with extremely weathered sandstone fragements.	D - M				**FILL**
				E	148.0	0.5								PID: 0.8 ppm
								CL	**FILL: Sandy CLAY**: low plasticity, dark grey, sand is fine to medium with bricks, sandstone cobbles and traces of asphalt.	<Wp				
				E	147.5	1.0								0.9-1.3m: Dark staining PID: 1.1 ppm
					147.0	1.5								1.4m: Sandstone Boulder
				E	146.5	2.0								
								CL	**FILL: Sandy CLAY**: low plasticity, dark grey, sand is fine to medium with bricks, sandstone cobbles and traces of asphalt.	<Wp				PID: 1.6 ppm
					146.0	2.5								
									Test pit TP02 terminated at 2.6 m Refusal					
					145.5	3.0								
					145.0	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP03***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,254; N: 6,263,422 (MGA94) | surface elevation: 148.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.8 m long 0.6 m wide

excavation 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: low liquid limit, dark grey-brown, sand is fine to medium grained, with rootlets and organic fines.	<Wp				
								SC	**FILL: CLAYEY SAND**: fine to medium grained, dark grey-brown, with bricks, terracotta fragments and plastic.	D - M				PID: 0.3 ppm
				E	148.0	0.5								PID: 4.1 ppm
								Cl	**Sandy CLAY**: medium plasticity, grey-brown, sand is fine to medium grained, traces of extremely weathered sandstone and rootlets.	<Wp	VSt	X		
				E	147.5	1.0								PID: 0.3 ppm
					147.0	1.5					H			
					146.5	2.0			Test pit TP03 terminated at 2.1 m Target depth					
					146.0	2.5								
					145.5	3.0								
					145.0	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP04***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,273; N: 6,263,445 (MGA94) | surface elevation: 151.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 2.3 m long 0.8 m wide

excavation 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E				SC	**FILL: CLAYEY SAND**: fine to coarse grained, grey-brown, clay is medium plasticity with bricks, teracotta and PVC fragments.	M				**FILL**
				E										PID: 0.9 ppm
					151.0	0.5								PID: 1.5 ppm
								SC	**FILL: CLAYEY SAND**: fine to coarse grained, dark grey-brown, with black staining, no odours noted.	M				
				E	150.5	1.0								PID: 3.3 ppm
										D				
								SM	**FILL: ASPHALT**: 40mm thick.	M				1.3m: Start of existing carpark pavement
					150.0	1.5		CL	**FILL: SILTY SAND**: fine to medium grained, dark brown, with fine to coarse gravel.	<Wp				
									FILL: Sandy CLAY: low plasticity, dark grey-brown, sand is fine to medium, traces of timber and fine to medium gravel.					
								Cl	**CLAY**: medium plasticity, grey-brown, with extremely weathered sandstone.	<Wp	VSt - H			**RESIDUAL SOIL**
				E	149.5	2.0								
					149.0	2.5								PID: 1.6 ppm
									Test pit TP04 terminated at 2.5 m Target depth					
					148.5	3.0								
					148.0	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	**TP05**
sheet:	1 of 1
project no.	**754-SYDGE284698**
client:	**Schools Infrastructure NSW - Department of Education**
date excavated:	**04 May 2021**
principal:	
date completed:	**04 May 2021**
project:	**The Forest High School**
logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**
checked by:	**RT**

position: E: 337,283; N: 6,263,451 (MGA94) | surface elevation: 151.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions:

excavation 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)	DCP (blows/100 mm)	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, low plasticity, sand is fine to medium with rootlets and organic fines.	<Wp				**TOPSOIL** PID: 4.8 ppm
				E				Cl	**FILL: Sandy CLAY**: medium plasticity, dark grey-mottled brown, sand is fine to coarse, traces of bricks, terracotta fragments, plastic and fine to medium gravel. no staining no odours.	<Wp				**FILL** PID: 4.3 ppm
					151.0	0.5								
				E				Cl	**CLAY**: medium plasticity, grey-brown, sand is fine to medium with extremely weathered sandstone fragments.	<Wp	VSt - H			**RESIDUAL SOIL**
					150.5	1.0								
														PID: 3.4 ppm
					150.0	1.5		Cl	**CLAY**: medium plasticity, grey-mottled brown, sand is fine to medium with extremely weathered sandstone fragments.	<Wp	H			
				E	149.5	2.0								
									Test pit TP05 terminated at 2.1 m Target depth					PID: 0.8 ppm
					149.0	2.5								
					148.5	3.0								
					148.0	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

		Excavation ID.	***TP06***
		sheet:	1 of 1
		project no.	***754-SYDGE284698***
client:	***Schools Infrastructure NSW - Department of Education***	date excavated:	***04 May 2021***
principal:		date completed:	***04 May 2021***
project:	***The Forest High School***	logged by:	***PP***
location:	***189 Allambie Road, Allambie Heights, NSW***	checked by:	***RT***

position: E: 337,316; N: 6,263,459 (MGA94) | surface elevation: 152.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 2.3 m long 0.6 m wide

excavation 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)	DCP (blows/100 mm)	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, silt is low plasticity, sand is fine to medium with rootlets and oganic fines, traces of terracotta and brick fragments.	<Wp				**TOPSOIL/FILL**
								Cl		<Wp	St			**RESIDUAL SOIL**
				E					**Sandy CLAY**: medium plasticity, grey-brown, sand is fine to medium, traces of tree roots and extremely weathered sandstone.					PID: 0.7 ppm
											VSt			PID: 1.2 ppm
				E	151.5	0.5								
					151.0	1.0								PID: 0.9 ppm
											H			
					150.5	1.5			Test pit TP06 terminated at 1.5 m Refusal					
					150.0	2.0								
					149.5	2.5								
					149.0	3.0								
					148.5	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP07***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,300; N: 6,263,435 (MGA94) | surface elevation: 151.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.8 m long 0.6 m wide

excavation 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	DCP (blows/mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E				SP	**ASPHALT**: 30mm layer.	D				**WEARING COURSE**
									BASECOURSE: SAND: fine - medium grained, dark grey-brown, with fine to medium gravel and silt.	D				**FILL**
								Cl		<Wp	VSt			PID: 0.6 ppm
				E					**CLAY**: medium plasticity, grey- brown, with fine to medium sand, traces of extremely weathered sandstone and tree roots.					**RESIDUAL SOIL**
					150.5	0.5								PID: 0.3 ppm
								Cl	**CLAY**: medium plasticity, grey-brown, fine to medium sand and extremely weathered sandtstone.	<Wp	H			
				E	150.0	1.0								PID: 0.8 ppm
					149.5	1.5			Test pit TP07 terminated at 1.5 m Target depth					
					149.0	2.0								
					148.5	2.5								
					148.0	3.0								
					147.5	3.5								

