

Report on Geotechnical Investigation

Proposed Residential Subdivision 32 Lovelle Street and 141 Yarrawa Road, Moss Vale

> Prepared for Prime Moss Vale Pty Ltd

> > Project 40494.03 April 2020



# **Douglas Partners** Geotechnics | Environment | Groundwater

# **Document History**

# Document details

Project No.	40494.03	Document No.	R.002.Rev0
Document title	Report on Geotechnical Investigation		
	Proposed Residential	Subdivision	
Site address	32 Lovelle Street and	141 Yarrawa Road	, Moss Vale
Report prepared for	Prime Moss Vale Pty Ltd		
File name	40494.03.R.002.Rev0		

# Document status and review

Status	Prepared by	Reviewed by	Date issued	
Rev0	R J Haselden	G W McIntosh	7 April 2020	

# Distribution of copies

Status	Electronic	Paper	Issued to
Rev0	1	0	Ms Angela Villate, Prime Moss Vale Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Report on Geotechnical Investigation Proposed Residential Subdivision 32 Lovelle Street and 141 Yarrawa Road, Moss Vale

# 1. Introduction

This report presents the results of a rock depth and rock quality assessment undertaken for a proposed residential subdivision at 32 Lovelle Street (Chelsea Gardens) and 141 Yarrawa Road (Coomungie), Moss Vale. The investigation was commissioned in an email dated 14 October 2019 by Prime Moss Vale Pty Ltd, the project developer, and was undertaken in accordance with Douglas Partners' Pty Ltd (DP) proposal WOL190315.P.001.Rev1 dated 4 October 2019.

Geotechnical investigation was carried out to determine the subsurface conditions at locations nominated by Orion Consulting Engineers Pty Ltd (OC) to provide information on the depth and strength of the bedrock for an assessment of excavatability for proposed bulk earthworks modelling. The field work included the drilling of eighteen cored boreholes followed by laboratory testing, engineering analysis and reporting. Details of the work undertaken and the results obtained are given in the report, together with comments relating to the above items, development potential and construction practice.

The investigation was undertaken concurrently with a stability assessment for the steep hillside in the northern part of the site, and a preliminary assessment of erosion and salinity potential. Both of these have been reported separately (Project 40494.03.R.001 and Project 40494.03.R.003 respectively).

Preliminary information on the field work was provided in a Memorandum C.001.Rev0 dated 4 December 2019. This report supersedes all previous written correspondence and verbal advice.

A draft report was provided dated 16 January 2020. This report supersedes all previous written correspondence and verbal advice.

# 2. Background

In 2018 DP carried out a preliminary geotechnical investigation (DP, 2018) at the site for the same project. The field work included 26 test pits and geotechnical mapping by an experienced engineering geologist. In summary, the report included preliminary comment on site preparation, excavation and filling including the re-use of excavated materials and the treatment of farm dams, soil and water management planning and sediment basins.

Information provided by the client for the current assessment included:

• Orion Consulting 'Bulk Earth Works Strategy', Project 19-34 Plans 000, 200 – 2023, 300 – 313, 401 and 501 – 508 Revision 1 dated 13 September 2019.



Information previously provided by the client included:

• Harvest Scientific Services (HSS) 'Soil, Groundwater, Agricultural Capability, Geotechnical Classification, Mineral Potential and Preliminary Contamination Report for the Proposed "Chelsea Gardens Development Site", Job Reference 200677 dated 11 October 2006;

Relevant information from the DP's 2018 report, HSS's 2006 report and plans was used in the current assessment.

# 3. Site Description

The site comprises Lot 12 in DP 866036 and Lot 3 in DP 706194 (refer Drawing 1). It forms an irregular-shaped area of approximately 124 ha with maximum north-south and east-west dimensions of 1170 m and 770 m, respectively. It is accessed from Hill Road, Lovelle Street and Yarrawa Road and extends around the southern part of the Moss Vale Golf Course. With the exception of the golf course, areas to the north of the site typically comprise low-density residential and larger rural-residential lots. Land immediately to the west includes a large warehouse occupied by Harper Distribution Services. The remaining land to the south, east and west comprised generally undeveloped rural land with scattered dwellings.

The site is mostly contained between two generally north-south oriented ridgelines that form the upper catchment of Whites Creek. The higher of these ridge lines is located through the eastern part of the site and the lower is located to the west of the site. A relatively small portion at the eastern edge of the site is in the catchment of an unnamed tributary of the Wingecarribee River. Much of the slopes within the site are gentle  $(0 - 10^\circ)$  with some moderately steep slopes  $(10 - 18^\circ)$  on the sides of low ridgelines. The northern part of the site however is dominated by steep  $(18 - 27^\circ)$  and very steep  $(27 - 45^\circ)$  slopes.

