Attachment AB

Preliminary Geotechnical Site Investigation

Preliminary Geotechnical Site Investigation for the Canberra Brickworks

For: Land Development Agency

8 November 2013

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

SMEC Australia Pty Ltd (SMEC) was engaged by the Land Development Agency (LDA) to undertake a Preliminary Geotechnical and Environmental Site Investigation (PSI) at the Canberra Brickworks, ACT (the Site). This report presents the findings of the geotechnical investigation undertaken at the Site.

The Site covers an approximate area of 45 ha. Features of the Site include a former brickworks, a semi-backfilled quarry, and a former village with open grassland to the south.

The site lies on the Williamsdale soil landscape, with undulating rises and local relief typically below 10% in natural terrain. The site sits on a minor local topographic high, with the ground surface sloping south and south west towards Yarralumla Creek, which discharges into the Molonglo River. Topography and drainage in some areas of the Site have been significantly modified including the brickworks, quarry and road infrastructure.

The subsurface conditions encountered on site are broadly consistent with data published on geological maps and referenced sources. The site sits across two distinct geological regions – the Yarralumla formation, as shown on the 1:100,000 geological sheet and the Deakin Volcanics.

As part of the geotechnical investigation undertaken by SMEC, twenty eight test pits have been excavated at the site. These test pits were positioned to provide information on the ground conditions across the whole of the site, and to investigate potential areas of interest. Test pits were concentrated in the south of the site, where high density residential land use is proposed (see draft masterplan, **Appendix B**). Test pits were also concentrated in the north of the Site to investigate the extent and properties of fill materials within the quarry. The remaining test pits were interspersed across the site to gain information over as large an area as possible.

Three previous investigations have been utilised in the study of this site, the 2006 Robsons' Laboratories' Environmental Investigation – Audit Report of Yarralumla Brickworks, the 2011 Douglas Partners' report on Geotechnical Investigations along Cotter Road, Yarralumla, commissioned as part of SMEC's Cotter Road Stage 1 detailed design, and Lester Firth & Associates' 1986 Old Canberra Brickworks, Conservation Plan.

Six geological units have been found in the testpits carried out for this investigation. These comprise topsoil, residual soil, alluvium, siltstone, sandstone and dacite.

Across the southern, fairly undisturbed portion of the site, topsoil overlies shallow residual soil which extends typically to 0.4-0.8 m bgl. Residual soil consists of low to medium plasticity, very stiff to hard, orange brown and red brown clay with varying amounts of well graded, sub-angular medium grained gravels. Residual soil thickness decreases upslope, resulting in several observable outcrops of weathered siltstone bedrock. Alluvial soils are found at the lowest point of the site, in an old creek bed now used for drainage beneath Adelaide Avenue.

Fill is present in many testpits, although is typically quite shallow in the southern areas of the site. Fill materials varied, although they typically consisted of low plasticity sandy to silty clays. The majority of fill was stiff to hard, however several softer, uncompacted fill layers were interspersed with these, and as such, any proposed development will require additional investigations in close proximity to structures.

Within the brickworks and quarry areas, the natural landscape has been altered by quarrying activities. Significant levels of fill are present, particularly within the quarry. The fill typically comprises whole brick, cobbles and boulders of siltstone quarry offcuts, in addition to glass, bitumen, ash and other anthropogenic materials. Fill is uncompacted, and prone to collapse upon disturbance. Removal of fill will likely be required for any development in this area; however additional investigations will be required to fully delineate the regions of fill.

On the eastern and western edges of the site Deakin Volcanics were observed, in the form of dacitic bedrock. Residual soils comprised low to medium plasticity hard orange-brown sandy clay, with traces of well graded gravels. Gravels were of natural bedrock material. Moisture content was assessed on site as typically dry, although some were dry to moist. There was an easily observable difference in soils between those overlying dacitic and siltstone bedrocks; however both sets of natural soils had typically similar consistencies of very stiff to hard.

The residual soils overlying the dacite and siltstone bedrock are both cohesive in nature, and as such are potentially erodible and dispersive. This much be taken into consideration when planning any future development.

1 INTRODUCTION

1.1 General

SMEC Australia Pty Ltd (SMEC) was engaged by the LDA to undertake a Preliminary Geotechnical and Environmental Site Investigation (PSI) at the Canberra Brickworks, ACT (the Site). This report presents the findings of the Geotechnical Site Investigation undertaken at the Site between the 9th and 11th of September 2013. The results of the environmental investigation are presented in a separate environmental report.

The location of the Site is presented in **Figure 1, Appendix A**. Geotechnical investigation locations (including previous investigations) are presented in **Figure 2, Appendix A**.

1.2 Objectives

The following scope of work was undertaken to meet the objectives of the PSI.

- Review of available background data including:
    - Previous geotechnical reports;
    - Geological maps and memoirs of the area;
    - Available hydrological maps; and
    - Groundwater Bore Search;
- Geomorphological Mapping Exercise across the site to determine potential areas of interest such as gullies and rock outcrops;
- Completion of 28 test pit's to a maximum depth of 3 m bgl across the Site, with Dynamic Cone Penetrometer (DCP) Testing undertaken on all suitable soil horizons;
- Logging of materials encountered in each test pit in accordance with the Unified Soil Classification System (USCS);
- Preparation of this PSI report, discussing the historical data, field methodologies, field testing results and preliminary findings.

1.3 Scope of Geotechnical Investigation

SMEC understands that to assist the LDA with the sale and/or development of the Site that geotechnical data and an interpretation of the geology across the site is required to achieve the following:

- To identify the location and nature of fill;
- To evaluate the general strength of soils above the rock level; and
- To assess the rock level and quality of rock where accessible by testpits and outcrops.

1.4 Limitations

SMEC have carried out the PSI in accordance with Australian Standards AS1289:1997 and AS1726:1993.

1.5 Structure of Report

This PSI has the following structure:

- Section 2 – reviews all available background data and describes the site setting, topography and geology;
- Section 3 – describes the methodology adopted for the site investigation works, detailing test pitting techniques and in-situ testing undertaken;
- Section 4 – presents the results of the site investigation works together with an interpretation of the subsurface conditions present on site.
- Appendix A – Figures
- Appendix B – Development Masterplan
- Appendix C – Test Pit Logs, with explanatory notes and core photos

2 SITE SETTING AND BACKGROUND DATA

2.1 Site Description

The Site covers an approximate area of 45 ha. Features of the Site include a former brickworks, a semi-backfilled quarry, and a former village with open grassland to the south. The Site is bound to the:

- North: Bentham St., Suburb of Yarralumla and the Royal Canberra Golf Course;
- East: Denham St. and Adelaide Avenue, Suburb of Yarralumla;
- South: Dension St., Suburb of Deakin;
- West: Royal Canberra Golf Course

The site lies on the Williamsdale soil landscape, with undulating rises and local relief typically below 10% in natural terrain. The site sits on a minor local high, with the surface sloping south and south west towards Yarralumla Creek, which discharges into the Molonglo River. Topography and drainage in some areas of the Site have been significantly modified including the brickworks, quarry and road infrastructure.

The site has been divided into four sub-regions, described below. The features observed in each sub-region are also depicted in Figure 2, **Appendix A**.

Brickworks

The Canberra Brickworks is located adjacent to the suburb of Yarralumla and the Royal Canberra Golf Course. Access to the brickworks is via Denman St. adjacent south. The brickworks were operational between 1913 and 1976 and are currently used by Thor's Hammer, a wood recycling business.

Former Brickworks Village/Hostel

The Brickworks Village/Hostel (brickworks village) is located immediately south of the brickworks. It comprises several demolished buildings with a former railway easement to the west and south. The extent of the former buildings is unknown. Inspection of this portion of the Site was limited by dense vegetation.

Quarry

The quarry is a large levelled grassed area with several exposed natural limestone and shale bedrock features. The area contains an unknown amount of fill used to level the quarry and to form several large mounds located in the northern and western portions of the area. An artificial lake was also present in the northern portion of the quarry.

Southern Areas

The Southern Areas of the Site comprise pine forests and open grasslands with several major roads (Dudley St, Cotter Rd and Yarra Glen) bisecting the Site east to west.

2.2 Background Information

SMEC has reviewed three previous reports containing geotechnical information, in addition to available soil and geological 1:100,000 reference sheets. The plans and reports reviewed as part of the PSI are listed below:

- Lester Firth & Associates Pty Ltd (June 1986), Old Canberra Brickworks, Conservation Plan, June 1986;
- Robson Laboratories Pty Ltd (October 2006), Environmental Investigation Audit, Yarralumla Brickworks Block 1 Section 102 Yarralumla, Canberra Central, ACT;
- Douglas Partners Pty Ltd (November 2011), Report on Geotechnical Investigation, Subgrade Investigation, Cotter Road Yarralumla, ACT;
- Jenkins, B.R. 2000, Soil Landscapes of the Canberra 1:100,000 Sheet Report, Department of Land and Water Conservation, Sydney; and
- Abell, R. S. 1992, Canberra 1:100 000 scale geological map. 8727. 1st Edition, BMR, Canberra.

A summary of the reports is provided below.

Lester Firth (1986)

Lester Firth Associates prepared a Conservation Plan for the Canberra Brickworks; the purpose of the plan was to outline conservation policies and management options for the brickworks.

The plan reports on the history of the Canberra Brickworks until its closure in 1976, and includes an assessment of the significance of various features of the site, including four geological monument sites within the Quarry Area.

Robson (2006)

An environmental report by Robsons Laboratories, titled *Audit Report of Yarralumla Brickworks* focused primarily on the northern portion of the site, detailing the results of 21 boreholes contained within the brickworks and the old shale quarry.

Douglas and Partners (2011)

A geotechnical report by Douglas Partners, titled *Geotechnical Investigations along Cotter Road* focused on the south western corner of the site, detailing the results of 3 test pits and 9 boreholes along Cotter Road.

2.3 Regional Geology and Soil Landscape

Reference to the 1:100,000 geological map of Canberra indicates that the site is underlain by the Yarralumla Formation, consisting of calcareous and tuffaceous mudstone and siltstone with minor limestone, calc-silicate hornfels and quartz sandstone. The Deakin Volcanics, consisting of Rhyodacitic ignimbrite and minor volcaniclastic and argillacrous sediments, occur in close proximity to the site, overlying the Yarralumla Formation.

The Yarralumla formation is the only fossiliferous marine unit within the extensive volcanic marker horizons of South Canberra, and is therefore a valuable marker horizon as its fossil fauna provide evidence as to the age of the surrounding volcanics. As one of the only locations from which the Yarralumla Formation can be closely observed, the Canberra Brickworks quarry forms one of Canberra's most important and oldest geological monuments (Lester Firth & Associates Pty Ltd, 1986).

