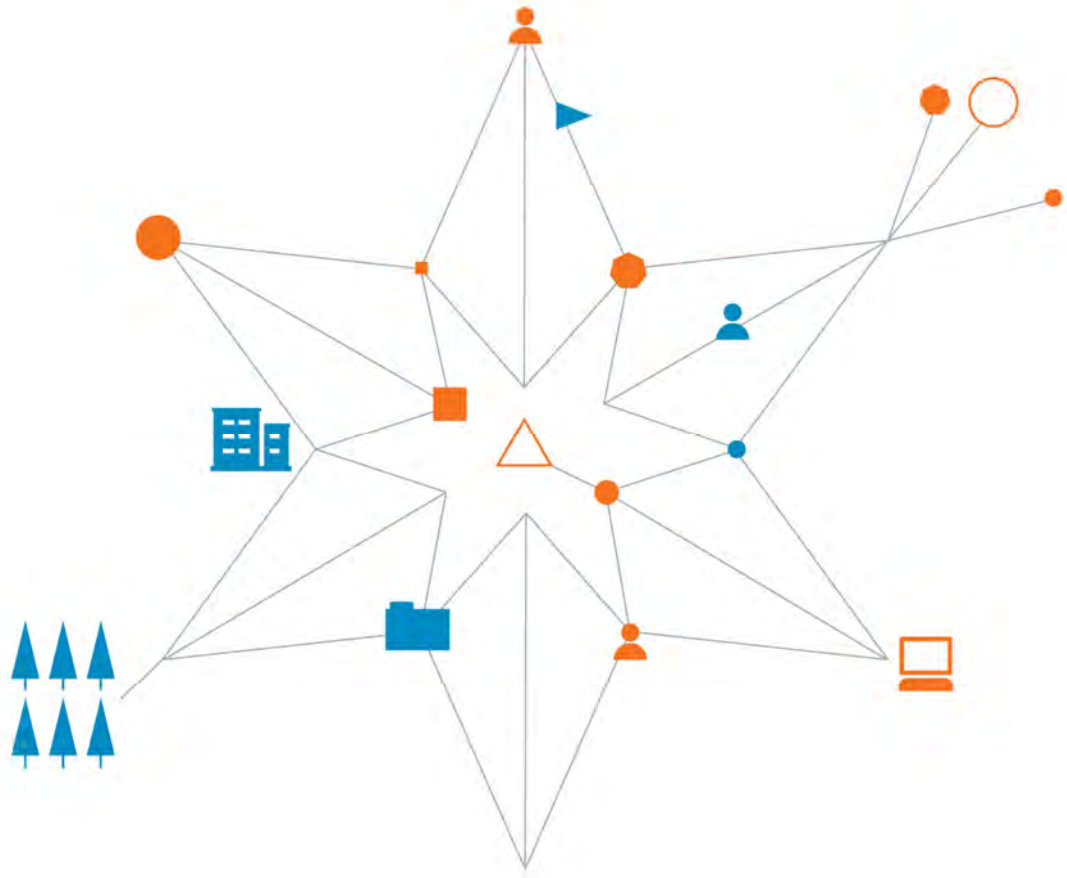
Department of Education (School Infrastructure) NSW
Mosman High School Geotechnical Investigation Report
754-SYDGE233510

30 March 2021



We're always pushing boundaries except when it comes to safety

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Mosman High School Geotechnical Investigation Report

Prepared for
Department of Education (School Infrastructure) NSW

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AC	Update to “proposed development” section.	28/08/2020	Dena Gabbassova	Rolf Rohleder	Rolf Rohleder
AD	Added Earthquake Site Sub Soil Classification	23/02/2021	Dena Gabbassova	Robert Turner	Robert Turner
AE	Development layout change. No change to report	16/03/2021	Dena Gabbassova	Robert Turner	Robert Turner
AF	Minor change to development description.	30/03/2021	Dena Gabbassova	Robert Turner	Robert Turner

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1. Introduction

Coffey Services Australia Pty Ltd (Coffey) was engaged by Schools Infrastructure NSW (SINSW), a division of the Department of Education (DoE), to provide geotechnical and contamination advice in relation to a proposed upgrade at Mosman High School located at 745 Military Road, Mosman, NSW (the 'site'). The location and boundaries of the school site are shown on the Location Plan in Appendix A – Figure 1.

Coffey was initially commissioned to conduct geotechnical investigation comprising desk study supported by boreholes at selected locations to assess three development layout options from concept masterplans provided. When the draft version of this report was prepared, a preferred development concept had not been advised. At that time, development concepts indicated the development would involve the construction of new multi-storey buildings within the northeastern corner of the site with existing buildings located centrally within the site being either removed or refurbished.

Investigation was carried out to inform the design of the proposed redevelopment as shown on the Masterplanning Study prepared by JDH Architects dated 27 June 2018. The Draft Geotechnical Investigation Report (GIR) report (Document Ref. 754-SYDGE233510-AB) was issued on 18 November 2019.

Subsequent revisions of the above report have used the 2019 geotechnical investigation outcomes to address specific development plans. This revision addresses the preferred development concept and staging for the State Significant Development Application (SSDA) presented in Appendix B, and summarised below:

- Demolition of Building B, Building C and part Building E;
- Removal of existing sports court and surrounding retaining walls and nominated trees;
- Construction of a new part 3/ part 4 storey building plus lift overrun and net enclosure to rooftop multi-court (Building G) on the corner of Military Road and Belmont Road providing:
  - administration and staff facilities;
  - multipurpose gym/hall;
  - library;
  - canteen facilities;
  - general and senior learning units;
  - science learning unit;
  - health / PE and performing arts unit; and
  - learning and admin support unit.
- Associated landscaping works including new outdoor play areas, a rooftop play space and rooftop multi-purpose court; and
- Relocation of the main pedestrian entrance from Military Road to Belmont Road.

Coffey understands that Building G will be constructed at grade and no basement levels are proposed. Based on the Development plan dated 17 February 2021, two of the completed five boreholes are within the proposed footprint of the new Building G, and a third is located 10 m west of the northwest wing.

2. Scope of Works

To fulfil the 2019 geotechnical investigation objectives, Coffey undertook the following scope of works:

- A site walkover to observe current site activities and conditions, and adjacent properties. The site walkover was carried out on 22 October 2019 and the resulting observations are outlined in the Desktop Study section below;
- Service locating at five borehole locations conducted by Geotrace Pty Ltd.
- Intrusive subsurface investigation comprising the following:
  - Progression of five boreholes using a track mounted limited access drill rig to characterise fill material and shallow natural soil.
  - In situ Standard Penetration Tests (SPT).
  - NMLC coring of the bedrock to a minimum embedment of 2 m into rock.
  - Collection of representative soil and rock samples for laboratory testing.
  - Testing of soil samples at a National Association of Testing Authorities (NATA) accredited laboratory.
  - Point Load Strength Index testing on rock samples.

3. Desktop Study

3.1. Site Information

The site is currently occupied by Mosman High School, with at-grade parking, school buildings, demountable classrooms, and bitumen play areas. It is fronted by Military Road to the east, Belmont Road to the north, Gladstone Avenue to the west, and Avenue Road to the south.

The location of the site and boundaries are shown in Appendix A - Figure 1. Additional site information is provided in Table 1 below.

Table 1: Site Information

Site Address:	Mosman High School, 745 Military Road, Mosman, NSW, 2088
Approx. Total Land Area:	14,500 m^2
Title Identification Details:	Lot 1 DP1268793
Current Land Use:	Public High School
Historical Land Use:	Historical evidence indicates the grounds have been used as a school since 1883.
Adjoining Site Use:	Low-density residential housing and commercial properties to the east, north, west, and south.
Site Coordinates:	The approximate UTM Zone 56 H grid coordinates for the centre of the site are: 310281 m E, 6258187 mS

A site walkover was carried out by a Coffey geotechnical engineer on 22 October 2019. Observations made during the site walkover are summarised below:

- The site appeared to slope from east to west in a terraced manner, with retaining walls observed at various locations within the site indicating a potential for cut to fill to have been undertaken to create level surfaces.
- Five permanent buildings were observed at the site and appeared to vary in age of construction.
- Two demountables were located in the southwest quadrant of the site.
- Two buildings on site are listed as heritage buildings by local government.
- An elevated walkway connects Blocks B, C, D, and E.
- All existing buildings on site have basement levels.
- Coffey was advised that the Block A building (heritage) contains asbestos-containing materials (ACM) within the interior, which are deteriorating.
- Coffey was advised that ACM are present below the Block D building.
- Three surfaced sport courts are present on site, one of which is a Covered Outdoor Learning Area (COLA).
- A bitumen play area is located at the centre of the site.
- The site was surfaced by various materials including concrete, bitumen, brick, turf, artificial turf, mulch and gravel.
- Evidence of contamination such as stained ground surfaces, odorous soil, or suspected ACM impacts to soil were not observed during the site walkover.

3.2. Site Setting

3.2.1. Topography

The site is located near the top of the western slope of a local ridge traversing from the north to the south. Military Road which forms the eastern boundary of the site follows the top of this ridge. The grade across the Mosman High School site gently slopes to the west at approximately 3 % and to the north at approximately 1%. The typical elevations across the site range from approximately 74 to 79 m AHD.

3.2.2. Geology

The Sydney 1:100,000 Geological Sheet 9130 indicates the site locality is underlain by Hawkesbury Sandstone, characterised by medium to coarse-grained quartz sandstone with very minor shale and laminite lenses. Appendix A – Figure 2 illustrates the site location in relation to this geological unit.

3.2.3. Groundwater

Two registered water supply wells, GW106880.1.1 and GW108738.1.1, are located approximately 350 m east of the site on Cullen Avenue and Raglan Street however no groundwater measurements were available for these wells. The site is located on a crest with an elevation of over 70 m AHD. Groundwater is expected to be deep within the sandstone bedrock.

3.2.4. Soil Landscape

Reference to the Sydney Soil Landscape Series Sheet 9130 (4th edition) and associated report indicates the soil landscape of the site and its surrounds is classified as a Lambert/Gymea Erosional Landscape which comprises undulating to rolling rises and low hills on Hawkesbury Sandstone.

These soils typically comprise loose, stony sandy loam, sandy clay loam, puggy clay, clayey sand, clay and friable sandstone. As the site is located at the crest of a ridge, the anticipated soil stratigraphy consists of sandy loam, sandy clay loam or clayey sand overlying weathered sandstone with a maximum soil depth of 1 m. The pH ranges from extremely acidic (pH 3.5) to slightly acidic (pH 6.0)

Gymea and Lambert erosional soils are stable or slightly reactive with a high to very high erosion hazard. Appendix A – Figure 3 illustrates the site location in relation to the surrounding soil landscapes.

3.2.5. Acid Sulfate Soils Risk Map

Reference to Department of Land and Water Conservation Prospect/Parramatta River Acid Sulfate Soil Risk Map 1997 (2nd Edition) indicates the site has “no known occurrences of acid sulfate soils”.

3.3. Utility Assets

After a Dial-Before-You-Dig search (DBYD) the utility asset owners in **Table 2** responded as owning assets within or adjacent to the subject site:

Table 2: Utility Asset Details

Asset Owner	Asset Type	Location
Ausgrid	Power – High Voltage, Transmission and Low Voltage Cables	Running around the perimeter of site. Not marked within site.
Jemena	Gas – 210 kPA Mains	Running along Avenue Road and Military Road adjacent to property line. Not marked within site.
NBN	Fibre Optic	Running along Avenue Road and Military Road adjacent to property line. Not marked within site.
Optus	Fibre Optic	Running along Avenue Road and Military Road adjacent to property line. Cable parallel to Avenue Road beneath the COLA and Block E.
Pipe Networks	Fibre Optic	Within Telstra duct. Not Marked within site.
Roads and Maritime Service	Power Cables	Within road and footpaths of Military Road and Belmont Road intersection. Not Marked within site.
Sydney Water	Water – 100, 150, or 500 mm Cast Iron Cement Lined Main	Running around the perimeter of site. Not marked within site.
Sydney Water	Sewer – 225 Vitrified Clay Main	Running along Gladstone Avenue and across the site beneath Block D and Canteen.
Telstra	Telecommunications	Cables running along Avenue Road and Military Road adjacent to property line. 20 mm PVC conduits entering site from Gladstone Avenue (beneath Block D), and from Avenue Road beneath Block A. WiFi conduit at the northeast corner of site.

3.4. Previous Reports

Coffey was not provided with any previous contamination or geotechnical assessment reports that had been prepared for the site for review as part of this assessment.

4. Geotechnical Investigation

4.1. Fieldwork

Geotechnical investigation field work was carried out between 7 am and 5 pm on 2 and 3 November 2019. Weather conditions were fine and dry on both days. Prior to starting the intrusive investigation, Coffey cross-referenced the DBYD plans with the proposed boreholes, and engaged Geotrace Pty Ltd (Geotrace) to conduct service locating at every exploratory hole location.

The field investigation consisted of five cored boreholes (BH01 to BH05) completed with a track-mounted limited access drill rig operated by Rockwell Drilling (Rockwell). Boreholes were advanced to depths between 3.04 m below ground (mbg) and 3.64 mbg. All boreholes reached target depth. Borehole locations were recorded in the field by measuring offsets from site features and are marked on the site plan in Appendix A.

Boreholes were advanced through asphalt, surficial soils and extremely weathered bedrock with solid stem augers and tungsten-carbide (TC) drill bit. Borehole BH03 required diatubing through the concrete pavement. Standard Penetration Tests (SPTs) were undertaken during auger drilling in four of the five boreholes to assess in-situ strength and obtain soil samples. Borehole BH04 encountered bedrock at a shallow depth and did not include an SPT. Following TC-bit refusal, boreholes were advanced through rock using NMLC core drilling techniques (noted on borehole logs).

A Coffey geotechnical engineer was present during fieldwork to identify drilling locations, record test results, log the encountered ground conditions and box the rock core. The borehole logs and rock core photographs are attached as Appendix C, together with Coffey soil and rock description and explanation sheets.

Boreholes were reinstated with sand and soil cuttings. Where pavement was present, quick set concrete was compacted on the surface of the borehole to match surrounds. No monitoring wells were installed due to absence of groundwater within the completed boreholes.

4.2. Laboratory Testing

Following completion of fieldwork, selected soil samples were sent to the Coffey Testing laboratory in Melrose Park, NSW for geotechnical testing and Eurofins laboratory in Lane Cove, NSW for aggressivity testing. The rock cores were sent to our core storage for Point Load Strength Index (IS_{50}) testing. The (IS_{50}) results are included on the borehole logs.

