# MILTON PUBLIC SCHOOL UPDATE INTRUSIVE GEOTECHNICAL INVESTIGATION REPORT

10 April 2025

Prepared for:
NSW Department of Education (DoE)

Prepared by:
Stantec Australia Pty ltd

Project Number:
305001663

| School Name: | Milton Public School |
|---|---|
| **School ID:** | 2565 |
| **School Address:** | 9 Thomas Street, Milton NSW 2538 |
| **School Region:** | South Coast Region / Shoalhaven |
| **Company Name:** | Stantec Australia Pty Ltd |
| **Report Status:** | Final R2 |
| **Report Date:** | 10 April 2025 |
| **Contract Number:** | DDWO05113/23 |

## Document History

| Version | Effective Date | Description of Revision | Prepared by | Approved by |
|---|---|---|---|---|
| 0 | 30/01/2024 | Draft | TH | LH |
| 1 | 07/02/2025 | Draft | FH | DD |
| 2 | 10/04/2025 | Final | FH | DD |
| 3 | 10/04/2025 | Updated Final | FH | DD |

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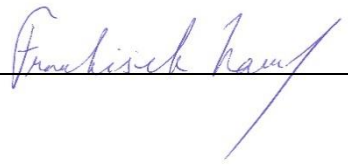
Prepared by 

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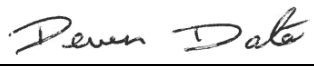
Reviewed/Approved by 

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# Table of Contents

# 1 Introduction

This *Milton Public School Update Intrusive Geotechnical Investigation Report* has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for Milton Public School upgrade (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37 of the T&I SEPP.

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the Addendum Division 5.1 guidelines for schools. The purpose of this report is to summarise potential geohazards presented on the site and present geotechnical recommendations.

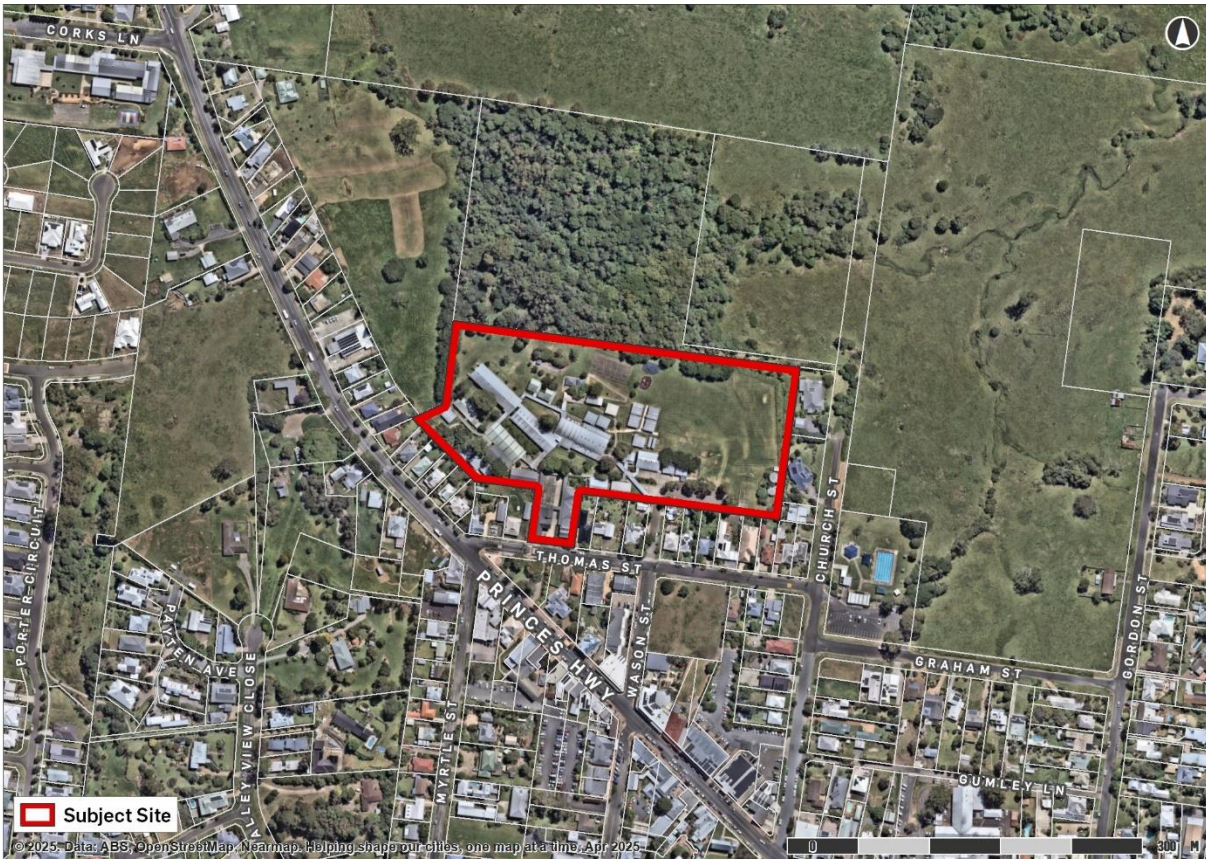
## 1.1 Site Description

The site is located at 9 Thomas Street, Milton, NSW, 2538 (the site). The site is legally referred to as Lot 1 in Deposited Plan 861814 and is within the Shoalhaven Local Government Area (LGA) and has an approximate area of 4 hectares. An aerial photograph of the site is provided at **Figure 1-1**.

The site is zoned SP2 Educational Establishment and existing development comprises various buildings, sports facilities and play space associated with Milton Public School. Milton Public School currently comprises 24 permanent teaching spaces (PTS) and 12 demountable teaching spaces (DTS). The site contains two locally heritage listed buildings (Building A and Q).

The site is predominantly cleared; however, there is existing vegetation interspersed throughout the site and significant trees are present along the northern and western boundary of the site. There is a gradual slope downwards from the south-east to the north-east. of the site.

The site is an irregularly shaped lot with a narrow frontage along Thomas Street. Pedestrian and vehicular access is provided from Thomas Street and from Wason Street. Milton Public School is adjoined by low density residential properties to the south, west and east and Milton Rainforest Reserve is located to the north.




*Source: Urbis, April, 2025*

**Figure 1-1 Aerial Photograph**

## 1.2 Proposed Activity description

The proposed activity relates to upgrades to Milton Public School. Specifically, the proposed activity comprises the following:

> Construction of a new two-storey home base building.

> Installation of additional solar panels.

> Relocation of existing cricket nets to the eastern boundary of site.

> Construction of new stairs and covered walkways linking the new building to the existing school.

> Construction of new fencing.

> Construction of new hardstand area.