A significant portion of the site has been excavated to provide raw materials for brickmaking. Excess raw materials from the quarry have been mixed with brick offcuts to backfill parts of the quarry, and to create fill mounds around the site, possibly to divert water from the quarry. Robson Laboratories' 2006 Environmental Investigation Audit confirmed the presence of siltstone within the Brickworks area and Quarry. Siltstone was typically moderately to highly weathered, underlying silty clay and fill of varying depths. The nature of fill varied widely across the site, from high plasticity clay to gravels and slag. The limited nature of this investigation, together with the varying depth of the quarry and the inconsistent nature of fill mean that further investigation is required for the full delineation of fill areas.

Douglas Partners' 2011 subgrade investigation details the presence of dacite in the south western corner of the site. The dacite is extremely low strength, extremely weathered, and medium to coarse grained. Dacite was mostly overlain directly by fill, however some test pits recorded natural clayey sand and clayey silt material overlying dacite.

The Canberra Soil Landscape 1:100,000 sheet places the site on the Williamsdale Soil Landscape, with moderately deep, moderately well-drained Yellow Chromosols, Red Kandosols and Brown Kandosols. These soils are typically hardsetting, erodible, and potentially dispersive.

2.4 Regional Hydrogeology

In the Canberra region, groundwater occurs in fractured rock aquifers and in unconsolidated sand in thin alluvial and colluvial aquifers. Yields of bores in fractured rock aquifers are in the range 0.1-5L/s and higher yields are obtained in closely jointed rocks along fault zones.

Groundwater salinity is generally less than 2000 mg/L TDS and largely determined by complex geology and recharge conditions. The depth to groundwater in the Canberra region generally ranges from about 2 to 20m from the surface and is dependent on the underlying geology.

No information on groundwater levels within the site is available.

3 INVESTIGATION METHODOLOGY

3.1 General

Field works were undertaken by a suitably qualified SMEC geotechnical engineer, between 9 September and 11 September 2013.

Fieldwork comprised excavation of 28 test pits across the Site. Test pit locations were selected both to gain information across the whole of the site, and to investigate potential areas of interest. Geotechnical investigations were concentrated to the south of the site, where high density residential land use is proposed (see draft masterplan, **Appendix B**), and to the north, to investigate the extent and properties of the quarry backfill. The remaining test pits were interspersed across the site to gain information over as large an area as possible.

The locations of test pits undertaken as part of this PSI are presented in **Figure 2, Appendix A**, together with locations of previous site investigations.

The GPS coordinates of each test pit were recorded on SMEC field sheets and provided in the attached test pit logs (**Appendix C**).

SMEC notes that the spatial density of site investigations conducted only provides a general idea of the geological features and subsurface material properties. There is the potential for significant variation in the subsurface profile and therefore this report is not sufficient to adequately assess the suitability of the Site for future residential land use or for design of structures. Further investigation must be undertaken once proposed land use is finalised to obtain more specific geotechnical characteristics in order to progress the design.

3.2 Methodology

3.2.1 Service Clearance

Test pit locations were cleared for the presence of underground services by a Telstra accredited plant location contractor referencing utility plans obtained through a Dial Before You Dig (DBYD) search.

3.2.2 Equipment Used

Testpits were undertaken by All Terrain Bobcats, using a Kobelco 8 tonne tracked excavator with a 0.6 m wide bucket. The Limit of Reach for this excavator is approximately 3 m for test pits less than 1 m in width. The excavator allowed access to all testpits whilst minimising disturbance to the surrounding area.

3.2.3 Test Pitting

Test pitting activities were undertaken from 9 September 2013 to 11 September 2013. A total of 28 test pits were excavated across the site to either refusal (on bedrock or competent material) or until the maximum investigation depth of 3 m below ground level.

In several cases refusal occurred in fill or natural soils rather than bedrock. In these cases, a ripper tyne was used to break up the soil or rock, allowing excavation to proceed further.

Test pits were backfilled upon completion, and compacted with the bucket and tracks of the excavator.

A summary of the test pit's completed as part of this PSI is provided below in **Table 3.1**.

Table 3.1: Test Pit ID and locations

Test Pit ID	Easting	Northing	Finished Depth (m)	Reason for Depth	Terminated In	Features
TP1	689880	6090395	1.16	Refusal	Dacite	General Site coverage
TP2	690061	6090208	2.1	Refusal on concrete - Possible abandoned pipe	Fill – Gravelly Sand	
TP3	690156	6090198	2	Refusal	Siltstone	Drainage Point/culvert
TP4	690384	6090131	0.45	Refusal	Siltstone	Targeted for potential high density residential development
TP5	690426	6089969	1.15	Refusal	Siltstone	
TP6	690523	6090005	1.7	Refusal	Siltstone	
TP7	690585	6090029	1.9	Refusal	Sandstone	
TP8	690677	6090064	1.5	Refusal	Dacite	
TP9	690582	6090185	1.26	Refusal	Dacite	
TP10	690692	6090236	1.58	Refusal	Fill - Clay	
TP11	690360	6090237	1.12	Refusal	Siltstone	General coverage
TP12	690156	6090337	1.2	Refusal	Siltstone	Abandoned Rail Easement, potential old creek bed
TP13	690045	6090415	1.3	Refusal	Siltstone	General coverage
TP14	690044	6090417	1.35	Refusal	Dacite	Abandoned Rail Easement
TP15	690003	6090627	2	Refusal	Siltstone	General Coverage – Former Brickworks Village
TP16	690023	6090573	1.15	Refusal	Sandstone	
TP17	690130	6090548	1.7	Refusal	Siltstone	
TP18	690328	6090431	1.37	Refusal	Siltstone	General coverage - Orchard
TP19	689935	6090722	1.1	Refusal	Dacite	General coverage - Former Brickworks
TP20	690043	6090659	1.2	Refusal	Siltstone	
TP21	690222	6090766	1.56	Collapse	Fill - Bricks	
TP22	690128	6090800	1.3	Refusal	Siltstone	
TP23	690166	6090733	2.37	Refusal	Siltstone	General coverage Quarry area
TP24	690226	6090726	0.5	Refusal	Siltstone	
TP25	690255	6090627	3.1	Machine Limit	Fill – Shale and Bricks	
TP26	690222	6090766	3	Collapse	Fill - Bricks	
TP27	690250	6090914	1.3	Refusal	Siltstone	
TP28	690321	6090751	3	Collapse	Fill - Bricks	Fill mound

3.2.4 In-situ Testing

Dynamic Cone Penetrometer (DCP) testing was undertaken at each soil horizon, in accordance with AS1289.6.3.2:1997. The number of blows to extend the DCP 150mm into the ground was recorded. The blow count can be approximately correlated to soil consistency and used to estimate subgrade CBR, and therefore provides a continuous record of material consistency/density with depth.

Pocket Penetrometer readings were taken at regular intervals, providing information on soil consistency together with DCP readings and field tests.

Results for DCP and PP testing are indicated on the test pit logs in **Appendix C.**

3.2.5 Soil Logging

The observed soil characteristics was logged and recorded in accordance with the Unified Soil Classification System (USCS), as outlined in AS1726:1993. Test pit logs are included in **Appendix C**.

4 GEOTECHNICAL INTERPRETATION

4.1 General

The following sections present the interpreted geotechnical model and subsurface conditions at the site. Information extracted from previous geotechnical reports, in conjunction with the findings of this site investigation have been considered in the geotechnical interpretation.

The subsurface materials have been classified and identified using the classification systems for rock and soil units as discussed in Section 4.2.

4.2 Soil Classification

Soils have been described using the Unified Soil Classification System (USCS). The USCS soil classes are broadly divided into three groups: gravels, sands and silts/clays. Each group can be subdivided into five or six units based on the soil consistency and density. The adopted Soil Classification System is presented below in Table 4.1.

Table 4.1 Soil Classification System

Soil Type	USC Symbol	Consistency/Density
Clays and Silts	CL, CI, CH, ML, MI, MH	Very Soft (VS)
		Soft (S)
		Firm (F)
		Stiff (St)
		Very Stiff (VSt)
		Hard (H)
Sands and poorly graded gravels	SW, SP, GP, SM, SC	Very Loose (VL)
		Loose (L)
		Medium Dense (MD)
		Dense (D)
		Very Dense (VD)
Gravels (well graded)	GW, GM, GC	Very Loose (VL)
		Loose (L)
		Medium Dense (MD)
		Dense (D)
		Very Dense (VD)

4.3 Geological Observations

The disused quarry presents several opportunities to identify rock strata and other geological features without additional excavation. Geomorphological mapping was undertaken across the site and several features were noted, including geological structures, rock outcrops, fossils and tuffaceous units. Significant features are displayed in **Figure 3, Appendix A**, and are detailed in Table 4.2.

Table 4.2: Features from Mapping Exercise

Feature	Description	Importance
1	Fill Mound adjacent to artificial lake	Displays fill and natural material.
2	Siltstone outcrop in base of artificial lake	Demonstrates depth to bedrock.
3	Anticline	Allows observation of geological structures.
4	Siltstone outcrop north of artificial lake	Demonstrates depth to bedrock.
5	Siltstone outcrop on peak of hill	Demonstrates depth to bedrock.
6	White, tuffaceous material located between two layers of shale.	Allows observation of geological strata
7	Anticline	Allows observation of geological structures.
8	Siltstone outcrop on slope of hill	Demonstrates depth to bedrock.
9	Siltstone outcrop on slope of hill	Demonstrates depth to bedrock.
10	Siltstone outcrop on peak of hill	Demonstrates depth to bedrock.
11	Fossil observed in siltstone quarry cutting	Allows observation of geological strata

Geological Structures

Two distinct anticlines were observed within the Quarry cut faces. The southernmost anticline strikes at approximately 150 degrees, with bedding planes dipping at approximately 45 degrees towards the East and West. Siltstone can be seen to grade to sandstone from the inner strata to the outer. The northern anticline strikes at approximately 180 degrees, with bedding planes dipping approximately 45 degrees to the northeast and south west.

Photograph 1: Southernmost Anticline, looking south-east, Location 8

Outcrops

Outcrops were observed at several locations across the site, and predominately comprised moderately to highly weathered siltstone. Outcrops in the southern portion of the site are valuable in displaying the depth to bedrock without requiring excavation. Shallow bedrock was observed towards the top of many slopes in the southern area of the site. Outcrops in some portions of the quarry are also valuable in displaying depth to bedrock, however in some cases outcrops are the result of excavation and backfill activities.

Photograph 2: Material outcropping at peak of hill. Location 10.

