



**INTRUSIVE GEOTECHNICAL
INVESTIGATION REPORT**

Gillieston Public School redevelopment and
new public preschool

17 January 2025

Prepared for:
School Infrastructure NSW

Prepared by:
Stantec Australia Pty Ltd

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School Address:	Corner Northview Street & Ryans Road, Gillieston Heights, NSW 2321
School Region:	Hunter and Central Coast NSW
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4	15/01/2025	Amendments to wording as per SI Planning and client request		

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Activity

The Gillieston Public School have been identified by the NSW Department of Education (DoE) as requiring redevelopment. The proposed Gillieston Public School redevelopment and new public preschool is driven by service need including increase in expected student enrolments and the and removing demountable structure and replacement with permanent teaching spaces.

The Gillieston Public School redevelopment and new public preschool comprises the following activity:

- > Demolition and removal of existing temporary structures.
- > Site preparation activity, including demolition, earthworks, tree removal.
- > Construction of new:
 - 32 permanent general learning spaces and 3 support teaching spaces
 - Administration and staff hubs
 - Hall, canteen and library
 - Out of school hours care
 - Public preschool (standalone building for 60 places)
 - Covered Outdoor Learning Areas (COLAs)
 - Outdoor play areas, including games courts and yarning circle
 - New at-grade car parking
 - Extension of the existing drop-off / pick-up area and new bus bay
 - Realignment of the existing fencing
 - Associated stormwater infrastructure upgrades
 - Associated landscaping
 - Associated pedestrian and road upgrade activity



1 Introduction

Stantec Australia (Stantec, formerly Cardno) was engaged by SINSW to complete an Intrusive Geotechnical Investigation Report for the Gillieston Public School, which is located at 100 Ryans Road, Gillieston Heights, NSW (the site). At the time of preparing this report, this was the site assessed, however it is noted that the REF site boundary also includes Lot 2 DP1308605, located at 19 Northview Street. Geotechnical engineer from Stantec attended site between 19 and 21 December 2022. The purpose of this investigation was to assess the site's surface and subsurface conditions in order to provide recommendations from a geotechnical viewpoint for the design and construction of the proposed school redevelopment on the existing site.

The results of the investigation are detailed in this report. The site location and site layout are depicted on **Appendix A – Site Plan**.

The scope of work for this investigation was completed in accordance with work order DDWO03878/22.

1.1 Background and Proposed Activity

Gillieston Public School is located in Gillieston Heights which is a suburb of the City of Maitland local government area in the Hunter Region of New South Wales. It is located at the vicinity of residential properties and Hunter Land Management. The site's infrastructure is predominantly located in the West portion of site and surrounded by open grass areas.

At the time of preparing this report, it was understood that the proposed activity will include demolition of the existing facilities and the construction of new school buildings with carparks.

No basement will be proposed. Earthwork will be limited to site general levelling only.

1.2 Objectives

The objectives of the geotechnical investigation were to provide information regarding the existing condition and the required data for the proposed activity. The results from the investigation undertaken are collated in this Intrusive Geotechnical Investigation report (IGIR) which comprises:

- Site investigation and fieldwork description.
- Investigation results including fieldwork results, in situ tests, subsurface conditions and groundwater conditions (if encountered).
- Laboratory testing results.
- Assessment of soil aggressivity (salinity) conditions.
- Geotechnical design parameters suitable for the proposed activity infrastructure.
- Earthquake design parameters in accordance with 'AS 1170.4-2007'.
- Subgrade assessment including design CBR.
- Site classification in accordance with 'AS 2870'.
- Foundation recommendations.
- Recommendations on earthworks including commentary on site preparation, drainage, erosion and vibrations.



2 Significance of Environmental Aspects

Based on the identification of potential impacts and an assessment of the nature and extent of the impacts of the proposed activity, it is determined that all potential impacts can be appropriately mitigated to ensure that there is minimal impact on the locality, community and/or the environment.

See Section 6 for further details.

3 Site Details

The Site is identified as 100 Ryans Road and 19 Northview Street, Gillieston Heights, legally described as Lot 51 DP 1162489 and Part Lot 2 DP 1308605.

The Site is located within the Maitland Local Government Area (LGA) and is zoned RU2 Rural Landscape and R1 General Residential zone under the provisions of the Maitland Local Environmental Plan 2011 (MLEP2011).

Existing attributes of the subject site are noted as follows:

- The subject site exhibits an area of approximately 23,385m² and is located in the suburb of Gillieston Heights;
- The subject site has a frontage to Ryans Road to the east, Gillieston Road to the north, and Northview Street to the south;
- In its existing state, the subject site comprises the existing Gillieston Public School. Existing school buildings are primarily located in the west portion of the subject site with a large area of open space situated in the eastern portion. There are limited permanent structures located on the subject site with thirteen (13) existing demountable classrooms currently occupying the subject site. Permanent buildings consist of the Main Administration Building, Original Brick Cottage, Library and GLS building located in the centre of the subject site; and
- Carparking is provided from Gillieston Road for staff. Pedestrian access is available via this main entrance from Gillieston Road and via a separate pedestrian-only access gates on Northview Street and Ryans Road.

The existing site context is shown in **Figure 1** and **Figure 2** below.



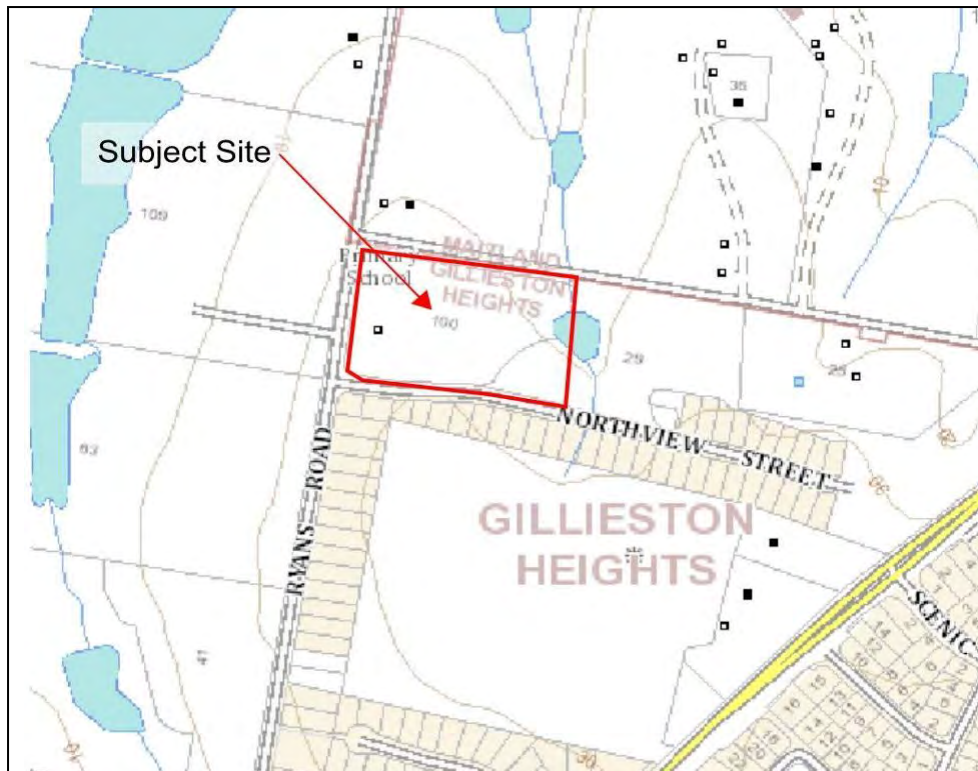


Figure 1 – Cadastral Map (Source: NSW Spatial Viewer, 2024)

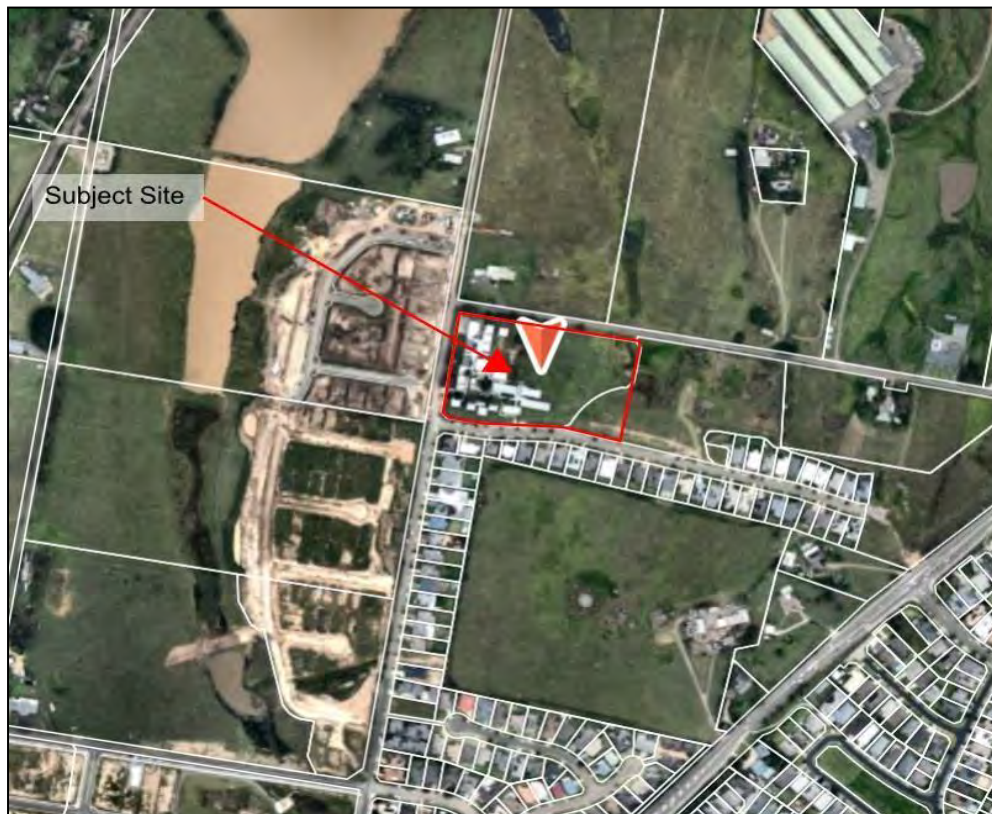


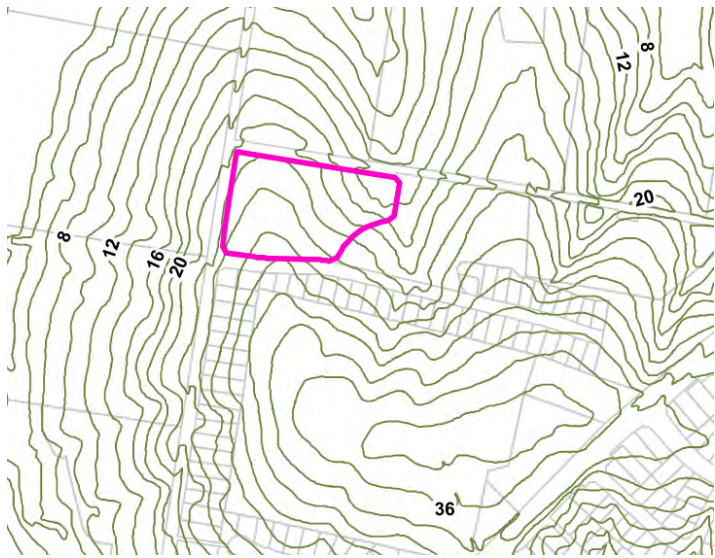
Figure 2 – Site Aerial Map (Source: Near Map, 2024)

4 Findings of Investigation

4.1 Assessed Site Details

Details related to the site at the time of completing the investigation are included in **Table 4-1** below whilst site features are shown in **Appendix A**.

Table 4-1 **Site Details**

Details	Comments
Site address	100 Ryans Road, Gillieston Heights, NSW 2321
Applicable Lot and Deposited Plan	51/DP1162489
Current land use	The land is currently used Gillieston Public School. This consists of school infrastructure and open grass areas.
Proposed land use	To Stantec's knowledge the selected land will be used for facilities, buildings and infrastructures activity to accommodate the increased local enrolment demand. No basement will be proposed. Earthwork will be limited to site general levelling only.
Local Government Authority (LGA)	City of Maitland Local Government Area
Current zoning (Maitland Local Environmental Plan 2011)	RU2: Rural Landscape, and R1: General Residential
Site coordinates (GDA1994 – MGA56)	362417.343, 6375244.41
Regional Contour (mAHD) (Referenced to 2022 Lotsearch)	<p>Site dips down North generally from about RL 30m at the South of the site to about RL 24m.</p> 

4.2 Surrounding Land Use

The land uses immediately surrounding the site were identified using aerial imagery and are summarised below in **Table 4-2**. The site and surrounding land uses are shown in **Appendix A**.