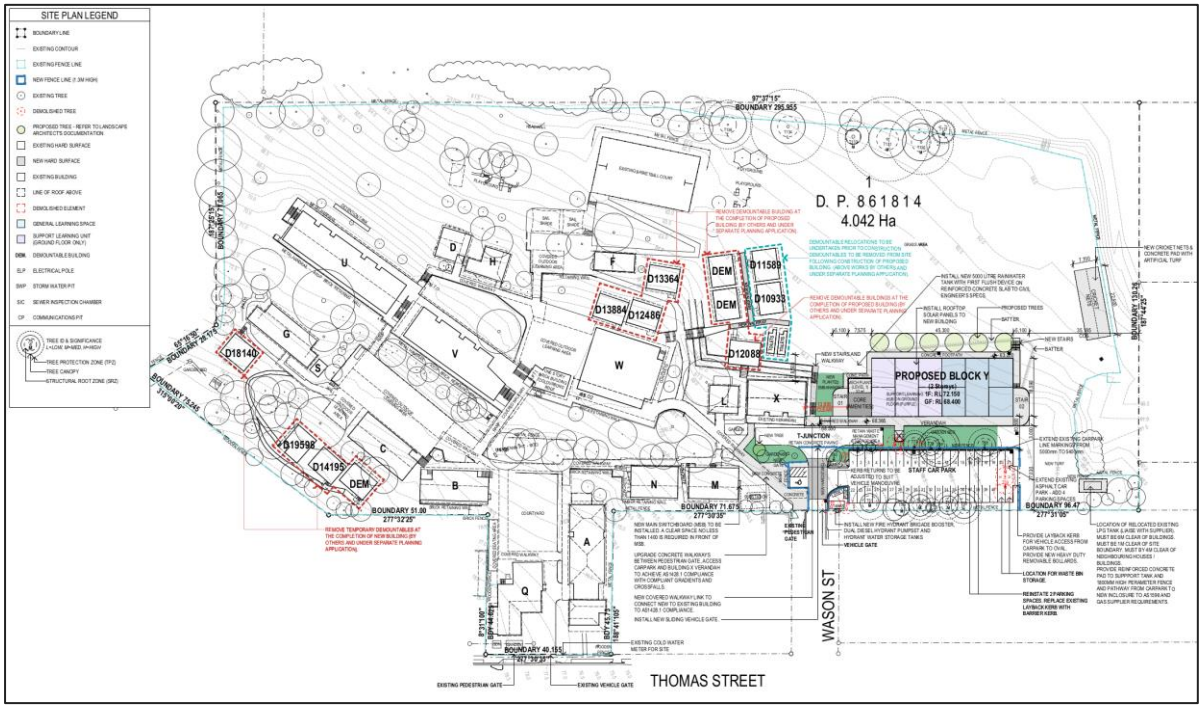
> Minor alterations to the existing staff car park.

> Disconnection and relocation of existing LPG tank.

> Tree removal.

> External landscape works.

Any works relating to demountables or the water tank will proceed via a separate planning pathway.




*Source: Fulton Trotter, 2025*

**Figure 1-2 Site Plan**

# 2 Findings of Investigation

## 2.1 Site Description

The site is located at 9 Thomas Street, Milton, NSW, 2538 (the site), and has an approximate site area of 4ha. The site is legally referred to as Lot 1 in Deposited Plan 861814 and is within the Shoalhaven Local Government Area (LGA). An aerial photograph of the site is provided at Figure 1.

The site is zoned SP2 Educational Establishment and existing development comprises various buildings, sports facilities and play space associated with Milton Public School. Milton Public School currently comprises 24 permanent teaching spaces (PTS) and 12 demountable teaching spaces (DTS). The site contains two local heritage listed buildings (Building A and Q).

The site is predominantly cleared of vegetation; however, there is existing vegetation interspersed throughout the site and significant trees are present along the northern and western boundary of the site. There is a gradual slope downwards from the south-east to the north-east. of the site.

The site is an irregularly shaped lot with a narrow frontage along Thomas Street. Pedestrian and vehicular access is provided to Thomas Street. Milton Public School is surrounded by low density residential properties to the south, west and east whilst Milton Rainforest Reserve is located to the north.

The site is shown in the following **Figure 2-1**, The detailed site layout plan and its surrounds are attached in **Appendix A**.


*Source: Urbis, April, 2025*

## 2.2 Surrounding Land Use

The land uses immediately surrounding the site were identified using aerial imagery and land zoning information from the local council, as summarized below in **Table 2-1**. Details of the site and surrounding land uses are shown in **Appendix A**.

**Table 2-1 Surrounding Land Use**

| Direction | Land Zoning | Land Use or Activity |
|---|---|---|
| North | RE1 (Public Recreation)<br>RU1 (Primary Production) | Milton Rainforest Reserve. |
| East | R2 (Low-Density Residential) | Residential dwellings. |
| South | RE1 (Public Recreation)<br>R1 (General Residential)<br>R2 (Low-Density Residential)<br>SP2 (Infrastructure) | Comprise residential dwellings, public recreation areas, infrastructure administration building carpark and retails. |

| Direction | Land Zoning | Land Use or Activity |
|---|---|---|
| | E1(Local Centre) | |
| West | R2 (Low-Density Residential) | Residential dwellings. |

## 2.3 Regional and Site Settings

Site setting information, as listed within publicly available data sets, is summarised in Error! Reference source not found.**-2**.

**Table 2-2 Site Setting Information**

| ITEMS | DETAILS |
|---|---|
| Regional Soil Landscape | A review of soil data from Minview, 2023 indicated that the site is underlain with Brown Podzolic Soils. Information obtained from, Britannica 2023, suggests that podzolic soils are characterised by moderate leaching, an accumulation of iron and clay content, a higher content of humic acid, and are shallow, occurring at less than 50cm from the surface. |
| Regional Geology | In reference to the Shoalhaven 1:100,000 coastal quaternary geological map, the site geology is identified as being underlain by Milton Mesozoic formations of Monzonite (MZ__m). This is described as porphyritic monzonite with phenocrysts of glassy plagioclase in a black fine-grained (and sporadically sub-aphanitic) matrix; variable to a monzonite porphyry; weathers to a light colour; small zones of olivine basalt dyke material. Refer to **Appendix C** Geological Map. |
| Regional Groundwater | The Lotsearch report (LS046788 EP) with data sourced from National Groundwater Information System (NGIS) and WaterNSW identified that there are five (5) bores within 2 km of the Site. No standing Groundwater Level (SWL) data are made available from the installed groundwater boreholes. |
| Surface Water Bodies | An unnamed drainage channel is located approximately 80 metres north of the site, which flows in an easterly direction and ultimately the catchment discharges to Narrawallee Creek, located approximately 2km northeast. It is inferred that surface water originating at the site, and potentially groundwater, would flow in a north-to-north easterly direction. |
| Acid Sulphate Soils | The site is classified as Class 5 ASS in accordance with Shoalhaven Local Environmental Plan 2014, described as,<br><br>- Class 5: Acid sulphate soils are not typically found in Class 5 areas. Areas classified as Class 5 are located within 500 meters on adjacent Class 1,2,3 or 4 land.<br><br>Furthermore, data presented by Lotsearch indicates that the site is within an area of low probability of acid sulphate soil occurrence, described as,<br>- Class B: Low Probability of occurrence. 6-70% chance of occurrence.<br>Refer to **Appendix D** Acid Sulfate Map<br><br>Based on soils encountered and analysed as part of the contamination investigation (Stantec, 2024), soils assessed as part of the investigation are not considered to be potential or actual acid sulphate soils based on laboratory analysis and desktop review of available data. Therefore, an Acid Sulphate Soil Management Plan (ASSMP) is not applicable. |

| ITEMS | DETAILS |
|---|---|
| | |
| Salinity | > No Dryland Salinity – National Assessment data on-site available. |

## 2.4 Geology

An assessment of the regional geology has been undertaken through review of MinView spatial geology website (NSW Department of Planning, Industry and Environment, 2023) which indicated the site is underlain by the following geological units as shown in Error! Reference source not found. below.

- Puim – Milton Monzonite – Porphyritic monzonite with phenocrysts of glassy plagioclase in a black fine-grained matrix; variable to monzonite-porphyry; weather to a light colour; small zones of olivine basalt dyke material.
- Pshs – Snapper Point Formation – fine to medium grained sandstone, pebbly sandstone and polymictic pebble conglomerate, medium to coarse grained sandstone with lithic pebbles and fragments, minor siltstone.
- Q_avf – Alluvial fan deposits – Fluvially-deposited quartz-lithic sand, silt, gravel and clay.