Fossils

Fossils were observed in some exposed siltstone within the quarry. The fossiliferous nature of the Yarralumla formation makes it an extremely valuable marker horizon as its fossil fauna provide evidence as to the age of the surrounding volcanics. The Canberra Brickworks quarry is one of the only locations from which the Yarralumla Formation and its fossil contents can be closely observed.

Photograph 3: Fossil observed in siltstone outcrop in Quarry - Location 11

Tuffaceous Material

White, tuffaceous material was observed in two outcrops within the quarry region of the site. This is consistent with the description of the Yarralumla Formation provided in the 1:100,000 geological maps. The tuff is poorly cemented, and consists of a fine-grained white clay matrix holding large fragments of fresh siltstone.

The tuffaceous material was not observed in-situ in any of the test pits. However, some small fragments of tuff were observed in the fill material in TP6. Tuff was also noted in a fill mound west of the artificial lake in the quarry. The fill mound consisted of demolition waste, brick and bitumen on the northern edge, and siltstone and tuff fragments on the southern edge.

Photograph 4: Tuff surrounded by moderately weathered siltstone. Location 6.

4.4 Subsurface Unitisation and General Descriptions

Across the majority of the site natural soils comprised red brown residual soils (silty clays and clay) underlain by siltstone, sandstone or dacite bedrock. The top of the bedrock was encountered from ground surface to depths of 1.9m below ground level, and varied in strength and degree of weathering.

The local geology can be distinguished into two geological regions, as displayed in **Figure 4, Appendix A**. Each region had markedly different bedrock and overlying soils. Region 1 (throughout the centre of the site) is typical of the Yarralumla formation, and is discussed in Section 4.4.1. Region

2 (on the western and eastern edges of the site) is typical of the Deakin Volcanics, and is discussed in Section 4.4.2.

Where natural material was not encountered, interpolations were made based on information from surrounding investigations. The boundaries between geological regions are interpolated based on available data. Additional testing is required to more accurately delineate the two regions.

Fill was encountered in 18 test pit locations across the site, to varying depths, and with varying properties. A summary of the fill conditions throughout the site, based on all available geotechnical information, is given in Section 4.4.3.

Test pit logs can be found in **Appendix C**.

Table 4.2: Geotechnical Unit Descriptions

Unit	Base depth bgl (m)	Description
Topsoil		
Unit 1: Topsoil	0.2 – 0.4 m	Low plasticity, firm to stiff clayey silt, dark brown, with sand, and grass rootlets. Dry, no odour, no staining
Region 1		
Unit 2: Residual Soil	0.4 – 0.8	Low to medium plasticity, very stiff to hard, orange brown and red brown clay with some well graded, sub-angular medium grained gravels. Dry, no odour, no staining.
Unit 3: Alluvium	0.4 - 0.7	Medium plasticity, stiff, grey mottled orange gravelly clay. Well graded, sub-rounded gravel.
Unit 4: Siltstone Bedrock	Varies	Fine grained layered siltstone, grading from extremely low strength, extremely weathered, highly fractured orange bedrock to high strength, slightly weathered, slightly fractured grey bedrock
Region 2		
Unit 5: Residual Soil	0.6 - 1	Low to medium plasticity hard orange-brown sandy clay, with traces of well graded gravels. Dry, no odour, some iron staining.
Unit 6: Dacitic Bedrock	Varies	Coarse grained, porphyritic, massive, orange brown, very low strength, highly weathered dacite. Iron staining.

Unit 1: Topsoil

Topsoil was encountered in all test pits across the site other than TP20, which occurred within a bitumen sealed carpark. The topsoil comprised low plasticity stiff to very stiff dark brown clayey silt. Traces of gravel and sand were present in some test pits.

In the southern, undisturbed portion of the site, topsoil was typically between 0.2-0.4 m bgl. Testpits located in the quarry and brickworks areas (TP19-28) had shallower topsoil (0.1-0.3 m) typically overlying fill. The maximum depth of topsoil observed was 0.45 m bgl, in TP6 and TP8, both on the southern portion of the site. The shallowest topsoil was 0.1 m bgl in TP24, 25 and 28, all within the Quarry area.

DCP N values were typically between 5 and 12, and Pocket Penetrometer readings were highly variable, between 100 kPa and 450 kPa.

4.4.1 Region 1

Region 1 consists of two main units – residual soil (Unit 2) and siltstone bedrock (Unit 4). Some alluvium (Unit 3) was observed adjacent to the creek bed. It should be noted that TP7 and TP16 encountered fine grained sandstone, as opposed to the siltstone bedrock encountered predominantly across the region. The southern anticline exposed a grading of materials from moderately weathered orange-brown siltstone to fine grained, yellow-brown sandstone, as displayed in Photograph 1. This suggests the potential for an interbedded siltstone and sandstone stratum.

Unit 2: Residual Soil

Residual soil was encountered in all test pits that reached natural material across the central region of the site. These included TP2-TP7, TP12, TP13, TP15-TP18, TP20, TP23, TP24 and TP27.

Several testpits began and terminated in fill due to collapse, refusal or depths above machine limit. These testpits were TP21, TP22, TP25, TP26 and TP28. These are discussed further in Section 4.4.3.

Residual soils comprised low to medium plasticity, very stiff to hard, orange brown and red brown clay with varying amounts of well graded, sub-angular medium grained gravels. Gravels displayed some rock fabric of the natural bedrock material. Moisture characteristics were assessed on site as typically dry, with some locations indicating dry to moist soils.

Residual soil typically extended to between 0.4-0.8 m below ground level, with a maximum depth of 1.9 m in TP15, and minimum thickness of 0 m in TP11, which encountered topsoil overlying bedrock.

DCP N values were typically between 10 and 17, and Pocket Penetrometer readings were typically between 400-450 kPa.

Photograph 5: Orange brown and red brown clays typical of the residual soil overlying siltstone. TP18.

Unit 3: Alluvium

Alluvium was encountered in TP16 and TP3. Alluvium is associated with water courses, and TP3 was targeted to intersect the bed of a creek noted in historical photographs. TP3 is in fact still a drainage point for the surrounding northern hills, and is adjacent to a culvert underneath Adelaide Avenue. Alluvial gravels in TP3 were noted to be wet.

Unit 3 consists of a medium plasticity, stiff, grey mottled orange gravelly clay. Gravels were well graded and sub-rounded, indicating an alluvial origin.

Photograph 6: Saturated gravelly clay, TP3

Unit 4: Bedrock

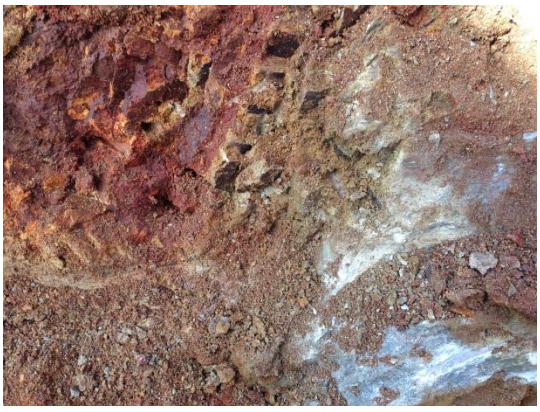
The bedrock comprised fine grained layered siltstone, grading from extremely low strength, extremely weathered, highly fractured orange bedrock to high strength, slightly weathered, slightly fractured grey bedrock. Fractures were extensive and typically iron stained in the low to medium strength siltstone.

The depth to top of bedrock varies across the site. Bedrock was typically encountered at 0.4-0.7 m bgl in relatively undisturbed areas of the site. However, a significantly larger variation in depth to bedrock is observed in the quarry area.

In the southern, undisturbed portion of the region, the maximum depth to bedrock was 1.9 m at TP15, and the minimum depth to bedrock was 0.17 m at TP4. Rock outcrops were noted in several locations, indicating bedrock at the surface. Natural outcrops were typically noted towards the top of hills, whilst several rock faces were exposed within the quarry from previous excavations.

Photograph 7: Highly weathered, highly fractured siltstone with iron staining in fractures.TP16.

Medium strength siltstone occurred from depths around 0.85-1.1 m. In TP17 corestones were observed. Large blocks of fresh grey high strength siltstone occurred in the midst of moderately weathered orange low strength siltstone, as displayed in Photograph 8 below.



Photograph 8: Corestone of fresh high strength siltstone (bottom right) surrounded by highly weathered, low strength siltstone. TP17

4.4.2 Region 2

Region 2 consisted of two main units – residual soil (Unit 5) and dacite bedrock (Unit 6), and occurred along the western and eastern edges of the site. Units were fairly consistent across the region of the site.

A summary of these units is provided in Table 4.2.

Unit 5: Residual Soil

Residual soils were encountered in all test pits that reached natural material across the western and eastern edges of the site. These included TP1, TP8, TP9, TP14 and TP19

TP10 began and terminated in fill due to refusal. These are discussed further in Section 4.4.3.

Residual soils comprised low to medium plasticity hard orange-brown sandy clay, with traces of well graded gravels. Gravels displayed some rock fabric of the natural bedrock material. Moisture characteristics were assessed on site as typically dry, with some locations indicating dry to moist soils.

Residual soils typically extended to between 0.6-1 m below ground level, with a maximum depth of 1.15 m in TP19 and minimum depth of 0.62 m in TP9.

DCP N values were typically between 20 and 25, and Pocket Penetrometer readings were typically between 400-450 kPa.

Photograph 9: Orange brown and yellow brown clays typical of the residual soil overlying dacite. TP8.

Unit 6: Dacitic Bedrock

The depth to top of dacite varied across the region. Dacite was typically encountered at 0.6-1 m bgl. In the southern, undisturbed portion of the site, the maximum depth to bedrock was 1.15 m in TP19 and the minimum depth was 0.62 m in TP9. No outcrops were observed.

Dacitic bedrock comprised coarse grained, porphyritic, massive, orange brown dacite. The bedrock was typically highly weathered, with very low strength, grading to low strength, moderately weathered dacite below 1.1 m bgl. Iron staining was present.

4.4.3 Fill

Fill was encountered at 18 test pit locations across the Site. Across the southern and brickworks portions of the site the fill encountered comprised reworked natural sandy to silty clays. Clays were low plasticity, with varying consistencies and colours. DCP N values ranged between 5 and 25, and Pocket Penetrometer readings varied between 200 and 400 kPa. The majority of fill in the southern areas was hard, with DCP values ranging between 17 and 25, and penetrometer values between 350-400 kPa, however several softer, uncompacted fill layers were interspersed with these. The variable nature of fill means that these values are not representative of fill across the site. Additional investigations should be undertaken for any development occurring on fill.