Table 4-2 Surrounding Land Use

Direction	Land Use or Activity
North	Gillieston Road and low-density residential properties
East	Low-density residential properties followed by Brave Cosmetics and Aquilina Auto Electrical Mobile Service
South	Northview Street, General residential properties followed by Hunter Land Management
West	Ryans Road, Rural Landscapes, an unnamed creek followed by Low-density residential properties



4.3 Regional and Site Settings

Site setting information, as listed within publicly available data sets, is summarised in **Table 4-3**.

Table 4-3 Site Setting Information

Item	Details
Regional Soil Landscape	<p>NSW DPIE eSPADE v2.1 website indicates that the site overlies on Bolwarra Heights Landscape (9232bh), which has the following characteristics:</p> <ul style="list-style-type: none"> Landscape—rolling low hills on Permian sediments in the centre-west of the sheet in the East Maitland Hills region. Slopes are 5–20%, elevation to 100 m, local relief to 80 m. Cleared tall open-forest. Soils—moderately deep (<150cm) well-drained Yellow Podzolic Soils, Brown Podzolic Soils with some moderately deep (<100cm) well drained Lithosols on crests, moderately deep (<140cm) imperfectly drained yellow Soloths on lower slopes. Qualities and Limitations—moderate foundation hazard, water erosion hazard, high run-on (localised), seasonal waterlogging (localised), localised steep slopes with mass movement hazard.
Atlas of Australian Soils	<p>Atlas of Australian Soils indicated that the site overlies on unit Gb10 which is described as River terraces, levees, flood-plains, coastal swamps, and tidal flats. This unit contains the same land forms and soils as unit Gb9, but in addition has (i) swamps and levees of the lower river flood-plain of (Uf6.6), (Ug5), and other undescribed soils; (ii) estuarine flats of peaty or organic soils over acid clays; and (iii) tidal mud flats. The soils of these areas are not well known but probably have similarities with the soils of units J3, Mc4, NY1, and NN1. The smaller areas mapped as unit Gb10 consist mainly of areas of (i) and/or (iii) above. Gb9 is described as River terraces and flood-plains: chief soils are dark friable loamy soils (Um6.11) locally underlain by either sandy or clayey substrata, and occurring on the middle river terraces. Associated are hard alkaline dark soils (Ddl.33 and Ddl.43), and/or friable dark soils (Dd3.12), and/or hard alkaline brown soils (Db1.33) on terrace remnants flanking the valley slopes; siliceous sands (Ucl.23) on low terraces adjoining the river; and local areas of various soils including (Ug5.15), (Ug5.16) and possibly (Ug5.4), (Db1), and (Dy) soils. Locally the (Ug5) soils may form soil complexes with the (Dd) and (Db) soils.</p>
Regional Geology	<p>The MinView NSW surface geology (ge612) online map illustrates that the subject site is underlain by Branxton Formation (Pmtb) of the Maitland Group from Radian age. The map shows the site is underlain by Branxton Formation (Pmtb) which is characterised as dominantly conglomerate, sandstone, siltstone.</p>
Regional Groundwater	<p>The Lotsearch report (LS038890 EP) with data sourced from WaterNSW showed no registered groundwater bores within a 500 m radius of the site. The nearest bore was GW201877, a stock and domestic bore 1258 m north east of site.</p>
Surface Water Bodies	<p>The nearest surface water body is an unnamed creek, which surrounds the site in an unenclosed oval shape with a minor radius of 250m and major radius of 530m approximately.</p>
Acid Sulfate Soils	<p>The NSW Government Planning Industry and Environment online mapping tool, eSPADE Version 2.1, indicates that the site is not mapped as being situated within or near an ASS risk area. The nearest mapped ASS risk area is approximately 250m east in an unnamed creek, which is identified as H1, High probability <1 m below ground surface.</p>

4.4 Site Description

The site is in an irregular shape with dimension of approximately 195 m x 116 m, covering an area of about 20643m². It is bounded by Gillieston Road and low-density residential properties to the North, low-density residential properties followed by Brave Cosmetics and Aquilina Auto Electrical Mobile Service to the East, Northview Street, General residential properties followed by Hunter Land Management to the South, Ryans Road, Rural Landscapes, an unnamed creek followed by Low-density residential properties to the West. The site is currently occupied by Gillieston Public School.



Site photos are shown below:



Photo 1 – Existing school site



Photo 2 – Existing school site looking west

4.5 Geology

The 1:100,000 Geological Series Sheet provided in Appendix – B indicates that the site is underlain by Branxton Formation (Pmtb) with the lithology of conglomerate, sandstone, siltstone from Maitland Group. The site is also adjacent to:

- Alluvial backswamp deposits (Q_ab) to the north west, described as Organic-rich mud, peat, silt, clay, and
- Alluvial terrace deposits (QP_at) to north, described as silt, clay, (fluvially- deposited) fine to medium grained quartz-lithic sand, polymictic gravel from Quaternary age, and
- Alluvial valley deposits (Q_av) to north east, described as silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel from Quaternary age, and
- Greta Coal Measures (Pgr) to west, described as sandstone, siltstone, pellet claystone, coal, chert, sporadic conglomerate from Permian age, and
- Muree Sandstone (Pmtu) to east, described as fine- to coarse-grained sandstone, conglomerate, minor claystone from Roadian age.

The Central and Eastern NSW 1:100,000 Soil Landscape Sheet indicates that the site is entirely located on Bolwarra Heights (9232bh) depicts as moderately deep (<150cm) well-drained Yellow Podzolic Soils, Brown Podzolic Soils with some moderately deep (<100cm) well drained Lithosols on crests, moderately deep (<140cm) imperfectly drained yellow Soloths on lower slopes.

4.6 Fieldwork

Fieldwork for the geotechnical investigation was carried out between 19th and 21st December 2022 and comprised the following:

- A detailed walkover inspection of the site and surrounds.
- Drilling of a total of twenty-eight (28) auger boreholes (BH1 to BH28 inclusive) within the footprint of the proposed redevelopment, using a track mounted drill rig provided by Stratacore Drilling.
- DCP/SPT tests were carried out at regular interval to determine the soil consistency.
- Three (3) selected boreholes were advanced into rock coring (BH8, BH14, and BH25) in order to assess the subsurface bedrock conditions.
- Selection of representative soil samples to external NATA accredited labs for geotechnical lab testing.

The approximate boreholes locations are shown on the enclosed Test Location Plan referenced Figure 1 in Appendix A.

4.7 Surface Conditions

Based on the observations from the geotechnical investigation, the sub surface profile within the footprint of the proposed activity can be generalised as follows:

- Topsoil Silty Sand: brown to dark brown, fine to medium grained, to depths of up to 0.3m across the site, overlying;
- Colluvial Silty Sand: brown to dark brown, fine to medium grained, variable thickness across the site, overlying;
- Residual deposit Clay and Silty Clay: brown red, brown yellow and grey, medium to high plasticity, with sand and gravel, to depths of up to 1.5m across the site, overlying;
- Extremely Weathered (EWM) Silty Sand: orange brown, fine to medium grained, with ironstone gravel, overlying,
- Weathered Sandstone: pale grey and pale brown, fine to coarse grained, very low to medium strength.

The encountered subsurface materials and their relative strengths have been recorded and logged as Engineering Log of Boreholes and on a Penetration Resistance of Soil Test Sheet. These have been enclosed in Appendix B.

Groundwater table or seepage was not encountered in any of the boreholes during auger drilling to shallow depths of not more than about 3.1m below existing ground surface levels. It should be noted however, that variations in groundwater seepage flows may occur due to variations in rainfall duration and intensity. It is anticipated the proposed levelling earthwork will not intersect with the groundwater table.



4.8 Lab Test Results

Geotechnical testing was undertaken at STS Pty Ltd, an NATA accredited laboratory, with testing certificates included in Appendix C. Table 2-4 through to 2-7 summarise the laboratory test results undertaken on soil samples obtained from the borehole.

4.8.1 FIELD MOISTURE CONTENT

Moisture content tests were undertaken on selected samples. The results are summarised in Table 2-4 below

Table 2-4 Field Moisture

Borehole No	Depth (m)	Material Description	Field Moisture Content (%)
BH01	0.5 - 1	Silty Clay, brown, with some sand and gravel	12.8
BH03	0.5 - 1	Silty Clay, brown	13.4
BH05	0.5 - 1	Silty Clay, brown, some sand	15.1
BH08	0.5 - 1	Silty Sandy Clay, brown	12.8
BH13	0 – 0.5	Silty Sandy Clay, brown	14.9
BH20	0.5 - 1	Silty Clay, red brown	18.7

4.8.2 ATTERBERG LIMIT TEST RESULTS

Atterberg Limits tests were scheduled on selected samples. The results are summarised in Table 2-5 below.

Table 2-5 Atterberg Limits Test Results

Borehole No	Depth (m)	Material Description	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
BH01	0.5 – 1	Silty CLAY, brown	28	15	13
BH03	0.5 – 1	Silty CLAY, brown	29	14	15
BH05	0.5 – 1	Silty CLAY, brown	31	17	14
BH08	0.5 – 1	Silty Clay, brown	32	17	15
BH13	0 – 0.5	Silty Clay, brown	25	14	11
BH20	0.5 – 1	Silty Clay, brown	44	17	27



Borehole No	Depth (m)	Material Description	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
BH26	0.5 – 1	Silty Clay, brown	18	16	2
BH28	0.5 – 1	Silty Clay, brown	22	17	5

4.8.3 PARTICLE SIZE DISTRIBUTION TEST AND EMERSON CRUMB TEST RESULTS

The Particle Size Distribution (PSD) and Emerson Class tests were performed on a selection of disturbed and SPT soil samples. The results are summarized in Table 2-5 below.

Table 2-5 Particle Size Distribution and Emerson Crumb Test Results

Borehole No	Depth (m)	Material Description	Gravels (%)	Sand (%)	Fines (Silt & Clay (%))	Emerson Class
BH01	0.5 – 1	Sandy CLAY, brown, trace gravel	14.7	37.9	47.4	3
BH03	0.5 – 1	Sandy CLAY, brown, trace gravel	7.2	45.7	47.1	-
BH05	0.5 – 1	CLAY, brown, with sand	7.2	15.7	77.1	5
BH09	0.5 – 1	Silty Clay	-	-	-	3
BH13	0 – 0.5	Silty Clay, brown	-	-	-	3
BH19	1 – 1.5	Silty Clay, brown	-	-	-	3
BH26	0.5 – 1	Silty Clay, brown	-	-	-	5

4.8.4 SOIL AGGRESSIVITY

Laboratory soil aggressivity testing was carried out on the soil sample taken on site. Result is summarised in Table 2-6 and attached in Appendix C.

Table 2-6 Soil Aggressivity Test Results

Borehole No	Depth (m)	Chloride (mg/kg)	Conductivity (µS/cm)	pH	Resistivity (ohm.m)	Sulfate (mg/kg)
BH7	1 – 1.5	20	39	6	25600	40
BH12	0.2 – 0.5	<10	28	6	35700	<10
BH18	0.5 – 1	10	34	5.8	29400	30
BH25	0.9 – 1.3	20	32	5.9	31200	30
BH26	1 – 1.5	<50	30	5.9	33300	30



Based on the above result and exposure classification outlined in AS 2159-2009, the subject alluvial and residual materials at both boreholes were assessed as non-aggressive for concrete piles in soil (Table 6.4.2 (C)) and non-aggressive for steel piles in soil (Table 6.5.2 (C)).