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP08***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,286; N: 6,263,386 (MGA94) | surface elevation: 149.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.8 m long 0.6 m wide

excavation 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	DCP (blows/mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E				CL	**FILL: ASPHALT**: 40mm layer.	D				**WEARING COURSE**
									FILL: Gravelly CLAY: sub-rounded to sub-angular, low plasticity, grey, gravel is fine to medium, sub-angular to subrounded, comprising hard weathered sandstone and siltstone. with terracotta fragments, bricks, black staining, no odour.					**FILL** PID: 0.8 ppm
				E				CI			VSt - H			**RESIDUAL SOIL**
					148.5	0.5			**Sandy CLAY**: medium plasticity, grey-brown, sand is fine to medium, traces of tree roots and extremely weathered sandstone.					PID: 2.5 ppm
				E	148.0	1.0								PID: 1.9 ppm
					147.5	1.5			Test pit TP08 terminated at 1.5 m Refusal					
					147.0	2.0								
					146.5	2.5								
					146.0	3.0								
					145.5	3.5								

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP09***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,366; N: 6,263,386 (MGA94) | surface elevation: 151.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 2.1 m long 0.6 m wide

excavation 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: grey-brown, sand is fine to medium with rootlets and organic fines, traces of brick fragments and reo bar / steel rod.	<Wp				**FILL**
								CL	**FILL: Sandy CLAY**: low plasticity, grey-brown, sand is fine to medium.	<Wp				0.2-0.9m: reworked naural, terracotta pipes encountered at 0.3m to 0.8 (150mm diameter) PID: 0.9 ppm
				E										PID: 1.2 ppm
					151.0	0.5								
				E	150.5	1.0		SC	**CLAYEY SAND**: fine - medium grained, pale grey-mottled brown, with weathered sandstone and traces of tree roots.	M	D - VD			**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL**
					150.0	1.5			Test pit TP09 terminated at 1.5 m Refusal					
					149.5	2.0								
					149.0	2.5								
					148.5	3.0								
					148.0	3.5								

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HT hand tools

support
N none
S shoring

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
D disturbed sample
B bulk disturbed sample
E environmental sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	**TP10**		
sheet:	1 of 1		
project no.	**754-SYDGE284698**		
client:	**Schools Infrastructure NSW - Department of Education**	date excavated:	**04 May 2021**
principal:		date completed:	**04 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,449; N: 6,263,416 (MGA94) | surface elevation: 152.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.6 m long 0.5 m wide

excavation 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	DCP (blows/100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, sand is fine to medium with rootlets and organic fines, no odours or staining.	<Wp	F			**TOPSOIL**
														PID: 0.3 ppm
				E				Cl	**Sandy CLAY**: medium plasticity, grey-brown, sand is fine to medium with rootlets and extremely weathered sandstone.	<Wp	St			**RESIDUAL SOIL**
					152.0	0.5								PID: 2.1 ppm
				E	151.5	1.0								PID: 1.4 ppm
								SC	**CLAYEY SAND**: fine - medium grained, pale grey, clay is medium plasticity with highly weathered sandstone and laminite and traces of rootlets.	D	MD - D			**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL**
					151.0	1.5								
									Test pit TP10 terminated at 1.8 m Refusal					
					150.5	2.0								
					150.0	2.5								
					149.5	3.0								
					149.0	3.5								

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP11***		
sheet:	1 of 1		
project no.	***754-SYDGE284698***		
client:	***Schools Infrastructure NSW - Department of Education***	date excavated:	***04 May 2021***
principal:		date completed:	***04 May 2021***
project:	***The Forest High School***	logged by:	***PP***
location:	***189 Allambie Road, Allambie Heights, NSW***	checked by:	***RT***

position: E: 337,411; N: 6,263,381 (MGA94) | surface elevation: 151.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions:

excavation 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	DCP (blows/ 100 mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E					**TOPSOIL: Sandy SILT**: dark grey-brown, low plasticity, sand is fine to medium with rootlets and organic fines, traces of crushed sandstone and brick fragments, no odour.	<Wp	S - F			**TOPSOIL/FILL** PID: 0.6 ppm
				E				Cl	**Sandy CLAY**: medium plasticity, pale brown, mottled grey, sand is fine to medium, traces of rootlets and extremely weathered sandstone, possibly reworked natural material.	<Wp	S - F			**RESIDUAL SOIL** PID: 0.8 ppm
					150.5	0.5								
				E	150.0	1.0		SC	**CLAYEY SAND**: fine - medium grained, pale grey, mottled brown, clay is medium plasticity with extremely weathered sandstone and laminite.	D	MD - D			**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL** PID: 1.1 ppm
					149.5	1.5								
									Test pit TP11 terminated at 1.6 m Target depth					
					149.0	2.0								
					148.5	2.5								
					148.0	3.0								
					147.5	3.5								

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HT hand tools

support
N none
S shoring

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
D disturbed sample
B bulk disturbed sample
E environmental sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
VS vane shear peak/remouded (kPa)

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

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Engineering Log - Excavation