Laboratory testing on selected samples from the geotechnical investigation comprised the following:

- Eight soil moisture content tests;
- Five Particle Size Distribution tests;
- Three soil aggressivity tests (Chloride, Conductivity, Resistivity, pH, Sulfate SO_4)
- Point load testing of rock core at approximately 1 m intervals.

5. Geotechnical Investigation Findings

5.1. Subsurface Profile

The site is surfaced with various materials including concrete, bitumen, brick, turf, artificial turf, mulch and gravel.

Fill was typically encountered below paved surfaces or at surface where pavement was absent. Pavement was between 120 mm and 170 mm thick. The fill depths encountered in the boreholes ranged from 0.2 m below ground level (BGL) to 0.7 m BGL.

Natural residual soil comprising fine to medium grained clayey sand (brown, orange, grey and / or red) with fine to coarse subangular gravel.

The residual soil graded quickly into very low strength sandstone bedrock, mottled red and pale grey medium to coarse grained becoming low or medium strength, pale grey and white with depth. Extremely or highly weathered very low strength bedrock was typically first encountered at depth between 0.5 m BGL and 1.3 m BGL, becoming low or medium strength by borehole termination depth (3.04m to 3.64m BGL). None of the boreholes encountered groundwater during the investigation. Table 3 below, summarises the general ground profile.

Table 3: Geotechnical Model

Unit	Material	Description	Range of Unit Thickness (m)	Rock Class
1	Topsoil	Clayey SILT, low plasticity, dark brown, trace organics	0.0 – 0.2	N/A
2	Fill	Sandy SILT, low plasticity, brown, with fine angular gravel; sand is fine to coarse grained	0.0 – 0.6	N/A
	Fill	Sandy GRAVEL with silt, fine to medium grained, angular, brown, sand is fine to coarse grained		
3	Residual Soil	Clayey SAND, fine to coarse grained, brown, grey and dark grey, with fine to medium grained gravel	0.2 – 0.9	N/A
4	Weathered Rock	SANDSTONE, medium to coarse grained, mottled red and grey, extremely to moderately weathered, very low to low strength	0.25-1.35	Class V or IV
5	Rock	SANDSTONE, medium to coarse grained, pale grey and white, fresh, low to medium strength	Unproven	Class III

Notes:

1. *The depths and unit thicknesses are based on the boreholes and may not represent the stratigraphy or the maximum or minimum depths and thicknesses of stratigraphic units across the entire site.*
2. *Rock classification is based on the system presented in "Foundations on Sandstone and Shale in the Sydney Region" Aust. Geomech. Jnl, Dec 1998, Pells et al (1998).*

5.2. Geotechnical Laboratory Testing Results

Laboratory testing was carried out by Coffey Testing Services, a NATA accredited laboratory. Table 4 summarises the laboratory testing schedule for samples collected during the investigation.

Table 4: Geotechnical Laboratory Testing

Laboratory Test	Test Method	Number of Tests
Moisture Content	AS1289.2.1.1	5
Particle Size Distribution (PSD)	AS1289.3.6.1	5
Point Load Strength Index $I_{S(50)}$	AS133.4.1 – 2005	10

The results of the Particle Size Distribution and Moisture Content tests are summarised in Table 5 below with the laboratory report sheets attached in Appendix D. Results of Point Load Index testing are presented on the borehole logs attached in Appendix C.

Table 5: Laboratory Soil Testing Results

Borehole	Depth (m)	Material	Particle Size (%)			Moisture Content (%)
			Gravel	Sand	Fines	
BH01	0.2 – 0.4	SAND	11	73	16	5.3
BH02	0.5 – 0.95	SAND	17	63	10	9.5
BH03	0.4 – 0.85	SAND	10	77	13	11.5
BH04	0.2 – 0.4	SAND	28	55	17	7.6
BH05	1.1 – 1.3	SAND	19	63	18	6.5

5.3. Soil Aggressivity Testing

Soil Aggressivity Testing was carried out by Eurofins, which is a NATA accredited laboratory. All tested samples were obtained from elevations above the groundwater table therefore fall into Soil Conditions B. According to the AS 2159-2009, the exposure classification for all soil samples is non-aggressive for both concrete and steel piles. Refer to Table 6 for a summary of soil aggressivity laboratory testing.

Table 6: Aggressivity Laboratory Testing Results

	Unit	BH01 (0.8 - 1.0 m)	BH03 (0.2-0.4 m)	BH05 (0.8-1.0 m)
Chloride	mg/kg	<10	13	12
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	41	84	39
pH (1:5 Aqueous extract at 25°C as rec.)	unit	8.1	9.4	6.0
Resistivity*	ohm.m	1200	600	1300
Sulphate (as SO4)	mg/kg	<10	130	79
Moisture Content	%	11	16	7.5

6. Discussion and Recommendations

6.1. Site Classification to AS2870

AS2870 provides a classification system for footing design of residential scale structures on reactive soil sites.

The school site is characterised by shallow bedrock overlain by natural soils of relatively low reactivity. Where these soils are predominantly sandy (less than 15% fines), the local soil profile would be classified as A (sand and rock sites with little or no ground movement from moisture changes). In other areas where the soil is clayey (more than 15% fines) and less than 0.6m thick, the local soil profile would generally be classified S (slightly reactive).

In locations where there is filling over the natural soil, the classification may be P (indicating the foundation performance will be governed by mechanisms other than reactive soil movements). Soil profiles are classified P, if the fill is clayey and more than 0.4m deep, or 0.8m deep if sandy.

The classification will vary at particular locations across the site (and possibly across building footprints) because of the presence (or absence) of fill. For this reason, we recommend that all structures be designed to found on Weathered Bedrock or Bedrock, depending on the loads that will be applied by the building.

6.2. Earthquake Site Subsoil Class

Based on Table 3.2 of AS 1170.4-2007, sites in Sydney are designated a Hazard Factor (**Z**) of **0.08**.

The subsoil at the site is interpreted to comprise a surface layer comprising less than 3m of soil or highly weathered rock, over rock with a compressive strength between 1 MPA and 50MPa. This is consistent with site subsoil **Class Be-Rock** (refer to Section 4.2 of AS1170.4-2007).

6.3. Foundations

Coffey understands that the proposed building will be constructed at grade and basement excavations will not be required. For the design of the proposed Building G structure it is expected that shallow pad or pile footings on weathered sandstone bedrock would be practicable.

6.3.1. Shallow Footings

The depth of fill and residual soil is shallow across the site and should be excavated to expose weathered bedrock. Footings should be founded on competent natural material and may be designed using a maximum allowable bearing pressure of 1000 kPa for Class IV Sandstone or better rock. To reduce the risk of excessive differential settlement, we recommended that all footings should be founded on bedrock.

All footings should be excavated, cleaned, inspected and poured without delay. Ground and surface water seepage may occur in footing excavations, particularly following rainfall. Immediately prior to pouring concrete, any water, loose debris or softened material must be removed from the base of footing excavations.

During construction, we recommend that periodic foundation inspections be carried out by a geotechnical engineer or engineering geologist to confirm that a suitable foundation stratum has been reached and to assess any variability in subsurface conditions across the site.

6.3.2. Pile Foundations

Pile foundations that may be suitable for this site include Continuous Flight Auger (CFA) and bored piles. For preliminary assessment of piles, the parameters in Table 7 should be adopted.

Table 7: Recommended Pile Foundation Design Parameters

Unit [a]	Ultimate End Bearing (MPa) [b]	Serviceability End Bearing (MPa)	Ultimate Shaft Adhesion (kPa)	Young's Modulus (MPa) [c]
3 – Class V Sandstone	3	1	150	70
3 – Class IV Sandstone	10	3	500	300
4 – Class III Sandstone	20	5	800	1000

Notes on Table 7:

a) Rock classified as sandstone using Pells et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" Aust. Geomech. Jnl, Dec 1998.
b) Assumes a minimum embedment depth of at least 0.5 m into the relevant bearing stratum.
c) For limit state design, serviceability should be assessed using the Young's modulus value to check that settlements are within tolerable limits.

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

For limit state design a geotechnical reduction factor (φ_g) is to be applied to the ultimate geotechnical pile capacity assessed using the ultimate shaft resistance and end bearing values shown in Table 7 to derive the design ultimate geotechnical pile capacity. In accordance with AS2159-2009, φ_g is dependent on assignment of an Average Risk Rating (ARR) which is a function of geotechnical uncertainty, redundancy of the foundation system, the degree of construction supervision, and the quantity and type of pile testing that will be conducted. The assessment of φ_g therefore depends on the structural design of the foundation system as well as the design and construction method, and testing (if any) to be employed by the designer and piling contractor.

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

6.3.3. Floor Slabs

Given the relatively thin layer of fill and loose sand, ground floor slabs may be cast on-grade following the site preparation recommended in Section 6.5.

6.4. Excavation

Coffey understands that no major excavations will occur due to the proposed structure being built on grade, however some deeper excavations may be required for lifts pits and other structural elements.

6.4.1. Excavatability

Excavation contractors should make their own judgement as to likely productivity, bulking factors, or specific plant requirements.

Based on the ground conditions encountered in the boreholes and the proposed concept of structures built on grade, excavation of the superficial fill, residual soils and extremely to highly weathered rock should be feasible using conventional earthmoving equipment. Excavations of medium or high strength sandstone will require the use of hard rock excavation techniques such as excavators fitted with rock hammers, rock saws, or rock grinders. Rotary rock grinders or rock saws may be required to avoid both over break and excessive vibrations adjacent to existing structures.

6.4.2. Unsupported Excavations

Batter slopes or bench excavation may be possible where excavations are set back sufficiently from adjacent structures and the site boundary. The batter slopes or benches should be scaled following excavation to remove all loose materials which could slide or topple from the face during construction and pose a risk to construction personnel. A summary of the recommended batter slopes for each geotechnical unit is presented in Table 8.

Table 8: Recommended Batter Slopes for Geotechnical Units

Geotechnical Unit	Maximum short-term batter slope (up to 2-month)	Maximum long-term batter slope
RESIDUAL SOIL	1.5H:1V Note 1	2H:1V Note 1
EXTREMELY OR HIGHLY WEATHERED SANDSTONE	1H:1V	2H:1V

Note 1: Flatter batters may be needed if the Residual Soil is cohesionless

6.4.3. Excavation Support

Where insufficient space is available for unsupported, open excavations, excavation support such as shoring or other temporary retaining structures can be employed in excavations in soils or highly weathered rock. Given the encountered site conditions, excavations above competent rock are not expected to be deeper than about 2 metres. Table 9 presents recommended design parameters for the design of the temporary retaining structures where there is a level retained ground surface. The recommended K_0 values assume that some wall movement and relaxation of horizontal stress will occur due to excavation. Retaining wall analyses will need to consider surcharges, footing loads from adjacent structures and roads and hydrostatic pressure.

Table 9: Earth Pressure Coefficients for Retaining Wall Design

Unit	Bulk Density γ (kN/m3)	Effective Cohesion c' (kPa)	Effective Friction Angle φ' (degrees)	Coefficient of Active Earth pressure, Ka	Coefficient of Earth pressure at rest, Ko	Coefficient of Passive Earth pressure, Kp	Elastic Modulus (MPa)
2a	20	0	25	0.4	0.5	2.5	10
2b	20	0	25	0.4	0.5	2.5	10
3	18	0	28	0.36	0.5	2.8	10
4	23	30	35	0.27	0.5	3.7	200

6.4.4. Excavation-induced Ground Movements

Stress relief caused by excavation may result in ground movements within the influence zone of the excavation. The magnitude of excavation-induced ground movements depends on numerous factors including the earth pressures that exist, groundwater conditions and the construction sequence. Documented data has shown that for well-designed and constructed shoring, vertical and lateral movements may be about 0.1% to 0.3% of the retained height at the excavation face. Lateral ground movements can occur at distances up to twice the excavation depth from the edge of excavations.

6.4.5. Groundwater Control During Excavation

The absence of groundwater observed during field investigation suggests that excavations will not encounter groundwater inflow. Minor to moderate groundwater inflows into excavation areas can generally be controlled using conventional sump and pump techniques for discharge into stormwater or sewer systems networks, subject to regulatory approvals. In the case of excessive groundwater inflows, other dewatering techniques may need to be employed, such as well-pointing around the perimeter of the excavation.

6.5. Earthworks

6.5.1. Site Preparation

Site preparation for the proposed development should generally comply with the following requirements:

- All areas of site construction or site re-grading should be stripped to remove existing uncontrolled fill, vegetation, topsoil, existing pavement, or other potentially deleterious material. Additional stripping may be required in any areas where poor, wet or saturated subgrade conditions are encountered.
- Prior to the compaction of Engineered Fill, the exposed subgrade should be proof rolled (with a minimum 12 tonne static roller) to identify any areas that may experience excessive ground deformation. The identified areas should be excavated and backfilled with approved materials.
- Site preparation should include provision of drainage, erosion control and sedimentation control measures as required.

It should be noted that trafficability in silty and clayey materials for wheeled vehicles can be expected to be difficult during and following heavy rainfall due to surface heaving and / or rutting.

6.5.2. Engineered Fill Compaction

Earthworks in relation to Engineered Fill compaction for any pavement construction or support of floor slabs should comply with the following requirements:

- Fill material should be placed in layers not exceeding 300 mm loose thickness and moisture conditioned to Standard Optimum Moisture Content (SOMC) ± 2%.
- Engineered Fill should be compacted to achieve a minimum dry density ratio of 98% SMDD (Standard Maximum Dry Density, for cohesive soils), or a minimum density index of 75% (cohesionless soils) and moisture conditioned to SOMC ± 2% at the time of compaction.
- Earthworks should be carried-out under Level 1 geotechnical inspections and testing as defined in AS3798-2007.

6.5.3. Re-use of Material

It is likely that site-won materials (free of organic and deleterious materials) will be generally suitable for re-use as fill. However, any boulders and large cobbles could inhibit compaction and therefore should be removed.

The suitability of site-won materials for re-use should be assessed and confirmed by the geotechnical engineer at the time of construction.

Materials such as existing asphalt, topsoil, vegetation, or other potentially deleterious material, are generally unsuitable for re-use as engineered fill. They should be stripped from the construction area and either stockpiled for landscaping purposes or shipped off site.

7. Limitations

Subsurface conditions can be complex, vary over relatively short distances and over time. The inferred geotechnical model and recommendations in this report are based on limited subsurface investigations at discrete locations. The engineering logs describe subsurface conditions only at the investigation locations.

Coffey were not provided with a proposed design for the new development. Additional investigations may be required to support detailed design due to factors such as scope limitations and changes to the nature of the project. Coffey should be engaged to assist with detailed design and/or to review designs. During construction Coffey should verify that conditions exposed are consistent with design assumptions.