4.8.5 CBR

CBR test results are summarised as follows for the proposed carpark and driveway pavement design:

Table 2-7 CBR test results

Test ID	Depths (m)	Material	FMC %	OMC %	MDD t/m ³	CBR %
BH01	0.5 – 1	Sand / Clay	12.8	14.4	1.84	7.0
BH03	0.5 – 1	Sand / Clay	13.4	15.6	1.81	5.0
BH05	0.5 – 1	Clay	15.1	17.1	1.74	4.5

Based on the results of field investigation and laboratory testing results, value of CBR 3% subgrade is recommended at a project level for both colluvial and residual clay encountered across the site. Founding pavements on colluvial material would be subject inspection and approval by an experienced geotechnical consultant.

4.8.6 ACID SULPHATE SOIL

Five (5) selected soil samples were scheduled for SPOCAS Acid Sulfate Soil testing. The results of analysis for the soils are compared to the below ASSMAC assessment criteria. It is assumed that >1000 tonnes of material would be disturbed hence the action criteria for greater than 1000 tonnes have been applied.

Table 2-6 NSW ASSMAC Action Criteria

Type of Material Texture	Approx Clay Content (%<0.002mm)	Action Criteria >1000 tonnes Sulfur Trail Spos or Stos%	Action Criteria >1000 tonnes Acid Trail TPA or TSA mole H+/t
Coarse e.g. Sands	< 5	0.03	18
Loams / Light Clays	5 – 40	0.03	18
<u>Medium to Heavy Fine Clays / Silts (adopted)</u>	<u>≥ 40</u>	<u>0.03</u>	<u>18</u>

Results of SPOCAS testing results are shown below:



Table 2-7 Results of SPOCAS Testing

Sample	Depth (m)	Ph _{field}	Ph _{ox}	TPA moles H ⁺ /ton	TSA moles H ⁺ /ton	Net Acidity %S	Net Acidity moles H ⁺ /ton
BH7	1 – 1.5	6	4.2	54	29	0.04	25
BH12	0.2 – 0.5	6	3.8	74	59	0.02	14
BH18	0.5 – 1	5.8	5.0	30	19	<0.02	12
BH25	0.9 – 1.3	5.9	4.5	42	14	0.04	27
BH26	1 – 1.5	5.9	4.2	60	39	0.03	21

Based on the SPOCAS test results summarised in Table 2-7, there are PASS encountered at the subject site as per the guideline of NSW ASSMAC. However, these minor detections have been influenced by the organic matter present in the tested soils. Therefore, further detailed testing should be undertaken to assess the requirement for an Acid Sulphate Soils Management Plan (ASSMP) for this proposed redevelopment.

4.8.7 ROCK STRENGTH TESTING

A summary of point load test results is provided in Table 2-8. Point load tests are conducted in accordance with AS 4133.4.1 – 2007 [1] on recovered rock core at intervals of approximately 1.5m, changes in lithology and/or above and below rock core samples, to aid on-site rock strength assessment using calibrated portable 6510 point load tester machines.

Rock strengths recorded on the borehole logs are based on field strength assessments confirmed onsite by point load index strength test (Is50) results. A standard conversion number of 20 has been adopted to convert the Is50 results into the empirical UCS values as part of the log preparation.

Table 2-8 Point Load Test Result

Borehole No	Rock Type	Depth (m)	Weathering	Orientation	Is(50) MPa	Descriptive Strength
BH-08	Sandstone	3.3	HW	D	0.17	L
				A	0.46	M
	Sandstone	4.45	SW	D	0.33	L
				A	0.36	L
BH-18	Sandstone	1.63	HW	D	0.025	VL
				A	0.03	VL
	Sandstone	2.56	MW	D	0.14	L
				A	0.96	M
	Sandstone	3.53	SW	D	0.91	M
				A	0.96	M



Borehole No	Rock Type	Depth (m)	Weathering	Orientation	I _s (50) MPa	Descriptive Strength
BH-25	Sandstone	1.5	HW	D	0.65	M
				A	0.79	M
	Sandstone	2.31	MW	D	0.11	L
				A	0.16	L
	Sandstone	3.12	MW	D	1.2	M
				A	0.67	M
	Sandstone	4.72	MW	D	0.33	L
				A	0.25	L

Notes to table:
HW – Highly weathered
MW – Moderately weathered
SW – Slightly weathered
FR – Fresh Rock
D – Diametral
A – Axial

Uniaxial Compressive Strength (UCS) testing was conducted on two core samples.

Table 2-9 UCS Test Results

Borehole No	Depth (m)	Material Description	UCS strength (MPa)
BH08	3.43-3.57	Siltstone	2.5
BH25	2.73-2.92	Sandstone	13.0

4.9 Mine Subsidence

In 2024, Stantec were engaged to undertake a desktop mine subsidence assessment for the proposed redevelopment. The assessment was undertaken in order to support the Review of Environmental Factors (REF) for the proposed site redevelopment. To assist with the assessment Stantec were provided with a letter from Subsidence Advisory (SA) NSW (Ref.EOTH24-00188,Dated. 2 July 24) which upon review indicated the following regarding the site,

- > The property is not within a declared Mine Subsidence District and thus approval by SA NSW is not required.
- > The property is however underlain by workings of the Homeville Top Split Seam at 390 m depth of cover.
- > The property is within the angle of draw (zone of influence) of workings of the Greta Top Split Seam at 320 m cover.
- > Recommendations that a desktop mine subsidence study is undertaken by a suitable consultant and structures are designed *‘to remain serviceable for any recommended subsidence parameters contained in the study’*

A review of NSW Government’s online Planning Portal “ePlanning Spatial viewer” [1] indicates that the site is not situated within a Mine Subsidence District. The eastern boundary of the ‘Maitland West’ mine subsidence district is noted to be on the other side of Ryans Road (west of the site). Further review of the underground mining layer on the planning portal indicates the site, although not in a mine subsidence district, is partially underlain by known mine workings. The review of planning portal is consistent with SA NSW’s advice (Ref.EOTH24-00188, Dated. 2 July 24).



Intrusive Geotechnical Investigation Report Gillieston Public School

The desktop assessment undertaken by Stantec (reported under reference 30450162-004.2, dated. 26/11/24 [2]) concluded that there was a risk of mine subsidence impacting the site, albeit low. As such, subsidence impact parameters were estimated and recommended to be incorporated in the design of structures and infrastructure in order to mitigate the impacts of any subsidence.

Redevelopment of the site shall consider the findings and recommendations outlined in Stantec's desktop mine report and any advice/requirements from SA NSW (if provided).



5 Geotechnical Comments

5.1 Proposed Activity

It is understood that the redevelopment activities comprise the removal of selected buildings within the site and the construction of new permanent teaching blocks. The proposed permanent buildings are understood to be one and two storey and are expected to be founded on piers constructed within good quality rock. The design loads and other detail design information of the structures are unknown at the time of writing this report.

5.2 Excavation and Earthwork

Excavation will be limited to general levelling only for the proposed school buildings and is expected to encounter mostly soil and very low to low strength sandstone at a likely shallow depth. Medium to very high strength rock is expected in the deeper depths and therefore it is unlikely to be countered on the proposed earthwork.

Excavation of soil and very low to low strength rock may be readily achieved using conventional earthmoving equipment. Ripping or hammering may not be required for the proposed earthwork. However, considering the condition of the structures within the school, the induced vibration level control will be required to avoid impacting the adjacent properties.

Induced vibrations in structures adjacent to the excavation should not exceed a Peak Particle Velocity (PPV) of 10mm/sec for brick or unreinforced structures.

If vibrations in adjacent structures exceed the values recommended above or appear excessive during construction, excavation should cease and the project Geotechnical Engineer should be contacted immediately for appropriate reviews so that counter- measures/actions can be taken.

Earthwork should be carried out in compliance with AS3798-2007 "Guidelines on earthworks for commercial and residential developments".



5.3 Site Classification and Subgrade Preparation

It is considered that the subsurface conditions comprise topsoil overlying residual clay materials and sandstone. In strict accordance with AS2870-2011 the site would be classified as Class P given the presence of potential mine subsidence. When considering reactive soil movement only, an expected site classification of “Class M – Moderately reactive clay or silt site, which may experience moderate ground movement from moisture change” could be adopted (if applicable) for footings constructed in accordance with AS2870-2011. Additional lab tests during intrusive investigation will be required to verify this site classification. It should be noted that footings shall consider the recommendations outlined in Stantec’s desktop mine report [2] and any advice/requirements from SA NSW (if provided).

The following site preparation measures are recommended:

- Remove all topsoil, fill and deleterious materials (including roots/vegetation);
- Proof roll and compact the exposed subgrade to at least 98% MMDD at +/- 2% OMC. Where the proof roll reveals soft-spots these should be excavated and replaced with approved engineering fill;
- Surface drainage should be maintained at all times by adopting appropriate cross-falls across the site. Surface drainage should be installed as soon as is practicable in order to capture and remove surface flows to prevent erosion and softening of the exposed surface.

Filling delivered to site must be approved by the geotechnical consultant prior to delivery to site. Highly reactive clay filling should be avoided.

Site observations and laboratory test results have indicated the presence of medium to high plasticity silty clays in some areas which could be adversely affected by inclement weather due to its moderate dispersive nature. Whilst these soils are typically of a stiff to very stiff consistency when dry, they can rapidly lose strength during rainfall and subsequent partial saturation and result in difficult trafficability conditions.

Conventional sediment and erosion control measures should be implemented during the construction phase, with exposed surfaces to be topsoiled and vegetated as soon as practicable following the completion of earthworks.

5.4 Temporary and Permanent Batter Slopes

Careful consideration must be given to the planning and design of excavation and excavation retention system (if required) to reduce the risks of destabilising and causing damage to the adjacent school structures and surrounding public footpaths/roads. As with any excavation (if any) some movement of the surrounding ground should be expected, the extent of which will depend on the encountered ground profile, support type and other factors such as stress relief in medium strength rock.



5.4.1.1 Temporary Cuts

Where open cuts are required as part of temporary activity during ground support. Recommendations for temporary unsupported cuts batters (if required) are presented in the following table.

Table 5-1 Cut Batter Recommendations

Geotechnical profile	Temporary Batter (Horizontal to Vertical Ratio)
Colluvial Soil	2.5H:1V
Residual Soil & EWM	1.5H:1V
Sandstone Class IV - V	1H:1V

Notes:

1. Table 3-1 applies to temporary unsupported cut batters only, for a period of no greater than 3 months once constructed
2. Temporary batters apply to cuts no greater than 1.50m in vertical height. Where deeper cuts are proposed for each stratum, further geotechnical designed support or retention systems may be required.
3. Excavations in soil have assumed no groundwater table has been encountered;
4. The ground surface at the crest of the excavation is horizontal;
5. There is no surcharge at the crest of the excavation for a distance equal to the depth of the excavation;
6. All cuts are protected from erosion.

5.4.1.2 Permanent Cuts

Where permanent cuts will be required, it is proposed following measures would potentially be required.

Table 5-2 Permanent Options

Geotechnical Profile	Permanent Options	Additional Comments
Residual Soils	<ul style="list-style-type: none"> > Regrade batter slope > Soil nail and shotcrete 	Residual soil encountered across subject site
Sandstone Class IV – V	<ul style="list-style-type: none"> > Regrade batter > Scaling, block removal and reprofiling > Rock / spot bolting > Rock fall netting > Catch fence and ditches 	Requires geotechnical input / site observations during top-down excavation activity to determine extend of stabilization options required



5.5 Expected Structural Foundations

Foundation design will need to consider the recommendations outlined in Stantec's desktop mine report [2] and any advice/requirements from SA NSW (if provided).

Shallow footings comprising strip or pad footings founded and socketed a nominal 0.5m into the underlain residual stiff to very stiff soil may be designed for a serviceability end bearing capacity of 150 kPa.

Should higher bearing capacity be required, piers may be required and socked 0.5m into the underlain highly weathered sandstone could be designed for a serviceability end bearing capacity of 700kPa.

Foundations proportioned on the basis of the above allowable parameters would be expected to experience total settlements of less than 1% of the footing width (or pile diameter) under the applied working load, with differential settlements between adjacent columns expected to be less than half of this value.

All footings will need to be inspected by a geotechnical engineer to confirm that foundation conditions are suitable for the design parameters.

5.6 Groundwater

It is anticipated that groundwater will be associated with seepage flows along the interface of the residual clay and bedrock and also minor seepage through fractures and joints in the rock above the permanent regional groundwater table. Considering the proposed earthwork will be limited to general levelling only, it is anticipated the proposed earthwork will not intersect with the groundwater table.