Excavation ID.	***TP12***		
sheet:	1 of 1		
project no.	***754-SYDGE284698***		
client:	***Schools Infrastructure NSW - Department of Education***	date excavated:	***04 May 2021***
principal:		date completed:	***04 May 2021***
project:	***The Forest High School***	logged by:	***PP***
location:	***189 Allambie Road, Allambie Heights, NSW***	checked by:	***RT***

position: E: 337,374; N: 6,263,417 (MGA94) | surface elevation: 153.5 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 2.5 m long 0.9 m wide

excavation 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	DCP (blows/mm) 2 4 6 8 10	structure and additional observations
E	N			E					**TOPSOIL: Sandy SILT**: dark grey, low plasticity, sand is fine to medium with rootlets and organic fines, traces of brick fragments.	<Wp				**FILL** PID: 0.6 ppm
				E				CL	**FILL: Sandy CLAY**: low plasticity, pale brown, mottled grey, sand is fine to medium, with brick, terracotta, sandstone and concrete fragments up to 400mm.	<Wp				PID: 1.1 ppm
				E	153.0	0.5								
			05/04/21		152.5	1.0				<Wp				1.0-1.5m: pit sidewall collapse, inferred low compaction and high groundwater inflows PID: 4.3 ppm
								CL	**FILL: Sandy CLAY**: low plasticity, pale brown, mottled grey.	>Wp				
					152.0	1.5								
									Test pit TP12 terminated at 1.8 m Refusal Inferred concrete/moderately weathered sandstone. unable to see test pit loose or sample due to GW inflow					
					151.5	2.0								
					151.0	2.5								
					150.5	3.0								
					150.0	3.5								

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator
- HT hand tools

support
- N none
- S shoring

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
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- VS vane shear peak/remouded (kPa)

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 - Excavation

Excavation ID.	**TP13**		
sheet:	1 of 1		
project no.	**754-SYDGE284698**		
client:	**Schools Infrastructure NSW - Department of Education**	date excavated:	**04 May 2021**
principal:		date completed:	**04 May 2021**
project:	**The Forest High School**	logged by:	**PP**
location:	**189 Allambie Road, Allambie Heights, NSW**	checked by:	**RT**

position: E: 337,362; N: 6,263,456 (MGA94) | surface elevation: 155.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.6 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration	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)	DCP (blows/ 100 mm)	structure and additional observations
E	N	1 2 3	Not Encountered	E				SC	**TOPSOIL: Sandy SILT**: dark grey, sand is fine to coarse with rootlets, brick and tile fragments and traces of fine to medium gravel (highly weathered sandstone).	<Wp		100 200 300 400	2 4 6 8 10	**TOPSOIL/FILL**
				E						D				**FILL**
									FILL: CLAYEY SAND: fine - medium grained, grey-brown, clay is low plasticity with fine to medium gravel (highly weathered sandstone) tiles, terracotta fragments and bricks.					PID: 0.4 ppm
				E	154.5	0.5								0.4m: terracotta pipe, inferred relic sewer pipe
								Cl	**Sandy CLAY**: medium plasticity, pale grey, mottled brown, sand is fine to medium with extremely weathered sandstone and laminite.	<Wp	VSt			**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL**
				E	154.0	1.0								PID: 0.6 ppm
					153.5	1.5								PID: 0.3 ppm
					153.0	2.0			Test pit TP13 terminated at 1.7 m Refusal					
					152.5	2.5								
					152.0	3.0								
					151.5	3.5								

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HT hand tools

support
N none
S shoring

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
D disturbed sample
B bulk disturbed sample
E environmental sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
VS vane shear peak/remouded (kPa)

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 - Excavation

Excavation ID.	***TP14***
sheet:	1 of 1
project no.	***754-SYDGE284698***
client: ***Schools Infrastructure NSW - Department of Education***	date excavated: ***04 May 2021***
principal:	date completed: ***04 May 2021***
project: ***The Forest High School***	logged by: ***PP***
location: ***189 Allambie Road, Allambie Heights, NSW***	checked by: ***RT***

position: E: 337,379; N: 6,263,461 (MGA94) | surface elevation: 155.0 m (AHD) | pit orientation: | DCP id.:

equipment type: Kobelco SK55SRX Excavator | excavation method: none | excavation dimensions: 1.8 m long 0.4 m wide

excavation 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	DCP (blows/mm) 2 4 6 8 10	structure and additional observations
E	N		Not Encountered	E				CI	**FILL: Gravelly SAND**: fine - medium grained, sub-angular, pale brown, gravel is fine, sub-angular comprimising moderately weathered sandstone, traces of tile fragments.	D <Wp				**FILL** PID: 0.6 ppm
				E					**FILL: Sandy CLAY**: medium plasticity, pale grey-brown, sand is fine to medium, with tile and terracotta fragments.					PID: 0.2 ppm
					154.5	0.5		SC	**CLAYEY SAND**: fine - medium grained, pale grey, mottled dark brown, with extremely weathered sandstone/laminite.	D	D - VD			**RESIDUAL SOIL / EXTREMELY WEATHERED MATERIAL**
				E	154.0	1.0								PID: 0.5 ppm
					153.5	1.5			Test pit TP14 terminated at 1.5 m Refusal					
					153.0	2.0								
					152.5	2.5								
					152.0	3.0								
					151.5	3.5								

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator
HT hand tools

support
N none
S shoring

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
D disturbed sample
B bulk disturbed sample
E environmental sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
VS vane shear peak/remouded (kPa)

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

APPENDIX D: LABORATORY TEST RESULTS

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*TETRA TECH COFFEY PTY LTD*	job no:	***TESTSYDS 00076AA***
Principal:			
project:	*THE FOREST HIGH SCHOOL*	report date:	*11 May 2021*
location:		borehole:	***BH01***
test procedure:	*AS 4133.1.1.1 and 4133.4.2.1*	date received:	*7 May 2021*
test apparatus:	*Avery with 50 kN KELBA load cell 28950*		*page 1 of 1*

All samples were tested in an "As Received" condition.