The attached document entitled “Important Information about Your Coffey Report” forms an integral part of this report and presents additional information about the uses and limitations of the report.

8. References

Chapman, G.A., Murphy, C.L., Tille, P.J., Atkinson, G., and R.J. Morse (2009). Sydney 1:100000 Soil Landscape Series Sheet 9130, 4th edition. Department of Environment, Climate Change and Water.

Chapman, G.A., Murphy, C.L., Tille, P.J., Atkinson, G., and R.J. Morse (2009). Soil Landscapes of the Sydney 1:100000 Sheet Report, 4th edition. Department of Environment, Climate Change and Water.

Murphy, C.L. (1997). Prospect/Parramatta River 1:25000 Acid Sulfate Soil Risk Map, 2nd edition. Department of Land and Water Conservation.

Wilson, G., McDonald, I.D., Roy, P.S. and C. Herbert (1983). Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney.

Appendix A – Figures

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

10 0 10 30 50

Scale (metres) 1:1000

drawn	DG / AW
approved	-
date	05/11/2019
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: SCHOOL INFRASTRUCTURE NSW

project: MOSMAN HIGH SCHOOL
GEOTECHNICAL AND CONTAMINATION ASSESSMENT
745 MILITARY ROAD, MOSMAN, NSW

title: BOREHOLE LOCATION PLAN

project no: 754-SYDGE233510-AF | figure no: FIGURE 1 | rev: A

LEGEND

- SITE BOUNDARY
- APPROXIMATE BOREHOLE LOCATION
- Rh — GEOLOGY - WIANAMATTA GROUP: medium to coarse grained quartz sandstone, very minor shale and laminite lenses

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

20 0 20 40 60 80 100

Scale (metres) 1:2000

drawn	DG / AW
approved	-
date	05/11/2019
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

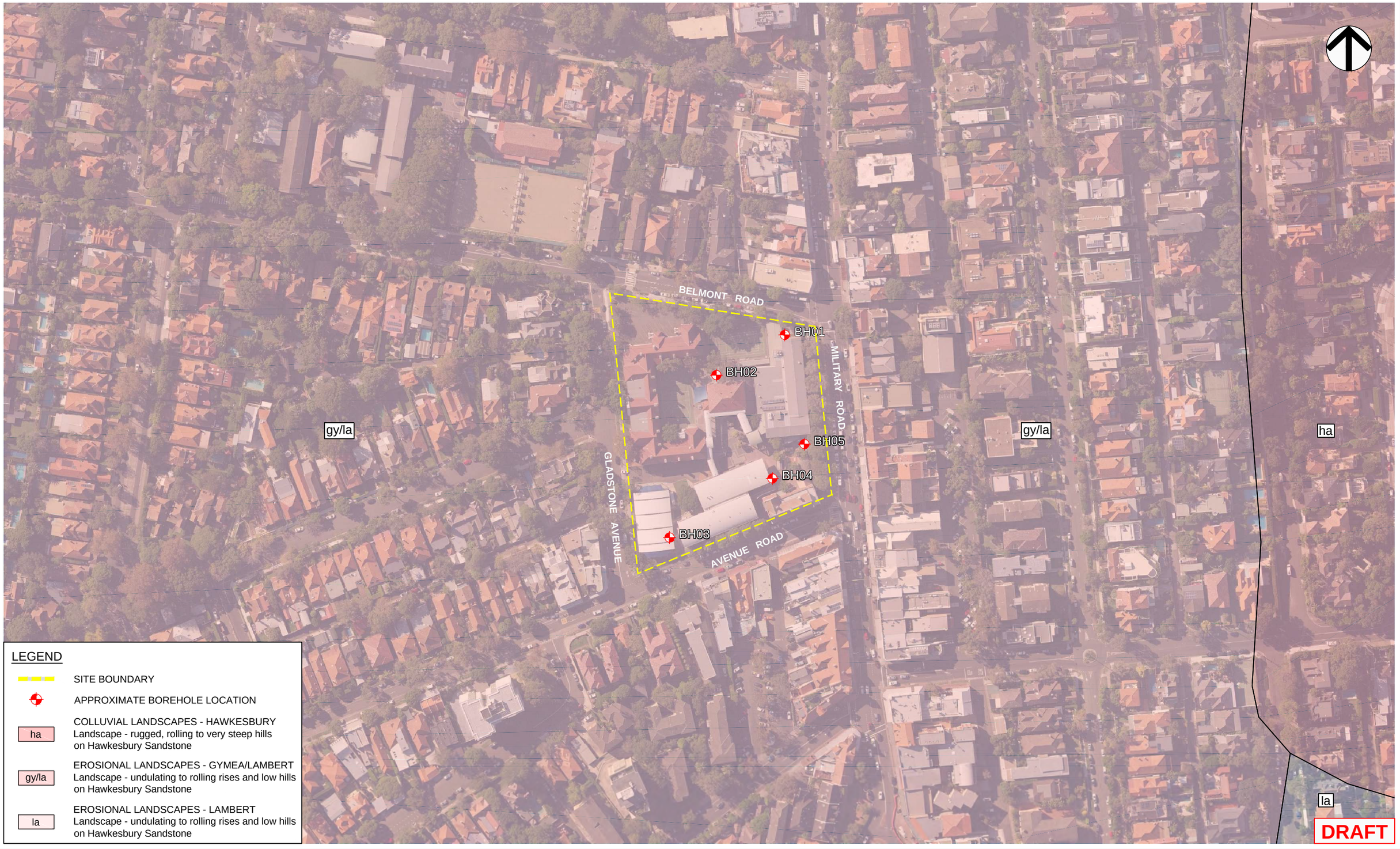
client: SCHOOL INFRASTRUCTURE NSW

project: MOSMAN HIGH SCHOOL
GEOTECHNICAL AND CONTAMINATION ASSESSMENT
745 MILITARY ROAD, MOSMAN, NSW

title: SITE PLAN SHOWING GEOLOGY

project no: 754-SYDGE233510-AF | figure no: FIGURE 2 | rev: A

PLOT DATE: 5/11/2019 1:58:02 PM DWG FILE: F:\1. PROJECTS\4. SYD-GEOTECH\NCS\2019\SYDGE233510 MOSMAN SCHOOL - CBRE\12. CAD\754-SYDGE233510-AB.DWG



LEGEND

- SITE BOUNDARY
- APPROXIMATE BOREHOLE LOCATION
- ha — COLLUVIAL LANDSCAPES - HAWKESBURY
  Landscape - rugged, rolling to very steep hills on Hawkesbury Sandstone
- gy/la — EROSIONAL LANDSCAPES - GYMEA/LAMBERT
  Landscape - undulating to rolling rises and low hills on Hawkesbury Sandstone
- la — EROSIONAL LANDSCAPES - LAMBERT
  Landscape - undulating to rolling rises and low hills on Hawkesbury Sandstone

DRAFT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

20 0 20 40 60 80 100

Scale (metres) 1:2000

drawn	DG / AW
approved	-
date	05/11/2019
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: SCHOOL INFRASTRUCTURE NSW

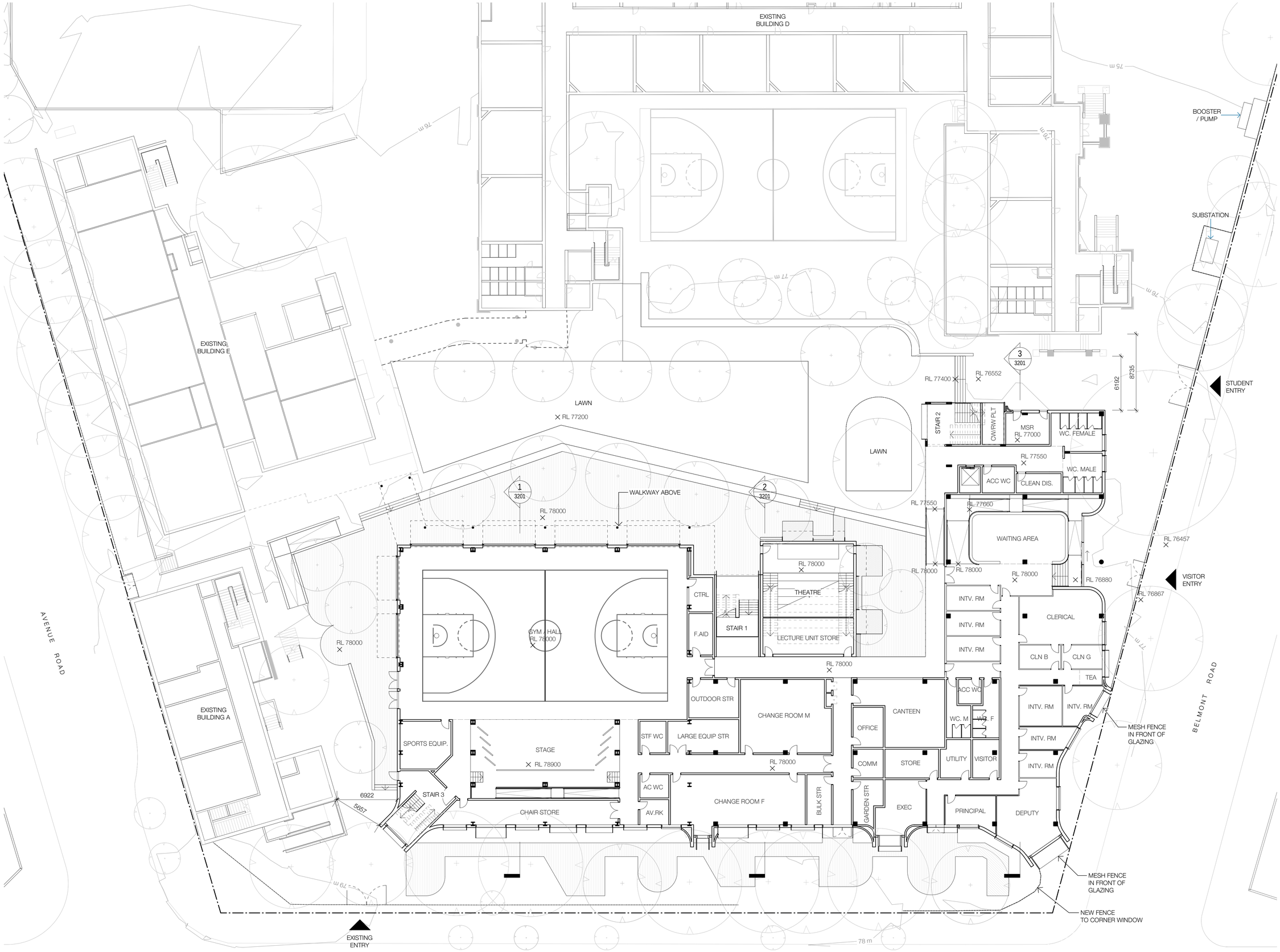
project: MOSMAN HIGH SCHOOL
GEOTECHNICAL AND CONTAMINATION ASSESSMENT
745 MILITARY ROAD, MOSMAN, NSW

title: SITE PLAN SHOWING SOIL LANDSCAPES

project no: 754-SYDGE233510-AF | figure no: FIGURE 3 | rev: A

PLOT DATE: 5/11/2019 1:56:16 PM DWG FILE: F:\1. PROJECTS\4. SYD-GEOTECHNICS\2019\SYDGE233510 MOSMAN SCHOOL - CBRE\12. CAD\754-SYDGE233510-AB.DWG