Surface levels generally range from approximately RL 752 (relative to Australian Height Datum [AHD]) near the water reservoir in the northern part of the site to approximately RL 682 in the unnamed tributary of Whites Creek at the western boundary of the Moss Vale Golf Course.

At the time of the investigation, the majority of site was vacant and lightly grassed and a number of farm dams had been constructed in the existing drainage depressions. Existing dwellings were located at 32 Lovelle Street and 141 Yarrawa Road. Several sheds and associated farm infrastructure were located in the vicinity of the dwellings. A bridge had also been constructed across the unnamed tributary of Whites Creek located in the north-western part of the site.

The colour photoplates in Appendix B show the site conditions during DP's October 2018 investigation.

# 4. Regional Geology

Reference to the Moss Vale 1:100 000 Geological Series Sheet (NSW DISRD, 2016) indicates that the stratigraphy of the site comprises, in ascending stratigraphical order, rocks of the Bringelly



Shale (*Twib*), volcanics and igneous intrusives ( $Jui_b \& Jui_m$ ), and Quaternary colluvium and residuum ( $Q_ct \& Q_r$ ). The Robertson Basalt (*CZuce*) is also located close to the site. The published distribution of the stratigraphical units is shown in Figure 1 (following page).

The lithologies of the various formations are summarised (after NSW DISRD, 2016) as comprising:

**Bringelly Shale (***Twib***):** light to dark grey, sideritic claystone to siltstone, dark grey carbonaceous claystone, sandstone to siltstone, quartz-lithic very fine to medium-grained sandstone. Plant fragments abundant locally. Typically strongly weathered with extensive soil development.

**Syenite-monzanite-diortie** (*Jui\_m*): pale-grey porphyritic felsic rock. Chlorite after amphibole and pyroxene. Rare miarolitic cavities.

Unnamed extrusive volcanics (Jui\_b): dark, medium-grained dolerite.

**Robertson Basalt (***CZuce***):** grey to black, fine-grained alkali olivine basalt; basanite locally. Typically deeply weathered with extensive development of red-brown soils.

**Quaternary colluvium (***Q\_ct***):** talus deposits and poorly-sorted, weakly cemented to unconsolidated colluvial lenses of polymictic conglomerate interspersed with unconsolidated clay and silty sand layers.

**Quaternary residuum (***Q\_r***):** residual deposits of unconsolidated clayey coarse to fine grained sands to weakly consolidated sandy clay layers; poor to extensive soil development.

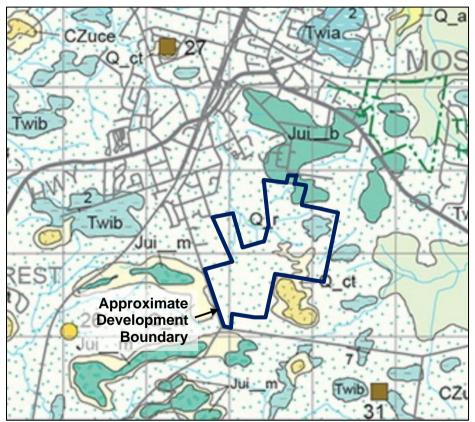


Figure 1: Distribution of Geological Units after Ref 1



# 5. Field Work Methods

The field work for the current investigation, to supplement and provide additional information on the subsurface conditions across the site, comprised the drilling of eighteen augered and diamond core drilled boreholes (Bores 107 - 124) to depths ranging from 2.5 m to 5.2 m. The boreholes included regular Standard Penetration Tests (SPTs) in the soil profile and were logged by a geotechnical engineer. At the completion of drilling, a piezometer was installed in Bore 107.

Previous and concurrent subsurface investigations and assessments used as part of the assessment described within comprised:

- Geological mapping (September 2018) by an experienced engineering geologist;
- The excavation (2018) of 26 test pits (Pits 1 26) to depths ranging from 0.5 m to 2.5 m;
- The drilling of six boreholes (Bores 101 106) to depths of 4.3 m to 10.9 m for the stability assessment of the steep hillside;
- The installation of six piezometers in Bores 101 106 for the stability assessment of the steep hillside; and
- The excavation of eight test pits (Pits 125 132) to depths ranging from 2.1 m to 3.2 m for the steep hillside and preliminary assessment of erosion and salinity.

The current and previous test locations are shown on Drawing 1 in Appendix B. The surface levels to Australian Height Datum (AHD) and coordinates to Map Grid of Australia (MGA) were determined on site using a differential GPS unit for which an accuracy of  $\pm$  20 mm is typical.