Top platen 228 mm, Bottom platen 120 mm

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS21W00073		*145 mm*		***2.2 t/m³***	*Laminite*	
10.75 to 10.90 m	*7 May 21*	*53.1 mm*	***0.501***	***15.8 %***	*Massive.*	
SYDS21S00729	*6.40 min*	*2.73:1*				*Shear*

10.75 to 10.90 m

SYDS_001R

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

NATA Accredited Laboratory No. 431

Authorised Signature:
Alan Cocks
Rock Testing Manager

Date: *11 May 2021*

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01840-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01840 / BH01_0.5-0.95
Date Sampled:	27/04/2021
Source:	Insitu Ground
Material:	Grey and Yellow mottled Silty SAND
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH01_0.5-0.95

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1	6	
Soil Description		Grey and Yellow mottled Silty SAND	
Type of Water		Distilled	
Temperature of Water (°C)		21	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01841-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01841 / BH01_0.5-1.95
Date Sampled:	27/04/2021
Source:	Insitu Ground
Material:	Light Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH01_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.1	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01842-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01842 / BH02_0.5-0.95
Date Sampled:	27/04/2021
Source:	Insitu Ground
Material:	Grey and Yellow mottled CLAY with some fine Sand
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH02_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	14.1	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01843-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01843 / BH02_3-3.1
Date Sampled:	27/04/2021
Source:	Insitu Ground
Material:	Light to Dark Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH02_3-3.1

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.9	
Date Tested		10/05/2021	

Comments

N/A

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*TETRA TECH COFFEY PTY LTD*	job no:	***TESTSYDS 00076AA***
Principal:			
project:	*THE FOREST HIGH SCHOOL*	report date:	*11 May 2021*
location:		borehole:	***BH03***
test procedure:	*AS 4133.1.1.1 and 4133.4.2.1*	date received:	*7 May 2021*
test apparatus:	*Avery with 200 kN CAS load cell 4222*		*page 1 of 1*

All samples were tested in an "As Received" condition.

Top platen 228 mm, Bottom platen 120 mm

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS21W00073 / ***8.34 to 8.55 m*** / *SYDS21S00730*	*7 May 21* / *10.14 min*	*145 mm* / *51.8 mm* / *2.79:1*	***12.0***	***2.3 t/m³*** / ***9.8 %***	*Sandstone* / *Bedding planes are at an angle of 90° to the axis of loading*	*Shear*

8.34 to 8.55 m

SYDS_001R

\\Ct-fs\zct\Sydney\Data\50. ROCK TESTING_TESTSYD-Rocks-2021\TESTSYDS00076AA - The Forest High School\[BH03 UCS.xlsm]Data Entry

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

NATA Accredited Laboratory No. 431

Date: *11 May 2021*

Authorised Signature:

Alan Cocks
Rock Testing Manager

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01844-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01844 / BH03_0.5-0.95
Date Sampled:	28/04/2021
Source:	Insitu Ground
Material:	Light Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH03_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	19.0	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01845-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01845 / BH03_1.5-1.95
Date Sampled:	28/04/2021
Source:	Insitu Ground
Material:	Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH03_1.5-1.95

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1	6	
Soil Description		Grey CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		21	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01846-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01846 / BH03_3-3.45
Date Sampled:	28/04/2021
Source:	Insitu Ground
Material:	Light to Dark Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH03_3-3.45

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	13.8	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01847-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01847 / BH04_0.5-0.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White/Yellow/Brown mottled CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH04_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.2	
Date Tested		10/05/2021	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	10.5	
Mould Length (mm)		127.2	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	41	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	17	
Plasticity Index (%)	AS 1289.3.3.1	24	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01848-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01848 / BH05_0.5-0.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	Yelloish Brown and Red mottled CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH05_0.5-0.95

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1	6	
Soil Description		Yellowish Brown and Red mottled CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		21	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SSI:SYDN21S-01912
Issue No: 1

Shrink Swell Index Report

Client: Tetra Tech Coffey Pty Ltd (Chatswood)
Level 19, 799 Pacific Highway
Chatswood NSW 2067

Principal:
Project No.: TESTSYDN00244AA
Project Name: 754-SYDGE284698 - The Forest High School
Lot No.: **TRN:**

Sample Details

Sample ID:	SYDN21S-01912	**Sampling Method:**	U50 - Submitted By Client
Date Sampled:	29/04/2021	**Material:**	Red mottled Brown and Grey CLAY with some Gravel
Date Submitted:	11/05/2021	**Source:**	Ex. Site
Date Tested:	19/05/2021		
Project Location:	The Forest High School		
Sample Location:	BH05_1.1-1.5		
Borehole Number:	BH05		
Borehole Depth (m):	1.1-1.5		