Appendix B – Preferred Development Plan



Recent revision history

#	Status	Description	Date

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
25mm

Checked
Checker

Approved
Approver

Sheet size
A1

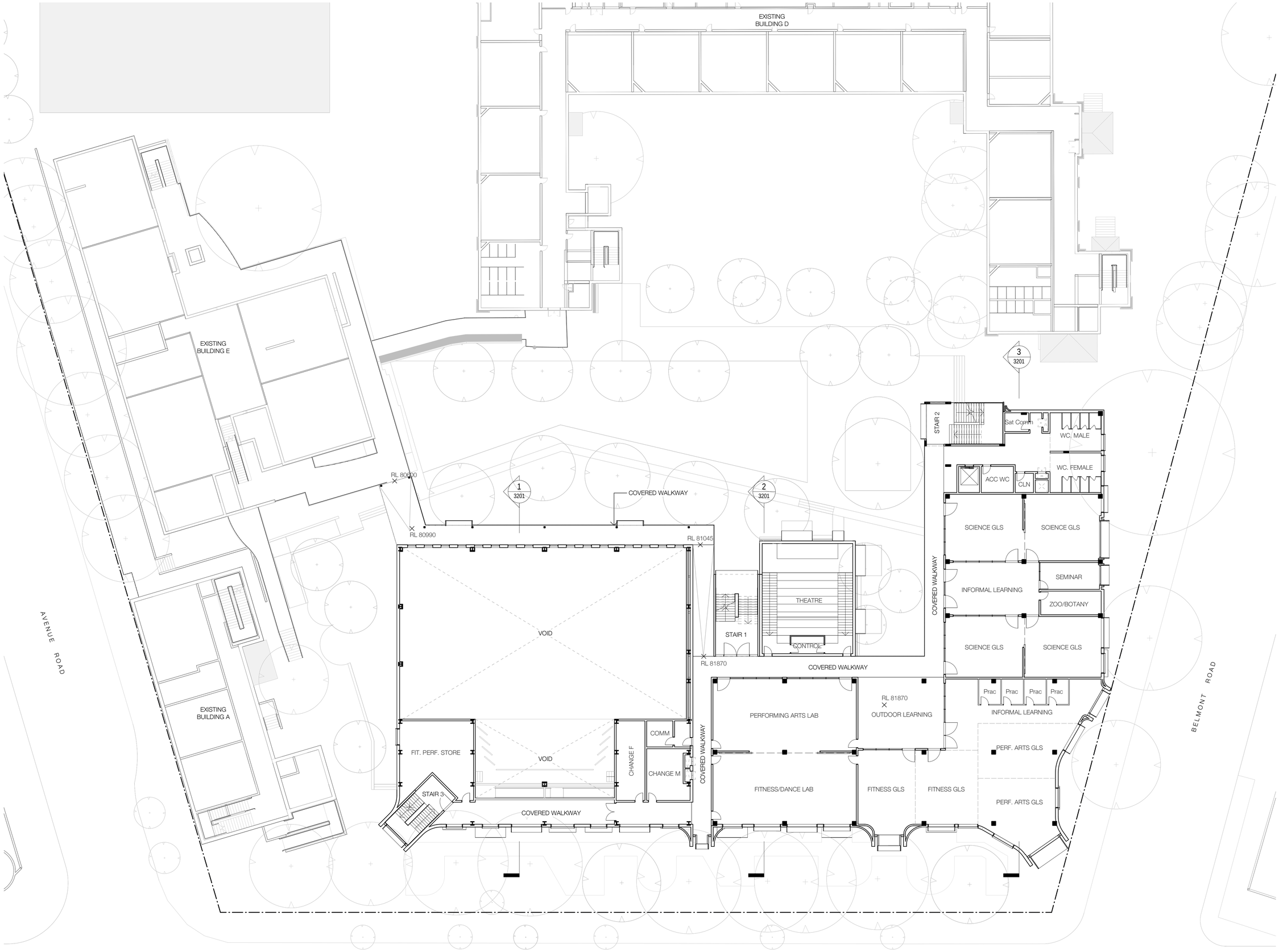
Scale
1 : 200

Sheet title
GROUND FLOOR PLAN

Sheet number
DA-2201

Revision

Status
PRELIMINARY



Recent revision history

#	Status	Description	Date

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
25mm

Checked
Checker

Approved
Approver

Sheet size
A1

Scale
1 : 200

Sheet title
LEVEL 1 FLOOR PLAN

Sheet number
DA-2202

Revision

Status
PRELIMINARY

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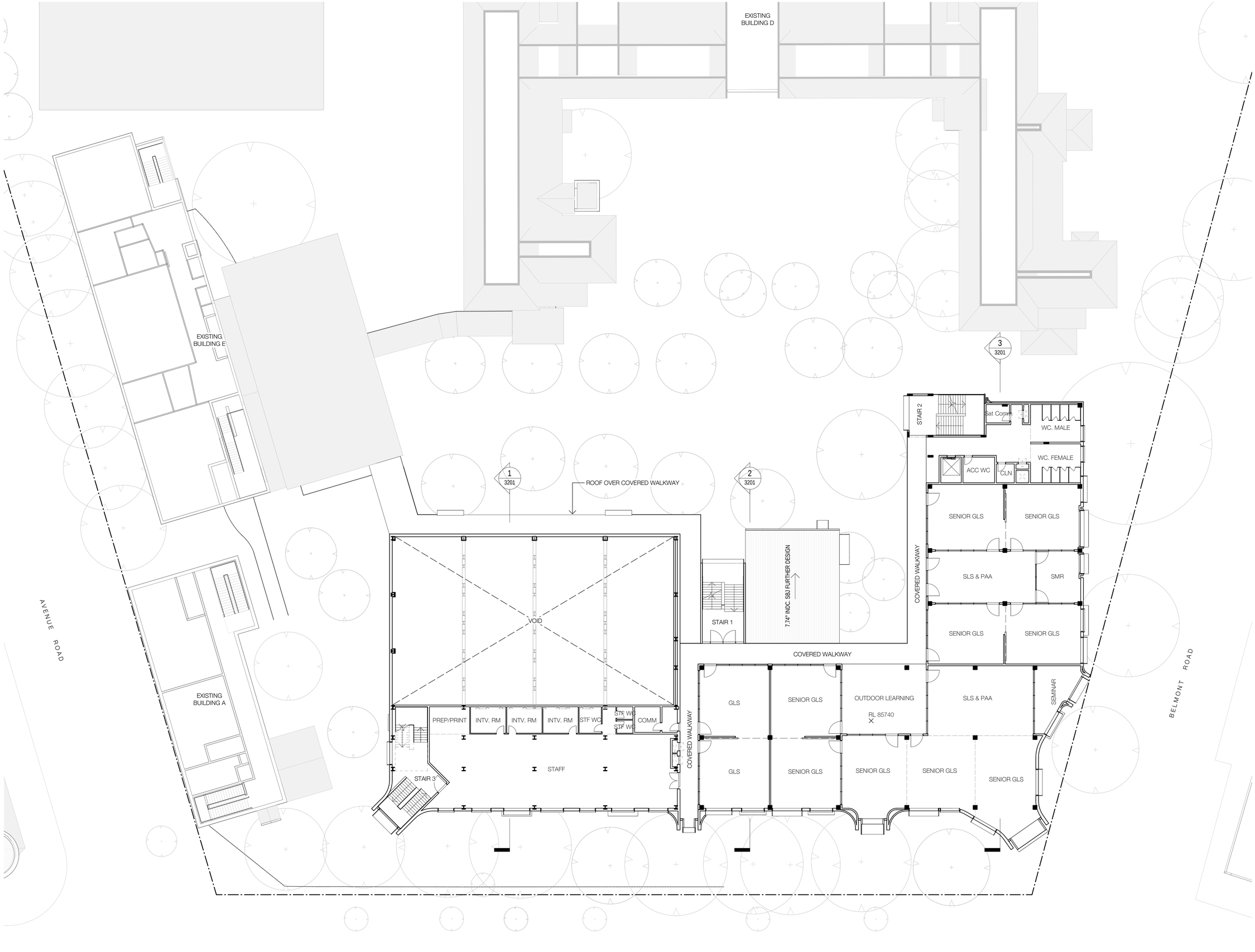

Recent revision history

#	Status	Description	Date

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
25mm

Checked	Approved	Sheet size	Scale
Checker	Approver	A1	1 : 200

Sheet title
LEVEL 2 FLOOR PLAN

Sheet number
DA-2203

Revision

Status
PRELIMINARY

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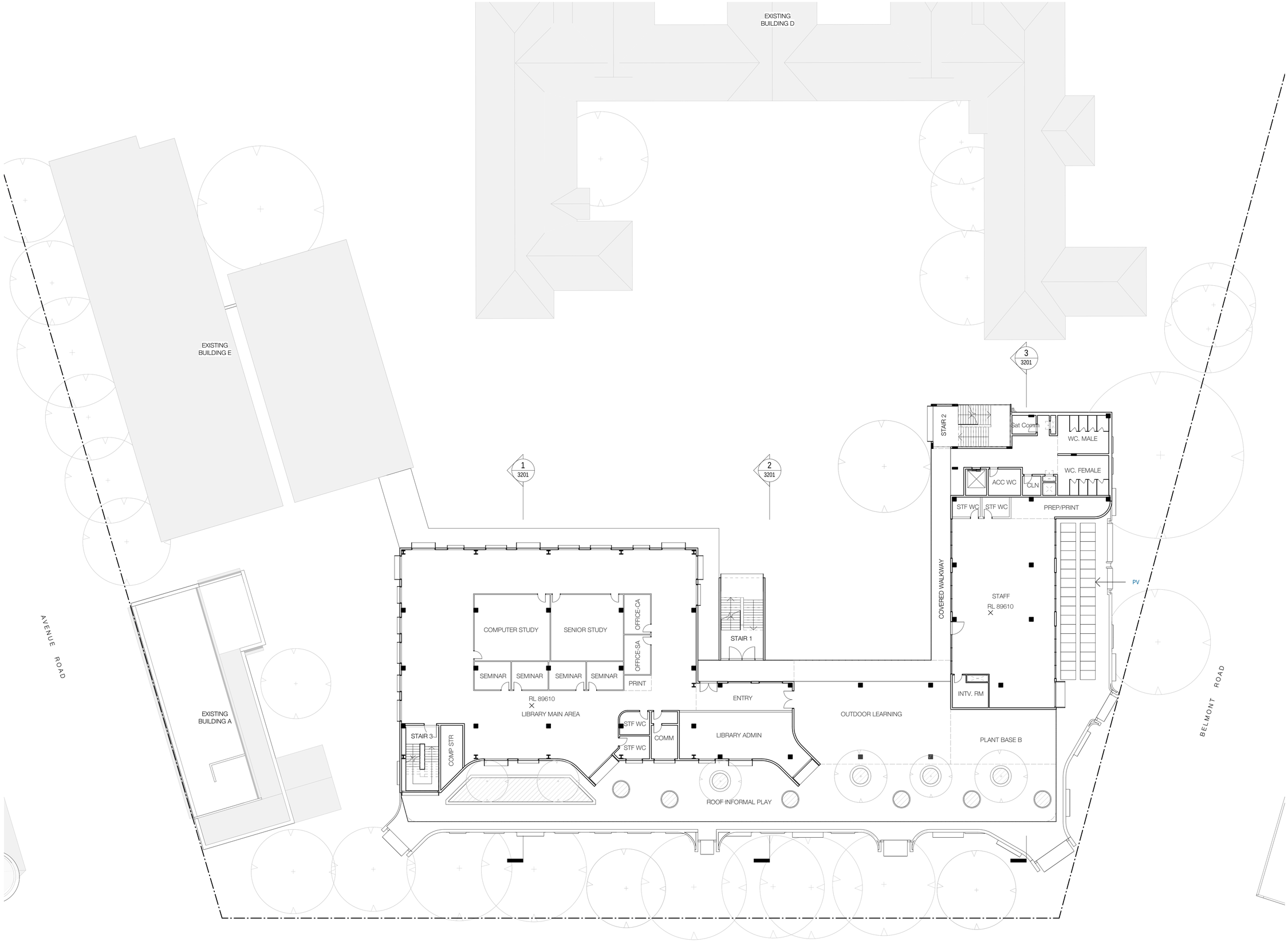

Recent revision history

#	Status	Description	Date

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
25mm

Checked	Approved	Sheet size	Scale
Checker	Approver	A1	1 : 200

Sheet title
LEVEL 3 FLOOR PLAN

Sheet number
DA-2204

Revision

Status
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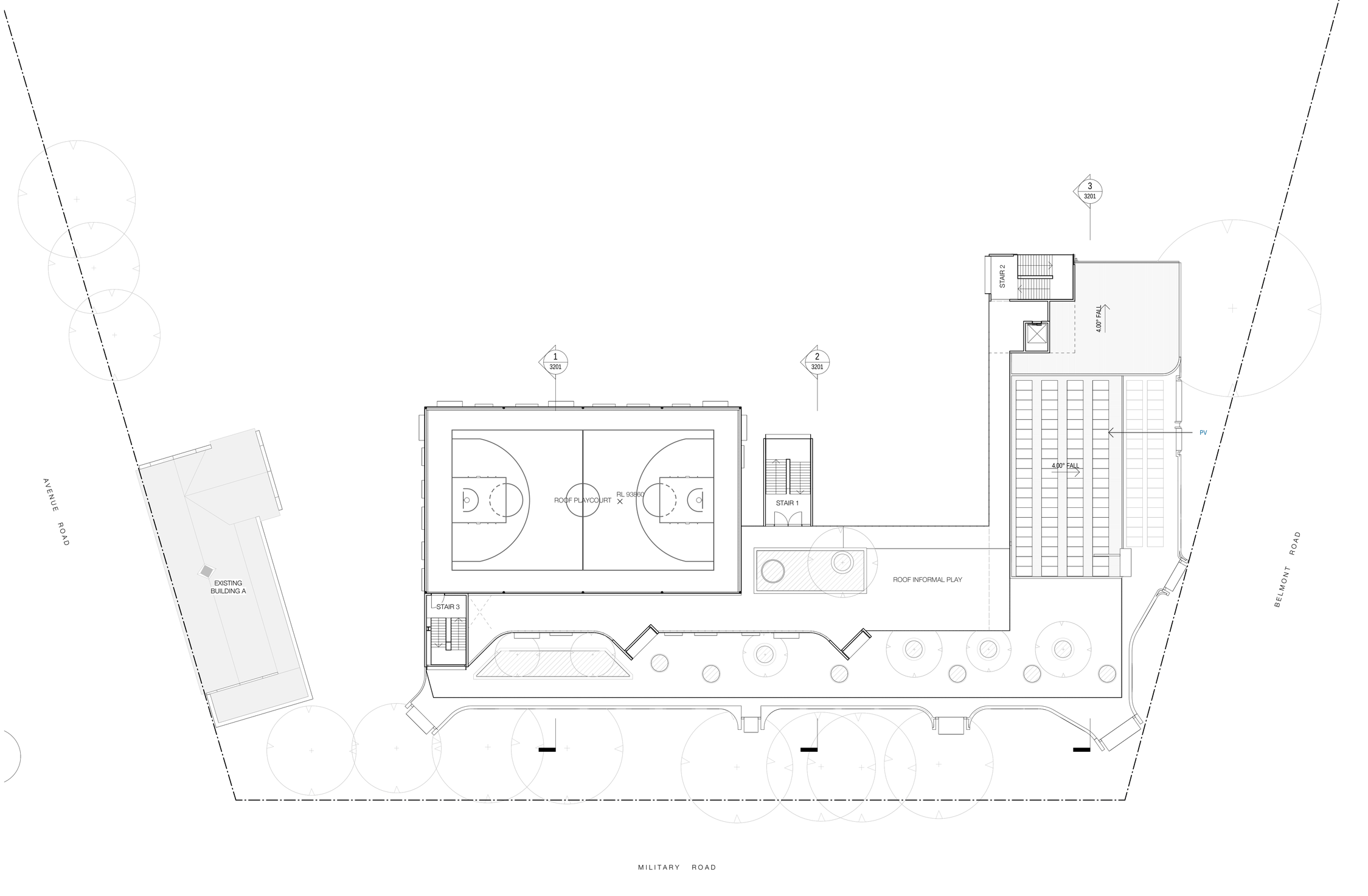