5.7 Earthquake Actions

The site stratigraphy comprises minor filling and topsoil underlain by stiff to hard silty clays, overlying bedrock at depths ranging from 1.8 m to 3 m within the footprint of the proposed structure. Therefore, the site's sub-soil class when assessed in accordance with AS 1170.4 – 2007 (Ref 4) is considered a rock site and a classification of Class Be is suggested.



6 Mitigation Measures

See the below table that outlines the appropriate mitigation measures for geotechnical risks outlined in this report.

Table 7-1 Mitigation Measures

Project Stage Design (D) Construction (C) Operation (O)	Mitigation Measures	Relevant Section of report
D / C	Further intrusive geotechnical investigation must be undertaken to fill in data gaps and provide updated advice following recent design changes. This pertains particularly to the eastern section of the site previously not investigated, and areas where design changes have occurred (ie central portion of the site where deep cut is proposed)	Section 4 and Section 5
D / C	Additional testing to delineate / confirm presence of Acid Sulfate Soils.	Section 4.8.6



7 Limitations

The agreed scope of this assessment has been limited for the current purposes of the Client. Subsurface conditions may vary considerably away from the sample locations where information has been obtained.

This Document has been provided by Stantec subject to the following limitations:

- > This Document has been prepared for the particular purpose outlined in Stantec's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- > The scope and the period of Stantec's services are as described in Stantec's proposal and are subject to restrictions and limitations. Stantec did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Stantec in regard to it.
- > Conditions may exist which were undetectable given the limited nature of the enquiry Stantec was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- > In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Stantec's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Stantec to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- > Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
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References

- [1] NSW Government, “ePlanning Spatial Viewer,” NSW Government Department of Customer Service, 2020. [Online]. Available: <https://www.planningportal.nsw.gov.au/spatialviewer/#!/find-a-property/address>. [Accessed 07 10 2024].
- [2] Stantec Australia Pty Ltd, Report on Desktop Mine Subsidence Assessment - Gillieston Public School Redevelopment - 304501632-004.2, 26 November 2024.



Appendix A Site Plans



Appendix B Boreholes

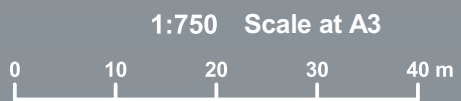


Appendix C Test Results



Appendix A Site Plans





Geotechnical Investigation-Site Plan

Gillieston Public School, Gillieston Heights

Appendix B Boreholes



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH01

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362463.531, N: 6375234.044 (56 MGA2020)

SURFACE ELEVATION : 18.520 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 300 g METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations	
	STABLE			0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets					TOPSOIL	
				0.30m									
				0.5		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel		MD			COLLUVIUM	
				0.70m									
				1.0		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel		St			RESIDUAL SOIL	
				1.30m									
				1.50m		SM	SILTY SAND: orange brown, pale grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel		D			EXTREMELY WEATHERED MATERIAL	
				1.5			EXCAVATION BH01 TERMINATED AT 1.50 m Target depth						
				2.0									
				2.5									
				3.0									
				3.5									
				4.0									
				4.5									
				5.0									

PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION

VE
W
U
H
VH
No Resistance

WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH02

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362455.680, N: 6375219.305 (56 MGA2020)

SURFACE ELEVATION : 19.987 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 300 g METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations	
	STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D				1	TOPSOIL
				0.30m			2						
				0.5		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel					3	COLLUVIUM
				0.70m			4						
				1.0		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel		St			3	RESIDUAL SOIL
				1.5			EXCAVATION BH02 TERMINATED AT 1.50 m Target depth					4	
				2.0								5	
				2.5								6	
				3.0								7	
				3.5								8	
				4.0								9	
				4.5								10	
				5.0								11	
												12	
												13	
												14	
												15	
												16	
												17	
												18	
												19	
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												21	
												22	
												23	
												24	
												25	

PHOTOGRAPHS
NOTES

☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<p>No Resistance</p> <p>10 Oct., 73 Water Level on Date shown</p> <p>water inflow</p> <p>water outflow</p>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test		VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
SUPPORT T Timbering			MOISTURE D - Dry M - Moist W - Wet	

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH03

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362444.504, N: 6375163.375 (56 MGA2020)

SURFACE ELEVATION : 23.701 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL								
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations
	STABLE			0.0			FILL: SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets					TOPSOIL
				0.50m								
				0.5					D			
				0.70m								
				1.00m			CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	D	St			COLLUVIUM
				1.0		CI-CH						
				1.20m								
				1.2			SILTY SAND: pale grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel	D				EXTREMELY WEATHERED MATERIAL
				1.50m		SM						
				1.5			EXCAVATION BH03 TERMINATED AT 1.50 m Target depth					
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								
				5.0								

PHOTOGRAPHS
NOTES

☐ YES

☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION

VE

W

U

H

VE

No Resistance

10 Oct., 73 Water
Level on Date shown

water inflow

water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - Wet

CONSISTENCY/
RELATIVE DENSITY

VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH04

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362432.683, N: 6375153.028 (56 MGA2020)

SURFACE ELEVATION : 24.879 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 300 g @ 1 METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations	
E F H	STABLE									100 200 300 400	5 10 15 20 25		
				0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets					TOPSOIL	
				0.30m									
				0.5		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel	D	D			COLLUVIUM	
				0.70m									
				1.0		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	St to VSt				RESIDUAL SOIL	
				1.20m									
				1.50m		CL-CI	SILTY CLAY: pale grey, mottled yellow, low to medium plasticity, with fine grained sand	M	D			EXTREMELY WEATHERED MATERIAL	
				1.5			EXCAVATION BH04 TERMINATED AT 1.50 m Target depth						
				2.0									
				2.5									
				3.0									
				3.5									
				4.0									
				4.5									
				5.0									

PHOTOGRAPHS
NOTES

☐ YES☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<div>VE W H H</div> <div>No Resistance</div> <div>10 Oct., 73 Water Level on Date shown</div> <div>water inflow</div> <div>water outflow</div>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	<div>VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense</div>	
SUPPORT T Timbering			<div>MOISTURE</div> <div>D - Dry M - Moist W - Wet</div>	

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH05

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362432.632, N: 6375152.988 (56 MGA2020)

SURFACE ELEVATION : 24.901 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL								
VE E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400 at METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations
	STABLE			0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets					TOPSOIL
			0.50m	0.5		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	D	St			RESIDUAL SOIL
		Not Encountered	1.00m	1.0		SM	SILTY SAND: pale grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel	D				EXTREMELY WEATHERED MATERIAL
				1.5			EXCAVATION BH05 TERMINATED AT 1.50 m Target depth					
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								
				5.0								

PHOTOGRAPHS
NOTES

☐ YES☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<div><div>VEWH</div><div>No Resistance</div></div> <div><div>10 Oct., 73 Water Level on Date shown</div><div>water inflow</div><div>water outflow</div></div>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	<div>MOISTURE</div> <div>D - Dry M - Moist W - Wet</div>	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH06

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362436.988, N: 6375233.710 (56 MGA2020)

SURFACE ELEVATION : 20.898 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL					
VE PENETRATION F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY
	STABLE			0.0			SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		
				0.40m					
				0.50m			FILL: SANDY GRAVEL: grey, medium to coarse gravel, fine grained sand, trace low plasticity silt		
							GRAVELLY SAND: orange brown, pale grey, fine grained sand, angular to sub-angular, medium to fine grained, ironstone gravel, trace low plasticity silt		
				1.0					
				1.50m					
				1.50m					
				1.63m					
				1.80m					
				2.0			EXCAVATION BH06 TERMINATED AT 1.80 m Auger refusal on medium strength rock		
				2.5					
				3.0					
				3.5					
				4.0					
				4.5					
				5.0					

PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH07
FILE / JOB NO : 304100928
SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362431.770, N: 6375215.274 (56 MGA2020) SURFACE ELEVATION : 21.916 (AHD)

EQUIPMENT TYPE : MI2 METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22 LOGGED BY : PB CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL					
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY
	STABLE			0.0			FILL: SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		
				0.40m			FILL: GRAVELLY SAND: grey, medium to coarse grained sand, sub-rounded to rounded, medium to fine grained gravel, trace low plasticity silt		
				0.80m			GRAVELLY SAND: orange brown, medium to fine grained sand, angular to sub-rounded, medium to coarse grained gravel, trace low plasticity silt	D	
			1.00m D	1.0					
			1.50m SPT 5, 10/90mm HB N=17.4m	1.5					
				1.74m			EXCAVATION BH07 TERMINATED AT 1.74 m Auger refusal on medium strength rock		
				2.0					
				2.5					
				3.0					
				3.5					
				4.0					
				4.5					
				5.0					

PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				
METHOD N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper SUPPORT T Timbering	PENETRATION WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow	SAMPLES & FIELD TESTS U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System MOISTURE D - Dry M - Moist W - Wet
		CONSISTENCY/ RELATIVE DENSITY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense		

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH08

FILE / JOB NO : 304100928

SHEET : 1 OF 2

PROJECT : Proposed School Redevelopment

LOCATION : Gillieston Public School

POSITION : E: 362417.343, N: 6375244.410 (56 MGA2020)

SURFACE ELEVATION : 22.156 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2

MOUNTING : Track

CONTRACTOR : Stratacore

DRILLER : ML

DATE STARTED : 20/12/22

DATE COMPLETED : 20/12/22

DATE LOGGED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
ADIT HWT Casing		E			0.0 22.2			FILL: SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets				TOPSOIL
				0.50m D	0.5 21.7			CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine to coarse grained sand, trace sub-angular to sub-rounded, medium to fine grained gravel		St		ALLUVIUM
				1.00m	1.0 21.2			SILTY SAND: brown, fine to coarse grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel				RESIDUAL SOIL
				1.50m SPT 5, 13/50mm HB N=R 1.70m	1.5 20.7		SM					
					2.0 20.2			SANDSTONE: recovered as silty sand, grey, orange brown, inferred extremely weathered sandstone, very low strength				WEATHERED ROCK
					2.5 19.7							
					3.0 19.2							
								Continued as Cored Drill Hole				
					3.5 18.7							
					4.0 18.2							
				4.5 17.7								
				5.0								

See Explanatory Notes for details of abbreviations & basis of descriptions.

STANTEC AUSTRALIA PTY LTD



CORED DRILL HOLE LOG

HOLE NO : BH08

FILE / JOB NO : 304100928

SHEET : 2 OF 3

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362417.343, N: 6375244.410 (56 MGA2020) SURFACE ELEVATION : 22.156 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : ML

DATE STARTED : 20/12/22 DATE COMPLETED : 20/12/22 DATE LOGGED : 20/12/22 LOGGED BY : PB CHECKED BY : TH

CASING DIAMETER : HWT BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING					MATERIAL					FRACTURES				
DRILLING & CASING	WATER	CORE LOSS RUN (%)	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other			
					0.0 22.2									
					0.5 21.7									
					1.0 21.2									
					1.5 20.7									
					2.0 20.2									
					2.5 19.7									
					3.0 19.2									
					3.10m		START CORING AT 3.10m							
		0% LOSS	25	Is(50) d=0.17 a=0.46 MPa UCS =2.5 MPa 3.57m	3.5 18.7		SANDSTONE: grey, orange brown and brown red, fine grained, bedded at 0-10 degree, ironstained	MW SW to MW						
					4.0 18.2			MW						
					4.28m			HW						
					4.44m		MUDSTONE: pale grey, indistinctly bedded, trace of sand and mudstone gravel clast	HW						
					4.5 17.7		SANDSTONE: grey, brown and orange brown, fine grained, 2-20 mm gravel in the strata, ironstained	MW HW						
					5.0 17.2			SW to MW						
		10% LOSS	48	Is(50) d=0.33 a=0.36 MPa	4.75 17.2									
		0% LOSS			5.00									

See Explanatory Notes for details of abbreviations & basis of descriptions.

BOREHOLE BH08 TERMINATED AT 5.00 m Target depth

STANTEC AUSTRALIA PTY LTD



HOLE NO : BH08

FILE / JOB NO : 304100928

SHEET : 3 OF 3

PROJECT : Proposed School Redevelopment

LOCATION : Gillieston Public School

POSITION : E: 362417.343, N: 6375244.410 (56 MGA2020)

SURFACE ELEVATION : 22.156 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2

MOUNTING : Track

CONTRACTOR : Stratacore

DRILLER : ML

DATE STARTED : 20/12/22 DATE COMPLETED : 20/12/22

DATE LOGGED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

CASING DIAMETER : HWT

BARREL (Length) : 3.00 m BIT : Stepped

BIT CONDITION : good

See Explanatory Notes for details of abbreviations & basis of descriptions.