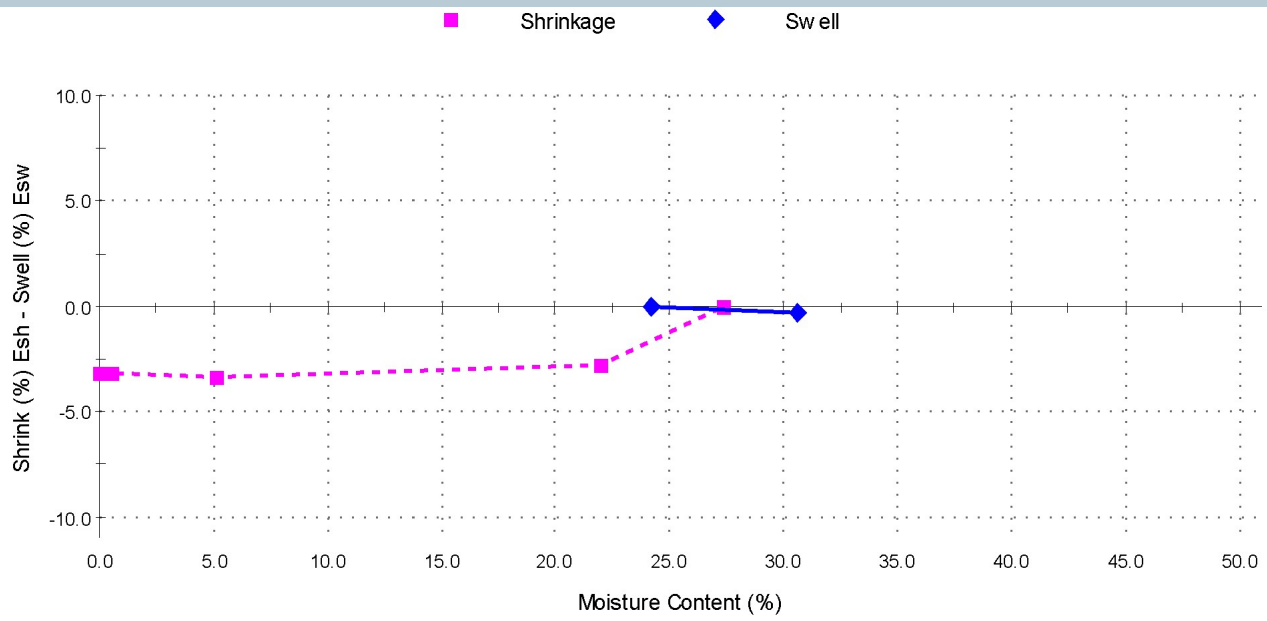
Swell Test — AS 1289.7.1.1

Swell on Saturation (%):	-0.3
Moisture Content before (%):	24.1
Moisture Content after (%):	30.6
Est. Unc. Comp. Strength before (kPa):	
Est. Unc. Comp. Strength after (kPa):	

Shrink Test — AS 1289.7.1.1

Shrink on drying (%):	3.2
Shrinkage Moisture Content (%):	27.4
Est. inert material (%):	
Crumbling during shrinkage:	No
Cracking during shrinkage:	Yes

Shrink Swell



Shrink Swell Index - Iss (%): 1.8

Comments

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Material Test Report

Report No: SYDN21S-01849-1
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01849 / BH05_1.5-1.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White and Red mottled CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH05_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.4	
Date Tested		10/05/2021	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	11.5	
Mould Length (mm)		254.2	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	62	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	23	
Plasticity Index (%)	AS 1289.3.3.1	39	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Material Test Report

Report No: SYDN21S-01850-1
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01850 / BH06_0.5-0.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White CLAY with Red and Yellow spots
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH06_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.6	
Date Tested		10/05/2021	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.5	
Mould Length (mm)		249.8	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	45	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	19	
Plasticity Index (%)	AS 1289.3.3.1	26	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01851-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01851 / BH06_1.5-1.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White/Yellow/Orange mottled Silty SAND
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH06_1.5-1.95

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1	6	
Soil Description		White/Yellow/Orange mottled Silty SAND	
Type of Water		Distilled	
Temperature of Water (°C)		21	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01913-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01913
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Light to Dark Brown mottled CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH07_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.6	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01914-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01914
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	White CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH07_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.8	
Date Tested		12/05/2021	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	8.0	
Mould Length (mm)		250.1	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	44	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	21	
Plasticity Index (%)	AS 1289.3.3.1	23	

Comments

N/A

SYDNEY LABORATORY
Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street, Melrose Park NSW 2114 Australia
ph: +61 2 8876 0500

Test report - uniaxial compressive strength

client:	*COFFEY SERVICES*	job no:	***TESTSYDS 00076AA***
Principal:			
project:	*754-SYDGE264698 - THE FOREST HIGH SCHOOL*	report date:	*14 May 2021*
location:		borehole:	***BH08***
	test procedure: *AS 4133.1.1.1 and 4133.4.2.1*	date received:	*11 May 2021*
	test apparatus: *Avery with 50 kN KELBA load cell 28950*		*page 1 of 1*

All samples were tested in an "As Received" condition.

Top platen 228 mm, Bottom platen 120 mm

QESTLab work order ID / depth / QESTLab sample ID	date tested / test duration	height / average diameter / height/dia ratio	uniaxial compressive strength MPa	wet density / moisture content	sample description / bedding/foliation	Client's Sample ID / failure mechanism
SYDS21W00075 / ***5.10 to 5.35 m*** / *SYDS21S00732*	*11 May 21* / *7.10 min*	*143 mm* / *52.0 mm* / *2.75:1*	***0.392***	***2.2 t/m³*** / ***13.9 %***	*Sandstone* / *Bedding planes are at an angle of 85° to the axis of loading*	*Shear*

5.10 to 5.35 m

SYDS_001R

\\Ct-fs\zct\Sydney\Data\50. ROCK TESTING_TESTSYD-Rocks-2021\TESTSYDS00076AA - The Forest High School\[BH08 UCS.xlsm]Data Entry

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

NATA Accredited Laboratory No. 431

Date: *14 May 2021*

Authorised Signature:

Alan Cocks
Rock Testing Manager

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01915-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01915
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Brownish Grey CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH08_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	20.5	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SSI:SYDN21S-01916
Issue No: 1

Shrink Swell Index Report

Client: Tetra Tech Coffey Pty Ltd (Chatswood)
Level 19, 799 Pacific Highway
Chatswood NSW 2067

Principal:
Project No.: TESTSYDN00244AA
Project Name: 754-SYDGE284698 - The Forest High School
Lot No.: **TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Cameron Bik
(Laboratory Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 25/05/2021

Sample Details

Sample ID:	SYDN21S-01916	**Sampling Method:**	U50 - Submitted By Client
Date Sampled:	30/04/2021	**Material:**	Grey and Brown mottled CLAY with some Gravel
Date Submitted:	11/05/2021	**Source:**	Ex. Site
Date Tested:	13/05/2021		
Project Location:	The Forest High School		
Sample Location:	BH08_1-1.45		
Borehole Number:	BH08		
Borehole Depth (m):	1-1.45		