Recent revision history

#	Status	Description	Date

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
25mm

Checked
Checker

Approved
Approver

Sheet size
A1

Scale
1 : 200

Sheet title
LEVEL 4 FLOOR PLAN

Sheet number
DA-2205

Revision

Status
PRELIMINARY

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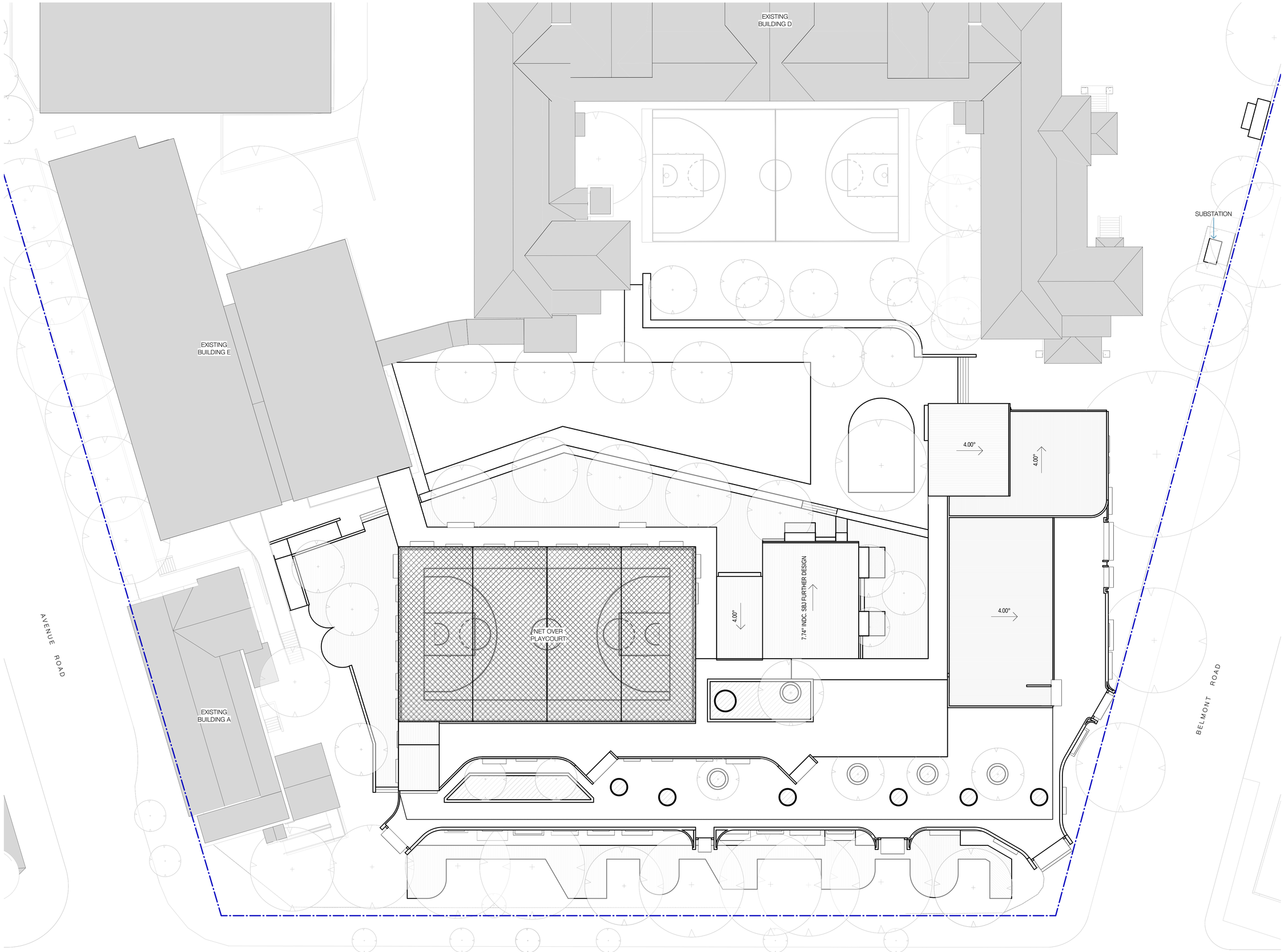

Recent revision history

#	Status	Description	Date

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Project
MOSMAN HIGH SCHOOL

Client
SCHOOL INFRASTRUCTURE NSW

Issuer
MULTIPLEX
W–B™
WOODS BAGOT

Project number
121468

Size check
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Checked	Approved	Sheet size	Scale
Checker	Approver	A1	1 : 200

Sheet title
ROOF PLAN

Sheet number
DA-2206

Revision

Status
PRELIMINARY

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Appendix C – Borehole Logs

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Engineering Log - Borehole

DRAFT

Borehole ID.	**BH01**
sheet:	1 of 2
project no.	**SYDGE233510**
date started:	**02 Nov 2019**
date completed:	**02 Nov 2019**
logged by:	**AE**
checked by:	**RR**

client: ***CBRE***

principal: ***Coffey Services Australia Pty Ltd***

project: ***Mosman School***

location: ***Mosman, NSW***

position: E: 337,492.12; N: 6,255,399.89 (MGA94) | surface elevation: 77.63 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T CASING		Not Encountered	D + E				OL	**TOPSOIL: Clayey SILT**: dark brown, low plasticity, trace organics (rootlets).	D	L		**TOPSOIL / FILL**
							ML	**SILT**: brown, low plasticity, trace fine to coarse grained sand, fine to coaurse sand, with clayey fine to medium gravel.				**RESIDUAL SOIL** PID: 1.9 ppm
			SPT 9, 25/60mm HB N=R	77			SW	**SAND**: fine to medium grained, grey to dark grey.	M	MD / D		PID: 0.9 ppm
					1.0			**SANDSTONE**: medium to coarse grained, pale grey and white, high quartz content with trace black crystalline clasts < 2mm, recovered as sand, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH01 continued as cored hole				
				76	2.0							
				75	3.0							
				74	4.0							
				73	5.0							
				72	6.0							
				71	7.0							
				70								

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

* 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

client:	**CBRE**	Borehole ID.	**BH01**
principal:	**Coffey Services Australia Pty Ltd**	sheet:	2 of 2
project:	**Mosman School**	project no.	**SYDGE233510**
location:	**Mosman, NSW**	date started:	**02 Nov 2019**
		date completed:	**02 Nov 2019**
		logged by:	**AE**
		checked by:	**RR**

position: E: 337,492.12; N: 6,255,399.89 (MGA94) | surface elevation: 77.63 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information				material substance					rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		77	1.0		started coring at 1.25m						
NMLC	Not Encountered	76	2.0		**SANDSTONE**: medium to coarse grained, pale grey and white, indistinctly laminated at 10-20 degrees, high quartz content with trace black crystalline clasts < 2mm.	SW					PT, 10°, PL, RO, CN PT, 15°, PL, RO, CN PT, 10°, UN, RO, CN SM, 0°, UN, Clayey sand, 30 mm JT, 0°, PL, RO, CN
		75	3.0			FR		a=0.15 d=0.16	86% 95%		PT, 20°, UN, RO, CN PT, 10°, PL, RO, CN SM, 10°, PL, Sandy clay, 6 mm
		74	4.0		Borehole BH01 terminated at 3.51 m Target depth						
		73	5.0								
		72	6.0								
		71	7.0								
		70									

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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)
DT diatube

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

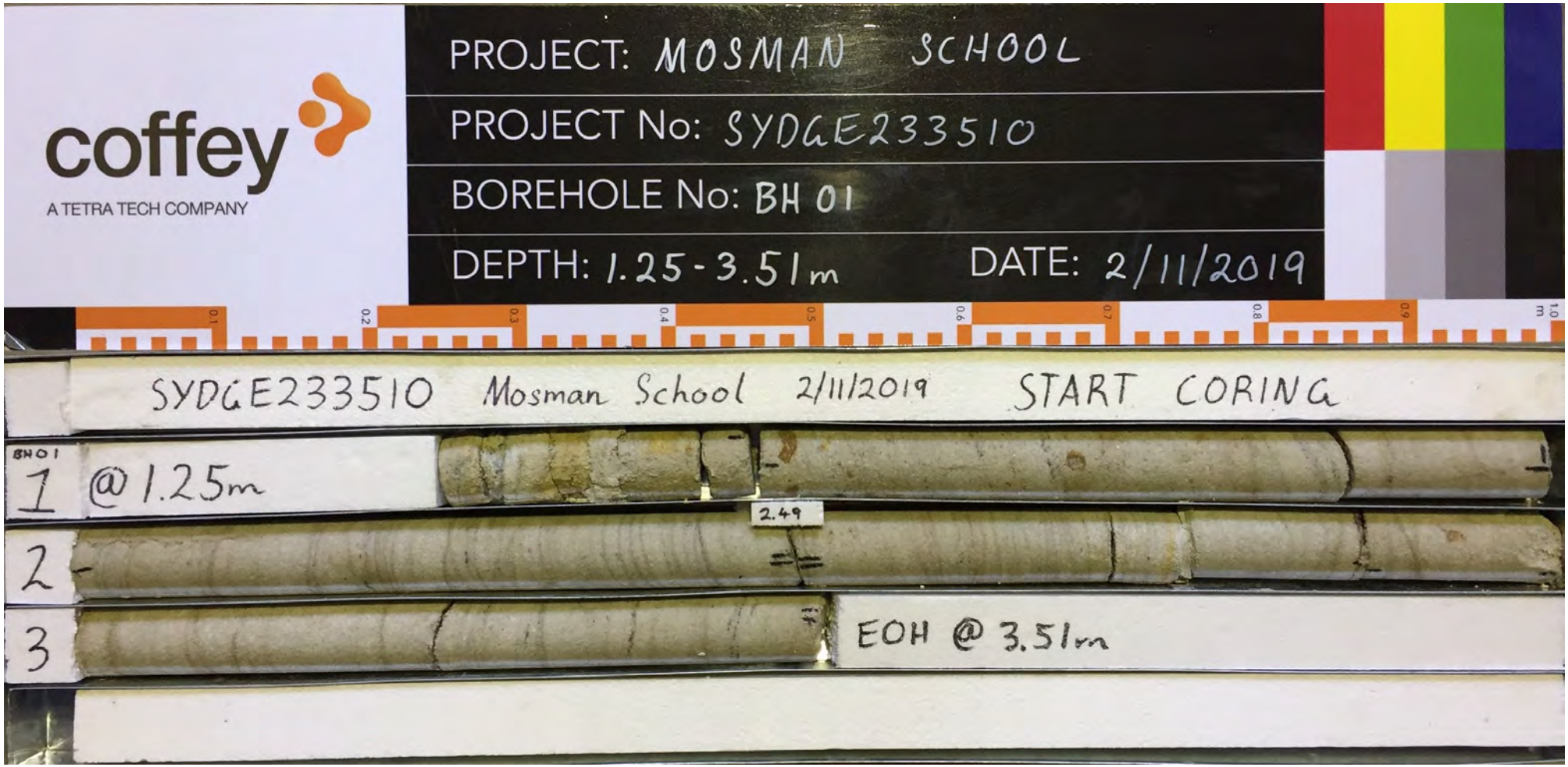
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

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 1.25 - 3.51 m

drawn	DG
approved	RR
date	15/11/2019
scale	N.T.S.
original size	A4

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client:	CBRE
project:	Mosman School Mosman, NSW
title:	**CORE PHOTOGRAPH** **BH01**
project no: SYDGE233510	fig no: **FIGURE 1** rev:

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Engineering Log - Borehole

DRAFT

Borehole ID.	**BH02**
sheet:	1 of 2
project no.	**SYDGE233510**
date started:	**03 Nov 2019**
date completed:	**03 Nov 2019**
logged by:	**AE**
checked by:	**RR**

client: **CBRE**

principal: **Coffey Services Australia Pty Ltd**

project: **Mosman School**

location: **Mosman, NSW**

position: E: 337,446.36; N: 6,255,376.05 (MGA94) | surface elevation: 76.97 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T CASING		Not Encountered	D + E					**FILL: Sandy SILT**: brown, with some fine, angular gravel.	D	L		**FILL** PID: 2.4 ppm
			SPT 1, 1, 7 N=8	76	1.0		SW	**SAND**: medium grained, pale grey and red, sand with fine to coarse gravel and silty/clay.		L		**RESIDUAL SOIL**
								SANDSTONE: medium to coarse grained, pale grey and white, high quartz content with trace black crystalline clasts < 2mm, recovered as sand, estimated very low to low strength, low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH02 continued as cored hole				
				75	2.0							
				74	3.0							
				73	4.0							
				72	5.0							
				71	6.0							
				70	7.0							

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

* 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

DRAFT

client:	**CBRE**	Borehole ID.	**BH02**
principal:	**Coffey Services Australia Pty Ltd**	sheet:	2 of 2
project:	**Mosman School**	project no.	**SYDGE233510**
location:	**Mosman, NSW**	date started:	**03 Nov 2019**
		date completed:	**03 Nov 2019**
		logged by:	**AE**
		checked by:	**RR**

position: E: 337,446.36; N: 6,255,376.05 (MGA94) | surface elevation: 76.97 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information				material substance					rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		76	1.0		started coring at 1.52m						
NMLC	Not Encountered				**NO CORE:** 0.23 m						
		75	2.0		**SANDSTONE**: medium to coarse grained, mottled pink-red and pale grey, indistinctly laminated at 0-25 degrees, high quartz content with trace black crystalline clasts < 2mm.	SW			71%		PT, 0°, PL, RO, CN PT, 0°, UN, RO, CN PT, 0°, PL, RO, CN
						FR		a=0.29 d=0.20			PT, 5°, UN, RO, CN 2.45 m: colour changes to pale grey and white
		74	3.0						100%		SM, 0°, UN, Clayey sand, 10 mm
								a=0.52 d=0.69			
		73	4.0		Borehole BH02 terminated at 3.64 m Target depth						
		72	5.0								
		71	6.0								
		70	7.0								

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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)
DT diatube

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

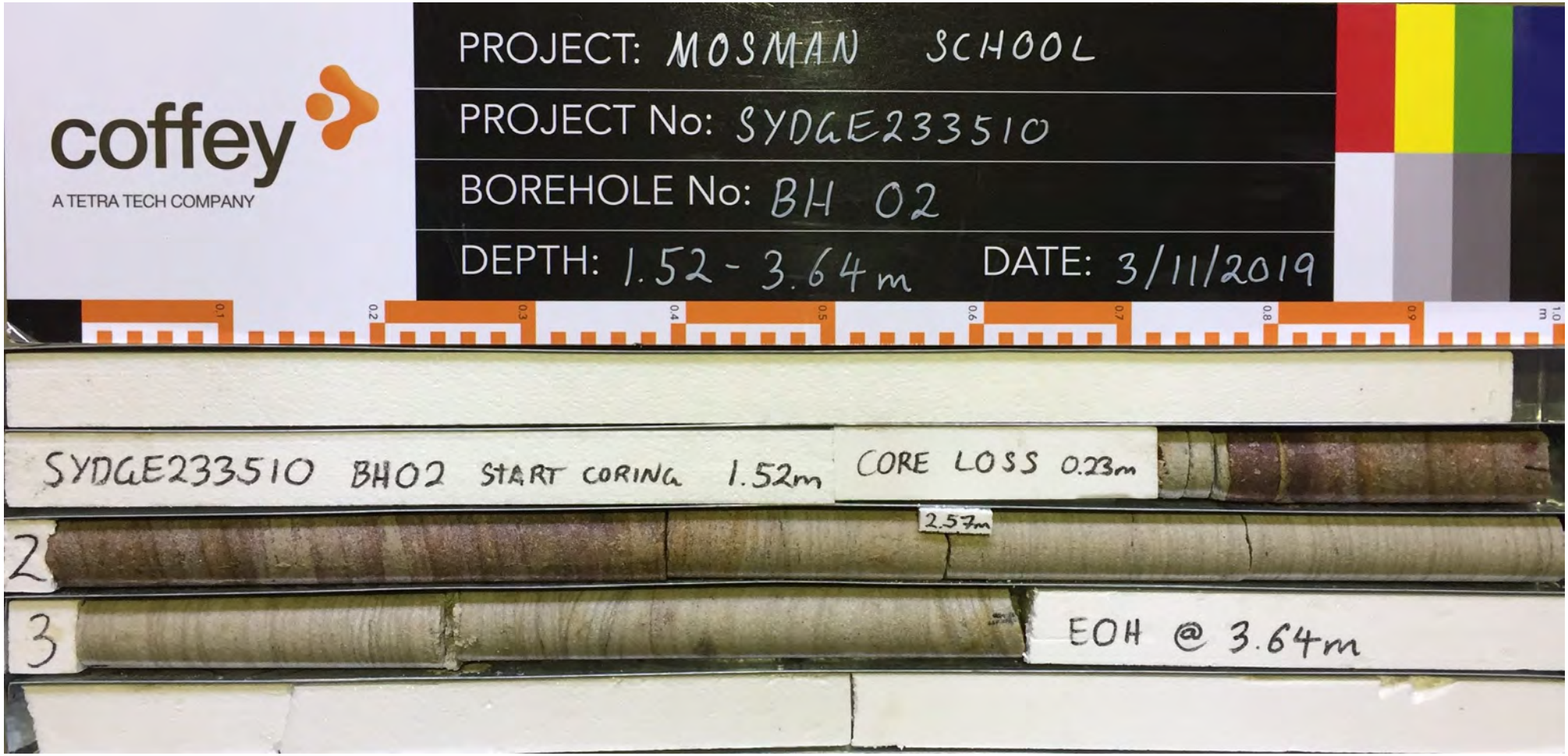
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