# 6. Field Work Results

# 6.1 General

The subsurface conditions encountered are given in the log sheets in Appendix B. The terms used to classify the strata are in Appendix A. Summary geological cross sections (Sections A - A', B - B' and C - C') are given on Drawings 2 - 4 in Appendix B.

# 6.2 Geological Mapping

The principal observations made are summarised below with selected items shown on in Photos 1 - 16 (refer Plates 1 - 5 in Appendix B).

- Bedrock comprising medium to high strength, slightly fracture dolerite at discrete locations in the steep to very steep hillside in the northern part of the site, below the existing water reservoirs (refer Photo 11).
- Bedrock comprising fine-grained sandstone in an excavated trench through the gently-sloping hillsides in the eastern part of the site (refer Photo 12).
- Numerous igneous cobbles on the surface of a gently sloping to moderately steep slope in the south-western part of the site (refer Photo 14).



# 6.3 Subsurface Investigation

The succession of strata is broadly summarised as follows:

**Uncontrolled Filling** – present in Pit 17 and observed in access roads around the dwelling off 32 Lovelle Street and in walls of farm dams. The type of material should be expected to vary significantly between different areas of filling and include building rubble, coal washery reject and natural soils sourced from the site (ie for farm dams).

**Topsoil** – clay, silty clay, sandy clay and clayey silt with root fibres to depths of 0.1 - 0.3 m;

**Alluvium** – stiff to hard silty clay overlying the residual soil profile in the lower reaches of the site, ranging in thickness from 0.9 m to in excess of 2.5 m, described in Pits 11, 13, 22, 24 and 25 but absent in the remaining pits.

**Colluvium** – present in Bores 101, 102, 104, 105 and 107, and Pits 1, 3 - 8, 126 and 127 comprising stiff to very stiff clay, silty clay and sandy clay with included gravel, cobbles and boulder-sized dolerite fragments to depths of up to 1.3 m in the middle and upper slopes and to depths of 4.4 m in the lower slopes at the test locations. The colluvium ranged in thickness from less than 0.4 m to 4.4 m, directly overlying (and probably, in part, grading to) residual soil or weathered bedrock. At Pit 1 in an area of seepage, colluvium was initially of soft consistency.

**Residual Soil** – stiff to hard clay, silty clay, sandy clay and shaly clay grading into extremely weathered siltstone, sandstone, shale, syenite and dolerite. The profile ranged in thickness from 0.1 m to in excess of 5.0 m, described in Bores 101 - 124 and Pits 1, 3, 4, 8, 10 - 16, 18 - 23, 25 and 26, and 125 - 132, but absent in the remaining pits.

**Bedrock** – comprising variously very low to very high strength, siltstone, sandstone, shale, syenite and dolerite in all boreholes and pits with the exception of Bore 120 and Pits 12, 20, 24, 26, 128, 131 and 132. Rock was intersected at depths ranging from 0.1 m (Pits 2 and 9) to 8.0 m (Bore 105).

# 7. Groundwater

The following groundwater observations were made during the current investigation:

- Groundwater was encountered during auger drilling at depths of 4.0 m (Bore 101), 7.7 m (Bore 107) and 2.8 m (Bore 119);
- Groundwater was measured in standpipe piezometers installed in the steep hillside in the northern part of the site at depths of 2.2 m (Bore 101), 5.6 m (Bore 102) and 7.9 m (Bore 105) on 6 November 2019. No groundwater was observed within the depth of the standpipe piezometers at the remaining locations (Bores 103, 104, 106 and 107).

Seepage was previously observed during DP's preliminary investigation in September 2018 in Pit 1 in an active area of slumping in the steep hillside. Seepage was also inferred during mapping and from a review of aerial photography:

- Between RL 694 to RL 709 in the lower hillside in the central and western parts of the site (refer Drawing 1); and
- About previous slumping near Pit 1.



Groundwater seepage was also previously observed by HSS (2006) in the vicinity of DP's Pit 1 in the northern hillside and also on both sides (ie east and west) along the lower and middle flanking slopes along the eastern ridgeline.

Groundwater levels are dependent on preceding climatic conditions and soil permeability, and can therefore vary with time. It is noted that the current field work was carried out following a below average period of rainfall.