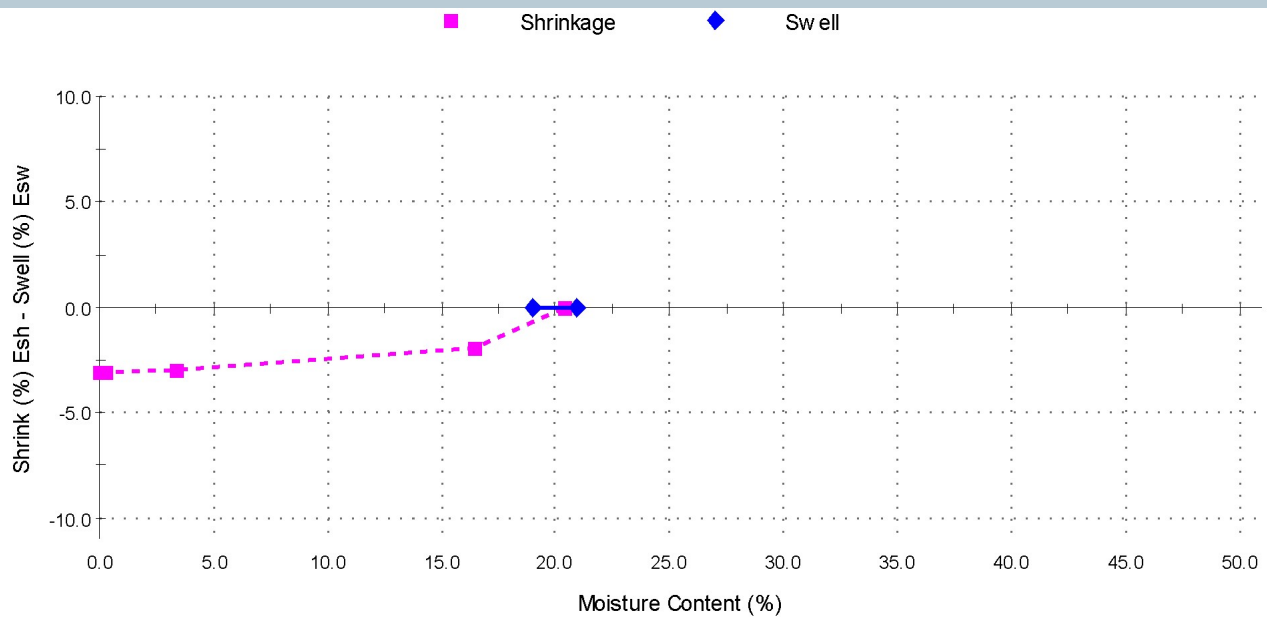
Swell Test AS 1289.7.1.1

Swell on Saturation (%):	-0.1
Moisture Content before (%):	20.9
Moisture Content after (%):	19.0
Est. Unc. Comp. Strength before (kPa):	
Est. Unc. Comp. Strength after (kPa):	

Shrink Test AS 1289.7.1.1

Shrink on drying (%):	3.1
Shrinkage Moisture Content (%):	20.4
Est. inert material (%):	
Crumbling during shrinkage:	No
Cracking during shrinkage:	Yes

Shrink Swell



Shrink Swell Index - Iss (%): 1.7

Comments

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01917-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01917
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Light and Dark Grey mottled CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH08_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.6	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01918-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01918
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Grey/Brown/Yellow Silty SAND with some Sandstone
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH09_0.5-0.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	9.8	
Date Tested		12/05/2021	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Grey/Brown/Yellow mottled Silty SAND	
Type of Water		Distilled	
Temperature of Water (°C)		21	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01919-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01919
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Yellow and Dark Brown mottled Sandy CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH09_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	19.8	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01920-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01920
Date Sampled:	30/04/2021
Source:	Ex. Site
Material:	Light to Dark Grey mottled Silty CLAY
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	BH09_6-6.45

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	13.3	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01852-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01852 / GW01_1.5-1.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White/Yellow/Red mottled CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	GW01_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	27.5	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01853-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01853 / GW01_3-3.45
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	Light to Dark Grey CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	GW01_3-3.45

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	22.1	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01854-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 13/05/2021

Sample Details

Sample ID / Client ID:	SYDN21S-01854 / GW01_4.5-4.95
Date Sampled:	29/04/2021
Source:	Insitu Ground
Material:	White and Red mottled CLAY
Specification:	No Specification
Sampling Method:	SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	GW01_4.5-4.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.1	
Date Tested		10/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01921-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula (Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01921
Date Sampled:	03/05/2021
Source:	Ex. Site
Material:	Light to Dark Brown mottled Silty SAND
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	GW02_4.5-4.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	11.0	
Date Tested		12/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Report No: SYDN21S-01922-1
Issue No: 1

Material Test Report

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: Maaria Pajula
(Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 19/05/2021

Sample Details

Sample ID:	SYDN21S-01922
Date Sampled:	03/05/2021
Source:	Ex. Site
Material:	Yellow/Brown mottled Sandy SILT
Specification:	No Specification
Sampling Method:	D, SPT - Submitted By Client
Project Location:	The Forest High School
Sample Location:	GW03_1.5-1.95

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	14.5	
Date Tested		12/05/2021	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	7.0	
Mould Length (mm)		249.8	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	29	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	21	
Plasticity Index (%)	AS 1289.3.3.1	8	
Date Tested		14/05/2021	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

California Bearing Ratio Test Report

Report No: CBR:SYDN21S-01923
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