Stantec

RMS LIB 40.3 EXTERNAL M6E REV1.3.GLB Log RTA CORED DRILL HOLE 5 304100928_GILLIESTON.GPJ <<DrawingFile>> 08/Feb/2023 14:29 10.03.00.09 Cardno M6E



TITLE:

Borehole Core Photographs – BH08
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
20/12/2022INCLINATION:
-90 degreeCORED LENGTH: BOX 1 OF 1
3.1-5.0m (1.9 m Length)DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
TH

EXCAVATION - GEOLOGICAL LOG

PIT NO : BH09

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362404.420, N: 6375211.026 (56 MGA2020)

SURFACE ELEVATION : 24.519 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL					
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY
	STABLE			0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		
				0.50m					
				0.5		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine to coarse grained sand, trace sub-angular to sub-rounded, medium to fine grained gravel		
				0.65m					
				1.00m			SILTY SAND: orange brown, grey, fine to coarse grained sand, low plasticity silt, with angular to sub-angular, medium to fine grained, ironstone gravel		
				1.50m					
				1.51m			EXCAVATION BH09 TERMINATED AT 1.51 m Auger refusal on medium strength rock		
				2.0					
				2.5					
				3.0					
				3.5					
				4.0					
				4.5					
				5.0					

PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH10

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362403.006, N: 6375247.651 (56 MGA2020)

SURFACE ELEVATION : 23.292 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL					
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY
	STABLE			0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		
		Not Encountered		0.30m					
				0.5		SM	SILTY SAND: orange brown, grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained gravel	D	D
				0.90m					
				1.0			SILTY SAND: pale grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained gravel, inferred weathered sandstone		
				1.00m			EXCAVATION BH10 TERMINATED AT 1.00 m Auger refusal on medium strength rock		
				1.5					
				2.0					
				2.5					
				3.0					
				3.5					
				4.0					
				4.5					
				5.0					

PHOTOGRAPHS
NOTES

YES



NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH11

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362379.585, N: 6375210.150 (56 MGA2020)

SURFACE ELEVATION : 25.695 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL								
VE PENETRATION E F H		SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations
		STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	L	<div><div>100</div><div>200</div><div>300</div><div>400</div></div>	TOPSOIL
						0.30m						SILTY SAND: grey to pale grey, fine grained sand, low plasticity silt, trace angular, medium to fine grained, ironstone gravel
					0.5		0.50m	EXCAVATION BH11 TERMINATED AT 0.50 m Auger refusal on medium strength rock				
					1.0							
					1.5							
					2.0							
					2.5							
					3.0							
					3.5							
					4.0							
					4.5							
					5.0							

PHOTOGRAPHS
NOTES

YES



NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



No Resistance

WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH12
FILE / JOB NO : 304100928
SHEET : 1 OF 1PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362382.560, N: 6375243.284 (56 MGA2020)

SURFACE ELEVATION : 24.905 (AHD)

EQUIPMENT TYPE : M12




METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations		
	STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	L	100	TOPSOIL		
			0.20m			0.30m						200	
			0.50m		0.80m	SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel					300	COLLUVIUM
					1.0		CI-CH			CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel		St	
			1.50m								WEATHERED ROCK		
			SPT 18/100mm HB N-R 1.60m	1.5			SILTY SAND: orange brown, pale grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained gravel, inferred weathered sandstone						
							EXCAVATION BH12 TERMINATED AT 1.60 m Auger refusal on medium strength rock						
				2.0									
				2.5									
				3.0									
				3.5									
				4.0									
				4.5									
				5.0									

PHOTOGRAPHS
NOTES☐ YES☒ NO

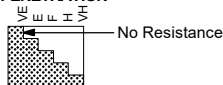
METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH13

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362364.357, N: 6375226.656 (56 MGA2020)

SURFACE ELEVATION : 25.279 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations
	STABLE	Not Encountered	D	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	St	100 200 300 400	TOPSOIL
				0.30m		CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	RESIDUAL SOIL				
				0.45m		SILTY SAND: orange brown, brown-red, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel	EXTREMELY WEATHERED MATERIAL				
				0.60m		SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone	WEATHERED ROCK				
				0.71m		EXCAVATION BH13 TERMINATED AT 0.71 m Auger refusal on medium strength rock					
			SPT 10/10mm HB N=R 0.71m	1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES ☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	 WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	MOISTURE D - Dry M - Moist W - Wet	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH14

FILE / JOB NO : 304100928

SHEET : 1 OF 2

PROJECT : Proposed School Redevelopment

LOCATION : Gillieston Public School

POSITION : E: 362352.234, N: 6375240.475 (56 MGA2020)

SURFACE ELEVATION : 24.777 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2

MOUNTING : Track

CONTRACTOR : Stratacore

DRILLER : ML


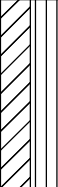


DATE STARTED : 20/12/22

DATE COMPLETED : 20/12/22

DATE LOGGED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

DRILLING					MATERIAL							
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
<div><div>AD/T</div><div>HWT Casing</div></div>		m	Not Encountered		0.0 24.8			FILL: SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets				TOPSOIL
		m		0.5 24.3		CI-CH	0.50m	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	D	F	ALLUVIUM	
		H		1.0 23.8			1.10m	SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel			WEATHERED ROCK	
			1.50m SPT 10/100mm HB N=R 1.60m	1.5 23.3			1.60m	colour becoming orange brown				
								Continued as Cored Drill Hole				
					2.0 22.8							
					2.5 22.3							
					3.0 21.8							
					3.5 21.3							
					4.0 20.8							
					4.5 20.3							

See Explanatory Notes for details of abbreviations & basis of descriptions.

STANTEC AUSTRALIA PTY LTD





TITLE:

Borehole Core Photographs – BH14
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
20/12/2022INCLINATION:
-90 degreeCORED LENGTH: BOX 1 OF 1
1.6-3.68m (2.08 m Length)DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
TH

EXCAVATION - GEOLOGICAL LOG

PIT NO : BH15

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362343.297, N: 6375226.124 (56 MGA2020)

SURFACE ELEVATION : 24.989 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
	STABLE	Not Encountered	1.25m SPT 10/50mm HB N=1 R=1.30m	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D			TOPSOIL
				0.40m							
				0.5		SM	SILTY SAND: brown, grey, fine grained sand, low plasticity silt, trace sub-rounded to rounded, medium to fine grained, ironstone gravel, trace medium to high plasticity clay	MD		RESIDUAL SOIL	
				0.60m							
				1.0		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	M	VSt		
				1.00m			SANDSTONE: recovered as silty sand, grey, orange brown, inferred extremely weathered sandstone, very low strength	D			WEATHERED ROCK
				1.30m			EXCAVATION BH15 TERMINATED AT 1.30 m Auger refusal on medium strength rock				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES

☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	 WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	MOISTURE D - Dry M - Moist W - Wet	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH16

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362331.221, N: 6375179.241 (56 MGA2020)

SURFACE ELEVATION : 26.038 (AHD)

EQUIPMENT TYPE : M12


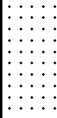
METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL											
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETROMETER	STRUCTURE & Other Observations	
				STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	D	100	TOPSOIL	
								0.30m		SM			SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained geotextile	200	COLLUVIUM
								1.00m		GRAVELLY SAND: brown, brown-red, fine grained sand, angular to sub-angular, medium to fine grained, ironstone gravel, trace low plasticity silt, inferred weathered sandstone			300	WEATHERED ROCK	
						SPT 10/10mm HB N=1.51m	1.5		1.51m	EXCAVATION BH16 TERMINATED AT 1.51 m Auger refusal on medium strength rock					
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								
							4.5								
							5.0								

PHOTOGRAPHS NOTES

☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE

D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH17

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362316.507, N: 6375167.385 (56 MGA2020)

SURFACE ELEVATION : 25.205 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations
	STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	D	100 200 300 400	TOPSOIL
				0.30m		SM	SILTY SAND: brown-red, brown-yellow, fine grained sand, low plasticity silt, with medium to high plasticity clay, trace angular, medium to fine grained gravel				EXTREMELY WEATHERED MATERIAL
				0.5		SM	SILTY SAND: pale grey, medium to fine grained sand, low plasticity silt, trace angular, fine grained gravel, inferred weathered sandstone				WEATHERED ROCK
				0.90m	0.91m			EXCAVATION BH17 TERMINATED AT 0.91 m Auger refusal on medium strength rock			
			SPT 10/10mm HB NHR 0.91m	1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES

☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<p>No Resistance</p> <p>10 Oct., 73 Water Level on Date shown water inflow water outflow</p>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	<p>MOISTURE</p> <p>D - Dry M - Moist W - Wet</p>	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH18

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362324.695, N: 6375150.118 (56 MGA2020)

SURFACE ELEVATION : 26.495 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations
VE E F H	STABLE	Not Encountered	SPT 10/10mm HB NHR 1.21m	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		L		TOPSOIL
				0.50m							
				0.5		SM	SILTY SAND: orange-brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained, ironstone gravel, trace medium to high plasticity clay	D	D		EXTREMELY WEATHERED MATERIAL
				1.00m							
				1.0			SILTY SAND: pale grey, medium to fine grained sand, low plasticity silt, trace angular, fine grained, ironstone gravel, inferred weathered sandstone		VD		WEATHERED ROCK
				1.20m							
				1.21m			EXCAVATION BH18 TERMINATED AT 1.21 m Auger refusal on medium strength rock				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES

☐ YES

☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	 WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	MOISTURE D - Dry M - Moist W - Wet	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH19

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362352.390, N: 6375188.685 (56 MGA2020)

SURFACE ELEVATION : 26.667 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
	STABLE	Not Encountered	1.50m SPT 5, 15/50mm HB N=1 1.70m	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	St	D	TOPSOIL
				0.40m		CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	RESIDUAL SOIL				
				1.00m		SM	SILTY SAND: orange brown, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, trace medium to high plasticity clay				EXTREMELY WEATHERED MATERIAL
				1.30m			SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred sandstone				WEATHERED ROCK
				1.70m			EXCAVATION BH19 TERMINATED AT 1.70 m Auger refusal on medium strength rock				
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES

☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<p>No Resistance</p> <p>10 Oct., 73 Water Level on Date shown</p> <p>water inflow</p> <p>water outflow</p>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	<p>MOISTURE</p> <p>D - Dry M - Moist W - Wet</p>	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH20

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362348.789, N: 6375146.458 (56 MGA2020)

SURFACE ELEVATION : 28.080 (AHD)

EQUIPMENT TYPE : M12





METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL											
VE	E	F	H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETROMETER	STRUCTURE & Other Observations	
				STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	St	100	TOPSOIL	
						0.50m	D	0.50m		CI-CH			CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	200	RESIDUAL SOIL
						1.00m		1.10m		SM			SILTY SAND: orange brown, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, trace medium to high plasticity clay	300	EXTREMELY WEATHERED MATERIAL
								1.30m					SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred sandstone	400	WEATHERED ROCK
						1.50m	SPT 10/10mm HB N=1.51m	1.51m					EXCAVATION BH20 TERMINATED AT 1.51 m Auger refusal on medium strength rock		
							2.0								
							2.5								
							3.0								
							3.5								
							4.0								
							4.5								
							5.0								

PHOTOGRAPHS NOTES

☐ YES☒ NO

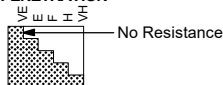
METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE

D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH21

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362369.477, N: 6375164.614 (56 MGA2020)

SURFACE ELEVATION : 27.880 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
	STABLE		D	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets				TOPSOIL
		Not Encountered		0.50m			SILTY SAND: orange brown, grey, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone	D			WEATHERED ROCK
					0.80m			EXCAVATION BH21 TERMINATED AT 0.80 m Auger refusal on medium strength rock			
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES

☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	<p>No Resistance</p> <p>10 Oct., 73 Water Level on Date shown water inflow water outflow</p>	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	<p>MOISTURE</p> <p>D - Dry M - Moist W - Wet</p>	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH22