# 8. Laboratory Testing

Point load strength index ( $I_{S[50]}$ ) testing was carried out on samples of rock core. The test results are shown on the borehole logs (Appendix B). The results indicate point load strengths of 0.3 – 1.9 MPa in the sedimentary rocks (ie sandstone, conglomerate, siltstone and shales) and 0.2 – 9.6 MPa in the igneous rocks (ie dolerite). Inferred values for uniaxial compressive strength (UCS), based on a correlation factor of 20, are in the range 6 - 38 MPa in the sedimentary rocks and 4 - 192 MPa in the igneous rocks.

# 9. Proposed Development

The Stage Bulk Earthworks Strategy Plan for the proposed development, dated September 2019 (refer Figure 2, following page) was provided for the current assessment. The plans indicated cut (in red) and fill (in blue) of up to about 3 m. The deepest area of cut are generally located within the ridgelines located in the eastern and south-western parts of the site, as well as for ponds and detention basins located in the central part of the site (ie around the southern part of the golf course). The approximate extent of cut and fill is also shown on Geotechnical Sections A - A', B - B' and C - C' on Drawings 2 - 4.

It is noted that the extent of potential excavation in the middle and upper slopes of the northern hillside had not been determined at the time of reporting and will be dependent on the results of DP's stability assessment for the steep hillside (Report 40494.03.R.001).





Figure 2: Bulk Earthworks Strategy Plan.



# 10. Comments

# 10.1 General

The following comments are based on the surface and subsurface profiles encountered during the DP's current and previous investigations and on the results of laboratory testing.

# 10.2 Geotechnical Site Model

The inferred geological model for the site includes:

- Extensive cover of the low-lying area of the Whites Creek catchment by alluvial materials to depths exceeding 3 m in some locations.
- Infilling of some drainage paths by water-logging susceptible colluvium and alluvium derived mainly from colluvial materials in the northern part of the site and possibly in areas adjacent to Park Leigh Hill, to the southeast of the site.
- A variable thickness of colluvial cover over most of the northern part of the site as the result of the combination of direct deposition by ancient landslide activity during slope retreat, historical landslide activity probably facilitated by land clearing and/or the transport of eroded debris (colluvium) downslope by sheet stormwater flow. It should be noted that the on-going erosion and/or deposition of colluvial materials may hide older (relict) landslide features within the lower elevations of the site.
- Residual soils, typically 1 2 m thick covering the ridgelines and increasing to up to 5 m thick in the lower reaches of the site, grading into the underlying weathered rock.
- Bedrock, of the Jurassic Volcanics, comprising dolerite, in the middle and upper slopes of the steep hillside in the northern part of the site.
- Bedrock, of unnamed intrusive igneous, comprising syenite, monzonite and diorite in the southwestern part of the site.
- Bedrock, of the Bringelly Shale, comprising shales, claystone, siltstone and laminite with more resistant sandstone bands through the eastern, central and north-westerns parts of the site and in the lower and middle slopes of the steep hillside.
- Groundwater flow through thinner sandstone bands at lower elevations within the hillside in the northern part of the site and also in the low ridgeline in the eastern part of the site may also trigger slumping at both new and previous slump and flow debris locations.

# **10.3 Excavation Conditions**

Based on the Stage Bulk Earthworks Strategy Plan, excavations to achieve the proposed design surface will necessitate cuts of up to approximately 3 m, with the depth of cuts typically increasing in the elevated areas of the site including the ridgeline in the eastern part of the site, the flanking slopes in the western and southern parts of the site, and also for ponds and detention basins in the central part of the site (ie around the southern part of the golf course). The approximate proposed excavation levels (PEL) are shown on borehole and test pit logs at individual locations.



Within the proposed depth of excavation, a wide range of materials will be encountered (refer Sections A - A', B - B' and C - C', Drawings 2 - 4). The profiles expected in the lower reaches of the site will generally comprise alluvial and residual soils to the full depth of proposed excavations. In the elevated areas mentioned above, the thickness of the soil profile generally decreases and excavations will include residual clays grading into very low to low strength rock typically at depths of 0.3 - 2.0 m however increasing to depths of 3 m or at some locations. Medium strength or stronger rock, or refusal on medium strength rock, was encountered or is expected within the proposed depth of cut at or in the vicinity of:

- Pits 9 and Bores 121 and 122 in the southern part of the site;
- Pits 17 and 21 and Bore 115 in the southern part of the eastern ridgeline in the eastern part of the site; and
- Pits 18 and Bores 110 and 111 in the eastern part of the site

The approximate extent of rock expected to be exposed at the proposed design surface is shown on Drawing 5 in Appendix B.