**Figure 2-2 Regional Geology**

# 3 Investigation Findings

## 3.1 Borehole Locations

The ground coordinates of the test locations were picked up by authorized surveyor nominated by the client. The coordinates of the location are reference to GDA2020 MGA, Zone 56, and are displayed below in **Table 3-1**.

**Table 3-1 Borehole Locations**

| ID | Easting | Northing (m) |
|---|---|---|
| BH01 | 266953.9645 | 6089066.7786 |
| BH02 | 266968.0615 | 6089067.9533 |
| BH03 | 266964.2290 | 6089076.7698 |
| BH04 | 266948.2466 | 6089077.6509 |
| BH05 | 266972.9544 | 6089080.0416 |

## 3.2 Fieldwork Activities

Fieldwork for the geotechnical investigation was carried out 28th November 2023 and comprised the following:

- Drilling of five (5) boreholes (BH01 to BH05) to depths ranging from 0.80m to 4.10m below ground level (mbgl). Drilling was carried out using a track mounted drill rig using solid flight augers with Tungsten Carbide (TC) bit.
- Standard Penetration Tests (SPTs) were conducted at nominal 1.50m intervals in conjunction with auger drilling at the borehole locations to assess the in-situ strength characteristics of the encountered materials and to allow sample retrieval for laboratory testing.
- Dynamic Cone Penetrometer (DCP) testing conducted from surface at borehole locations to a maximum 1.25m depth bgl, to assist with the assessment of the in-situ soil strength conditions at each borehole location.
- Logging of encountered subsurface conditions for all BHs was carried out in accordance with AS1726 – Geotechnical Site Investigation (Standards Australia Limited, 2017) by a geotechnical engineer from Stantec.
- Sampling of soil samples for material classification purposes.
- Backfilling of boreholes using with auger cuttings. The soils were compacted with back auger rotation and crowbar and returned to original surface level.

A site plan with borehole locations is provided in Error! Reference source not found.**.** Engineering logs of the boreholes are presented in **Error! Reference source not found.** together with explanatory notes.

## 3.3 Sub-Surface Conditions

Based on the observations from the geotechnical investigation, the sub surface profile within the footprint of the proposed development can be generalised in the following soil units shown in **Table 3-2** and Subsurface conditions encountered are summarised in Table 3-3 and detailed in engineering borehole logs attached in **Appendix B** together with explanatory notes.

**Table 3-3 Table 3-2 Summary of Sub-Surface Units**

| Unit | Material Type | Description of Layer |
|---|---|---|
| 1 | TOPSOIL | **Sandy CLAY:** low plasticity, brown, fine to coarse grained sand, trace roots. |
| 2 | FILL | **Sandy CLAY:** medium to high plasticity clay, brown to dark brown, fine to coarse grained sand, trace fine gravel, trace roots. |
| 3a | RESIDUAL | **Gravelly CLAY / Sandy CLAY:** low to high plasticity clay, grey to yellow-brown to brown, fine to coarse gravel, fine to coarse grained sand, trace low plasticity silt |
| 4a | EXTREMELY WEATHERED | **Extremely weathered Monzonite recovered as Gravelly SAND and Clayey SAND:** fine to coarse grained sand, yellow-brown, fine to coarse, sub-rounded to sub-angular gravel, low plasticity clay, trace roots. |
| 4b | EXTREMELY WEATHERED | **Extremely weathered Monzonite recovered as Sandy CLAY:** low to medium plasticity clay, yellow-brown to dark brown, fine to coarse grained sand. |

Subsurface conditions encountered are summarised in **Table 3-3** and detailed in engineering borehole logs attached in **Appendix B** together with explanatory notes.

**Table 3-3 Summary of Sub-Surface material encountered m below ground level**

| BH ID | Topsoil | Fill | Residual Clay | XW Sand | XW Clay | GW Seepage | TD |
|---|---|---|---|---|---|---|---|
| BH01 | 0.00 | - | 0.15 | - | - | NE | 0.80 |
| BH02 | 0.00 | 0.20 | 0.50 | 1.20 | - | NE | 2.20 |
| BH03 | 0.00 | 0.20 | 0.50 | 1.20 | - | NE | 2.50 |
| BH04 | 0.00 | 0.20 | 0.50 | - | 2.50 | NE | 4.10 |
| BH05 | 0.00 | - | - | 0.30 | 1.60 | NE | 3.40 |

Notes:
i) TD = Termination Depth
ii) NE = Not Encountered
iii) XW = Extremely Weathered
iv) GW = Groundwater

## 3.4 Groundwater

Groundwater standing level or seepage was not encountered in any of the boreholes at the time of investigation. 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 bulk earthworks will not intersect with the groundwater table.

## 3.5 Lab Test Results

Laboratory testing conducted on strategically selected samples recovered during the fieldwork comprised the following:

- Two (2) Moisture Content tests.
- Two (2) Atterberg & Linear Shrinkage tests.
- Two (2) Particle Size Distribution tests.
- Two (2) Emerson Classification tests.

Testing was performed by NATA-accredited laboratories Australian Soil and Concrete Testing (ASCT) Illawarra laboratory. Laboratory test report sheets and certificates are included in **Error! Reference source not found.**.

### 3.5.1 FIELD MOISTURE CONTENT

Moisture content tests were scheduled on selected samples. The results are summarised in **Table 3-4** below.

**Table 3-4 Field Moisture**

| Borehole No | Depth (m) | Material Description | Field Moisture Content (%) |
|---|---|---|---|
| BH03 | 0.50-1.00 | Sandy CLAY: high plasticity, brown to dark brown, fine to coarse grained sand, trace fine gravel, trace roots. | 18.8 |
| BH05 | 0.50-1.00 | Clayey SAND: fine to coarse grained, pale brown, low plasticity clay, trace fine gravel. | 8.2 |

### 3.5.2 ATTERBERG LIMIT TEST RESULTS

Atterberg Limits tests were scheduled on selected samples. The results are summarised in **Table 3-5** below.

Table 3-5 Atterberg Limits Test Results

| Borehole No | Depth (m) | Material Description | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) |
|---|---|---|---|---|---|
| BH03 | 0.50-1.00 | Sandy CLAY: high plasticity, brown to dark brown, fine to coarse grained sand, trace fine gravel, trace roots. | 54 | 25 | 29 |
| BH05 | 0.50-1.00 | Clayey SAND: fine to coarse grained, pale brown, low plasticity clay, trace fine gravel. | 31 | 18 | 13 |

### 3.5.3 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 3-6** below.

Table 3-6 Particle Size Distribution and Emerson Crumb Test Results

| Borehole No | Depth (m) | Material Description | Gravels (%) | Sand (%) | Fines (Silt & Clay (%) | Emerson Class |
|---|---|---|---|---|---|---|
| BH02 | 0.50-1.00 | Sandy CLAY | - | - | - | 5 |
| BH03 | 0.50-1.00 | Sandy CLAY | 4 | 46 | 50 | - |
| BH04 | 0.50-1.00 | Sandy CLAY | - | - | - | 5 |
| BH05 | 0.50-1.00 | Clayey SAND | 8 | 72 | 20 | - |

# 4 Geotechnical Comments

## 4.1 Excavation and Earthwork

Following available information, we believe that excavation will be limited to the general levelling for proposed relocation of demountables, new school buildings and landscaping. It is expected that mainly soil will be encountered during all earthworks. Very low to low strength rock can be expected which are underlying the residual soils and can be encountered during earthworks.