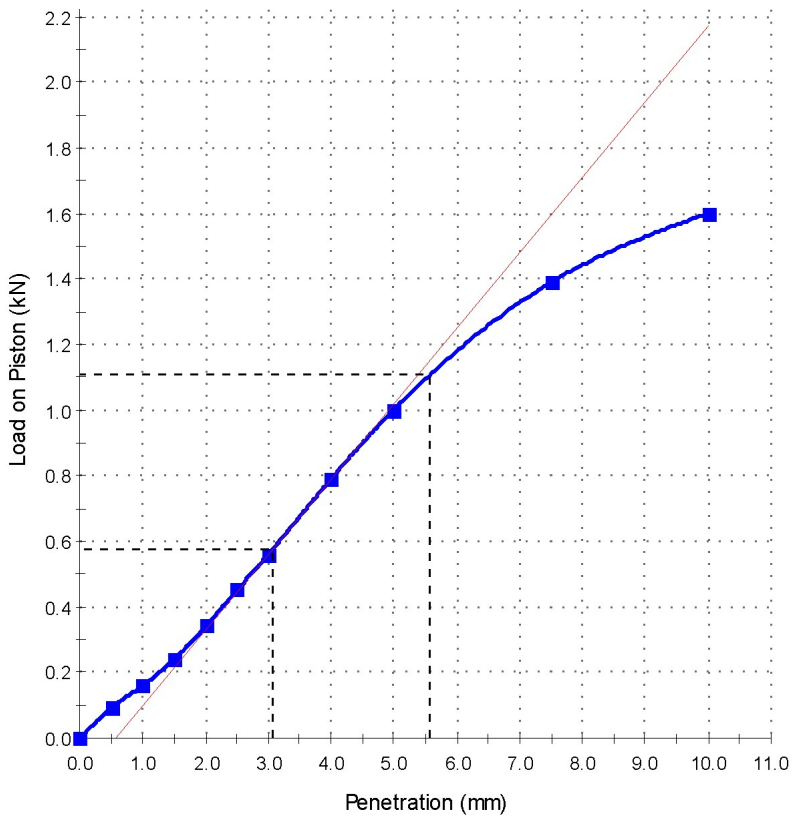
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: David Stone
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 25/05/2021

Sample Details

Sample ID:	SYDN21S-01923	**Sampling Method:**	Bulk Bags - Submitted By Client
Client ID:		**Material:**	Brown Silty CLAY
Date Sampled:	3/05/2021	**Source:**	Insitu ground
Date Submitted:	11/05/2021	**Specification:**	No Specification
Date Tested:	24/05/2021		
Project Location:	The Forest High School		
Sample Location:	TP07_0.2-1		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 5.0mm (%):	**6**
Dry Density before Soaking (t/m³):	1.72
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	18.3
Moisture Ratio before Soaking (%):	102.0
Dry Density after Soaking (t/m³):	1.70
Density Ratio after Soaking (%):	99.0
Swell (%):	1.0
Moisture Content of Top 30mm (%):	19.9
Moisture Content of Remaining Depth (%):	18.9
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	96
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	18.3

Comments

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

California Bearing Ratio Test Report

Report No: CBR:SYDN21S-01924
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

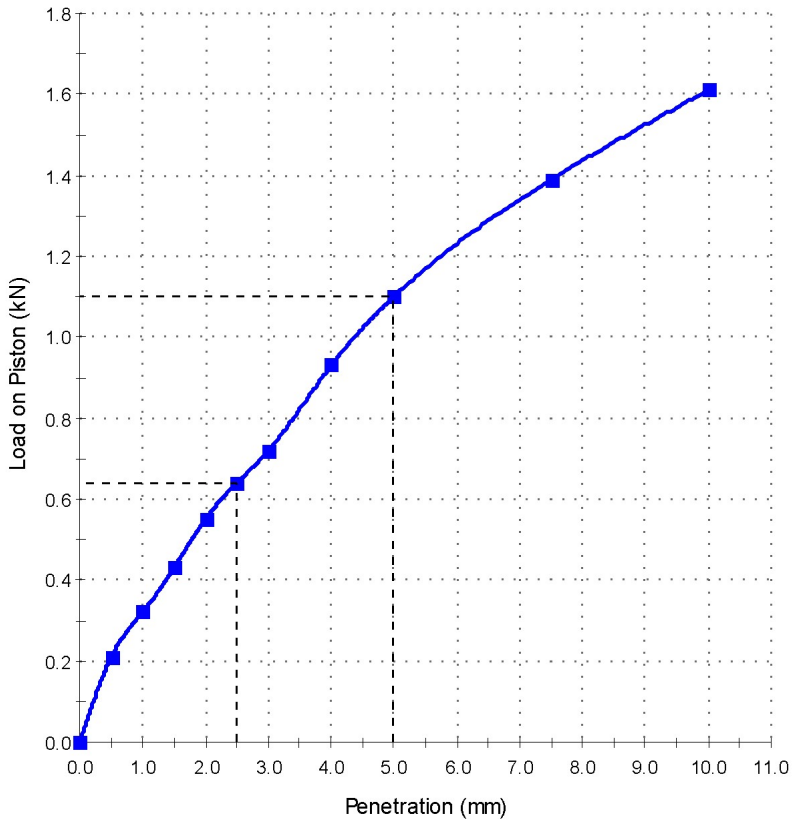
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: David Stone
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 25/05/2021

Sample Details

Sample ID:	SYDN21S-01924	**Sampling Method:**	Bulk Bags - Submitted By Client
Client ID:		**Material:**	Light Brown Silty CLAY
Date Sampled:	3/05/2021	**Source:**	Insitu ground
Date Submitted:	11/05/2021	**Specification:**	No Specification
Date Tested:	24/05/2021		
Project Location:	The Forest High School		
Sample Location:	TP10_0.5-1		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 5.0mm (%):	**6**
Dry Density before Soaking (t/m³):	1.84
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	12.0
Moisture Ratio before Soaking (%):	102.5
Dry Density after Soaking (t/m³):	1.81
Density Ratio after Soaking (%):	98.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	16.7
Moisture Content of Remaining Depth (%):	14.9
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	17.1

Comments

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

California Bearing Ratio Test Report

Report No: CBR:SYDN21S-01925
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