# **10.4 Excavation Equipment**

It is expected that excavation within the site soils in the lower reaches of the site and in the upper profile in the elevated areas of the site could be readily carried out using conventional hydraulic equipment. Excavation into the underlying bedrock will be required at some of elevated locations (refer Drawing 5) to achieve the nominated design surface levels. The excavatability of rock primarily depends on the rock strength and jointing characteristics. As a guide, excavator bucket refusal and TC auger bit refusal for drilling on the test pit and borehole logs has been assessed for the equipment used as equivalent to approximately the top of medium strength rock. A general excavatability versus equipment type and methods are shown in Table 1.

Soil/Rock Type	Typical Equipment Used for Bulk Excavation	Typical Equipment Used for Localised Excavations for Footings and Trenches
Soil	Any hydraulic plant	Any hydraulic plant
Very low to low strength rock	Light to medium ripping (eg D6 Class Bulldozer)	Excavator (possibly with pneumatic or hydraulic hammer for trimming and trenching
Medium strength and fractured rock	Heavy ripping (eg D8 or D9 Class Bulldozer)	Pneumatic or hydraulic hammer, trenching machines
High strength rock and fractured rock	Very heavy ripping (eg D9 or D10 Class Bulldozer)	Pneumatic or hydraulic hammer, trenching machines
Medium or stronger, slightly fractured to massive rock	Blasting	Pneumatic or hydraulic hammer

Table 1.	Generalised Excavatabilit		unment Type	and Mothods
	Generaliseu Excavalabilit	y versus Equ	прилент туре	and methods

Geotechnical Investigation, Proposed Residential Subdivision 32 Lovelle Street and 141 Yarrawa Road, Moss Vale



Where the depth of excavation extends into the underlying rock of very low to low strength for both the sedimentary and igneous rocks, which is anticipated within (as a minimum) the yellow hatched areas on Drawing 5, light to medium ripping should be expected probably at reduced production rates. Rock of medium strength was encountered or is anticipated within the depth of excavation is shown within the red hatched areas shown on Drawing 5. At these locations, heavy or very heavy ripping should be expected at very low production rates. It is noted that slightly fractured, medium strength conglomerate was encountered in Bore 111 of which the removal of the upper 0.2 m is proposed. Due to the relatively shallow depth of this material at the borehole location, allowance should be made for the use of medium to heavy rock hammering in combination with ripping equipment.

While slightly fractured or massive igneous rock was not encountered within the depth of the investigation in the southern and western parts of the site, the use of blasting or pneumatic and/or hydraulic hammers at very low production rates should be expected if this material is encountered during earthworks. Slightly fractured volcanic rock was encountered at depths of 2.4 - 3.5 m in the steep hillside in the northern part of the site, however concept plans for excavation is that area had not been prepared at the time of reporting.

Detailed excavation works in the medium strength or stronger rock (ie in and possibly adjacent to the red hatched red in Drawing 5) for trenching or foundations will probably require rock hammering or rock sawing equipment at very low production rates. It is further noted that underboring, if proposed, in massive high strength sandstone or volcanic rocks should also expect construction difficulties and very low production rates.

It is noted that the areas shown on Drawing 5 of the approximate extent of various rock strengths has been assessed using limited and widely spaced data points. Therefore it should be expected and allowance should be made for the extent of these materials to vary from that shown.

Equipment suitability for the ground conditions and the experience of their operators for the site conditions is best determined by intending tenderers. It is recommended that intending tenderers make their own assessment of ground conditions, excavation difficulties and appropriate equipment based on inspections of the site and core samples held by DP.

# 10.5 Construction Related Vibration

Staged bulk earthworks are proposed for the development. There is potential for construction activities to be adjacent to previously completed and developed stages. Construction activities, particularly vibratory compaction or rock excavation using hydraulic rock breakers, may result in significant ground vibration. Monitoring of a limited range of compaction plant by DP has indicated the general vibration attenuation curves (Vector sum peak particle velocity [VSPPV] versus separation distance) as shown in Figure 3.

The German Standard for *Structural Vibration – Effects of Vibrations on Structures* (DIN4150-3:1999) recommends that ground vibrations at the foundation level of residential buildings in good condition, bearing on "sound" rock foundations, be limited to a peak particle velocity ranging in a continuum, from 5 mm/s to 15 mm/s to 20 mm/s for any orthogonal direction (PPVi) at vibration frequencies of 10 Hz to 50 Hz to 100 Hz which are typical of excavation plant, in order to reduce the potential for structural damage.