Prior to bulk earthworks, the site shall be cleared of any foreign matter or unsuitable material which includes but may not be limited to the following:

- Vegetation or organic matter including root balls of any larger trees onsite;
- Topsoil or soil significantly affected by roots or root fibres;

- Any scattered waste or dumped materials;
- Uncontrolled filling which may be subject to further assessment;
- Loose or low strength (soft to firm) soils or otherwise 'unsuitable' soils; or
- Expansive soils.

Excavation of soil and very low to low strength rock can 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".

## 4.2 Subgrade Preparation

The following site preparation measures are recommended:

- Remove all topsoil, fill and deleterious materials (including roots/vegetation);
- Proof roll testing to be carried out using a minimum 12 tonne roller and compact the exposed subgrade to at least 98% Standard Maximum Dry Density (SMDD) at +/- 2% Optimum Moisture Content (OMC).
- Should isolated soft/loose areas be encountered during this process, this material should be removed and replaced with suitable granular structural fill. Structural fill could comprise a select well graded granular material such as processed sandstone and road-base (DGB20).
- Backfill excavation with approved structural fill in 150mm layers to a standard compaction of at least 98%.
- 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.

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.

## 4.3 Site Classification

It is considered that the subsurface conditions comprise topsoil overlying fill, residual clay/sand and extremely weathered Monzonite. Based on the geotechnical sub-surface logs and laboratory testing, it is expected the site classification of "Class S" be adopted (if applicable) for footings constructed in accordance with AS2870-2011. For this project, Atterberg limits results were used to estimate the Iss based on published data.

As shown in **Table 3-5**, liquid limits resulted in the range of 31% to 54%, which was estimated to be 0.9 to 2.5% Iss. Taking into consideration of these Iss values, the site can be classified as slightly reactive clay site (Class 'S'), which may experience only slight ground movement from moisture changes with a characteristic surface movement up to 20mm.

## 4.4 Temporary Cuts

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.

Where open cuts are required as part of temporary works during ground support. Recommendations for temporary unsupported cuts and batters (if required) are presented below in **Table 4-1.**

**Table 4-1 Cut / Batter Recommendations**

| Geotechnical profile | Temporary Batter (Horizontal to Vertical Ratio) |
|---|---|
| Fill | 2.5H:1V |
| Residual Soil | 1.5H:1V |

Notes:

i) Table 4-1 applies to temporary unsupported cut batters only, for a period of no greater than 3 months once constructed
ii) 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.
iii) Excavations in soil have assumed no groundwater table has been encountered;
iv) The ground surface at the crest of the excavation is horizontal;
v) There is no surcharge at the crest of the excavation for a distance equal to the depth of the excavation;
vi) All cuts are protected from erosion.

## 4.5 Geotechnical Parameters

Geotechnical soil parameters and rock mass classifications are provided below and are based on a combination of the subsurface data and laboratory tests conducted. The geotechnical parameters provided are inferred and presented to assist with geotechnical design.

### 4.5.1 GEOTECHNICAL SOIL PARAMETERS

Geotechnical soil parameters for both cohesive and non-cohesive soils encountered on site have been provided below in **Table 4-2** and **Table 4-3**, respectively. No geotechnical parameters have been assigned to topsoil and manmade fill layers due to the potential variability. All topsoil and manmade fill layers are recommended to be considered soft for cohesive soils, and loose for granular soils.

**Table 4-2 Cohesive Soil Parameters**

| Unit | Material | Cu (kPa) | Unit Weight (kN/ m³) | C' (kPa) | ϕ' (°) | Poisson's Ratio | E' (MPa) |
|---|---|---|---|---|---|---|---|
| 1/2 | T / F - CLAY | - | 17 | - | - | - | - |
| 3 | RS – Firm CLAY | 25 | 18 | 2 | 22 | 0.30 | 2 |
| 3 | RS – Stiff CLAY | 50 | 19 | 5 | 24 | 0.30 | 4 |
| 3 | RS – Very Stiff CLAY | 100 | 20 | 10 | 26 | 0.30 | 8 |
| 3/4b | RS / XW – Hard CLAY | 200 | 21 | 20 | 27 | 0.30 | 15 |

Notes:
i) Cu = undrained shear strength in kPa
ii) c' = cohesion of soil in kPa
iii) ϕ' = friction angle of soil in degrees
iv) E = elastic modulus of soil in MPa

**Table 4-3 Non-Cohesive Soil Parameters**

| Unit | Material | Unit Weight ((kN/ m³) | C' (kPa) | ϕ' (°) | Poisson's Ratio | E' (MPa) |
|---|---|---|---|---|---|---|
| 1/2 | T / F - SAND | 16 | - | - | - | - |
| 3/4a | RS / XW – Medium Dense SAND | 17 | - | 30 | 0.30 | 10 |
| 4a | XW – Dense SAND | 18 | - | 34 | 0.30 | 40 |
| 4a | XW – Very Dense SAND | 20 | - | 37 | 0.30 | 80 |

Notes:
v) T = Topsoil
vi) F = Fill
vii) RS = Residual Soil
viii) XW = Extremely Weathered

## 4.6 Expected Structural Foundations

Foundation options for the proposed development can be both shallow and or deep foundations, depending on the subsurface materials encountered and structural loads. Parameters for both shallow and deep footing system options are provided below.

### 4.6.1 SHALLOW / PAD FOOTINGS

Due to the unknown loads and footing systems, no specified allowable bearing capacities can be determined at this time and all values presented below are just preliminary. Once specific loadings have been ascertained, Stantec can assist to optimise the footing size and depth to suit the loading

on the founding material. Bearing capacity of footings in soil needs to be subjected to geotechnical checking considering footing size, depth, slope (ground surface and/or footing base) and loadings (i.e. bearing capacity is not a soil property but is dependent of footing size, depth, slope and loadings). A footing subjected to pull out forces should be further geotechnical assessment in addition to bearing capacity, overturning and sliding.

Conventional shallow footings designed in accordance with engineering principles and nominally embedded 0.5m into the design founding material, may be proportioned on the following allowable end-bearing pressures, summarised in **Table 4-4** and **Table 4-5** below.

**Table 4-4 Allowable End Bearing Pressures – Cohesive Soils**

| Founding Material | Area ($m^2$) | Allowable Bearing Capacity (kPa) |
|---|---|---|
| CLAY – Soft | 1 x 1 | 35 |
| CLAY – Firm | 1 x 1 | 75 |
| CLAY – Stiff | 1 x 1 | 150 |
| CLAY – Very Stiff to Hard or better | 1 x 1 | 250 |

Note:
1. Ultimate bearing capacity tabulated above assuming eccentricity of 1/6 x footing width.
2. Horizontal ground is assumed
3. The settlement for shallow footings depends upon the loading conditions, footing size and foundation material, but it should be less than 1% of the footing width if proportioned on the basis of above parameters.
4. A minimum geotechnical strength reduction factor Øg of 0.4 can be applied for the allowable design values.

**Table 4-5 Allowable End Bearing Pressures - Non-Cohesive Soils**

| Founding Material | Area ($m^2$) | Allowable Bearing Capacity (kPa) |
|---|---|---|
| SAND – Loose | 1 x 1 | 75 |
| SAND – Medium Dense | 1 x 1 | 125 |
| SAND – Dense | 1 x 1 | 250 |
| SAND – Very Dense | 1 x 1 | 400 |

## 4.7 Groundwater

It is anticipated that groundwater will most likely not be encountered during construction. If groundwater is encountered, it will most likely be associated with seepage flows along the interface of the residual sand/clay, 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 development earthwork will not intersect with the groundwater table.