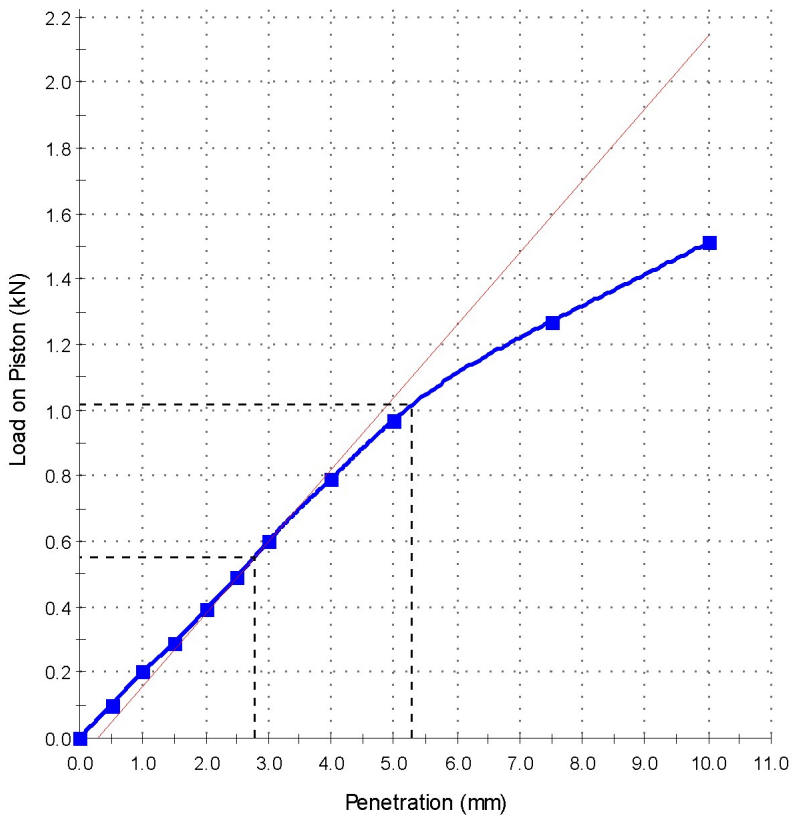
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: David Stone
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 25/05/2021

Sample Details

Sample ID:	SYDN21S-01925	**Sampling Method:**	Bulk Bags - Submitted By Client
Client ID:		**Material:**	Brown Silty CLAY
Date Sampled:	3/05/2021	**Source:**	Insitu ground
Date Submitted:	11/05/2021	**Specification:**	No Specification
Date Tested:	24/05/2021		
Project Location:	The Forest High School		
Sample Location:	TP11_0.3-1		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 5.0mm (%):	**5**
Dry Density before Soaking (t/m³):	1.72
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	18.2
Moisture Ratio before Soaking (%):	102.0
Dry Density after Soaking (t/m³):	1.70
Density Ratio after Soaking (%):	98.5
Swell (%):	1.0
Moisture Content of Top 30mm (%):	23.3
Moisture Content of Remaining Depth (%):	20.8
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	1
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	19.6

Comments

Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
31 Hope Street
Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

California Bearing Ratio Test Report

Report No: CBR:SYDN21S-01926
Issue No: 1

Client:	Tetra Tech Coffey Pty Ltd (Chatswood) Level 19, 799 Pacific Highway Chatswood NSW 2067
Principal:	
Project No.:	TESTSYDN00244AA
Project Name:	754-SYDGE284698 - The Forest High School
Lot No.:	**TRN:**

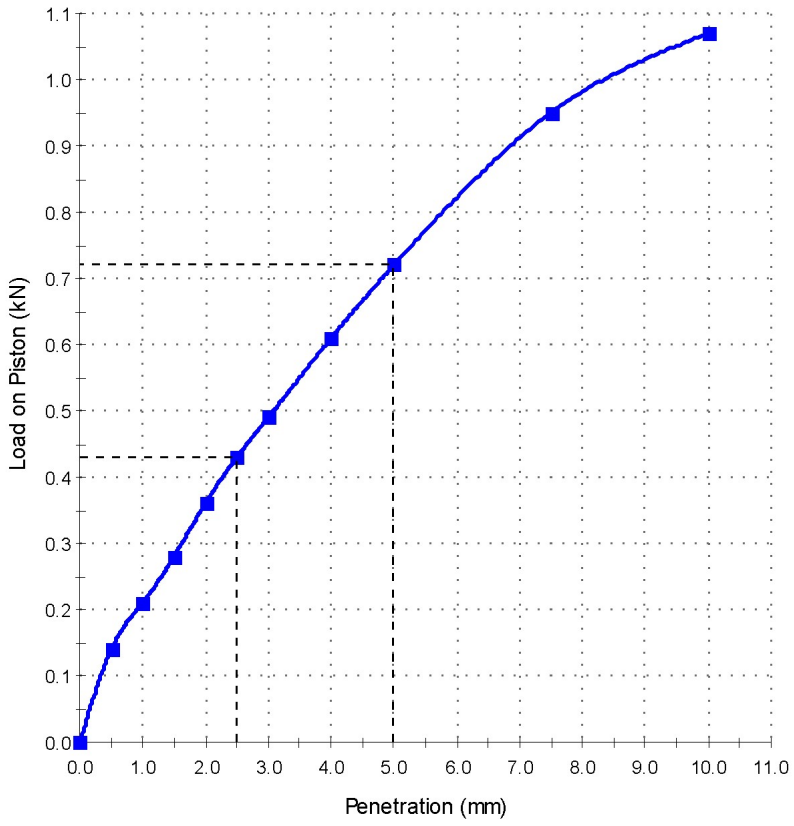
Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Approved Signatory: David Stone
(Senior Geotechnician)
NATA Accredited Laboratory Number:431
Date of Issue: 25/05/2021

Sample Details

Sample ID:	SYDN21S-01926	**Sampling Method:**	D, SPT - Submitted By Client
Client ID:		**Material:**	Brown Silty CLAY
Date Sampled:	3/05/2021	**Source:**	Insitu ground
Date Submitted:	11/05/2021	**Specification:**	No Specification
Date Tested:	24/05/2021		
Project Location:	The Forest High School		
Sample Location:	TP13_0.8-1.5		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 5.0mm (%):	**3.5**
Dry Density before Soaking (t/m³):	1.51
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	25.7
Moisture Ratio before Soaking (%):	100.5
Dry Density after Soaking (t/m³):	1.47
Density Ratio after Soaking (%):	97.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	32.4
Moisture Content of Remaining Depth (%):	29.6
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	26.3

Comments