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362382.597, N: 6375162.292 (56 MGA2020)

SURFACE ELEVATION : 27.659 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER	STRUCTURE & Other Observations
	STABLE	Not Encountered	1.50m SPT 5, 10/10mm HB N=H 1.66m	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	St	100 200 300 400	TOPSOIL
				0.30m		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel				COLLUVIUM
				0.60m		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel				RESIDUAL SOIL
				1.10m		SM	SILTY SAND: orange brown, fine grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, trace medium to high plasticity clay				EXTREMELY WEATHERED MATERIAL
				1.40m			SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone				WEATHERED ROCK
				1.66m			EXCAVATION BH22 TERMINATED AT 1.66 m Auger refusal on medium strength rock				
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO											
METHOD N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper SUPPORT T Timbering		PENETRATION No Resistance WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow		SAMPLES & FIELD TESTS U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System MOISTURE D - Dry M - Moist W - Wet		CONSISTENCY/ RELATIVE DENSITY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense			

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH23

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362373.044, N: 6375146.309 (56 MGA2020)

SURFACE ELEVATION : 28.565 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL					
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY
VE E F H	STABLE	Not Encountered		0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets		
				0.5		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	St	
				1.0			SILTY SAND: pale grey, orange brown, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone	D	
			1.50m SPT 13/130mm HB N=H 1.63m	1.5			EXCAVATION BH23 TERMINATED AT 1.63 m Auger refusal on medium strength rock		
				2.0					
				2.5					
				3.0					
				3.5					
				4.0					
				4.5					
				5.0					

PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH24

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362397.539, N: 6375156.658 (56 MGA2020)

SURFACE ELEVATION : 27.043 (AHD)

EQUIPMENT TYPE : M12

METHOD : Auger Drilling

DATE EXCAVATED : 21/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL							
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400	STRUCTURE & Other Observations
	STABLE	Not Encountered	SPT 10/10mm HB N=R 1.01m	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D			TOPSOIL
				0.30m		SILTY SAND: pale grey, orange brown, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone	WEATHERED ROCK				
				0.50m							
				1.0		1.01m	EXCAVATION BH24 TERMINATED AT 1.01 m Auger refusal on medium strength rock				
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							
				5.0							

PHOTOGRAPHS
NOTES ☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	 No Resistance	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	MOISTURE D - Dry M - Moist W - Wet	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

SUPPORT
T Timbering

WATER
10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH25

FILE / JOB NO : 304100928

SHEET : 1 OF 2

PROJECT : Proposed School Redevelopment

LOCATION : Gillieston Public School

POSITION : E: 362395.898, N: 6375142.870 (56 MGA2020)

SURFACE ELEVATION : 27.949 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2

MOUNTING : Track

CONTRACTOR : Stratacore

DRILLER : ML

DATE STARTED : 20/12/22

DATE COMPLETED : 20/12/22

DATE LOGGED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

DRILLING						MATERIAL						
PROGRESS		DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	STRUCTURE & Other Observations
DRILLING & CASING	WATER											
<div>AD/T</div> <div>HWT Casing</div>		m	Not Encountered		0.0 27.9			FILL: SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	D		TOPSOIL
				0.40m	SILTY SAND: orange-brown, fine grained sand, low plasticity silt, trace sub-angular to sub-rounded, medium to fine grained gravel		FILL					
		f		0.90m D		CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	ALLUVIUM					
				1.10m		SILTY SAND: pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel, inferred weathered sandstone	WEATHERED ROCK					
		H		1.30m SPT 15/60mm	1.38m	Continued as Cored Drill Hole						
				HB N=R 1.38m	1.5 26.4							
					2.0 25.9							
					2.5 25.4							
					3.0 24.9							
					3.5 24.4							
					4.0 23.9							
					4.5 23.4							
					5.0							

See Explanatory Notes for details of abbreviations & basis of descriptions.

STANTEC AUSTRALIA PTY LTD



CORED DRILL HOLE LOG

HOLE NO : BH25

FILE / JOB NO : 304100928

SHEET : 2 OF 2

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362395.898, N: 6375142.870 (56 MGA2020)

SURFACE ELEVATION : 27.949 (AHD)

ANGLE FROM HORIZONTAL : 90°

RIG TYPE : MI2

MOUNTING : Track

CONTRACTOR : Stratacore

DRILLER : ML

DATE STARTED : 20/12/22

DATE COMPLETED : 20/12/22

DATE LOGGED : 20/12/22

LOGGED BY : PB

CHECKED BY : TH

CASING DIAMETER : HWT

BARREL (Length) : 3.00 m BIT : Stepped

BIT CONDITION : good

DRILLING					MATERIAL				FRACTURES			
PROGRESS		CORE LOSS (% LOSS)	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50)	NATURAL FRACTURE (mm)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other	
DRILLING & CASING	WATER											
					0.0 27.9							
					0.5 27.4							
					1.0 26.9							
					1.38m		START CORING AT 1.38m					
		0% LOSS	36	Is(50) d=0.65 a=0.79 MPa	1.5 26.4		SANDSTONE: pale grey, brown and orange brown, medium to coarse grained, 1-5 % carbonaceous lamination at 10-50 degrees, dark grey, trace of ironstone gravel	SW to MW			1.44: BP 5 - 10° Fe SN CU RF 1.50: BP 5° Fe SN PR RF 1.60: DB 1.67-1.70: JT 35° Sand IR RF	
					2.0 25.9			MW			1.85: BP 0 - 5° Fe SN PR RF 1.87: BP 0 - 5° Fe SN PR RF 1.90: BP 0 - 5° Fe SN PR RF 1.91: BP 0° Sand PR RF 1.92-2.00: FZ 2.05-2.07: JT 55° Fe SN IR RF 2.06: BP 5° Fe SN PR RF 2.12: BP 5° Fe SN UN RF 2.12-2.19: JT 45° Fe SN CU RF 2.15-2.19: JT 60° Fe SN IR RF 2.19-2.22: JT 40° Fe SN IR RF 2.19-2.24: JT 65° Fe SN IR RF 2.24-2.28: FZ 2.43: BP 5° Fe SN IR RF 2.43-2.49: FZ 2.58: EOR	
		2.58			2.5 25.4			SW			2.64-2.68: JT 55° Fe SN ST RF 2.67: DB 2.74: BP 0° Fe SN PR RF	
		10% LOSS	48	UCS =13 MPa	2.92m						2.91: DB 2.97-3.00: JT 45° Fe SN IR RF	
					3.0 24.9			EW SW			3.00-3.30: CS 3.21: DB 3.26-3.29: BP 35° Fe SN IR RF 3.32-3.40: JT 75° Sand IR RF	
					3.40m			EW			3.61-3.63: JT 45° Sand CU RF 3.64: BP 0° Sand PR RF 3.70: BP 0° Sand PR RF 3.70-3.82: Core Loss	
					3.5 24.4		SANDSTONE: pale grey to grey, medium to fine grained, 10-15 % of carbonaceous lamination at 10-20 degrees, dark grey, with gravel medium to fine grained, rounded to sub-rounded	HW				
					3.70m			EW				
					3.82m		CORE LOSS 0.12m (3.70-3.82)					
		3.82			3.86m			EW				
		52% LOSS	22		4.0 23.9		SANDSTONE: grey, brown yellow, medium to coarse grained, with gravel, medium to fine grained, rounded to sub-rounded CORE LOSS 0.31m (3.86-4.17)				3.86-4.17: Core Loss	
					4.17m							
					4.5 23.4		SANDSTONE: pale grey, brown and brown yellow, medium to coarse grained, with gravel, medium to fine grained, rounded to sub-angular	MW			4.17-4.29: FZ 4.36-4.42: FZ 4.49: DB 4.52-4.59: FZ 4.69: DB 4.75: BP 0° Sand CU S 4.70-5.00: JT 50° Fe SN PR RF 4.84-4.86: JT 45° Fe SN PR RF 4.88-4.92: JT 45° Fe SN PR RF	
		0% LOSS	35	Is(50) d=0.33 a=0.25 MPa	5.0 22.9			EW SW				
					5.00m							

See Explanatory Notes for
details of abbreviations
& basis of descriptions.BOREHOLE BH25 TERMINATED AT 5.00 m
Target depth

STANTEC AUSTRALIA PTY LTD





TITLE:

Borehole Core Photographs – BH25
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
20/12/2022INCLINATION:
-90 degreeCORED LENGTH: BOX 1 OF 1
1.38-5.0m (3.62 m Length)DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
TH

EXCAVATION - GEOLOGICAL LOG

PIT NO : BH26

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362436.114, N: 6375141.277 (56 MGA2020)

SURFACE ELEVATION : 25.480 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL								
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 100 200 300 400 at 1 METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations
	STABLE	Not Encountered	D B	0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D	MD - D St	100 200 300 400		TOPSOIL
				0.30m		SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel	COLLUVIUM					
				0.50m		CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	RESIDUAL SOIL					
				0.70m		SILTY SAND: orange-brown, pale grey, fine to medium grained sand, low plasticity silt, trace angular to sub-angular, medium to fine grained, ironstone gravel	WEATHERED ROCK					
				1.00m		EXCAVATION BH26 TERMINATED AT 1.35 m Auger refusal on medium strength rock						
1.35m				1.5								
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								
				5.0								

PHOTOGRAPHS
NOTES ☐ YES ☒ NO

METHOD	PENETRATION	SAMPLES & FIELD TESTS	CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System	CONSISTENCY/ RELATIVE DENSITY
N Natural Exposure E Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper	 WATER 10 Oct., 73 Water Level on Date shown water inflow water outflow	U50 - Undisturbed Sample 50 mm diameter D - Disturbed Sample B - Bulk Disturbed Sample MC - Moisture Content HP - Hand Penetrometer (UCS kPa) VS - Vane Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT - Plate Bearing Test	Based on Unified Classification System	VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

MOISTURE
D - Dry
M - Moist
W - Wet

See Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH27

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362496.104, N: 6375194.206 (56 MGA2020)

SURFACE ELEVATION : 18.916 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 300 g METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations	
	STABLE			0.0		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	M				TOPSOIL	
				0.30m									
				0.5		SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel	MD				COLLUVIUM	
				1.0				W					
				1.20m									
				1.50m		CI-CH	CLAY: brown red, brown yellow and grey, medium to high plasticity, with fine grained sand, trace sub-rounded to rounded, medium to fine grained gravel	VSt				RESIDUAL SOIL	
				1.5			EXCAVATION BH27 TERMINATED AT 1.50 m Target depth						
				2.0									
				2.5									
				3.0									
				3.5									
				4.0									
				4.5									
				5.0									

PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION



WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD



EXCAVATION - GEOLOGICAL LOG

PIT NO : BH28

FILE / JOB NO : 304100928

SHEET : 1 OF 1

PROJECT : Proposed School Redevelopment
LOCATION : Gillieston Public School

POSITION : E: 362490.485, N: 6375233.916 (56 MGA2020)

SURFACE ELEVATION : 16.031 (AHD)

EQUIPMENT TYPE : MI2

METHOD : Auger Drilling

DATE EXCAVATED : 19/12/22

LOGGED BY : PB

CHECKED BY : TH

EXCAVATION DIMENSIONS : 0.10 m LONG 0.10 m WIDE

DRILLING				MATERIAL									
VE PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO- METER 300 g METER	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm	STRUCTURE & Other Observations	
<div><div></div><div></div><div></div><div></div></div>	STABLE	Not Encountered	<div><div>0.50m</div><div>B</div><div>1.00m</div></div>	0.0	<div></div>	SM	SILTY SAND: brown, fine grained sand, low plasticity silt, trace angular, medium to fine grained gravel, trace of rootlets	D		<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>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PHOTOGRAPHS
NOTES☐ YES☒ NO

METHOD

N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION

VE
W
U
H
VH
No Resistance

WATER

10 Oct., 73 Water
Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample
50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak,
R-Remoulded (uncorrected kPa)
PBT - Plate Bearing TestCLASSIFICATION SYMBOLS &
SOIL DESCRIPTION
Based on Unified
Classification System

MOISTURE

D - Dry
M - Moist
W - WetCONSISTENCY/
RELATIVE DENSITYVS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very DenseSee Explanatory Notes for
details of abbreviations
& basis of descriptions.