# 5 Mitigation Measures

The following mitigation measure are proposed on the site, subject to detailed geotechnical design.

**Table 5-1 Mitigation Measures**

| Project Stage* | Mitigation Measures | Reason for Mitigation Measures | Section of Report |
|---|---|---|---|
| C | Prior to bulk earthworks, the site shall be cleared of any foreign matter or unsuitable material. | To reduce the risks differential settlement and/or failures. | Section 4.1 |
| C | Proof roll testing to be carried out using a minimum 12 tonne roller and compact the exposed subgrade to at least 98% Standard Maximum Dry Density (SMDD) at +/- 2% Optimum Moisture Content (OMC). | To reduce the risks differential settlement and/or failures. | Section 4.2 |
| C | Should isolated soft/loose areas be encountered during this process, this material is required to be removed and replaced with suitable granular structural fill. Structural fill may comprise a select well graded granular material such as processed sandstone and road-base (DGB20) | To reduce the risks differential settlement and/or failures. | Section 4.2 |
| C | Backfill excavation with approved structural fill in 150mm layers to a standard compaction of at least 98%. | To reduce the risks differential settlement and/or failures. | Section 4.2 |
| C | Surface drainage must be maintained at all times by adopting appropriate cross-falls across the site. Surface drainage must be installed as soon as is practicable in order to capture and remove surface flows to prevent erosion and softening of the exposed surface | To reduce the risks differential settlement and/or failures. | Section 4.2 |
| D, C | Design and construction of temporary and batter cuts should follow recommendations presented in Table 9. | To prevent stability of the batter cuts. | Section 4.4 |
| D | Foundation options for the proposed development can be both shallow and or deep foundations, depending on the subsurface materials encountered and structural loads, subject to detail design. | To reduce the risks differential settlement and/or failures. | Section 4.6 |

**Note: Project stages include:*

- *(D) Design*
- *(C) Construction*
- *(O) Operation*

# 6 Conclusion and evaluation of environmental impact

Based on our Intrusive Geotechnical Investigation, we conclude with the following:

- The extent and nature of potential impacts are low and will not have significant impact on the locality, community and/or the environment.

- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment

# 7 Limitations

Milton Public School Updated - Geotechnical Investigation Report for the purpose and objectives and scope identified in this report.

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.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Stantec for incomplete or inaccurate data supplied by others.
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# Appendix A Boreholes

Stantec

# BOREHOLE LOG SHEET

**Client:** Schools Infrastructure NSW
**Project:** Schools Infrastructure NSW
**Location:** Milton High School

## Hole No: BH01

**Job No:** 304100928 **Sheet:** 1 of 1

**Position:** **Angle from Horizontal:** 90° **Surface Elevation:**
**Rig Type:** Track Mounted Drill Rig **Mounting:** Track **Driller:** MATT
**Casing Diameter:** NA **Contractor:** Stratacore
**Data Started:** 28/11/23 **Date Completed:** 28/11/23 **Logged By:** SA **Checked By:** TH

| Drilling | | | Water | Sampling & Testing | | Depth (m) | Material Description | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Resistance | Casing | | Sample or Field Test | DCP (blows per 100 mm) 1 3 6 12 | | Graphic Log | Classification | SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure | Moisture Condition | Consistency Relative Density | STRUCTURE & Other Observations |
| AD/T | F | NA | Not Encountered | | | 0 | | | Sandy CLAY: low plasticity, brown, fine to coarse grained sand, trace roots | M (>PL) | | TOPSOIL |
| | | | | | | | | | 0.15m | | | |
| | | | | | | | | | Gravelly CLAY: low plasticity, grey, fine to coarse gravel, trace low plasticity silt, with roots | | VSt | RESIDUAL SOIL |
| | | | | | | 0.5 | | CL | | M (<PL) | | |
| | H | | | | | | | | | | H | |
| | | | | | R/30mm | | | | 0.80m | | | |
| | | | | | | | | | TERMINATED AT 0.80 m Refusal | | | |
| | | | | | | 1.0 | | | | | | |
| | | | | | | 1.5 | | | | | | |
| | | | | | | 2.0 | | | | | | |
| | | | | | | 2.5 | | | | | | |
| | | | | | | 3.0 | | | | | | |
| | | | | | | 3.5 | | | | | | |

**METHOD**
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

**PENETRATION**
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

**WATER**
Water Level on Date shown
water inflow
water outflow

**FIELD TESTS**
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

**SAMPLES**
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

**MOISTURE**
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
*w* - Moisture content

**SOIL CONSISTENCY**
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

**RELATIVE DENSITY**
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec Australia PTY LTD

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# BOREHOLE LOG SHEET

**Client:** Schools Infrastructure NSW
**Project:** Schools Infrastructure NSW
**Location:** Milton High School

## Hole No: BH02

**Job No:** 304100928 **Sheet:** 1 of 1

**Position:** **Angle from Horizontal:** 90° **Surface Elevation:**
**Rig Type:** Track Mounted Drill Rig **Mounting:** Track **Driller:** MATT
**Casing Diameter:** NA **Contractor:** Stratacore
**Data Started:** 28/11/23 **Date Completed:** 28/11/23 **Logged By:** SA **Checked By:** TH

| Drilling | | | Water | Sampling & Testing | | Depth (m) | Material Description | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Resistance | Casing | | Sample or Field Test | DCP (blows per 100 mm) 1 3 6 12 | | Graphic Log | Classification | SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure | Moisture Condition | Consistency Relative Density | STRUCTURE & Other Observations |
| AD/T | E | NA | Not Encountered | | | 0 | | | Sandy CLAY: low to medium plasticity, brown, fine to coarse grained sand, trace roots | M (>PL) | | TOPSOIL |
| | | | | | | | | | 0.20m | | | |
| | | | | | | | | | FILL: Sandy CLAY: medium plasticity, brown, fine to coarse grained sand | M (>PL) | | FILL |
| | | | | | | 0.5 | | | 0.50m | | | |
| | F-H | | | | | | | | Sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand | M (<PL) | VSt | RESIDUAL SOIL |
| | | | | | | 1.0 | | CI | | | | |
| | | | | | | | | | 1.20m | | | |
| | F | | | SPT 1.50 - 1.68 m 2, 25/25mm HB N=R | R/50mm | 1.5 | | SC | Gravelly SAND: fine to coarse grained, yellow-brown, fine to coarse, sub-rounded to sub-angular gravel, with low plasticity clay, trace roots | M | H/D | EXTREMELY WEATHERED |
| | H | | | | | 2.0 | | | | | | |
| | VH | | | | | | | | 2.20m | | | |
| | | | | | | | | | TERMINATED AT 2.20 m Refusal | | | |
| | | | | | | 2.5 | | | | | | |
| | | | | | | 3.0 | | | | | | |
| | | | | | | 3.5 | | | | | | |