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 1.52 - 3.64 m

drawn	DG
approved	RR
date	15/11/2019
scale	N.T.S.
original size	A4

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client:	CBRE
project:	Mosman School Mosman, NSW
title:	**CORE PHOTOGRAPH** **BH02**
project no: SYDGE233510	fig no: **FIGURE 1** rev:

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Engineering Log - Borehole

DRAFT

Borehole ID.	**BH03**
sheet:	1 of 2
project no.	**SYDGE233510**
date started:	**03 Nov 2019**
date completed:	**03 Nov 2019**
logged by:	**AE**
checked by:	**RR**

client: ***CBRE***

principal: ***Coffey Services Australia Pty Ltd***

project: ***Mosman School***

location: ***Mosman, NSW***

position: E: 337,419.46; N: 6,255,280.90 (MGA94) | surface elevation: 75.95 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
DT		Not Encountered	D + E					**ASPHALT**: Basketball Court Surface.				**ASPHALT**
								CONCRETE: Basketball Court Subsurface.	D	L		**CONCRETE**
AD/T CASING			SPT 3, 4, 5 N=9				SW	**FILL: Sandy GRAVEL**: fine to medium grained, angular, brown, sand is fine to coarse grained.	M			**FILL**
								SAND: medium grained, yellow-orange and red, clayey sand with fine to coarse gravel.				**RESIDUAL SOIL**
				75	1.0			**SANDSTONE**: medium to coarse grained, pale grey and white, indistinctly laminated at 0-30 degrees, high quartz content with trace black crystalline clasts < 2mm, recovered as sand, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH03 continued as cored hole				
				74	2.0							
				73	3.0							
				72	4.0							
				71	5.0							
				70	6.0							
				69	7.0							
				68								

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

* 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

DRAFT

client:	**CBRE**	Borehole ID.	**BH03**
principal:	**Coffey Services Australia Pty Ltd**	sheet:	2 of 2
project:	**Mosman School**	project no.	**SYDGE233510**
location:	**Mosman, NSW**	date started:	**03 Nov 2019**
		date completed:	**03 Nov 2019**
		logged by:	**AE**
		checked by:	**RR**

position: E: 337,419.46; N: 6,255,280.90 (MGA94) | surface elevation: 75.95 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information				material substance					rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		75	1.0		started coring at 1.31m						
NMLC	Not Encountered	74	2.0		**SANDSTONE**: medium to coarse grained, pale grey and white, indistinctly laminated at 0-30 degrees, high quartz content with trace black crystalline clasts < 2mm.	FR	X O	a=1.03 d=0.68	100%		PT, 25°, PL, RO, CN PT, 25°, PL, RO, CN
		73	3.0						100%		SM, 0°, PL, Sandy clay, 8 mm
								a=0.29 d=0.29			
		72	4.0		Borehole BH03 terminated at 3.57 m Target depth						
		71	5.0								
		70	6.0								
		69	7.0								
		68									

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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)
DT diatube

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

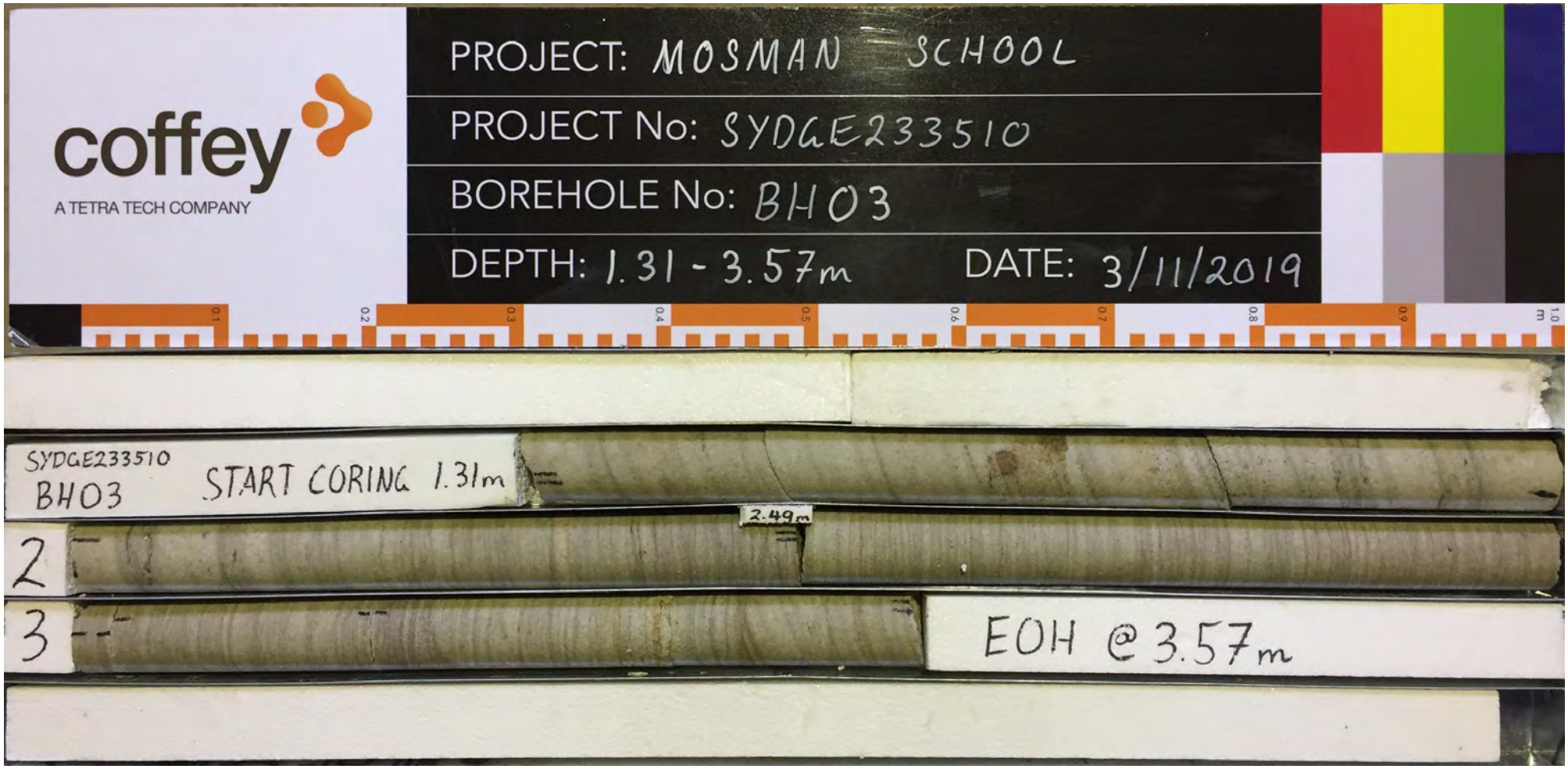
strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

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 1.31 - 3.57 m

drawn	DG
approved	RR
date	15/11/2019
scale	N.T.S.
original size	A4

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client:	CBRE
project:	Mosman School Mosman, NSW
title:	**CORE PHOTOGRAPH** **BH03**
project no: SYDGE233510	fig no: **FIGURE 1** rev:

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Engineering Log - Borehole

DRAFT

Borehole ID.	**BH04**
sheet:	1 of 2
project no.	**SYDGE233510**
date started:	**02 Nov 2019**
date completed:	**02 Nov 2019**
logged by:	**AE**
checked by:	**RR**

client: **CBRE**

principal: **Coffey Services Australia Pty Ltd**

project: **Mosman School**

location: **Mosman, NSW**

position: E: 337,478.90; N: 6,255,318.99 (MGA94) | surface elevation: 77.96 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T — CASING		Not Encountered	D + E				SW	**CONCRETE**: Pavement.	D	L		**CONCRETE**
								FILL: Sandy SILTY GRAVEL: fine to medium grained, angular, brown, sand is fine to medium grained.				**FILL**
								SAND: medium to coarse grained, pale grey and white, clayey sand with fine to coarse gravel.				**RESIDUAL SOIL**
												PID: 2.4 ppm
				77	1.0			**SANDSTONE**: medium to coarse grained, pale grey and white, high quartz content with trace black crystalline clasts < 2mm, recovered as sand, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
								Borehole BH04 continued as cored hole				
				76	2.0							
				75	3.0							
				74	4.0							
				73	5.0							
				72	6.0							
				71	7.0							

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

* 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

client:	**CBRE**	Borehole ID.	**BH04**
principal:	**Coffey Services Australia Pty Ltd**	sheet:	2 of 2
project:	**Mosman School**	project no.	**SYDGE233510**
location:	**Mosman, NSW**	date started:	**02 Nov 2019**
		date completed:	**02 Nov 2019**
		logged by:	**AE**
		checked by:	**RR**

position: E: 337,478.90; N: 6,255,318.99 (MGA94) | surface elevation: 77.96 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information				material substance					rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
					started coring at 0.70m						
NMLC	Not Encountered	77	1.0		**SANDSTONE**: medium to coarse grained, pale grey and white, indistinctly laminated at 20 degrees, high quartz content with trace black crystalline clasts < 2mm.	MW FR HW SW		a=0.40 d=0.24	98%		PT, 0°, PL, RO, CN SM, 15°, UN, RO, Rock fragments, Clay, Sand, 25 mm
		76	2.0			FR			92%		PT, 10°, UN, VR, Fe/Mn SN JT, 5°, PL, RO, Fe SN PT, 25°, PL, RO, Fe/Mn SN PT, 10°, UN, RO, CN
		75	3.0					a=0.63 d=0.50			PT, 20°, PL, RO, CN
					Borehole BH04 terminated at 3.04 m Target depth						
		74	4.0								
		73	5.0								
		72	6.0								
		71	7.0								

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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)
DT diatube

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 0.70 - 3.04 m

drawn	DG
approved	RR
date	15/11/2019
scale	N.T.S.
original size	A4

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client:	CBRE
project:	Mosman School Mosman, NSW
title:	**CORE PHOTOGRAPH** **BH04**
project no: SYDGE233510	fig no: **FIGURE 1** rev:

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Engineering Log - Borehole

DRAFT

Borehole ID.	**BH05**
sheet:	1 of 2
project no.	**SYDGE233510**
date started:	**02 Nov 2019**
date completed:	**02 Nov 2019**
logged by:	**AE**
checked by:	**RR**

client: **CBRE**

principal: **Coffey Services Australia Pty Ltd**

project: **Mosman School**

location: **Mosman, NSW**

position: E: 337,499.06; N: 6,255,333.90 (MGA94) | surface elevation: 78.47 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T CASING		Not Encountered	D + E	78				**CONCRETE**: Pavement.	D	L		**CONCRETE**
								FILL: SILTY SAND: medium grained, pale brown to brown.				**FILL** PID: 1.2 ppm
			SPT 4, 5, 7 N=12		1.0		SC	**CLAYEY SAND**: fine grained, orange-brown, clayey sand with fine to coarse gravel.	M	MD		**RESIDUAL SOIL**
			D + E	77				**SANDSTONE**: medium to coarse grained, pale grey and white, high quartz content with trace black crystalline clasts < 2mm, recovered as sand, estimated very low to low strength.				**INFERRED WEATHERED BEDROCK**
					2.0			Borehole BH05 continued as cored hole				
				76	3.0							
				75	4.0							
				74	5.0							
				73	6.0							
				72	7.0							
				71								

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: NON CORED SYDGE233510 MOSMAN SCHOOL.GPJ <<DrawingFile>> 15/11/2019 09:16

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

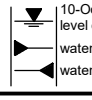
* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration

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

DRAFT

client:	**CBRE**	Borehole ID.	**BH05**
principal:	**Coffey Services Australia Pty Ltd**	sheet:	2 of 2
project:	**Mosman School**	project no.	**SYDGE233510**
location:	**Mosman, NSW**	date started:	**02 Nov 2019**
		date completed:	**02 Nov 2019**
		logged by:	**AE**
		checked by:	**RR**

position: E: 337,499.06; N: 6,255,333.90 (MGA94) | surface elevation: 78.47 m (AHD) | angle from horizontal: 90°

drill model: Drill Technics D710, Track mounted | drilling fluid: | hole diameter : 100 mm

drilling information				material substance					rock mass defects		
method & support	water	RL (m)	depth (m)	graphic log	material description **ROCK TYPE**: grain characterisics, colour, structure, minor components	weathering & alteration	estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH	samples, field tests & Is(50) (MPa) a = axial; d = diametral	core run & RQD	defect spacing (mm) 30 100 300 1000 3000	additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general
		78	1.0		started coring at 1.40m						
NMLC	Not Encountered	77	2.0		**SANDSTONE**: medium to coarse grained, pale grey and white, indistinctly laminated at 20 degrees, high quartz content with trace black crystalline clasts < 2mm.	SW / FR		a=0.69 d=0.54	92%		SM, 20°, PL, Clayey sand, 12 mm JT, 0°, PL, RO, CN
		76	3.0						98%		PT, 20°, UN, RO, CN PT, 20°, UN, RO, CN PT, 20°, UN, RO, CN
		75	4.0		Borehole BH05 terminated at 3.42 m Target depth			a=0.70 d=0.60			
		74	5.0								
		73	6.0								
		72	7.0								
		71									

CDF_0_9_07_LIBRARY.GLB rev:AU Log COF BOREHOLE: CORED SYDGE233510 MOSMAN SCHOOL.GPJ <<DrawingFile>> 15/11/2019 09:17