CARDNO NSW/ACT PTY LTD





TITLE:

Borehole SPT Photographs – BH06
Gillieston Public School

PROJECT NO:
304100928

TEST DATE:
19/12/2022

INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2

CONTRACTOR:
Stratacore

LOGGED BY:
PB

CHECKED BY:
TH





TITLE:

Borehole SPT Photographs – BH07
Gillieston Public School

PROJECT NO:
304100928

TEST DATE:
19/12/2022

INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2

CONTRACTOR:
Stratacore

LOGGED BY:
PB

CHECKED BY:
TH





TITLE: Borehole SPT Photographs – BH08 Gillieston Public School			
PROJECT NO: 304100928	TEST DATE: 20/12/2022	INCLINATION: -90 degree	SPT PHOTOS
DRILL RIG: MI2	CONTRACTOR: Stratacore	LOGGED BY: PB	CHECKED BY: TH





TITLE:

Borehole SPT Photographs – BH12
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
21/12/2022INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
TH



TITLE: Borehole SPT Photographs – BH14 Gillieston Public School			
PROJECT NO: 304100928	TEST DATE: 20/12/2022	INCLINATION: -90 degree	SPT PHOTOS
DRILL RIG: MI2	CONTRACTOR: Stratacore	LOGGED BY: PB	CHECKED BY: TH





TITLE:

Borehole SPT Photographs – BH19
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
21/12/2022INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
THProject: Project Gillieston Public School
Number: 304100928BH ID: 2 BH19
Depth: 1.5 – 1.95 (SPT)
Core Tray No.:
Date: 21/12/2022



TITLE:

Borehole SPT Photographs – BH22
Gillieston Public School

PROJECT NO:
304100928

TEST DATE:
21/12/2022

INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2

CONTRACTOR:
Stratacore

LOGGED BY:
PB

CHECKED BY:
TH





TITLE:

Borehole SPT Photographs – BH23
Gillieston Public SchoolPROJECT NO:
304100928TEST DATE:
21/12/2022INCLINATION:
-90 degree

SPT PHOTOS

DRILL RIG:
MI2CONTRACTOR:
StratacoreLOGGED BY:
PBCHECKED BY:
TH

Appendix C Test Results



Moisture Content of Soil and Aggregate Samples

Project: GILLIESTON PUBLIC SCHOOL

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0154

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HIGHWAY, ST LEONARDS, NSW 2065

Report Date: 24/01/2023

Test Method: AS1289.2.1.1

Page: 1 OF 2

Sampling Procedure: AS 1289.1.2.1 Clause 6.5.1 - Hand Excavated Pit or Trench (Not covered under NATA Scope of Accreditation)

STS / Sample No.	S1	S2	S3	S5	S8	S11
Sample Location	BH01	BH03	BH05	BH08	BH13	BH20
Material Description	Silty, Clay, brown, some Sand and Gravel	Silty, Clay, brown	Silty, Clay, brown, some Sand	Silty, Sandy, Clay, brown	Silty, Sandy, Clay, brown	Silty, Clay, red/brown
Depth (mm)	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	0.0-0.5	0.5-1.0
Sample Date	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Moisture Content (%)	12.8	13.4	15.1	12.8	14.9	18.7

Remarks:

Approved Signatory.....

Technician: B.V.

Orlando Mendoza - Laboratory Manager

Moisture Content of Soil and Aggregate Samples

Project: GILLIESTON PUBLIC SCHOOL

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0154

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HIGHWAY, ST LEONARDS, NSW 2065

Report Date: 24/01/2023

Test Method: AS1289.2.1.1

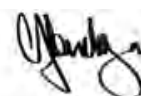
Page: 2 OF 2

Sampling Procedure: AS 1289.1.2.1 Clause 6.5.1 - Hand Excavated Pit or Trench (Not covered under NATA Scope of Accreditation)

STS / Sample No.	S15	S17				
Sample Location	BH01	BH03				
Material Description	Silty, Sandy, Clay, brown	Silty, Sandy, Clay, brown				
Depth (mm)	0.5-1.0	0.5-1.0				
Sample Date	19/12/2022	19/12/2022				
Moisture Content (%)	5.1	9.4				

Remarks:

Approved Signatory.....



Technician: B.V.

Orlando Mendoza - Laboratory Manager

Particle Size Distribution

Project: Gillieston Public School, Gillieston Heights

Client: STANTEC PTY LTD (CARDNO)

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HIGHWAY, ST LEONARDS, NSW 2060

Test Method: AS1289.3.6.1

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Material Description: Sand, brown, with silt/clay/gravel

STS / Sample No.: 7250D-L/1

Sample Location: BH01

Date Sampled: 19/12/2022

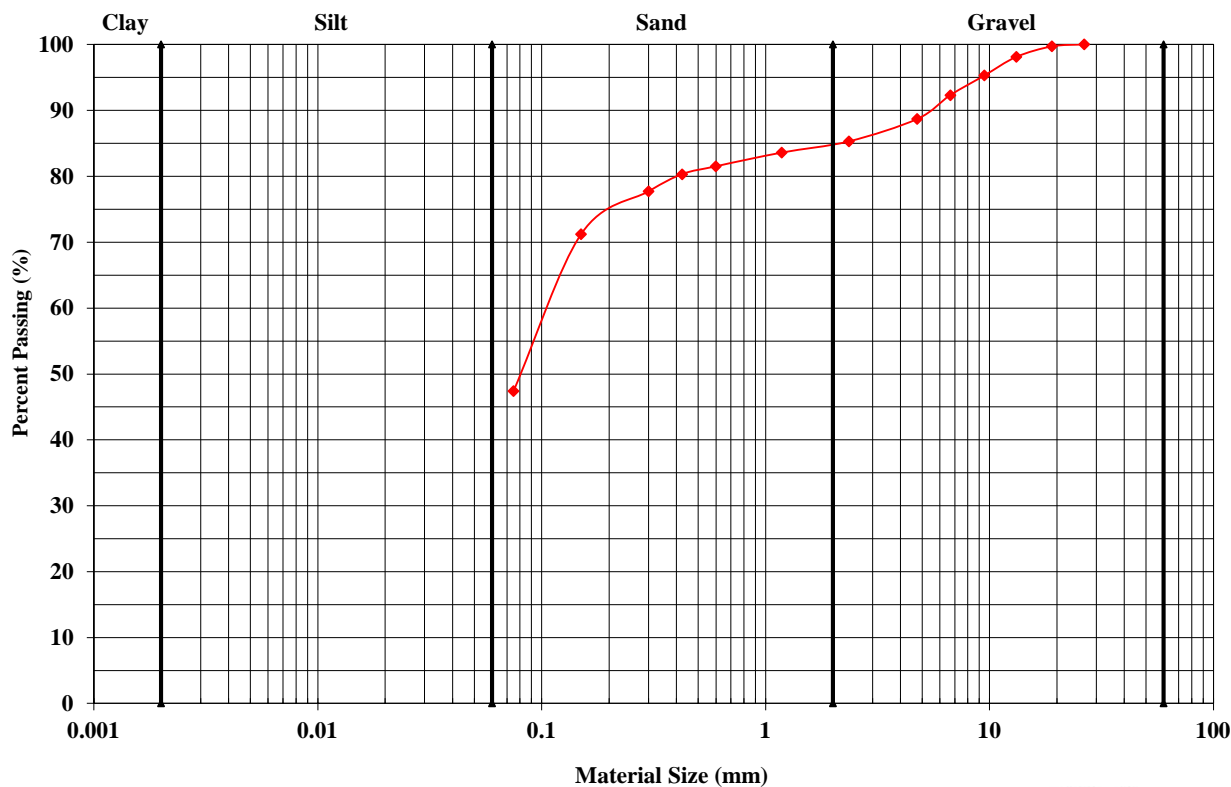
Project No.: 32110

Report No.: 23/0157

Report Date: 24/01/2023

Page: 1 OF 3

Client Project No: 304100928



Remarks:

Technician: BV

Approved Signatory.....

Orlando Mendoza - Laboratory Manager

Particle Size Distribution

Project: Gillieston Public School, Gillieston Heights

Client: STANTEC PTY LTD (CARDNO)

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HWY, ST LEONARDS, NSW 2065 Depth (m): 0.5 - 1.0

Test Method: AS1289.3.6.1

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Material Description: Sand, brown, with silt/clay/gravel

STS / Sample No.: 7250D-L/2

Sample Location: BH03

Date Sampled: 19/12/2022

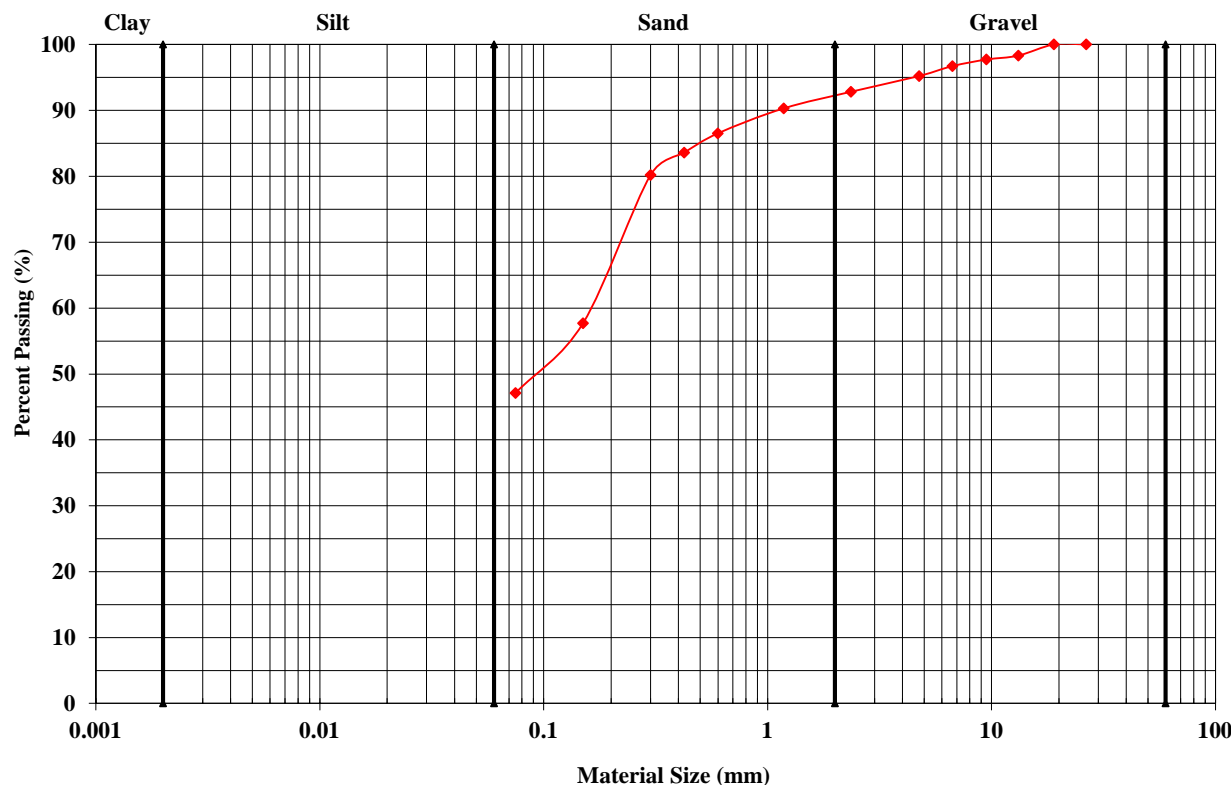
Project No.: 32110

Report No.: 23/0157

Report Date: 24/01/2023

Page: 2 OF 3

Client Project No: 304100928



Sieve Size (mm)	Percent Passing (%)
26.5	100.0
19.0	100.0
13.2	98.3
9.5	97.7
6.7	96.7
4.75	95.2
2.36	92.8
1.18	90.3
0.60	86.5
0.425	83.6
0.30	80.2
0.15	57.7
0.075	47.1

Remarks:

Technician: BV

Approved Signatory.....