Within the quarry areas, fill consisted of brick waste, ash, quarry cuttings (shale) with traces of anthropogenic inclusions (glass, metal and bitumen). Fill was uncompacted, and the walls of several testpits collapsed throughout excavation. Ash waste was likely sourced from the operation of the brickworks (combustion of wood and coal) and was identified in fill at both the brickworks and quarry.

With the exception of test pits TP23 to TP28 in the quarry area and TP02, fill generally terminated at a depth of less than 1 m.

Testpits TP2, TP21, TP25, TP26, and TP28 were terminated in fill due to collapse or refusal. Testpits TP21, TP25, TP26, and TP28 occurred in the quarry area and comprised uncompacted brick waste and quarry cuttings. TP23 and TP28 continued to the maximum investigation depth of 3 m.

TP02 was terminated in fill logged to comprise silty cobbles to gravelly sand with traces of brick and bitumen. The test pit terminated at 2 m bgl due to refusal on a concrete pipe. The source of the fill is unknown but is likely attributed to filling to meet the design grade of Cotter road.

Photograph 10: Whole brick fill with clay encountered throughout the Quarry site. TP28.

4.5 Groundwater

Groundwater was not encountered in this investigation. There was some inflow of water in TP3, in a gravel layer approximately 0.5-0.65 m bgl. This test pit was placed to target a low-lying area, adjacent to a culvert allowing drainage underneath Adelaide Avenue. Material below this gravel layer was dry, and water is believed to have been due to stormwater runoff from a recent rain event.

Groundwater was encountered by neither Robson Laboratories nor Douglas Partners in their investigations.

4.6 Interpretation of Subsurface Conditions

The subsurface conditions encountered on site are broadly consistent with data published on geological maps and referenced sources. The site sits across two district geological regions – the Yarralumla formation, as predicted by the 1:100,000 geological sheet, and the Deakin Volcanics.

Across the southern, fairly undisturbed portion of the site, topsoil overlies shallow residual soil which extends typically to 0.4-0.8 m bgl. Residual soil consists of low to medium plasticity, very stiff to hard, orange brown and red brown clay with varying amounts of well graded, sub-angular medium grained gravels. Residual soil thickness decreases upslope, with several exposed outcrops of weathered siltstone.. Alluvial soils are found at the lowest point of the site, in an old creek bed now used for drainage beneath Adelaide Avenue.

Fill is present in many testpits, although is typically quite shallow in the southern areas of the site. Fill materials varied, although they typically consisted of low plasticity sandy to silty clays. The majority of fill was stiff to hard, with DCP values ranging between 17 and 25, and penetrometer values between 350-400 kPa, however several softer, uncompacted fill layers were interspersed with these, and as such, any proposed development will require additional investigations in close proximity to structures.

Within the brickworks and quarry areas, the natural landscape has been altered by quarrying activities. Significant levels of fill are present, particularly within the quarry. The fill encountered comprises whole brick, cobbles and boulders of siltstone quarry offcuts, in addition to glass, bitumen, ash and other anthropogenic materials. Fill is uncompacted, and prone to collapse upon disturbance. Removal of fill will likely be required for any development in this area; however additional investigations will be required to fully delineate the regions of fill.

On the eastern and western edges of the site Deakin Volcanics were observed, in the form of dacitic bedrock. Residual soils comprised low to medium plasticity hard orange-brown sandy clay, with traces of well graded gravels. Gravels were of natural bedrock material. Moisture content was assessed on site as typically dry, although some were dry to moist. There was an easily observable difference in soils between those overlying dacitic and siltstone bedrock, however both sets of natural soils had typically similar consistencies. Although residual soils overlying dacite typically had DCP N values between 20 and 25, and residual soils typically had DCP N values between 10 and 17, Penetrometer readings were typically between 400-450 kPa for both soils.

The residual soils overlying dacite and siltstone bedrock are both cohesive in nature, and as such, are potentially erodible and dispersive. This much be taken into consideration when planning any future development.

5 REFERENCES

Abell, R. S. 1992, Canberra 1:100 000 scale geological map. 8727. 1st Edition, BMR, Canberra.

Douglas Partners Pty Ltd (November 2011), Report on Geotechnical Investigation, Subgrade Investigation, Cotter Road Yarralumla, ACT;

Jenkins, B.R. 2000, Soil Landscapes of the Canberra 1:100,000 Sheet Report, Department of Land and Water Conservation, Sydney; and

Lester Firth & Associates Pty Ltd (June 1986), Old Canberra Brickworks, Conservation Plan, June 1986;

Robson Laboratories Pty Ltd (October 2006), Environmental Investigation Audit, Yarralumla Brickworks Block 1 Section 102 Yarralumla, Canberra Central, ACT;

Standards Australia 1997, *AS1289: Method of Testing Soils for Engineering*, Standards Australia, Sydney

Standards Australia 1993, *AS1726: Geotechnical Site Investigations*, Standards Australia, Sydney

APPENDIX A: FIGURES

FIG NO. 1	**FIGURE TITLE** Site Location	**DATE** 2/10/2013	0 155 310 620 Meters 1:25,000	**PAGE SIZE** A4	**COORDINATE SYSTEM** ACT Grid 1966
PROJECT NO. 3002369	**PROJECT TITLE** Canberra Brickworks Preliminary Site Investigation	**CREATED BY** J. Seng	**SOURCES** Imagery © Bing Maps, Imagery © Roadnet		

SMEC

Location: X:\PROJECT\3002369 Yarralumla Brickworks Site Investigation\6 Delivery\6.2 Figures and Result Tables\6.2.1 GIS\Figure 1.mxd

LEGEND

- The Site
- DP Locations
- SMEC Test Pit Locations
- Robsons TP Locations
- Railway Line
- Site Division

Quarry
Brickworks
Former Brickworks Village
Southern Areas

TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09 TP10 TP11 TP12 TP13 TP14 TP15 TP16 TP17 TP18 TP19 TP20 TP21 TP22 TP23 TP24 TP25 TP26 TP27 TP28
rTP 1 rTP 2 rTP 3 rTP 4 rTP 5 rTP 6 rTP 7 rTP 8 rTP 9 rTP 10 rTP 11 rTP 12 rTP 13 rTP 14 rTP 15 rTP 16 rTP 17 rTP 18 rTP 19 rTP 20 rTP 21
SS-1
BH9 BH10 BH11 BH12A BH12 BH13 BH14 BH15 BH16 BH17 BH18
DTP10 DTP11 DTP12 DTP13

Lane Poole Pl
Bentham St
Yarralumla
Loftus St
Novar St
Hutchins St
Mueller St
Ewart St
Gunn St
Banks St
Schomburgk St
Weston St
Hill Cnr
Woolls St
Maxwell St
Blakely Row
Drummond Row
Blowin Cl
Abbott St
Rodway St
Newman St
Dunrossil Dr
Cotter Rd
Denman St
Fraser Pl
Kintore Cres
Guilfoyle St
Dudley St
Yarra Glen
Denison St
Jersey St
Newdegate St
Macartney Cres
Gormanston Cres
Nathan St
Thesiger Ct
Gells Ct
Adelaide Ave
Kent St

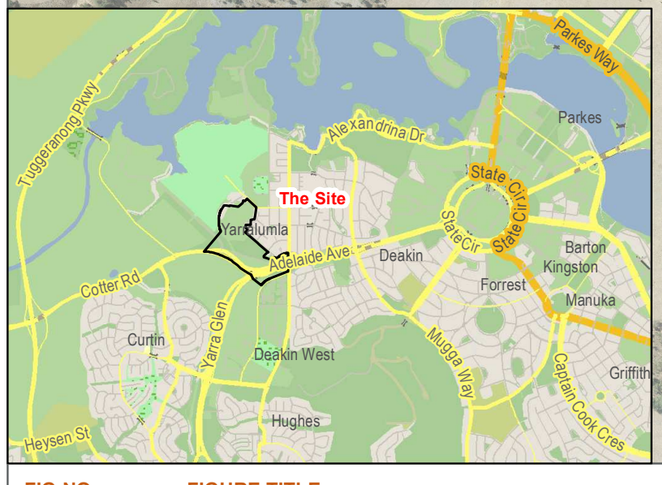


FIG NO.	FIGURE TITLE	DATE	PAGE SIZE	COORDINATE SYSTEM
2	**Borehole Locations (all investigations)**	30/10/2013	A3	ACT Grid 1966

0 50 100 200
1:4,500 Meters

PROJECT NO.	PROJECT TITLE	CREATED BY	SOURCES
3002369	Canberra Brickworks Preliminary Site Investigation	J. Seng	Imagery © Roadnet, Imagery © Stromlo

SMEC Celebrating 40 years 1970 - 2010

Location: X:\PROJECT\3002369 Yarralumla Brickworks Site Investigation\6 Delivery\6.2 Figures and Result Tables\6.2.1 GIS\geotech map - fig 2.mxd