**METHOD**
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

**PENETRATION**
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

**WATER**
Water Level on Date shown
water inflow
water outflow

**FIELD TESTS**
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

**SAMPLES**
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

**MOISTURE**
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
*w* - Moisture content

**SOIL CONSISTENCY**
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

**RELATIVE DENSITY**
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec Australia PTY LTD

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# BOREHOLE LOG SHEET

**Client:** Schools Infrastructure NSW
**Project:** Schools Infrastructure NSW
**Location:** Milton High School

## Hole No: BH03

**Job No:** 304100928 **Sheet:** 1 of 1

**Position:** **Angle from Horizontal:** 90° **Surface Elevation:**
**Rig Type:** Track Mounted Drill Rig **Mounting:** Track **Driller:** MATT
**Casing Diameter:** NA **Contractor:** Stratacore
**Data Started:** 28/11/23 **Date Completed:** 28/11/23 **Logged By:** SA **Checked By:** TH

| Drilling | | | | Sampling & Testing | | Depth (m) | Material Description | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Resistance | Casing | Water | Sample or Field Test | DCP (blows per 100 mm) 1 3 6 12 | | Graphic Log | Classification | SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure | Moisture Condition | Consistency Relative Density | STRUCTURE & Other Observations |
| AD/T | E | NA | Not Encountered | | | 0 | | | Sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace roots | M (>PL) | | TOPSOIL |
| | | | | | | | | | 0.20m | | | |
| | | | | | | | | | FILL: Sandy CLAY: medium to high plasticity, brown to dark brown, fine to coarse grained sand, trace fine gravel, trace roots | M (>PL) | | FILL |
| | | | | | | 0.5 | | | 0.50m | | | |
| | F | | | | | | | CH | Sandy CLAY: high plasticity, brown to dark brown, fine to coarse grained sand, trace fine gravel, trace roots | M (>PL) | VSt | RESIDUAL SOIL |
| | | | | | | 1.0 | | | | M (<PL) | H | |
| | | | | | R/50mm | | | | 1.20m | | | |
| | | | | | | 1.5 | | SC | Gravelly SAND: fine to coarse grained, yellow-brown, fine to coarse, sub-rounded to sub-angular gravel, with low plasticity clay | M | VD | EXTREMELY WEATHERED |
| | H | | | | | 2.0 | | | | | | |
| | E | | | | | | | | | | | |
| | VH | | | | | 2.5 | | | 2.50m | | | |
| | | | | | | | | | TERMINATED AT 2.50 m Refusal | | | |
| | | | | | | 3.0 | | | | | | |
| | | | | | | 3.5 | | | | | | |

**METHOD**
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

**PENETRATION**
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

**WATER**
Water Level on Date shown
water inflow
water outflow

**FIELD TESTS**
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

**SAMPLES**
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

**MOISTURE**
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
*w* - Moisture content

**SOIL CONSISTENCY**
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

**RELATIVE DENSITY**
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec Australia PTY LTD

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# BOREHOLE LOG SHEET

**Client:** Schools Infrastructure NSW
**Project:** Schools Infrastructure NSW
**Location:** Milton High School

## Hole No: BH04

**Job No:** 304100928 **Sheet:** 1 of 1

**Position:** **Angle from Horizontal:** 90° **Surface Elevation:**
**Rig Type:** Track Mounted Drill Rig **Mounting:** Track **Driller:** MATT
**Casing Diameter:** NA **Contractor:** Stratacore
**Data Started:** 28/11/23 **Date Completed:** 28/11/23 **Logged By:** SA **Checked By:** TH

| Drilling | | | Water | Sampling & Testing | | Depth (m) | Material Description | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Resistance | Casing | | Sample or Field Test | DCP (blows per 100 mm) 1 3 6 12 | | Graphic Log | Classification | SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure | Moisture Condition | Consistency Relative Density | STRUCTURE & Other Observations |
| AD/T | E | NA | Not Encountered | | | 0.5 | | | Sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace roots | M (>PL) | | TOPSOIL |
| | | | | | | | | | 0.20m<br>FILL: Sandy CLAY: medium plasticity, brown, fine to coarse grained sand | M (>PL) | | FILL |
| | | | | B 0.50 - 1.00 m | | | | | 0.50m<br>Sandy CLAY: medium plasticity, yellow-brown, fine to coarse grained sand, with fine to medium, sub-rounded gravel | M (>PL) | St | RESIDUAL SOIL |
| | F | | | | R | 1.0 | | | | | VSt | |
| | | | | SPT 1.50 - 1.95 m<br>5, 11, 17 N=28 | | 1.5 | | Cl | | M (<PL) | | |
| | F-H | | | | | 2.0 | | | | | | |
| | | | | | | 2.5 | | | 2.50m<br>Gravelly Sandy CLAY: low plasticity, yellow-brown to orange-brown, fine to coarse grained sand, fine to coarse gravel | | H | EXTREMELY WEATHERED |
| | | | | | | | | CL | | M (<PL) | | |
| | | | | SPT 3.00 - 3.30 m<br>15, 19 HB N=R | | 3.0 | | | 3.00m<br>Sandy CLAY: medium plasticity, pale brown, fine to coarse grained sand | | | |
| | | | | | | | | Cl | | M (<PL) | | |
| | H | | | | | 3.5 | | | 3.50m<br>Sandy CLAY: low plasticity, yellow-brown to grey-brown, fine to coarse grained sand, with fine to coarse grained sand | | | |
| | | | | | | | | CL | | M (<PL) | | |
| | VH | | | | | 4.0 | | | 4.10m | | | |
| | | | | | | | | | TERMINATED AT 4.10 m<br>Refusal | | | |
| | | | | | | 4.5 | | | | | | |

**METHOD**
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

**PENETRATION**
VE Very Easy (No Resistance)
E Easy
F Firm
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VH Very Hard (Refusal)

**WATER**
Water Level on Date shown
water inflow
water outflow

**FIELD TESTS**
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MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

**SAMPLES**
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

**MOISTURE**
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
*w* - Moisture content

**SOIL CONSISTENCY**
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

**RELATIVE DENSITY**
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec Australia PTY LTD

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# BOREHOLE LOG SHEET

**Client:** Schools Infrastructure NSW
**Project:** Schools Infrastructure NSW
**Location:** Milton High School

# Hole No: BH05

**Job No:** 304100928 **Sheet:** 1 of 1

**Position:** **Angle from Horizontal:** 90° **Surface Elevation:**
**Rig Type:** Track Mounted Drill Rig **Mounting:** Track **Driller:** MATT
**Casing Diameter:** NA **Contractor:** Stratacore
**Data Started:** 28/11/23 **Date Completed:** 28/11/23 **Logged By:** SA **Checked By:** TH

| Drilling | | | Water | Sampling & Testing | | Depth (m) | Material Description | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Resistance | Casing | | Sample or Field Test | DCP (blows per 100 mm) 1 3 6 12 | | Graphic Log | Classification | SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure | Moisture Condition | Consistency Relative Density | STRUCTURE & Other Observations |
| AD/T | E | NA | Not Encountered | | R | 0.5 | | | Sandy CLAY: medium plasticity, brown to dark brown, fine to coarse grained sand | M (>PL) | | TOPSOIL |
| | | | | | | | | | 0.30m | | | EXTREMELY WEATHERED |
| | | | | | | 1.0 | | SC | Clayey SAND: fine to coarse grained, pale brown, low plasticity clay, trace fine gravel | D | D | |
| | | | | SPT 1.50 - 1.80 m 8, 20 N=R | | 1.5 | | | | | | |
| | F | | | | | 2.0 | | CL | 1.60m Sandy CLAY: low plasticity, yellow-brown, fine to coarse grained sand | M (<PL) | | |
| | | | | | | 2.5 | | | 2.50m | | H | |
| | | | | SPT 3.00 - 3.30 m 4, 25 HB N=R | | 3.0 | | CI | Sandy CLAY: medium plasticity, brown to dark brown, fine to coarse grained sand | M (<PL) | | |
| | VH | | | | | | | | 3.40m | | | |
| | | | | | | 3.5 | | | TERMINATED AT 3.40 m Refusal | | | |