Orlando Mendoza - Laboratory Manager

Atterberg Limits and Linear Shrinkage Report

Project: Gillieston Public School, Gillieston Heights

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0178

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HWY, ST LEONARDS, NSW 2065

Report Date: 25/01/2023

Test Method: RMS T108,T109

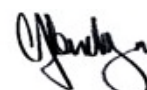
Page: 1 OF 2

Client Request No.: 304100928

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7250D-L/1	7250D-L/2	7250D-L/3	7250D-L/4	7250D-L/5	7250D-L/6
Sample Location	BH01	BH03	BH05	BH08	BH13	BH20
Material Description	Sand, brown, with silt/clay/gravel	Sand, brown, with silt/clay/gravel	Sand, brown, with silt/clay/gravel	Silty Sandy Clay, brown	Silty Clay, brown	Silty Clay, brown
Depth (m)	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.0 - 0.5	0.5 - 1.0
Sample Date	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Sample History	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried	Oven Dried
Method of Preparation	Dry sieved	Dry sieved	Dry sieved	Dry sieved	Dry sieved	Dry sieved
Liquid Limit (%)	28	29	31	32	25	44
Plastic Limit (%)	15	14	17	17	14	17
Plasticity Index	13	15	14	15	11	27
Linear Shrinkage (%)	N/A	N/A	N/A	N/A	N/A	N/A
Mould Size (mm)	N/A	N/A	N/A	N/A	N/A	N/A
Crumbing	N/A	N/A	N/A	N/A	N/A	N/A
Curling	N/A	N/A	N/A	N/A	N/A	N/A

Remarks:



Approved Signatory.....

Technician:

Orlando Mendoza - Laboratory Manager

Atterberg Limits and Linear Shrinkage Report

Project: Gillieston Public School, Gillieston Heights

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0178

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HWY, ST LEONARDS, NSW 2065

Report Date: 25/01/2023

Test Method: RMS T108,T109

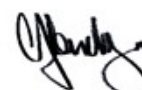
Page: 2 OF 2

Client Request No.: 304100928

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7250D-L/7	7250D-L/8				
Sample Location	BH26	BH28				
Material Description	Silty Clay, brown	Silty Clay, brown				
Depth (m)	0.5 - 1.0	0.5 - 1.0				
Sample Date	19/12/2022	19/12/2022				
Sample History	Oven Dried	Oven Dried				
Method of Preparation	Dry Sieved	Dry Sieved				
Liquid Limit (%)	18	22				
Plastic Limit (%)	16	17				
Plasticity Index	2	5				
Linear Shrinkage (%)	N/A	N/A				
Mould Size (mm)	N/A	N/A				
Crumbing	N/A	N/A				
Curling	N/A	N/A				

Remarks:



Approved Signatory.....

Technician: BV

Orlando Mendoza - Laboratory Manager

Emerson Class No.

Project: Gillieston Public School, Gillieston Heights

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0179

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HWY, ST LEONARDS, NSW 2065

Report Date: 25/01/2023

Test Method: AS1289.3.8.1

Page: 1 OF 1

Client Request No.: 304100928

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.	7250D-L/1	7250D-L/2	7250D-L/3	7250D-L/4	7250D-L/5	7250D-L/6
Sample Location	BH01	BH05	BH09	BH13	BH19	BH26
Material Description	Silty Clay, brown	Silty Clay, brown	Silty Clay, brown	Silty Clay, brown	Silty Clay, brown	Silty Clay, brown
Depth (mm)	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.0 - 0.5	1.00 - 1.5	0.5 - 1.0
Sample Date	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Date Tested	24/01/2023	24/01/2023	24-Jan-23	24-Jan-23	24-Jan-23	24-Jan-23
Source of Material	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
Water Temperature (°)	21	21	21	21	21	21
Emerson Class No.	3	5	3	3	3	5

Emerson Classification

Class 1: Slaking and complete dispersion before remoulding

Class 2: Slaking and some dispersion before remoulding

Class 3: Slaking and no dispersion before remoulding, dispersion after remoulding

Class 4: Slaking and no dispersion before remoulding, no dispersion after remoulding, calcite or gypsum present

Class 5: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, dispersion after slaking in a 1:5 soil / water suspension

Class 6: Slaking and no dispersion before remoulding, no dispersion after remoulding, no calcite or gypsum present, flocculation after shaking in a 1:5 soil / water suspension

Class 7: No slaking, swelling occurs

Class 8: No slaking, swelling does not occur

Remarks:



Approved Signatory.....

Technician: BV

Orlando Mendoza - Laboratory Manager

California Bearing Ratio Determination Report

Project: Gillieston Public School, Gillieston Heights

Project No.: 32110

Client: STANTEC PTY LTD (CARDNO)

Report No.: 23/0175

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HWY, ST LEONARDS, NSW 2065

Report Date: 25/01/2023

Test Method: AS1289.5.1.1,6.1.1,2.1.1

Page: 1 OF 1

No. of Days Soaked: 4

Compactive Effort: Standard

Target Compaction (%): 100

Surcharge (Kg): 4.5


Client Request No.: 304100928

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

STS / Sample No.		7250D-L/1	7250D-L/2	7250D-L/3		
Sample Location		BH01	BH03	BH05		
Material Description		Sand, brown, with silt/clay/gravel	Sand, brown, with silt/clay/gravel	Sand, brown, with silt/clay/gravel		
Depth of Sample (m)		0.5 - 1.0	0.5 - 1.0	0.5 - 1.0		
Sample Date		19/12/2022	19/12/2022	19/12/2022		
Oversize on Wet Basis +19mm (%)		0.2	0.0	0.0		
Field Moisture Content (%)		12.8	13.4	15.1		
Optimum Moisture Content (%)		14.4	15.6	17.1		
Maximum Dry Density (t/m ³)		1.84	1.81	1.74		
Dry Density (t/m ³)	Before Soaking	1.84	1.81	1.74		
	After Soaking	1.82	1.79	1.70		
Relative Compaction (%)	Before Soaking	99.8	100.1	100		
	After Soaking	98.6	99.1	97.5		
Moisture Content (%)	Before Soaking	14.7	15.9	17.1		
	After Soaking	17.7	17.6	20.6		
Moisture Ratio Before Soaking (%)		102.0	102.0	100.0		
Moisture Content after test (%)	Top 30mm	17.1	17.1	21		
	Entire Depth	17.4	17.7	20.6		
Swell after Soaking (%)		1.2	1	2.5		
CBR Value (%)		7.0	5.0	4.5		
Penetration (mm)		2.5	5.0	2.5		

Remarks: +19mm material excluded from test

Approved Signatory.....



Technician: BV

Orlando Mendoza - Laboratory Manager

Unconfined Compressive Strength of Rock Core

Project: GILLIESTON PUBLIC SCHOOL

Client: STANTEC PTY LTD (CARDNO)

Address: LEVEL 9 - THE FORUM, 203 PACIFIC HIGHWAY, ST LEONARDS, NSW 2065

Test Method: RMS T229, T120

Project No.: 32110

Report No.: 23/0187

Report Date: 27/01/23

Page: 1 OF 1

Sampling Procedure: Samples Supplied By Client (Not covered under NATA Scope of Accreditation)

Sample No.	7250D-L/1	7250D-L/2				
Location (BH)	BH 08	BH 25				
Depth (m)	3.43 - 3.57	2.73 - 2.92				
Sample Description	Claystone	Sandstone				
Date Cored	20/12/2022	21/12/2022				
Date Tested	25/01/2023	25/01/2023				
Testing Machine	MAN Industries	MAN Industries				
Sample Diameter (mm)	62.8	63.2				
Sample Height (mm)	85.1	117.3				
L/D Ratio	1.4	1.9				
Sample Conditioning	Tested as Received	Tested as Received				
Test Duration (min:sec)	7.5	7.5				
Failure Description	Tensile Dominated	Double Shear				
Uniaxial Compressive Strength * (MPa)	2.5	13.0				
Initial Moisture Content (%)	N/A	N/A				
Moisture Content as Tested (%)	8.2	7.6				
Dry Density (kg/m ³)	1850	2120				
Storage Conditions	Core Box	Core Box				
Other Comments						

* Where L/D Ratio is less than 2, Uniaxial Compressive Strength has been corrected.

* Where MPa is greater than 50, indicated strength is to be considered its minimum

Remarks:

Technician: BV

Approved Signatory.....



Orlando Mendoza - Laboratory Manager

Unconfined Compressive Strength of Rock Cores

Project: GILLIESTON PUBLIC SCHOOL

Client: STANTEC AUSTRALIA PTY LTD (CARDNO)

Address: Level 9, 203 Pacific Highway, St Leonards

Project No.: 32110

Report No.: 23/0187

Report Date: 27/01/2023

Page: 2 of 2



CERTIFICATE OF ANALYSIS

Work Order	: ES2301736	Page	: 1 of 4
Client	: STS Geotechnics	Laboratory	: Environmental Division Sydney
Contact	: Orlando Mendoza	Contact	: Customer Services ES
Address	: Unit 14/1 Cowpasture Place Wetherill Park 2164	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 32110/7250D-L	Date Samples Received	: 19-Jan-2023 11:15
Order number	: 2023-023	Date Analysis Commenced	: 23-Jan-2023
C-O-C number	: ----	Issue Date	: 27-Jan-2023 12:25
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ED045G: LOR raised for Chloride on sample 5 due to sample matrix.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Excess ANC not required because pH OX less than 6.5.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m³ in-situ soil, multiply reported results x wet bulk density of soil in t/m³.

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S4-BH7-1.0-1.5M	S7-BH12-0.2-0.5M	S9-BH18-0.5-1.0M	S14-BH25-0.9-1.3M	S16-BH26-1.0-1.5M
Sampling date / time				18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00	
Compound	CAS Number	LOR	Unit	ES2301736-001	ES2301736-002	ES2301736-003	ES2301736-004	ES2301736-005	
				Result	Result	Result	Result	Result	
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit	6.0	6.0	5.8	5.9	5.9	
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm	39	28	34	32	30	
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit	4.9	5.3	5.3	5.3	5.1	
pH OX (23B)	----	0.1	pH Unit	4.2	3.8	5.0	4.5	4.2	
EA029-B: Acidity Trail									
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	25	14	12	27	21	
Titrateable Peroxide Acidity (23G)	----	2	mole H+ / t	54	74	30	42	60	
Titrateable Sulfidic Acidity (23H)	----	2	mole H+ / t	29	59	19	14	39	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.020	% pyrite S	0.040	0.023	<0.020	0.044	0.034	
sulfidic - Titrateable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	0.086	0.118	0.049	0.067	0.096	
sulfidic - Titrateable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	0.046	0.095	0.030	0.023	0.063	
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020	
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020	
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020	
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	<10	<10	<10	
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	<0.020	0.065	<0.020	<0.020	<0.020	
Peroxide Calcium (23Wh)	----	0.020	% Ca	<0.020	0.067	<0.020	<0.020	<0.020	
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	<0.020	<0.020	<0.020	<0.020	
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	<10	<10	<10	
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020	
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	0.036	<0.020	0.048	0.038	0.034	
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.040	<0.020	0.049	0.038	0.036	
Acid Reacted Magnesium (23U)	----	0.020	% Mg	<0.020	<0.020	<0.020	<0.020	<0.020	
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	<10	<10	<10	
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020	
EA029-H: Acid Base Accounting									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S4-BH7-1.0-1.5M	S7-BH12-0.2-0.5M	S9-BH18-0.5-1.0M	S14-BH25-0.9-1.3M	S16-BH26-1.0-1.5M
Sampling date / time					18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00	18-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301736-001	ES2301736-002	ES2301736-003	ES2301736-004	ES2301736-005
				Result	Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting - Continued									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		0.04	0.02	<0.02	0.04	0.03
Net Acidity (acidity units)	----	10	mole H+ / t		25	14	12	27	21
Liming Rate	----	1	kg CaCO3/t		2	1	<1	2	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		0.04	0.02	<0.02	0.04	0.03
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		25	14	12	27	21
Liming Rate excluding ANC	----	1	kg CaCO3/t		2	1	<1	2	2
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		7.5	4.7	8.0	7.2	6.8
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		25600	35700	29400	31200	33300
ED040S: Soluble Major Anions									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		40	<10	30	30	30
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		20	<10	10	20	<50

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

- (SOIL) EA029-D: Calcium Values
- (SOIL) EA029-E: Magnesium Values
- (SOIL) EA029-F: Excess Acid Neutralising Capacity
- (SOIL) EA029-H: Acid Base Accounting
- (SOIL) EA029-G: Retained Acidity
- (SOIL) EA029-A: pH Measurements
- (SOIL) EA029-C: Sulfur Trail
- (SOIL) EA029-B: Acidity Trail