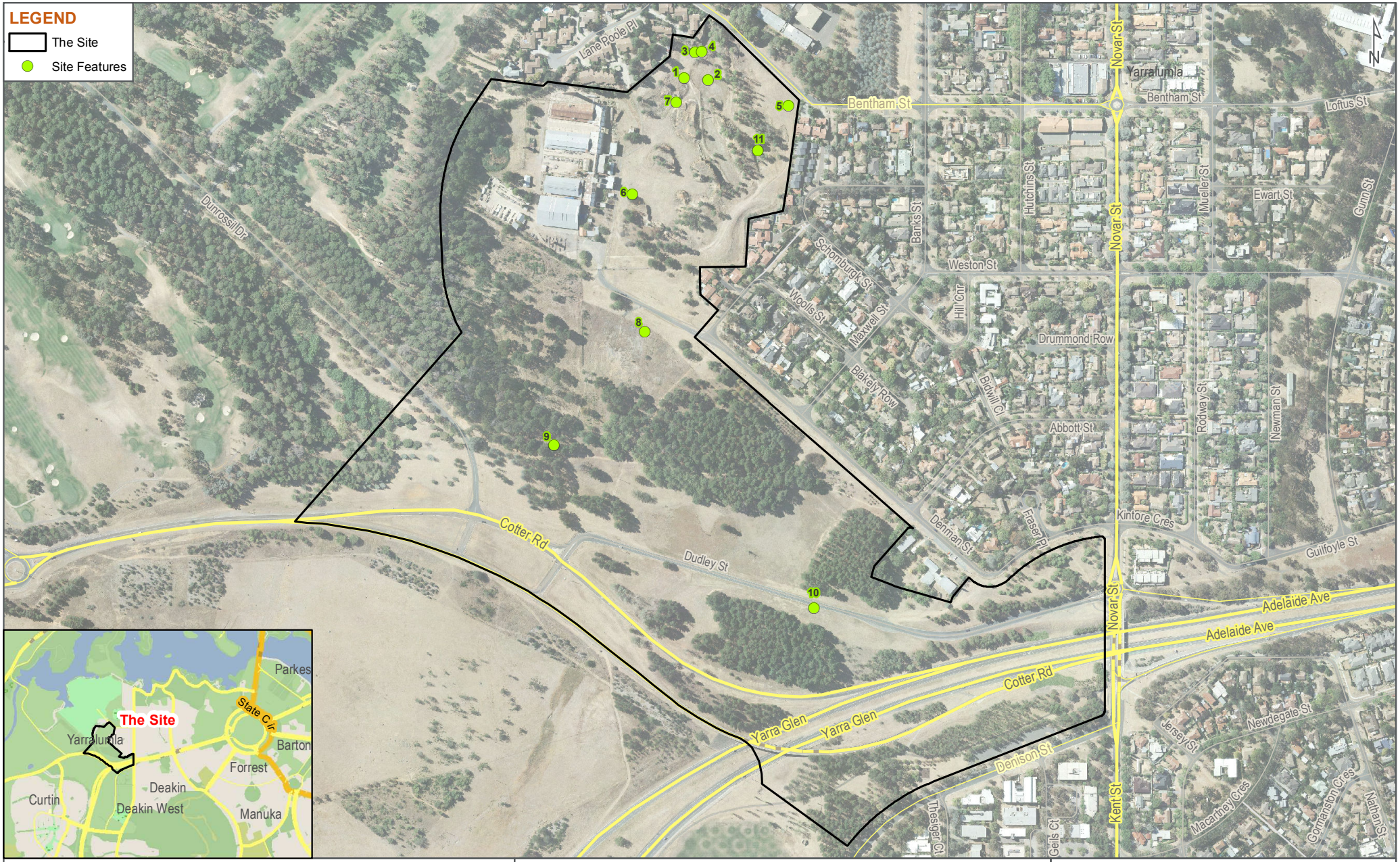


FIG NO. 3	**FIGURE TITLE** **Outcrops and Observations**	**DATE** 31/10/2013	0 40 80 160 1:6,500 Meters	**PAGE SIZE** A4	**COORDINATE SYSTEM** ACT Grid 1966
PROJECT NO. 3002369	**PROJECT TITLE** Canberra Brickworks Preliminary Site Investigation	**CREATED BY** J. Seng	**SOURCES** Imagery © roadnet, Imagery © Stromlo		

Location: X:\PROJECT\3002369 Yarralumla Brickworks Site Investigation\6 Delivery\6.2 Figures and Result Tables\6.2.1 GIS\geotech map - fig 3.mxd

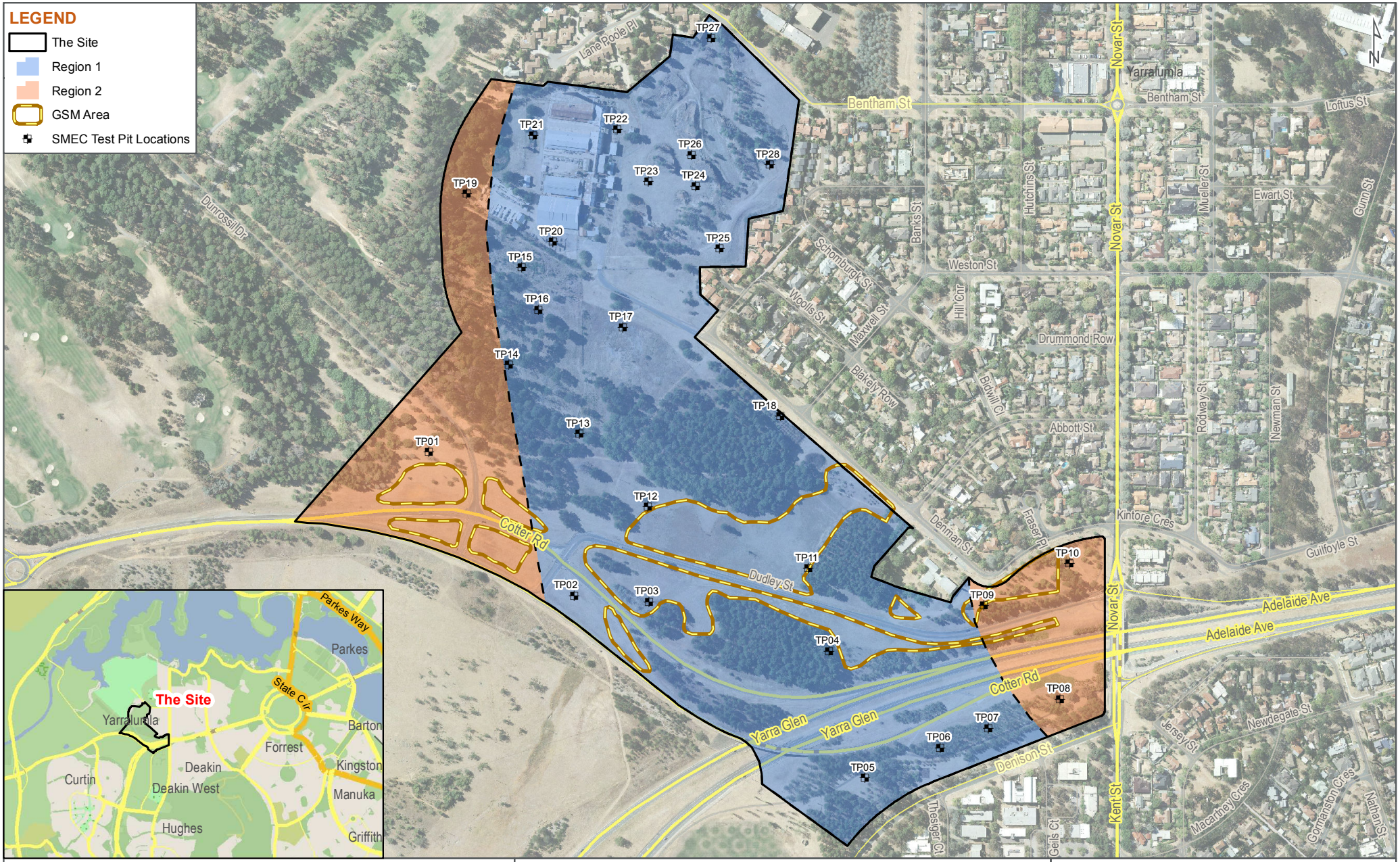


FIG NO. 4	**FIGURE TITLE** Geological Regions	**DATE** 30/10/2013	0 40 80 160 Meters 1:6,500	**PAGE SIZE** A4	**COORDINATE SYSTEM** ACT Grid 1966
PROJECT NO. 3002369	**PROJECT TITLE** Canberra Brickworks Preliminary Site Investigation	**CREATED BY** J. Seng	**SOURCES** Imagery © Roadnet, Imagery © Stromlo		

Location: X:\PROJECT\3002369 Yarralumla Brickworks Site Investigation\6 Delivery\6.2 Figures and Result Tables\6.2.1 GIS\geotech map - fig 4.mxd

APPENDIX B: DEVELOPMENT MASTERPLAN

CANBERRA BRICKWORKS AND ENVIRONS

ACT Government
Economic Development

Land Development Agency
CANBERRA FIRST

MARCH 2013 BOARD PRESENTATION

APPENDIX C: TEST PIT LOGS

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP01

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 689880.000, N: 6090395.000 (56 MGA94)
SURFACE ELEVATION : 585.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara Stariha
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / E / F / H PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP01-0.0 (0.0-0.2)	585.0 / 0.0			SILT low plasticity, dark brown, trace gravel, rootlets, no odour, no staining		F			TOPSOIL
			0.30m TP01-0.5 (0.3-0.5)			ML					100 200 300 400	0.17: HP In-situ =200 - >450 kPa
							0.37m					
						GW	Sandy GRAVEL medium grained, to 20 mm, well graded, sub-rounded, grey-brown, with silt, no odour, no staining		D			RESIDUAL SOIL
							0.49m					0.43: HP In-situ =375 - >450 kPa
				585.5 / 0.5			CLAY low plasticity, grey mottled orange, trace sand, rootlets, no odour, no staining	D	Fb			
			0.80m TP01-1.0 (0.8-1.0)			CL						0.74: HP In-situ >450 kPa
							1.01m					
				586.0 / 1.0			DACITE coarse grained, porphyritic, massive, orange with red bands, extremely low strength, highly weathered, highly fractured, no odour, no staining					BEDROCK
							1.16m					
							EXCAVATION TP01 TERMINATED AT 1.16 m Refusal					
				586.5 / 1.5								
				587.0 / 2.0								
				587.5 / 2.5								
				588.0 / 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP02

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690061.000, N: 6090208.000 (56 MGA94)
SURFACE ELEVATION : 594.960 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara Stariha
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP02-0.0 (0.0-0.2)	595.0	0.0		CL	CLAY low plasticity, dark brown, with sand, with grass rootlets, no odour, no staining	D to M	St			TOPSOIL 0.20: HP In-situ =225 - 450 kPa
			0.40m TP02-0.5 (0.4-0.6)	595.5	0.5		ML	SILT with cobbles low plasticity, dark orange-brown, with gravel, with bitumen, no odour, no staining 0.62m		S			FILL 0.51: HP In-situ =125 - 150 kPa
			1.00m TP02-1.0 (1.0-1.2)	596.0	1.0			COBBLES coarse, to 400 mm, well graded, angular, grey, with gravel, with clay, no odour, no staining 1.12m		MD			
			1.20m TP02-1.3 (1.2-1.4)	596.5	1.5		SW	Gravelly SAND coarse grained, to 200 mm, well graded, angular, red-brown, with cobbles, with bitumen, bricks, no odour, no staining	D	D			1.20: HP In-situ =425 - >450 kPa 1.30: bricks observed
			1.80m QC108 TP02-2.0 (1.8-2.0)	597.0	2.0			2.10m					1.90: asphalt observed
				597.5	2.5			EXCAVATION TP02 TERMINATED AT 2.10 m Refusal on concrete - Possible abandoned pipe					
					3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP03