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)
DT diatube

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 1.40 - 3.42 m

drawn	DG
approved	RR
date	15/11/2019
scale	N.T.S.
original size	A4

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client:	CBRE		
project:	Mosman School Mosman, NSW		
title:	**CORE PHOTOGRAPH BH05**		
project no: SYDGE233510		fig no: **FIGURE 1**	rev:

Appendix D – Laboratory Test Results

Coffey Geotechnics Pty Ltd Chatswood
Level 18, Tower B, Citadel Tower 799 Pacific Highway
Chatswood
NSW 2067

Attention: **David McFadden**

Report **686235-S**
Project name DOE MOSMAN HIGH
Project ID SYDGE233510
Received Date Nov 04, 2019

Client Sample ID			**BH01_0.2-0.4**	**BH01_0.8-1.0**	**BH03_0.2-0.4**	**BH04_0.2-0.4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S19-No04994**	**S19-No04995**	**S19-No04997**	**S19-No04998**
Date Sampled			**Nov 02, 2019**	**Nov 02, 2019**	**Nov 03, 2019**	**Nov 02, 2019**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	390
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	220
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	610
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	93	74	94	77
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	560
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	120
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	680
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 1	< 0.5	< 0.5	13
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.1	0.6	0.6	13
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.5	1.2	1.2	13
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	2.4
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	13
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	9.5
Benzo(a)pyrene	0.5	mg/kg	0.7	< 0.5	< 0.5	8.0
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 1	< 0.5	< 0.5	9.4
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	6.0
Benzo(k)fluoranthene	0.5	mg/kg	< 1	< 0.5	< 0.5	5.1
Chrysene	0.5	mg/kg	0.6	< 0.5	< 0.5	8.5

Client Sample ID			BH01_0.2-0.4	BH01_0.8-1.0	BH03_0.2-0.4	BH04_0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04994	S19-No04995	S19-No04997	S19-No04998
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 03, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.3
Fluoranthene	0.5	mg/kg	1.2	< 0.5	< 0.5	20
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.6
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	0.5	< 0.5	< 0.5	7.2
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.9
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	12
Pyrene	0.5	mg/kg	1.2	< 0.5	< 0.5	20
Total PAH*	0.5	mg/kg	4.2	< 0.5	< 0.5	124.9
2-Fluorobiphenyl (surr.)	1	%	101	98	98	88
p-Terphenyl-d14 (surr.)	1	%	149	148	148	91
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	108	102	145	76
Tetrachloro-m-xylene (surr.)	1	%	148	131	140	129
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			BH01_0.2-0.4	BH01_0.8-1.0	BH03_0.2-0.4	BH04_0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04994	S19-No04995	S19-No04997	S19-No04998
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 03, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	118	97	107	148
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1242	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1248	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1254	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1260	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PCB*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibutylchlorendate (surr.)	1	%	108	102	145	76
Tetrachloro-m-xylene (surr.)	1	%	148	131	140	129
Chloride	10	mg/kg	-	< 10	13	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	41	84	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	8.1	9.4	-
Resistivity*	0.5	ohm.m	-	1200	600	-
Sulphate (as SO4)	10	mg/kg	-	< 10	130	-
% Moisture	1	%	8.9	11	16	9.7
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	7.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	< 5	63	22
Copper	5	mg/kg	11	< 5	320	15
Lead	5	mg/kg	150	36	11	43

Client Sample ID			BH01_0.2-0.4	BH01_0.8-1.0	BH03_0.2-0.4	BH04_0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04994	S19-No04995	S19-No04997	S19-No04998
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 03, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	0.1	< 0.1	< 0.1	0.1
Nickel	5	mg/kg	< 5	< 5	< 5	5.1
Zinc	5	mg/kg	58	17	110	48

Client Sample ID			BH05_0.3-0.5	BH05_1.1-1.3	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04999	S19-No05000	S19-No05001	S19-No05002
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 02, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	290
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	180
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	470
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	92	87	93	81
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	430
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	110
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	540
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	12
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.7	0.6	0.6	12
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	12
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.3
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	3.1
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	7.6
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	7.3
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	0.7	< 0.5	< 0.5	6.1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.4
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	8.2
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	6.8
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	2.1
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	17
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.2

Client Sample ID			BH05_0.3-0.5	BH05_1.1-1.3	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04999	S19-No05000	S19-No05001	S19-No05002
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 02, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.6
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	12
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	17
Total PAH*	0.5	mg/kg	0.7	< 0.5	< 0.5	99.2
2-Fluorobiphenyl (surr.)	1	%	101	98	89	88
p-Terphenyl-d14 (surr.)	1	%	115	149	135	92
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	-
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	-	-
Toxaphene	1	mg/kg	< 1	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	-	-
Dibutylchlorendate (surr.)	1	%	105	126	-	-
Tetrachloro-m-xylene (surr.)	1	%	130	106	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	-
Bolstar	0.2	mg/kg	< 0.2	< 0.2	-	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	-	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	-
Coumaphos	2	mg/kg	< 2	< 2	-	-
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	-	-
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	-	-
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-	-
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	-	-
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	-	-
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	-	-
EPN	0.2	mg/kg	< 0.2	< 0.2	-	-

Client Sample ID			BH05_0.3-0.5	BH05_1.1-1.3	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S19-No04999	S19-No05000	S19-No05001	S19-No05002
Date Sampled			Nov 02, 2019	Nov 02, 2019	Nov 02, 2019	Nov 02, 2019
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Ethion	0.2	mg/kg	< 0.2	< 0.2	-	-
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	-	-
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	-	-
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	-	-
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	-	-
Fenthion	0.2	mg/kg	< 0.2	< 0.2	-	-
Malathion	0.2	mg/kg	< 0.2	< 0.2	-	-
Merphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	-	-
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Monocrotophos	2	mg/kg	< 2	< 2	-	-
Naled	0.2	mg/kg	< 0.2	< 0.2	-	-
Omethoate	2	mg/kg	< 2	< 2	-	-
Phorate	0.2	mg/kg	< 0.2	< 0.2	-	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	-
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	-	-
Ronnel	0.2	mg/kg	< 0.2	< 0.2	-	-
Terbufos	0.2	mg/kg	< 0.2	< 0.2	-	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	-	-
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	122	114	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	< 0.5	-	-
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1232	0.5	mg/kg	< 0.5	< 0.5	-	-
Aroclor-1242	0.5	mg/kg	< 0.5	< 0.5	-	-
Aroclor-1248	0.5	mg/kg	< 0.5	< 0.5	-	-
Aroclor-1254	0.5	mg/kg	< 0.5	< 0.5	-	-
Aroclor-1260	0.5	mg/kg	< 0.5	< 0.5	-	-
Total PCB*	0.5	mg/kg	< 0.5	< 0.5	-	-
Dibutylchlorendate (surr.)	1	%	105	126	-	-
Tetrachloro-m-xylene (surr.)	1	%	130	106	-	-
Chloride	10	mg/kg	-	12	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	39	-	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	6.0	-	-
Resistivity*	0.5	ohm.m	-	1300	-	-
Sulphate (as SO4)	10	mg/kg	-	79	-	-
% Moisture	1	%	7.6	7.5	13	9.5
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	3.3	3.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	22	9.2	8.0	16
Copper	5	mg/kg	< 5	< 5	230	16
Lead	5	mg/kg	17	5.0	17	38
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	6.9	< 5	83	43

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Nov 07, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Nov 07, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Sydney	Nov 07, 2019	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Polychlorinated Biphenyls	Sydney	Nov 07, 2019	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Chloride	Sydney	Nov 07, 2019	28 Days
- Method: E045 /E047 Chloride			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Nov 07, 2019	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Nov 07, 2019	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Sydney	Nov 07, 2019	28 Days
- Method: E045 Anions by Ion Chromatography			
% Moisture	Sydney	Nov 04, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 20794

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NATA # 1261
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Address: Level 18, Tower B, Citadel Tower 799 Pacific Highway
Chatswood
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Project Name: DOE MOSMAN HIGH
Project ID: SYDGE233510

Order No.:
Report #: 686235
Phone: +61 2 9406 1000
Fax: +61 2 9406 1002

Received: Nov 4, 2019 4:21 PM
Due: Nov 11, 2019
Priority: 5 Day
Contact Name: David McFadden

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Asbestos - AS4964	HOLD	Eurofins | mgt Suite B15	Aggressivity Soil Set	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	BH01_0.2-0.4	Nov 02, 2019		Soil	S19-No04994			X		X	X
2	BH01_0.8-1.0	Nov 02, 2019		Soil	S19-No04995			X	X	X	X
3	BH02_0.0-0.2	Nov 03, 2019		Soil	S19-No04996	X					
4	BH03_0.2-0.4	Nov 03, 2019		Soil	S19-No04997	X		X	X	X	X
5	BH04_0.2-0.4	Nov 02, 2019		Soil	S19-No04998	X		X		X	X
6	BH05_0.3-0.5	Nov 02, 2019		Soil	S19-No04999	X		X		X	X
7	BH05_1.1-1.3	Nov 02, 2019		Soil	S19-No05000			X	X	X	X
8	DUP01	Nov 02, 2019		Soil	S19-No05001					X	X
9	DUP02	Nov 02, 2019		Soil	S19-No05002					X	X

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Sample Detail						Asbestos - AS4964	HOLD	Eurofins | mgt Suite B15	Aggressivity Soil Set	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
10	BH1_SPT_0.5-0.71(BAG)	Nov 02, 2019		Soil	S19-No05003		X				
11	BH2_SPT_0.5-0.95(BAG)	Nov 02, 2019		Soil	S19-No05004		X				
12	BH2_0.9-1.0(BAG)	Nov 02, 2019		Soil	S19-No05005		X				
13	BH2_1.0-1.1(BAG)	Nov 02, 2019		Soil	S19-No05006		X				
14	BH3_SPT_0.4-0.85(BAG)	Nov 02, 2019		Soil	S19-No05007		X				
15	BH5_SPT_0.5-0.95(BAG)	Nov 02, 2019		Soil	S19-No05008		X				
Test Counts						4	6	6	3	8	8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Sulphate (as SO4)	mg/kg	< 10			10	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	72			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	82			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	83			70-130	Pass	
m&p-Xylenes	%	88			70-130	Pass	
o-Xylene	%	87			70-130	Pass	
Xylenes - Total	%	88			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	80			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	86			70-130	Pass	
Acenaphthylene	%	95			70-130	Pass	
Anthracene	%	113			70-130	Pass	
Benz(a)anthracene	%	105			70-130	Pass	
Benzo(a)pyrene	%	106			70-130	Pass	
Benzo(b&j)fluoranthene	%	114			70-130	Pass	
Benzo(g.h.i)perylene	%	112			70-130	Pass	
Benzo(k)fluoranthene	%	89			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chrysene	%	70			70-130	Pass	
Dibenz(a.h)anthracene	%	122			70-130	Pass	
Fluoranthene	%	104			70-130	Pass	
Fluorene	%	100			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	118			70-130	Pass	
Naphthalene	%	93			70-130	Pass	
Phenanthrene	%	108			70-130	Pass	
Pyrene	%	102			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	96			70-130	Pass	
Dimethoate	%	74			70-130	Pass	
Ethion	%	100			70-130	Pass	
Fenitrothion	%	91			70-130	Pass	
Methyl parathion	%	80			70-130	Pass	
LCS - % Recovery							
Chloride	%	102			70-130	Pass	
Sulphate (as SO4)	%	94			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	109			70-130	Pass	
Cadmium	%	110			70-130	Pass	
Chromium	%	109			70-130	Pass	
Copper	%	109			70-130	Pass	
Lead	%	118			70-130	Pass	
Mercury	%	106			70-130	Pass	
Nickel	%	112			70-130	Pass	
Zinc	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S19-No05000	CP	%	88			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-No05001	CP	%	105			70-130	Pass	
Cadmium	S19-No05001	CP	%	105			70-130	Pass	
Chromium	S19-No05001	CP	%	118			70-130	Pass	
Lead	S19-No05001	CP	%	124			70-130	Pass	
Mercury	S19-No05001	CP	%	117			70-130	Pass	
Nickel	S19-No05001	CP	%	119			70-130	Pass	
Zinc	S19-No05001	CP	%	86			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-No04000	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S19-No09837	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-No09837	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S19-No09837	NCP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-No04000	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-No04000	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-No04000	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-No04000	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-No04000	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-No04000	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-No04000	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-No04000	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S19-No09837	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-No09837	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S19-No09837	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S19-No01768	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S19-No09837	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S19-No09837	NCP	mg/kg	0.07	< 0.05	31	30%	Fail	Q15
Endosulfan I	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S19-No09837	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S19-No09837	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S19-No09837	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1221	S19-No09837	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1242	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1248	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1254	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1260	S19-No09837	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
pH (1:5 Aqueous extract at 25°C as rec.)	S19-No04995	CP	pH Units	8.1	8.2	Pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S19-No04997	CP	mg/kg	13	16	20	30%	Pass	
Sulphate (as SO4)	S19-No04997	CP	mg/kg	130	130	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-No05000	CP	%	7.5	7.2	4.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-No05000	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S19-No05000	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-No05000	CP	mg/kg	9.2	9.0	3.0	30%	Pass	
Copper	S19-No05000	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	S19-No05000	CP	mg/kg	5.0	5.8	14	30%	Pass	
Mercury	S19-No05000	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S19-No05000	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S19-No05000	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Ursula Long	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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: SYDN19S-03135-1
Issue No: 1

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

Principal:
Project No.: 757-SYDN00058AA
Project Name: SYDGE233510 - Mosman High
Lot No.: **TRN:**

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.