**METHOD**
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

**PENETRATION**
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

**WATER**
Water Level on Date shown
water inflow
water outflow

**FIELD TESTS**
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PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

**SAMPLES**
B - Bulk disturbed sample
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**MOISTURE**
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PL - Plastic limit
LL - Liquid limit
*w* - Moisture content

**SOIL CONSISTENCY**
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

**RELATIVE DENSITY**
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec Australia PTY LTD

# Appendix B Test Results

**ASCT Illawarra**
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: +61 (02) 4256 1684
E-Mail: illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

# Report on Moisture Content, Emerson Class, Soil pH, EC, PASS/AASS and Foreign Material

| | | | |
|---|---|---|---|
| Client: | Stantec Australia Pty Ltd | Report No: | **1292-EC** |
| Client Address: | 16 Burelli St, Wollongong NSW 2500 | Report Date: | 7/12/2023 |
| Project: | Geotechnical Testing | Report Page: | Page 1 of 1 |
| Works Component: | Milton | Project No: | 26 |
| Material Used: | Insitu | Test Request/Order: | 304100928 |
| Material Description: | - | Lot Number: | - |
| Lot Boundaries: | Chainage - to -. Offsets - to -. | ITP/PCP Number: | - |
| Lab Test Date/s: | Laboratory testing 06/12/2023 | Control Line: | BH02 |

| **Sample Number:** | | **18224** | **18226** | **-** | **-** | **-** |
|---|---|---|---|---|---|---|
| Field Sample/Test Date: | | 28/11/2023 | 28/11/2023 | - | - | - |
| Chainage / Location: | (m) | - | - | - | - | - |
| Offset from control line: | (m) | - | - | - | - | - |
| Level of Test: | (m) | BH02 | BH04 | - | - | - |
| Test Depth: | (mm) | 0.5-1.0m | 0.5-1.0m | - | - | - |
| Lab Test Date (Moisture): | | - | - | - | - | - |
| **Moisture Content:** | **(%)** | **-** | **-** | **-** | **-** | **-** |
| Test Water Used: | | Distilled | Distilled | - | - | - |
| Temperature of Water: | (°C) | 22 | 22 | - | - | - |
| Soil Description: | | - | - | - | - | - |
| **Emerson Class Number:** | | **CLASS 5** | **CLASS 5** | **-** | **-** | **-** |
| Soil Moisture Condition: | | - | - | - | - | - |
| Distilled Water: | **(pH)** | - | - | - | - | - |
| Soil Suspension Ratio (Soil:Water) | | - | - | - | - | - |
| Test Temperature: | (°C) | - | - | - | - | - |
| **pH Value of Soil-suspension:** | **(pH)** | **-** | **-** | **-** | **-** | **-** |
| **Electrical Conductivity:** | **0** | **-** | **-** | **-** | **-** | **-** |
| **Field pH:** | **($pH_F$)** | **-** | **-** | **-** | **-** | **-** |
| **Field pH Oxidised:** | **($pH_{FOX}$)** | **-** | **-** | **-** | **-** | **-** |
| **Acid Sulfate Soil Indication:** | | **-** | **-** | **-** | **-** | **-** |
| **Foreign Material - Type III** | **(%)** | **-** | **-** | **-** | **-** | **-** |

| **Sampling & Test Methods (Results relate only to the items sampled/tested)** | **Report Remarks & Endorsement** |
|---|---|
| Sampled by Customer: Results apply to the sample/s as received. **<br>AS 1289.1.1: (2001)Preparation of disturbed soil samples<br>AS 1289.3.8.1: (2017)Emerson Class number of a soil | |
| | *Accredited for compliance with ISO/IEC 17025 - Testing.*<br>NATA Accreditation number: 20656<br><br>Issued By: P.Baltoski<br>*Approved Signatory* |
| **(** NATA accreditation does not cover the performance of this service)** | *WB054 - Rev 4, 06/02/2023* |

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WB080 - Rev 32, 28/11/2023

# Report on Material Quality

| | | | |
|---|---|---|---|
| Client: | Stantec Australia Pty Ltd | Report No: | **26-1293-MQ** |
| Client Address: | 16 Burelli St, Wollongong NSW 2500 | Report Date: | 7/12/2023 |
| Project: | Geotechnical Testing | Report Page: | Page 1 of 2 |
| Works Component: | Milton | Project No: | 26 |
| Material Used: | Insitu | Request/Order: | 304100928 |
| Material Description: | - | Lot Number: | - |
| Lot Comments: | - | ITP/PCP Number: | - |
| Lab Test Date/s: | Laboratory testing 30/11/2023 to 04/12/2023 | Control Line: | BH03 |

| Sample Number | Sample Date | Chainage/Location | Offset | Level of Test | Test Depth |
|---|---|---|---|---|---|
| **18225** | **28/11/2023** | **-** | **-** | **BH03** | **0.5-1.0m** |

**Sampling & Test Methods** (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

Sampled by Customer: Results apply to the sample/s as received. **
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
PSD: Ratios, Co-efficients & Weighted Indices

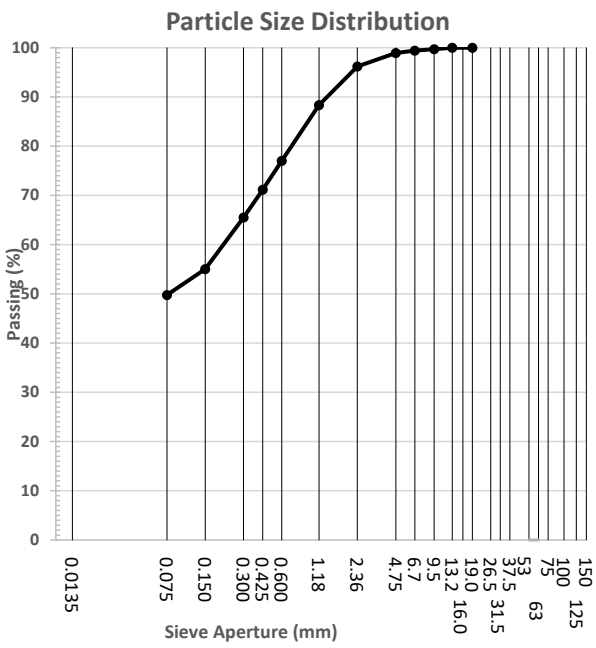
**Report Remarks & Endorsement**

NATA

*Accredited for compliance with ISO/IEC 17025 - Testing.*
NATA Accreditation number: 20656

Issued By: P.Baltoski
*Approved Signatory*

| **Specification Name** | | | | |
|---|---|---|---|---|
| **Particle Size Distribution (WASHED)** | Units | **Result** | **Specification Limits** | **Graphical Representation** |
| Passing 150mm Sieve | % | | | |
| Passing 125mm Sieve | % | | | |
| Passing 100mm Sieve | % | | | |
| Passing 75.0mm Sieve | % | | | |
| Passing 63.0mm Sieve | % | | | |
| Passing 53.0mm Sieve | % | | | |
| Passing 37.5mm Sieve | % | | | |
| Passing 31.5mm Sieve | % | | | |
| Passing 26.5mm Sieve | % | | | |
| Passing 19.0mm Sieve | % | **100** | | |
| Passing 16.0mm Sieve | % | | | |
| Passing 13.2mm Sieve | % | **100** | | |
| Passing 9.5mm Sieve | % | **100** | | |
| Passing 6.7mm Sieve | % | **99** | | |
| Passing 4.75mm Sieve | % | **99** | | |
| Passing 2.36mm Sieve | % | **96** | | |
| Passing 1.18mm Sieve | % | **88** | | |
| Passing 0.600mm Sieve | % | **77** | | |
| Passing 0.425mm Sieve | % | **71** | | |
| Passing 0.300mm Sieve | % | **66** | | |
| Passing 0.150mm Sieve | % | **55** | | |
| Passing 0.075mm Sieve | % | **50** | | |
| Passing 0.0135mm Sieve | % | | | |




| **Moisture, Ratios, Coefficients & Indices** | Units | **Result** | **Specification Limits** | **Remarks** |
|---|---|---|---|---|
| Moisture Content (AS1289.2.1.1-2005) | % | **18.8** | | Field Condition Total sample |