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690156.000, N: 6090198.000 (56 MGA94)
SURFACE ELEVATION : 592.330 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara Stariha
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			QC107 TP03-0.0 (0.0-0.2)	0.0 / 592.5		CL	CLAY low to medium plasticity, dark brown, with medium grained, well graded, sub-rounded gravel, with grass rootlets, no odour, no staining	D to M	S to F		100 200 300 400	TOPSOIL 0.12: HP In-situ =100 - 150 kPa
			0.30m TP03-0.5 (0.3-0.5)	0.24m		CI	CLAY medium plasticity, grey mottled orange, with medium grained, well graded, sub-rounded gravel, no odour, no staining	M	St			ALLUVIUM 0.37: HP In-situ =175 - 75 kPa
				0.5 / 593.0		CI	Gravelly CLAY medium plasticity, orange mottled grey, with medium to fine grained, well graded, sub-angular gravel, no odour, no staining	W	VSt			0.58: HP In-situ =450 - >450 kPa
			0.80m TP03-1.0 (0.8-1.0)	0.65m			SILTSTONE fine grained, layered, grey weathered orange, medium strength, highly weathered, slightly fractured, no odour, iron staining in fractures	M				BEDROCK
				1.0 / 593.5								
			1.80m TP03-2.0 (1.8-2.0)	1.5 / 594.0								1.65: Ripper used from 1.65 m
				2.00m			EXCAVATION TP03 TERMINATED AT 2.00 m Refusal					
				2.0 / 594.5								
				2.5 / 595.0								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP04

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690384.000, N: 6090131.000 (56 MGA94)
SURFACE ELEVATION : 590.490 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara Stariha
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / E / F / H PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP04-0.0 (0.0-0.2)	590.5 0.0		ML	SILT low plasticity, brown, with coarse, angular gravel, with grass rootlets, non odour, non staining	D	St	2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	100 200 300 400	TOPSOIL 0.08: HP In-situ >450 - 325 kPa
			0.30m TP04- 0.50 (0.3-0.45)	0.17m			SILTSTONE fine grained, layered, red brown, low strength, moderately weathered, highly fractured, no odour, iron staining in fractures					BEDROCK
				0.45m			EXCAVATION TP04 TERMINATED AT 0.45 m Refusal					
				591.0 0.5								
				591.5 1.0								
				592.0 1.5								
				592.5 2.0								
				593.0 2.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP05

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690426.000, N: 6089969.000 (56 MGA94)
SURFACE ELEVATION : 596.650 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER kPa 100 200 300 400	STRUCTURE & Other Observations
			TP05-0.0 (0.0-0.2)	0.0 597.0		ML	Clayey SILT low plasticity, dark brown, with clay, grass rootlets, no odour, no staining	D	S			TOPSOIL
			0.40m TP05-0.5 (0.4-0.6)	0.40m 0.5		CL	Silty CLAY low plasticity, red brown, no odour, no staining		H		X	RESIDUAL SOIL 0.53: HP In-situ =425 kPa
			0.80m TP05-1.0 (0.8-1.0)	0.65m 597.5			SILTSTONE fine grained, layered, pale orange, extremely low strength, extremely weathered, highly fractured, no odour, iron staining				X	ROCK 0.75: HP In-situ >425 kPa
				0.90m 1.0			SILTSTONE fine grained, massive, light grey with orange staining, medium strength, highly weathered, slightly fractured, no odour, iron staining					
				1.15m 598.0 1.5 598.5 2.0 599.0 2.5 599.5 3.0			EXCAVATION TP05 TERMINATED AT 1.15 m Refusal					

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP06

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690523.000, N: 6090005.000 (56 MGA94)
SURFACE ELEVATION : 598.770 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/150mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
			TP06-0.0 (0.0-0.2)	0.0 / 599.0		ML	SILT low plasticity, brown, trace clay, with grass rootlets, no odour, no staining	D	VSt		100 200 300 400	TOPSOIL 0.20: HP In-situ >450 kPa
			0.40m TP06-0.5 (0.4-0.6)	0.45m								
			0.80m TP06-1.0 (0.8-1.0)	0.5 / 599.5		GW	Silty GRAVEL medium grained, to 20 mm, well graded, sub-rounded, light brown, no odour, iron staining		D			ALLUVIUM 0.75: HP In-situ >450 kPa
				1.00m 1.0 / 600.0			SILTSTONE fine grained, layered, orange brown, extremely low strength, extremely weathered, highly fractured, no odour, iron staining in fractures					BEDROCK 1.25: HP In-situ >450 kPa
			1.50m TP06-1.7 (1.5-1.7)	1.50m 1.5			becoming grey weathered orange in fractures					
				1.60m			becoming grey, high strength, slightly weathered, slightly fractured					
				1.70m 600.5			EXCAVATION TP06 TERMINATED AT 1.70 m Refusal					
				2.0 / 601.0								
				2.5 / 601.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP07

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690585.000, N: 6090029.000 (56 MGA94)
SURFACE ELEVATION : 593.470 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER kPa 100 200 300 400	STRUCTURE & Other Observations
			TP07-0.0 (0.0-0.2)	593.5 0.0		ML	SILT low plasticity, red brown mottled black, with fine grained gravel, with grass rootlets, no odour, no staining					TOPSOIL 0.20: HP In-situ >450 kPa
			0.40m TP07-0.5 (0.4-0.6)	0.40m			Gravelly CLAY low plasticity, light grey, well graded, sub-angular gravel, trace sand, no odour, no staining					FILL
			0.80m TP07-1.0 (0.8-1.0)	594.0 0.5		CL		D	H			0.75: HP In-situ >450 kPa
				1.00m 594.5 1.0		CL	CLAY low plasticity, pale brown mottled grey, no odour, no staining					RESIDUAL SOIL 1.25: HP In-situ >450 kPa
			1.70m TP07-1.9 (1.7-1.9)	1.50m 595.0 1.5			SANDSTONE medium to coarse grained, massive, grey weathered orange, extremely low strength, extremely weathered, no odour, iron staining					BEDROCK 1.60: Ripper from 1.6 m
				1.90m 595.5 2.0			EXCAVATION TP07 TERMINATED AT 1.90 m Refusal					
				596.0 2.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP08

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690677.000, N: 6090064.000 (56 MGA94)
SURFACE ELEVATION : 595.930 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER 100 200 300 400 kPa	STRUCTURE & Other Observations
			TP08-0.0 (0.0-0.2)	596.0 / 0.0		ML	SILT low plasticity, dark brown, trace sand, with grass rootlets, no odour, no staining		VSt			TOPSOIL 0.25: HP In-situ =250 - 450 kPa
			0.40m TP08-0.5 (0.4-0.6)									
				0.45m								
				0.5		CL	Sandy CLAY low plasticity, orange-brown, coarse sand, with fine, well graded, sub-rounded gravel, no odour, no staining		H			FILL 0.50: HP In-situ =250 - >450 kPa
				0.55m / 596.5			Sandy Silty CLAY medium plasticity, red-brown, no odour, iron staining					RESIDUAL SOIL 0.60: Large patch of iron staining
			0.80m TP08-1.0 (0.8-1.0)			CI		D	H			0.75: HP In-situ >450 kPa
			1.00m TP08-1.5 (1.3-1.5)	1.00m / 1.0 / 597.0			DACITE coarse grained, porphyritic, massive, orange-brown, extremely low strength, extremely weathered, no odour, no staining					BEDROCK 1.10: Ripper used from 1.1 m
				1.30m			becoming low strength, slightly weathered					
				1.50m / 1.5 / 597.5			EXCAVATION TP08 TERMINATED AT 1.50 m Refusal					
				2.0 / 598.0								
				2.5 / 598.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP09

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690582.000, N: 6090185.000 (56 MGA94)
SURFACE ELEVATION : 592.450 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP09-0.0 (0.0-0.2)	592.5 / 0.0		ML	SILT low plasticity, light brown, with fine grained sand, with grass rootlets, no odour, no staining		H	2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	100 200 300 400	TOPSOIL 0.20: HP In-situ >450 kPa
			0.40m TP09-0.5 (0.4-0.6)	0.36m / 593.0 / 0.5		CL-CI	CLAY low to medium plasticity, orange-brown, trace fine grained sand, no odour, no staining					RESIDUAL SOIL 0.49: HP In-situ >450 kPa
			0.80m TP09-1.0 (0.8-1.0)	0.62m / 593.5 / 1.0			DACITE coarse grained, porphyritic, massive, orange-brown, low strength, highly weathered, moderately fractured, no odour, iron staining particularly in fractures	D				BEDROCK
				1.06m / 594.0 / 1.5			becoming medium strength, highly weathered, moderately fractured					
				1.26m / 594.5 / 2.0			EXCAVATION TP09 TERMINATED AT 1.26 m Refusal					
				595.0 / 2.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP10

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690692.000, N: 6090236.000 (56 MGA94)
SURFACE ELEVATION : 596.420 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP10-0.0 (0.0-0.2)	596.5 / 0.0		ML	SILT low plasticity, dark brown, with coarse, <20 mm gravel, with grass rootlets, no odour, no staining	D	St			TOPSOIL 0.20: HP In-situ =150 - 225 kPa
			0.40m TP10-0.5 (0.4-0.6)	0.39m		CL	Silty CLAY low plasticity, light orange brown, no odour, no staining		VSt			FILL 0.45: HP In-situ =325 - 450 kPa
			0.90m TP10-1.0 (0.9-1.1)	597.0 / 0.5 / 597.5 / 1.0 / 1.5		CI	CLAY medium plasticity, light orange brown speckled black, trace sand, no odour, no staining		H / Fb			0.85: HP In-situ =450 - >450 kPa
				1.58m			EXCAVATION TP10 TERMINATED AT 1.58 m Refusal					
				598.0 / 2.0 / 598.5 / 2.5 / 599.0 / 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP11

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690360.000, N: 6090237.000 (56 MGA94)
SURFACE ELEVATION : 584.110 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETRO-METER Blows/150mm	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
			TP11-0.0 (0.0-0.2)	584.5 0.0		ML	Clayey SILT low plasticity, red-brown, with grass rootlets, no odour, no staining		VSt	2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	100 200 300 400	TOPSOIL
							0.21m SILTSTONE fine grained, layered, orange brown, low strength, highly weathered, highly fractured, no odour, iron staining in fractures					BEDROCK
			0.40m TP11-0.5 (0.4-0.6)	585.0 0.5			0.60m becoming medium strength, slightly weathered, highly fractured	D				0.78: Ripper from 0.78
			1.00m TP11-1.0 (1.0-1.2)	585.5 1.0			1.12m EXCAVATION TP11 TERMINATED AT 1.12 m Refusal					
				586.0 1.5								
				586.5 2.0								
				587.0 2.5								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP12

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690156.000, N: 6090337.000 (56 MGA94)
SURFACE ELEVATION : 585.070 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