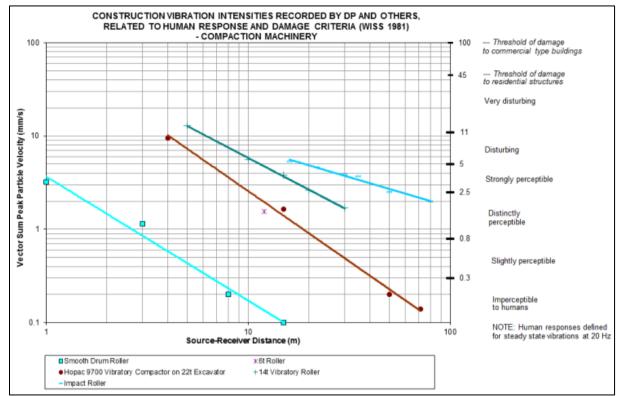


Figure 3: Compaction Plant Vibration Levels

Residential structures adjacent to active sections of the site can most likely withstand vibration levels higher than those required to maintain the comfort of their occupants. A human comfort criterion is therefore indicated and the peak particle velocity in any orthogonal direction i (PPVi), is proposed as the control parameter. It is recommended that a Provisional Allowed Vibration Limit of 8.0 mm/sec PPVi be set during normal working hours, measured at foundation level of the potentially affected residence/s. This limit is based on AS2670.2:1990 *Evaluation of Human Exposure to Whole-Body Vibrations – Continuous and Shock Induced Vibrations in Buildings (1 – 80 Hz)* but extended from only the vertical component to any directional component for conservative vibration management.

Reference to Figure 3 indicates that ground vibration levels in excess of the guidelines for human comfort (8.0 mm/sec PPVi) are likely to be exceeded by heavy (14 tonne) vibratory compaction plant at separation distances less than about 10 m. It is however noted that while vibration levels for human comfort are significantly less than those required for structural damage, complaints are likely at lower vibration levels. To minimise the potential for disruptions due to complaints, it is suggested that heavy rollers not be used in vibratory mode within 15 m of a residence. This may need to be confirmed on site by field trials with the equipment to be used during construction.

It is anticipated that detailed excavation of rock will be required for trenching (ie for the installation of services) and for foundations in the areas hatched in red and possibly into the adjacent areas on Drawing 5.

Vibration monitoring carried out by Douglas Partners at various excavation sites in a variety of rock types has indicated a general relationship (refer Table 3) between of peak particle velocity (any component) versus distance for various hammer sizes, ripping type and rock saw attachments.



Provisional Allowed Vibration Limit:	8 mm/s PPVi
Likely equivalent maximum vector sum:	11 mm/s VSPPV*
Excavation Plant	Buffer Distance
Rock Saw on Excavator	0.5 m
Ripper on 20 t Excavator	0.8 m
Rock Hammer <500 kg operating weight	5.0 m
Rock Hammer 501 – 2000 kg operating weight	7.6 m

# Table 2: Approximate Buffer Distances for Excavation Plant

\* Assumes no more than two vibration components are in-phase.

While Table 2 indicates that the use of rock hammers for excavation in active sections of the site is unlikely to have a detrimental effect on the structural or architectural finishes of the adjacent structures or to exceed human comfort levels in previously completed stages, site specific works for individual allotments adjacent to existing development will probably require rock sawing of detailed excavations to limit vibrations.

# 11. Summary

A geotechnical investigation has been carried out to determine rock depth and quality to assess the excavatability of the rock, where expected to be encountered. The investigation comprised borehole drilling and test pit excavations.

The results of the field work indicated that the depth of rock in the lower reaches of the site is in excess of proposed cuts (ie excavation to design level will be within the soil profile) and no difficulties are anticipated. The depth of soil decreases towards the elevated parts of the site (eg ridgelines and flanking slopes) and rock is expected to be within the proposed cut depths in these areas, particularly in the deeper areas of cut.

It is expected that excavation within the site soils could be readily carried out using hydraulic equipment. The excavation of very low to low strength (eg weathered rock), which is expected at some elevated areas in the ridgelines and flanking slopes will require light to medium ripping for bulk excavation and hydraulic hammering for trenching at reduced production rates. The excavation of medium strength or stronger rock, which is also expected at a few locations with require heavy or very heavy ripping and hydraulic hammering for trenching at very low productions rates. The locations of the more difficult excavation areas are shown on Drawing 5.

The staging of earthworks should also consider the effects of vibrations of previously completed stages. Nominal buffer zones for equipment types have been provided in the report.

# 12. References

AS 2670.2:1990, Evaluation of Human Exposure to Whole-Body Vibration, Part 2: Continuous and Shock-Induced Vibration in Buildings (1 to 80 Hz), Standards Australia.



DIN 4150-3:1999, Structural Vibration, Part 3: Effects of Vibrations on Structures, Deutsche Norm.