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*WB080 - Rev 32, 28/11/2023*

# Report on Material Quality

| | | | |
|---|---|---|---|
| Client: | Stantec Australia Pty Ltd | Report No: | **26-1293-MQ** |
| Client Address: | 16 Burelli St, Wollongong NSW 2500 | Report Date: | 7/12/2023 |
| Project: | Geotechnical Testing | Report Page: | Page 2 of 2 |
| Works Component: | Milton | Project No: | 26 |
| Material Used: | Insitu | Request/Order: | 304100928 |
| Material Description: | - | Lot Number: | - |
| Lot Comments: | - | ITP/PCP Number: | - |
| Lab Test Date/s: | Laboratory testing 30/11/2023 to 04/12/2023 | Control Line: | BH03 |

| Sample Number | Sample Date | Chainage/Location | Offset | Level of Test | Test Depth |
|---|---|---|---|---|---|
| **18225** | **28/11/2023** | **-** | **-** | **BH03** | **0.5-1.0m** |

| Plasticity | Units | Result | Specification Limits | Remarks |
|---|---|---|---|---|
| Liquid Limit | % | **54** | | Oven Dried & Dry Sieved |
| Plastic Limit | % | **25** | | Oven Dried & Dry Sieved |
| Plastic Index | % | **29** | | Oven Dried & Dry Sieved |

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WB080 - Rev 32, 28/11/2023

# Report on Material Quality

| | | | |
|---|---|---|---|
| Client: | Stantec Australia Pty Ltd | Report No: | **26-1295-MQ** |
| Client Address: | 16 Burelli St, Wollongong NSW 2500 | Report Date: | 7/12/2023 |
| Project: | Geotechnical Testing | Report Page: | Page 1 of 2 |
| Works Component: | Milton | Project No: | 26 |
| Material Used: | Insitu | Request/Order: | 304100928 |
| Material Description: | - | Lot Number: | - |
| Lot Comments: | - | ITP/PCP Number: | - |
| Lab Test Date/s: | Laboratory testing 30/11/2023 to 04/12/2023 | Control Line: | BH05 |

| Sample Number | Sample Date | Chainage/Location | Offset | Level of Test | Test Depth |
|---|---|---|---|---|---|
| **18227** | **28/11/2023** | **-** | **-** | **BH05** | **0.5-1.0m** |

**Sampling & Test Methods** (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

Sampled by Customer: Results apply to the sample/s as received. **
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
PSD: Ratios, Co-efficients & Weighted Indices

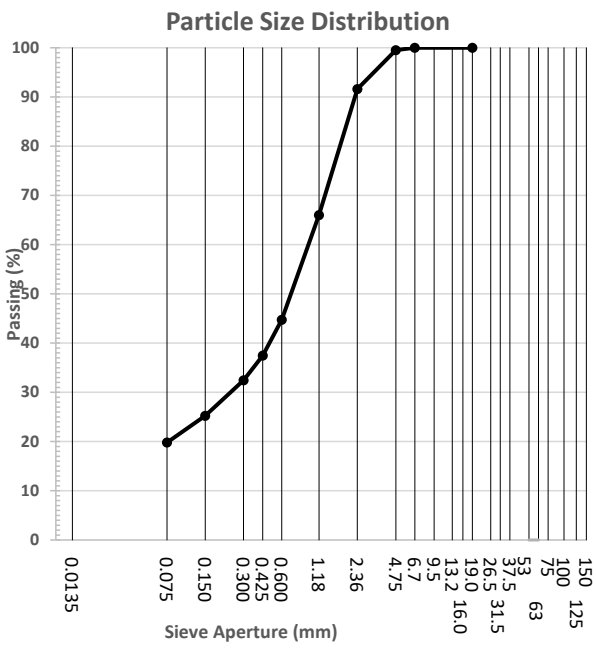
**Report Remarks & Endorsement**

NATA

*Accredited for compliance with ISO/IEC 17025 - Testing.*
NATA Accreditation number: 20656

Issued By: P.Baltoski
*Approved Signatory*

| **Specification Name** | | | | |
|---|---|---|---|---|
| **Particle Size Distribution (WASHED)** | Units | **Result** | **Specification Limits** | **Graphical Representation** |
| Passing 150mm Sieve | % | | | |
| Passing 125mm Sieve | % | | | |
| Passing 100mm Sieve | % | | | |
| Passing 75.0mm Sieve | % | | | |
| Passing 63.0mm Sieve | % | | | |
| Passing 53.0mm Sieve | % | | | |
| Passing 37.5mm Sieve | % | | | |
| Passing 31.5mm Sieve | % | | | |
| Passing 26.5mm Sieve | % | | | |
| Passing 19.0mm Sieve | % | **100** | | |
| Passing 16.0mm Sieve | % | | | |
| Passing 13.2mm Sieve | % | | | |
| Passing 9.5mm Sieve | % | | | |
| Passing 6.7mm Sieve | % | **100** | | |
| Passing 4.75mm Sieve | % | **100** | | |
| Passing 2.36mm Sieve | % | **92** | | |
| Passing 1.18mm Sieve | % | **66** | | |
| Passing 0.600mm Sieve | % | **45** | | |
| Passing 0.425mm Sieve | % | **37** | | |
| Passing 0.300mm Sieve | % | **32** | | |
| Passing 0.150mm Sieve | % | **25** | | |
| Passing 0.075mm Sieve | % | **20** | | |
| Passing 0.0135mm Sieve | % | | | |
| **Moisture, Ratios, Coefficients & Indices** | Units | **Result** | **Specification Limits** | **Remarks** |
| Moisture Content (AS1289.2.1.1-2005) | % | **8.2** | | Field Condition Total sample |



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*WB080 - Rev 32, 28/11/2023*

# Report on Material Quality

| | | | |
|---|---|---|---|
| Client: | Stantec Australia Pty Ltd | Report No: | **26-1295-MQ** |
| Client Address: | 16 Burelli St, Wollongong NSW 2500 | Report Date: | 7/12/2023 |
| Project: | Geotechnical Testing | Report Page: | Page 2 of 2 |
| Works Component: | Milton | Project No: | 26 |
| Material Used: | Insitu | Request/Order: | 304100928 |
| Material Description: | - | Lot Number: | - |
| Lot Comments: | - | ITP/PCP Number: | - |
| Lab Test Date/s: | Laboratory testing 30/11/2023 to 04/12/2023 | Control Line: | BH05 |

| Sample Number | Sample Date | Chainage/Location | Offset | Level of Test | Test Depth |
|---|---|---|---|---|---|
| **18227** | **28/11/2023** | **-** | **-** | **BH05** | **0.5-1.0m** |

| Plasticity | Units | Result | Specification Limits | Remarks |
|---|---|---|---|---|
| Liquid Limit | % | **31** | | Oven Dried & Dry Sieved |
| Plastic Limit | % | **18** | | Oven Dried & Dry Sieved |
| Plastic Index | % | **13** | | Oven Dried & Dry Sieved |