Approved Signatory: Sam Hall
(Technician)
NATA Accredited Laboratory Number:431
Date of Issue: 14/11/2019

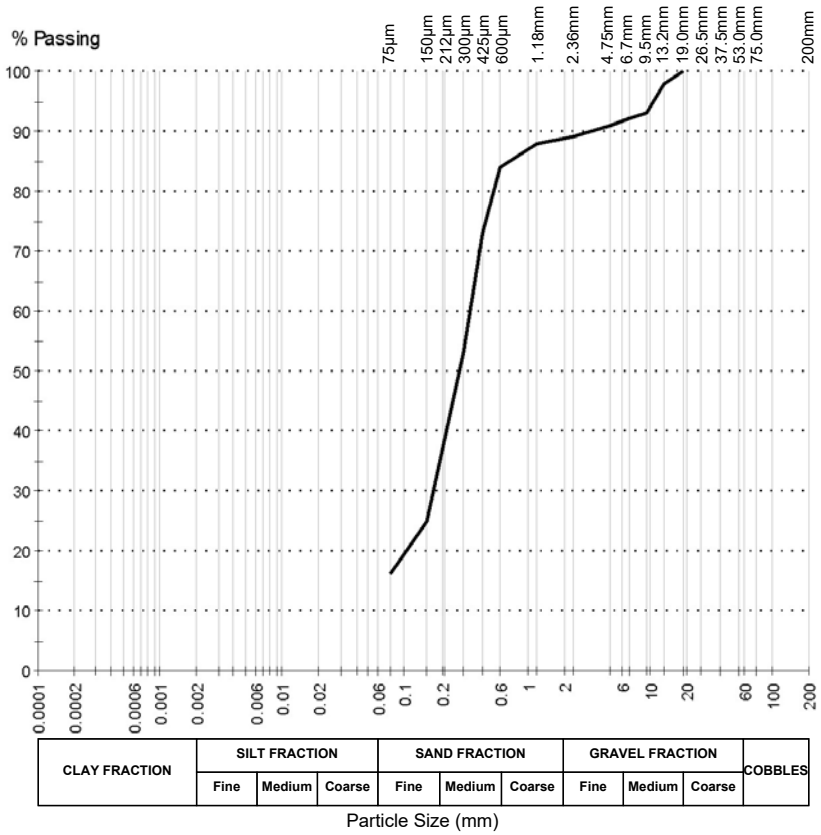
Sample Details

Sample ID:	SYDN19S-03135
Client Sample:	
Date Sampled:	02/11/2019
Source:	Supplied By Client
Material:	dark brown - clayey Sand
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	DOE Mosman High (SYDGE233510)
Sample Location:	BH01 (0.2-0.4m)

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	5.3	
Date Tested		6/11/2019	

Particle Size Distribution



Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/11/2019

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	98	
9.5mm	93	
6.7mm	92	
4.75mm	91	
2.36mm	89	
1.18mm	88	
600µm	84	
425µm	73	
300µm	53	
150µm	25	
75µm	16	

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: SYDN19S-03136-1
Issue No: 1

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

Principal:
Project No.: 757-SYDN00058AA
Project Name: SYDGE233510 - Mosman High
Lot No.: **TRN:**

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.

Approved Signatory: Sam Hall
(Technician)
NATA Accredited Laboratory Number:431
Date of Issue: 14/11/2019

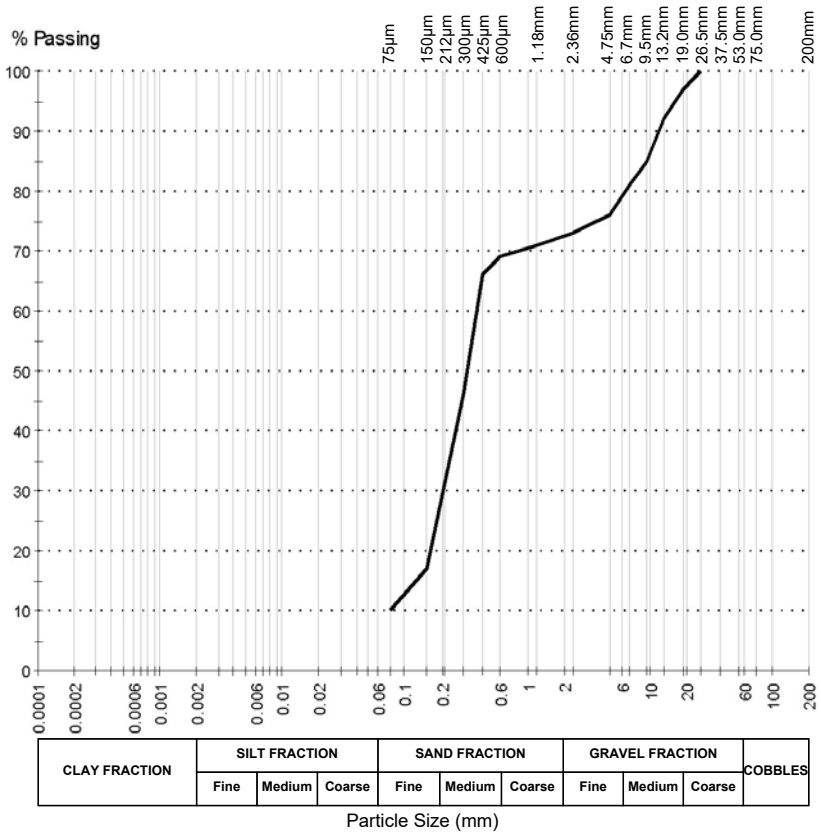
Sample Details

Sample ID:	SYDN19S-03136
Client Sample:	
Date Sampled:	03/11/2019
Source:	Supplied By Client
Material:	dark brown - clayey Sand
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	DOE Mosman High (SYDGE233510)
Sample Location:	BH02 (0.5-0.95m)

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	9.5	
Date Tested		6/11/2019	

Particle Size Distribution



Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/11/2019

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	97	
13.2mm	92	
9.5mm	85	
6.7mm	81	
4.75mm	76	
2.36mm	73	
1.18mm	71	
600µm	69	
425µm	66	
300µm	46	
150µm	17	
75µm	10	

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: SYDN19S-03137-1
Issue No: 1

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

Principal:
Project No.: 757-SYDN00058AA
Project Name: SYDGE233510 - Mosman High
Lot No.: **TRN:**

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.

Approved Signatory: Sam Hall
(Technician)
NATA Accredited Laboratory Number:431
Date of Issue: 14/11/2019

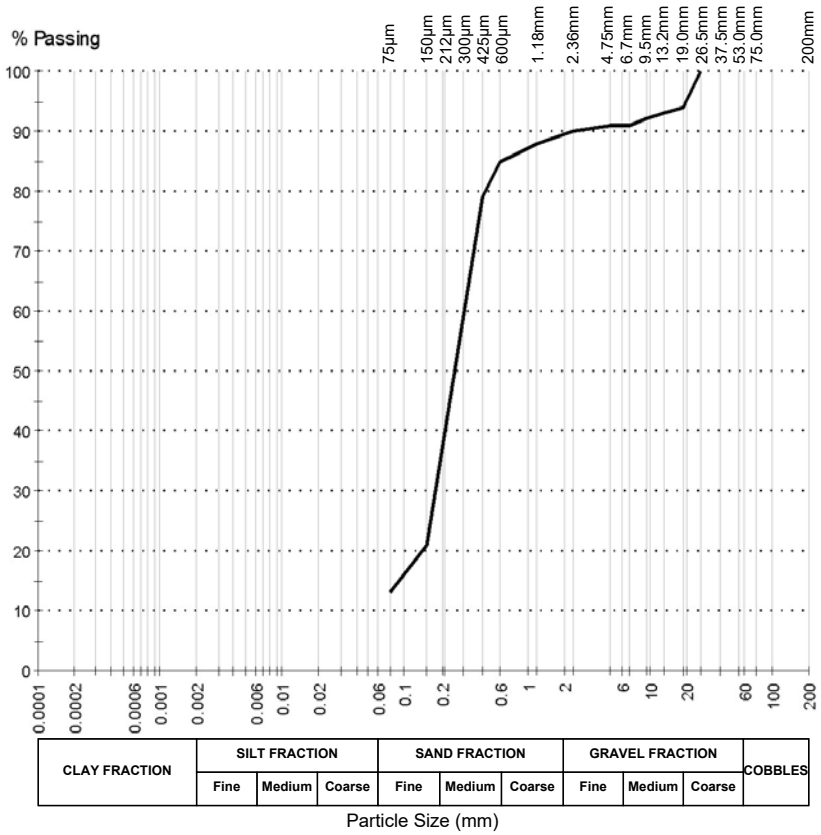
Sample Details

Sample ID:	SYDN19S-03137
Client Sample:	
Date Sampled:	03/11/2019
Source:	Supplied By Client
Material:	light brown - gravelly Sand
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	DOE Mosman High (SYDGE233510)
Sample Location:	BH03 (0.4-0.85m)

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	11.5	
Date Tested		6/11/2019	

Particle Size Distribution



Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/11/2019

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	94	
13.2mm	93	
9.5mm	92	
6.7mm	91	
4.75mm	91	
2.36mm	90	
1.18mm	88	
600µm	85	
425µm	79	
300µm	59	
150µm	21	
75µm	13	

Comments

N/A

Sydney Laboratory

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

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Material Test Report

Report No: SYDN19S-03138-1
Issue No: 1

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

Principal:
Project No.: 757-SYDN00058AA
Project Name: SYDGE233510 - Mosman High
Lot No.: **TRN:**

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.

Approved Signatory: Sam Hall
(Technician)
NATA Accredited Laboratory Number:431
Date of Issue: 14/11/2019

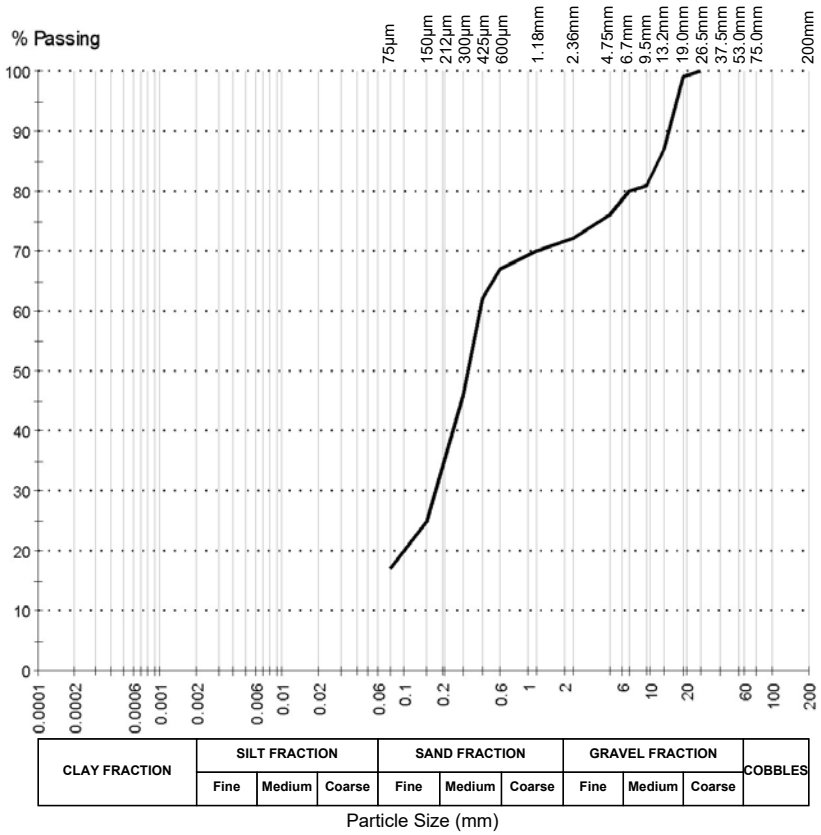
Sample Details

Sample ID:	SYDN19S-03138
Client Sample:	
Date Sampled:	02/11/2019
Source:	Supplied By Client
Material:	brown - gravelly Sand
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	DOE Mosman High (SYDGE233510)
Sample Location:	BH04 (0.2-0.4m)

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	7.6	
Date Tested		6/11/2019	

Particle Size Distribution



Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/11/2019

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	99	
13.2mm	87	
9.5mm	81	
6.7mm	80	
4.75mm	76	
2.36mm	72	
1.18mm	70	
600µm	67	
425µm	62	
300µm	46	
150µm	25	
75µm	17	

Comments

N/A

Sydney Laboratory

Coffey Testing Pty Ltd
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Melrose Park NSW 2114

Phone: +61 (2) 8876 0500

Material Test Report

Report No: SYDN19S-03139-1
Issue No: 1

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

Principal:
Project No.: 757-SYDN00058AA
Project Name: SYDGE233510 - Mosman High
Lot No.: **TRN:**

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.

Approved Signatory: Sam Hall
(Technician)
NATA Accredited Laboratory Number:431
Date of Issue: 14/11/2019

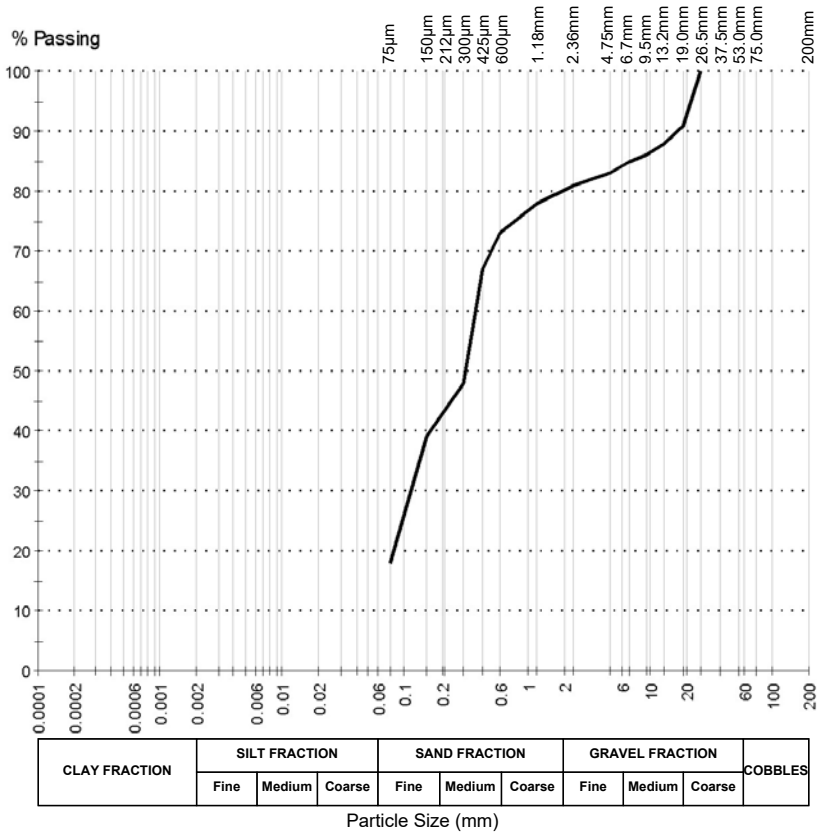
Sample Details

Sample ID:	SYDN19S-03139
Client Sample:	
Date Sampled:	02/11/2019
Source:	Supplied By Client
Material:	light pink - gravelly Sand
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	DOE Mosman High (SYDGE233510)
Sample Location:	BH05 (1.1-1.3m)

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	6.5	
Date Tested		6/11/2019	

Particle Size Distribution



Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/11/2019

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	91	
13.2mm	88	
9.5mm	86	
6.7mm	85	
4.75mm	83	
2.36mm	81	
1.18mm	78	
600µm	73	
425µm	67	
300µm	48	
150µm	39	
75µm	18	

Comments

N/A