DP (2018), Report on Preliminary Geotechnical Investigation, Proposed Residential Subdivision, 141 Yarrawa Road and 32 Lovelle Street, Moss Vale, Douglas Partners Pty Ltd, Project 40494.01.R.001.Rev1.

HSS (2006), Soil, Groundwater, Agricultural Capability, Geotechnical Classification, Mineral Potential and Preliminary Contamination Report for the Proposed "Chelsea Gardens Development Site", Harvest Scientific Services, Job Reference 200677.

NSW DISRD (2016) *Moss Vale 1:100 000 Geological Sheet 8928*, Geological Survey, NSW Department of Industry, Skills and Regional Development.

# 13. Limitations

Douglas Partners (DP) has prepared this report for this project at 32 Lovelle Street and 141 Yarrawa Road, Moss Vale in accordance with DP's proposal WOL190315.P.001.Rev0 dated 4 October 2019 and acceptance received from Prime Moss Vale Pty Ltd dated 14 October 2019. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Prime Moss Vale Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or subsurface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition



materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires a risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

# **Douglas Partners Pty Ltd**

# Appendix A

About This Report



### Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

# Copyright

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# **Borehole and Test Pit Logs**

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

# Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

 In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

# Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

# About this Report

# **Site Anomalies**

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

# **Information for Contractual Purposes**

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

# **Site Inspection**

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

# Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thinwalled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

# **Test Pits**

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the insitu soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

# Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

# **Continuous Spiral Flight Augers**

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

# **Non-core Rotary Drilling**

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

# **Continuous Core Drilling**

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

# **Standard Penetration Tests**

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

 In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

 In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

15, 30/40 mm

# Sampling Methods

The results of the SPT tests can be related empirically to the engineering properties of the soils.

# Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

# Soil Descriptions

# **Description and Classification Methods**

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

# Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Туре	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Туре	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded a good representation of all particle sizes
- Poorly graded an excess or deficiency of particular sizes within the specified range
- Uniformly graded an excess of a particular particle size
- Gap graded a deficiency of a particular particle size with the range

# **Cohesive Soils**

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Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

# **Cohesionless Soils**

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose		4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

# Soil Descriptions

# Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil derived from in-situ weathering of the underlying rock;
- Transported soils formed somewhere else and transported by nature to the site; or
- Filling moved by man.

Transported soils may be further subdivided into:

- Alluvium river deposits
- Lacustrine lake deposits
- Aeolian wind deposits
- Littoral beach deposits
- Estuarine tidal river deposits
- Talus scree or coarse colluvium
- Slopewash or Colluvium transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

# Rock Descriptions

# **Rock Strength**

Rock strength is defined by the Point Load Strength Index  $(Is_{(50)})$  and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index Is <sub>(50)</sub> MPa	Approximate Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	М	0.3 - 1.0	6 - 20
High	Н	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

\* Assumes a ratio of 20:1 for UCS to  $Is_{(50)}$ . It should be noted that the UCS to  $Is_{(50)}$  ratio varies significantly for different rock types and specific ratios should be determined for each site.

# **Degree of Weathering**

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

# Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

# **Rock Descriptions**

# **Rock Quality Designation**

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

RQD % =  $\frac{\text{cumulative length of 'sound' core sections} \ge 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$ 

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

# **Stratification Spacing**

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

# Symbols & Abbreviations

# Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

# **Drilling or Excavation Methods**

С	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

### Water

$\triangleright$	Water seep
$\bigtriangledown$	Water level

# Sampling and Testing

- A Auger sample
- B Bulk sample
- D Disturbed sample
- E Environmental sample
- Undisturbed tube sample (50mm)
- W Water sample
- pp Pocket penetrometer (kPa)
- PID Photo ionisation detector
- PL Point load strength Is(50) MPa
- S Standard Penetration Test V Shear vane (kPa)