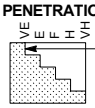
VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER kPa 100 200 300 400	STRUCTURE & Other Observations
			TP12-0. (0.0-0.2)	0.0		ML	Sandy SILT low plasticity, dark brown, well graded sand, no odour, no staining	D to M	F			TOPSOIL 0.15: HP In-situ =0 kPa
			0.40m TP12-0.5 (0.4-0.6)	0.31m 585.5 0.5		ML	Gravelly SILT to 400 mm, low plasticity, dark red-brown, well graded, sub-angular gravel, with cobbles, with boulders, no odour, no staining		F			FILL 0.45: HP In-situ =300 kPa
				0.60m 586.0 1.0			SILTSTONE fine grained, layered, orange brown, low strength, highly weathered, highly fractured, no odour, iron staining, particularly in fractures	D				BEDROCK 0.60: Bitumen observed BEDROCK
				1.20m 586.5 1.5			EXCAVATION TP12 TERMINATED AT 1.20 m Refusal					1.20: Note: Sample location likely to recieve wash from surrounding area
				587.0 2.0								
				587.5 2.5								
				588.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION



WATER

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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP13

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690045.000, N: 6090415.000 (56 MGA94)
SURFACE ELEVATION : 583.820 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP13-0.0 (0.0-0.2)	0.0 584.0		ML	SILT low plasticity, brown, with clay, with grass rootlets, no odour, no staining		F			TOPSOIL 0.15: HP In-situ =50 - 375 kPa
			0.40m TP13-0.5 (0.4-0.6)	0.32m 0.5		CL	CLAY low plasticity, red-brown, with sand, with gravel, no odour, no staining	D	H			RESIDUAL SOIL 0.55: HP In-situ =425 - >450 kPa
			0.80m TP13-1.0 (0.8-1.0)	584.5 0.69m 1.0 585.0 1.30m			SILTSTONE fine grained, amorphous, layered, grey weathered orange, high strength, fresh, moderately weathered, no odour, iron staining in fractures					BEDROCK
				1.5 585.5 2.0 586.0 2.5 586.5 3.0			EXCAVATION TP13 TERMINATED AT 1.30 m Refusal					

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP14

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690044.000, N: 6090417.000 (56 MGA94)
SURFACE ELEVATION : 597.420 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm (2.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0, 22.5)	HAND PENETROMETER kPa (100, 200, 300, 400)	STRUCTURE & Other Observations
			TP14-0.0 (0.0-0.2)	0.0 597.5		ML	Clayey SILT low plasticity, dark brown, with grass rootlets, no odour, no staining	D to M	St			TOPSOIL
				0.25m								
			0.40m TP14-0.5 (0.4-0.6)	0.5 598.0		CL	Silty CLAY low plasticity, red brown, no odour, no staining				0.50: HP In-situ =125 - 350 kPa	FILL
			0.80m TP14-1.0 (0.8-1.0)	0.80m					VSt			
				1.0 598.5		SW	Gravelly SAND orange brown, fine to coarse grained, well graded, sub-rounded gravel, no odour, iron staining		VD		1.00: HP In-situ =300 - >450 kPa	RESIDUAL SOIL
				1.15m			DACITE coarse grained, porphyritic, massive, orange brown, very low strength, highly weathered, no odour, iron staining					BEDROCK
				1.35m			EXCAVATION TP14 TERMINATED AT 1.35 m Refusal					
				1.5 599.0								
				2.0 599.5								
				2.5 600.0								
				3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP15

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690003.000, N: 6090627.000 (56 MGA94)
SURFACE ELEVATION : 595.880 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			QC103 QC104 TP15-0.0 (0.0-0.2)	0.0 596.0		ML	SILT low plasticity, dark brown, with sand, with medium grained, sub-angular gravel, with grass rootlets and bricks, no odour, no staining	D	F		100 200 300 400	TOPSOIL 0.15: HP In-situ =75 - 400 kPa
				0.20m			SILT low plasticity, red-brown, with clay, with glass and charcoal, no odour, iron staining					FILL
			0.40m TP15-05 (0.4-0.6)	0.5 596.5		ML						0.60: HP In-situ =375 - >450 kPa
			0.80m TP15-1.0 (0.8-1.0)	1.0								
				1.00m			Silty CLAY low plasticity, orange mottled black, with sand, no odour, iron staining	D to M	H			RESIDUAL SOIL
			1.80m TP15-2.0 (1.8-2.0)	597.0 1.5 597.5		CL						
				1.90m			SILTSTONE fine grained, amorphous, layered, grey, low strength, moderately weathered, moderately fractured, no odour, iron staining in fractures					BEDROCK
				2.0 598.0			EXCAVATION TP15 TERMINATED AT 2.00 m Refusal					
				2.5 598.5 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP16

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690023.000, N: 6090573.000 (56 MGA94)
SURFACE ELEVATION : 593.710 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP16-0.0 (0.0-0.2)	0.0 / 594.0		GW	Silty GRAVEL coarse grained, well graded, sub-angular, dark brown, with cobbles, no odour, iron staining in gravel	D to M	VD			TOPSOIL 0.15: HP In-situ =175 kPa
			0.40m TP16-0.5 (0.4-0.6)	0.30m / 0.5		CL	Gravelly CLAY low plasticity, red-brown, natural sandstone, medium grained, subrounded gravel, with sand, no odour, iron staining in gravel		VSt			RESIDUAL SOIL 0.40: HP In-situ =300 - >450 kPa 0.60: HP In-situ =450 - >450 kPa
			0.75m TP16-1.0 (0.8-1.0)	0.75m / 594.5 / 1.0			SANDSTONE medium to coarse grained, massive, red/orange brown, very low strength, extremely weathered, no odour, iron staining along fractures					BEDROCK
				1.15m / 595.0 / 1.5			EXCAVATION TP16 TERMINATED AT 1.15 m Refusal					
				595.5 / 2.0								
				596.0 / 2.5								
				596.5 / 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP17

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690130.000, N: 6090548.000 (56 MGA94)
SURFACE ELEVATION : 591.270 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 9/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			QC102 TP17-0.0 (0.0-0.2)	591.5 / 0.0		CL	Sandy CLAY low to medium plasticity, orange brown, with coarse, to 15 mm, well graded gravel, with grass rootlets, with bitumen and glass, no odour, no staining					TOPSOIL
				0.20m								
			0.40m TP17-0.5 (0.4-0.6)	591.5 / 0.5		CL	Sandy CLAY coarse, to 15 mm, well graded, low to medium plasticity, orange brown, with gravel, with bitumen and glass, no odour, no staining		H			FILL 0.25: HP In-situ =425 - >450 kPa
				0.50m								
			0.80m TP17-1.0 (0.8-1.0)	592.0 / 1.0			SILTSTONE fine grained, layered, grey weathered orange, very low strength, highly weathered, highly fractured, interspersed with fresh, grey, high strength shale corestones ~500 mm in diameter from ~ 0.6 m., no odour, iron staining in fractures	D				BEDROCK
				592.5 / 1.5								
				1.70m			EXCAVATION TP17 TERMINATED AT 1.70 m Refusal					
				593.0 / 2.0								
				593.5 / 2.5								
				594.0 / 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP18

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690328.000, N: 6090431.000 (56 MGA94)
SURFACE ELEVATION : 596.560 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 10/9/13
LOGGED BY : Kara
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP18-0.0 (0.0-0.1)	0.0		SW	Clayey SAND medium grained, well graded, dark brown, trace gravel, with grass rootlets, no odour, no staining	D to M	MD			TOPSOIL 0.20: HP In-situ =200 - 275 kPa
			0.40m TP18-0.5 (0.4-0.6)	597.0 0.5		CI	0.34m CLAY medium plasticity, red brown, trace gravel, no odour, no staining		St			RESIDUAL SOIL 0.45: HP In-situ =175 - 375 kPa
							0.54m SILTSTONE fine grained, layered, orange mottled grey and red, extremely low strength, extremely weathered, highly fractured, no odour, iron staining particularly in fractures					BEDROCK 0.70: HP In-situ =350 - >475 kPa
			1.00m TP18-1.0 (1.0-1.2)	597.5 1.0			0.88m 0.95m becoming grey weathered orange, very low strength, highly weathered, moderately fractured becoming medium strength, slightly weathered, moderately fractured					
							1.37m EXCAVATION TP18 TERMINATED AT 1.37 m Refusal					
				598.0 1.5								
				598.5 2.0								
				599.0 2.5								
				599.5 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP19

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 689935.000, N: 6090722.000 (56 MGA94)
SURFACE ELEVATION : 589.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER 100 200 300 400 kPa	STRUCTURE & Other Observations
			TP19-0.0 (0.0-0.2)	589.0 0.0		CL	CLAY low plasticity, dark brown, with silt, with grass rootlets, no odour, no staining	D to M	F			TOPSOIL 0.00: ACM Fragments observed in vicinity TOPSOIL
				0.18m								
			0.30m TP19-0.3 (0.3-0.5)			CI	CLAY medium plasticity, orange brown mottled grey, trace sand, trace well graded, sub-angular gravel, no odour, no staining	M	VSt			RESIDUAL SOIL
			0.50m TP19-1.0 (0.8-1.0)	589.5 0.5								0.50: HP In-situ =325 - >450 kPa 0.60: Decomposed organic matter observed - possible tree root
				0.79m			DACITE coarse grained, porphyritic, massive, orange brown mottled red, extremely low strength, extremely weathered, no odour, iron staining					BEDROCK
				0.98m			becoming low strength, highly weathered					
				590.0 1.0								
				1.10m			EXCAVATION TP19 TERMINATED AT 1.10 m Refusal					
				590.5 1.5								
				591.0 2.0								
				591.5 2.5								
				592.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP20

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690043.000, N: 6090659.000 (56 MGA94)
SURFACE ELEVATION : 583.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / E / F / H PENETRATION	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP20-0.0 (0.0-0.2)	583.0 0.0		GP	0.05m GRAVEL medium to coarse grained, to 20 mm, poorly graded, angular, grey, DGB, well compacted gravel sealed carpark, no odour, no staining		D			FILL
						CI	CLAY medium plasticity, light brown, with coarse, to 20 mm, well graded, angular, shale and brick gravel, with bitumen and brick, no odour, no staining		St			
			0.40m TP20-0.5 (0.4-0.6)				0.27m SILTSTONE fine grained, amorphous, layered, grey weathered orange, low to medium strength, moderately weathered, highly fractured, no odour, iron staining in fractures					BEDROCK
				583.5 0.5			0.47m becoming medium to high strength, slightly weathered, moderately fractured	D				
			1.00m TP20-1.0 (1.0-1.2)	584.0 1.0			1.20m					
							EXCAVATION TP20 TERMINATED AT 1.20 m Refusal					
				584.5 1.5								
				585.0 2.0								
				585.5 2.5								
				586.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP21

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690222.000, N: 6090766.000 (56 MGA94)
SURFACE ELEVATION : 588.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER kPa 100 200 300 400	STRUCTURE & Other Observations
			TP21-0.0 (0.0-0.2)	588.0 0.0		ML	Gravelly SILT low plasticity, dark brown, coarse, to 20 mm, well graded, sub-angular gravel, with grass rootlets, with brick, no odour, no staining		S			TOPSOIL
				0.14m			Silty COBBLES coarse, to 400 mm, well graded, angular, red-brown, with boulders, combination of bricks, tiles, quarry refuse (shale), and white tuff fragments. Also ash, coal and bitumen observed, no odour, no staining	D	VL			FILL
			0.40m TP21-0.5 (0.4-0.6)	588.5 0.5								
			0.80m TP21-1.0 (0.8-1.0)	589.0 1.0								
				589.5 1.5			1.56m EXCAVATION TP21 TERMINATED AT 1.56 m Collapse					
				590.0 2.0								
				590.5 2.5								
				591.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP22

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690128.000, N: 6090800.000 (56 MGA94)
SURFACE ELEVATION : 586.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm (2.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0, 22.5)	HAND PENETROMETER kPa (100, 200, 300, 400)	STRUCTURE & Other Observations
			TP22-0.0 (0.0-0.2)	586.0 0.0		CL	Sandy CLAY low plasticity, brown, with metal, with grass rootlets, no odour, no staining	D	St			TOPSOIL
							0.19m					
						SW	Gravelly SAND brown, medium grained, well graded, angular shale gravel, with clay, with ash and bitumen, no odour, no staining	D to M	MD			FILL
							0.38m					
			0.40m QC113 TP22-0.5 (0.4-0.6)			GW	Sandy GRAVEL medium grained, well graded, angular, grey speckled white, with ash and bitumen, no odour, no staining					0.45: HP In-situ =350 - >450 kPa
				586.5 0.5			0.54m					
						CL	Sandy CLAY low plasticity, brown mottled red, with ash, bitumen and bricks, no odour, no staining	M	VSt			
			0.80m TP22-1.0 (0.8-1.0)	587.0 1.0								0.75: HP In-situ >450 kPa
							1.25m					
							1.30m SILTSTONE fine grained, amorphous, layered, grey, high strength, slightly weathered, moderately fractured, no odour, iron staining in fractures					BEDROCK
				587.5 1.5			EXCAVATION TP22 TERMINATED AT 1.30 m Refusal					
				588.0 2.0								
				588.5 2.5								
				589.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP23

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690166.000, N: 6090733.000 (56 MGA94)
SURFACE ELEVATION : 605.500 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP23-0.0 (0.0-0.2)	605.5 / 0.0		ML	Sandy SILT low plasticity, brown, with grass rootlets, with brick, no odour, no staining		St			TOPSOIL 0.15: HP In-situ =375 - 450 kPa
			0.40m TP23-0.5 (0.4-0.6)	606.0 / 0.5			0.30m Sandy CLAY medium plasticity, brown, with coarse, to 300 mm, angular gravel, cobbles and boulders of fresh siltstone (quarry cuttings), brick, bitumen, no odour, no staining					FILL 0.50: HP In-situ =350 - 450 kPa
			0.80m TP23-1.0 (0.8-1.0)	606.5 / 1.0		CI		D	St			
			1.80m TP23-2.0 (1.8-2.0)	607.0 / 1.5			1.59m SILTSTONE fine grained, amorphous, layered, orange-brown, medium strength, slightly weathered, highly fractured, no odour, iron staining particularly in fractures					BEDROCK
				607.5 / 2.0			2.37m EXCAVATION TP23 TERMINATED AT 2.37 m Refusal					2.37: No ACM observed
				608.0 / 2.5								
				608.5 / 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP24

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690226.000, N: 6090726.000 (56 MGA94)
SURFACE ELEVATION : 597.500 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm	HAND PENETROMETER kPa	STRUCTURE & Other Observations
			TP24-0.0 (0.0-0.2)	597.5 0.0		ML	Sandy SILT low plasticity, brown, with grass rootlets, bitumen and bricks, no odour, no staining	D	St			TOPSOIL
				0.10m		CI	Gravelly CLAY medium plasticity, orange-brown, medium grained, to 200 mm, well graded, angular, possible DGB or quarry cuttings gravel, no odour, no staining	M	St			FILL
				0.30m		CL	Gravelly CLAY low plasticity, light grey, medium grained, shale, to 100 mm, well graded, sub-rounded gravel, possible quarry cuttings , no odour, no staining		F			
			0.40m TP24-0.5 (0.4-0.5)	0.40m								BEDROCK
				0.50m			SILTSTONE fine grained, amorphous, layered, dark grey, high strength, slightly weathered, moderately fractured, no odour, iron staining in fractures					
				598.0 0.5			EXCAVATION TP24 TERMINATED AT 0.50 m Refusal					
				598.5 1.0								
				599.0 1.5								
				599.5 2.0								
				600.0 2.5								
				600.5 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP25

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690255.000, N: 6090627.000 (56 MGA94)
SURFACE ELEVATION : 601.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER 100 200 300 400 kPa	STRUCTURE & Other Observations
			TP25-0.0 (0.0-0.2)	601.0 0.0		Cl	0.10m CLAY medium plasticity, light brown, with coarse, well graded, angular gravel, with brick, glass and grass rootlets, no odour, no staining		St			TOPSOIL
			0.50m TP25-0.5 (0.4-0.6)	601.5 0.5			Clayey COBBLES coarse, well graded, angular, light brown and grey, with fresh to slightly weathered shale boulders, some bricks and glass, no odour, no staining, reworked natural material, possible quarry cuttings					FILL 0.10: reworked natural material, possible quarry cuttings 0.30: metal pipe observed
			1.00m TP25-1.0 (0.8-1.0)	602.0 1.0								
				602.5 1.5				D	MD			
			2.00m TP25-2.0 (1.9-2.1)	603.0 2.0								2.00: rusted metal container - possibly old drum
				603.5 2.5			3.00m					
			3.00m TP25-3.0 (2.8-3.0)	604.0 3.0			EXCAVATION TP25 TERMINATED AT 3.10 m Machine Limit					3.00: bitumen and ash observed
				604.5 3.5								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP26

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690222.000, N: 6090766.000 (56 MGA94)
SURFACE ELEVATION : 588.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION (Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components)	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm (2.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0, 22.5)	HAND PENETROMETER kPa (100, 200, 300, 400)	STRUCTURE & Other Observations
			TP26-0.0 (0.0-0.2)	588.0 0.0		ML	SILT low plasticity, dark brown, with sand, with glass, grass rootlets, no odour, no staining		St			TOPSOIL
			0.40m QC110 TP26-0.5 (0.4-0.6)	588.5 0.5			0.34m COBBLES coarse, to 250 mm, poorly graded, angular, red-brown, whole bricks , with metal, ash, bitumen, no odour, no staining		MD			FILL
			0.80m TP26-1.0 (0.8-1.0)	589.0 1.0		Cl	0.56m CLAY medium plasticity, grey and brown, with silt, with bitumen, ash, no odour, no staining		St			
			1.80m TP26-2.0 (1.8-2.0)	589.5 1.5			1.10m COBBLES coarse, to 250 mm, poorly graded, angular, red-brown, whole bricks , metal, ash, bitumen, no odour, no staining	D	L			2.00: Metal engine part observed
			2.80m TP26-3.0 (2.8-3.0)	590.0 2.0								
				590.5 2.5								
				591.0 3.0			3.00m EXCAVATION TP26 TERMINATED AT 3.00 m Collapse					
				591.5 3.5								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP27

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690250.000, N: 6090914.000 (56 MGA94)
SURFACE ELEVATION : 594.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY / RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER kPa 100 200 300 400	STRUCTURE & Other Observations
			TP27-0.0 (0.0-0.7)	594.0 0.0		CL	Gravelly CLAY low plasticity, dark brown, coarse, angular gravel, with grass rootlets, no odour, no staining		St			TOPSOIL
							0.28m					0.15: HP In-situ =200 - >450 kPa
			0.40m TP27-0.5 (0.4-0.6)	594.5 0.5			COBBLES coarse, to 300 mm, well graded, angular, grey, with shale boulders, reworked natural material - probably quarry cuttings, overlying fine grained, fresh, high strength natural outcrops, no odour, no staining	D	L			FILL
			0.80m TP27-1.0 (0.8-1.0)	595.0 1.0			1.05m fill ending at 1.05 m, becoming unworked siltstone - high strength, fresh, moderately fractured					BEDROCK
							1.30m EXCAVATION TP27 TERMINATED AT 1.30 m Refusal					
				595.5 1.5								
				596.0 2.0								
				596.5 2.5								
				597.0 3.0								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F 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-Remouded (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.

SMEC AUSTRALIA

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP28

PROJECT : Old Canberra Brickworks
LOCATION : Yarralumla ACT
CLIENT : Land Development Agency
FEATURE : Geotechnical
FILE / JOB NO : 3002369
SHEET : 1 OF 1

POSITION : E: 690321.000, N: 6090751.000 (56 MGA94)
SURFACE ELEVATION : 597.000 (AHD)

EQUIPMENT TYPE : 8-tonne Excavator
METHOD : Test Pit

DATE EXCAVATED : 11/9/13
LOGGED BY : Claudia Rodriquez
CHECKED BY :

EXCAVATION DIMENSIONS : 2.00 m LONG 0.60 m WIDE

DRILLING | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DYNAMIC CONE PENETROMETER Blows/150mm 2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5	HAND PENETROMETER 100 200 300 400 kPa	STRUCTURE & Other Observations
			TP28-0.0 (0.0-0.2)	597.0 0.0		CI	Gravelly CLAY medium plasticity, dark brown, medium grained, well sorted, angular gravel, with sand, with brick, glass, bitumen, and grass rootlets, no odour, no staining		St			TOPSOIL
				0.10m			Clayey COBBLES coarse, to 250 mm, poorly graded, angular, red-brown, whole brick fill , with sand, with glass and bitumen, no odour, no staining					FILL
			0.40m TP28-0.5 (0.4-0.6)	597.5 0.5								
				598.0 1.0								
				598.5 1.5				D	L			
				599.0 2.0								
				599.5 2.5								
				3.00m			EXCAVATION TP28 TERMINATED AT 3.00 m Collapse					
				600.0 3.0								
				600.5 3.5								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

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

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

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10 Oct., 73 Water Level on Date shown
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SMEC AUSTRALIA