# **Description of Defects in Rock**

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

# **Defect Type**

В	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

### Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h horizontal

21

- v vertical
- sh sub-horizontal
- sv sub-vertical

# Coating or Infilling Term

cln	clean
со	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

### **Coating Descriptor**

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

### Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

### Roughness

ро	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

# Other

fg	fragmented
bnd	band
qtz	quartz

# Symbols & Abbreviations

# **Graphic Symbols for Soil and Rock**

# General

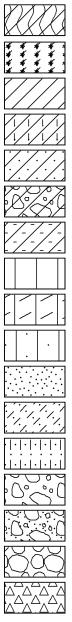
0	

Asphalt Road base

Concrete

Filling

# Soils



Topsoil

Peat Clay

Silty clay

Sandy clay

Gravelly clay

Shaly clay

Silt

Clayey silt

Sandy silt

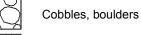
Sand

Clayey sand

Silty sand

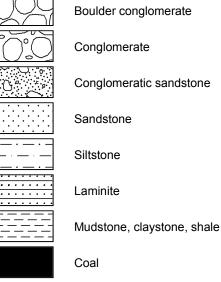
Gravel

Sandy gravel



Talus

# Sedimentary Rocks



Limestone

# **Metamorphic Rocks**

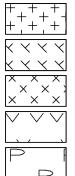
+

Slate, phyllite, schist

Quartzite

Gneiss

# **Igneous Rocks**



Granite

Dolerite, basalt, andesite

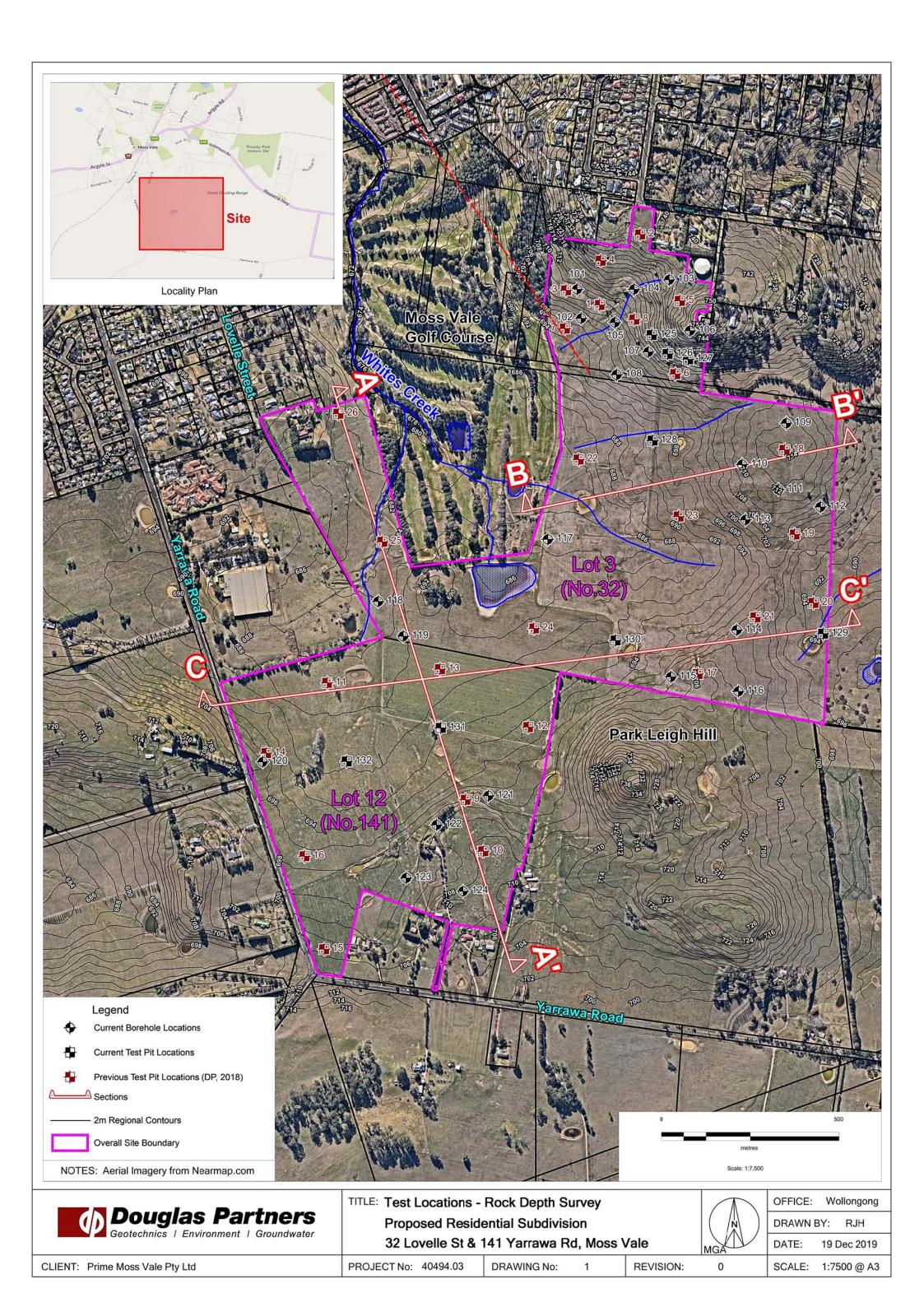
Dacite, epidote

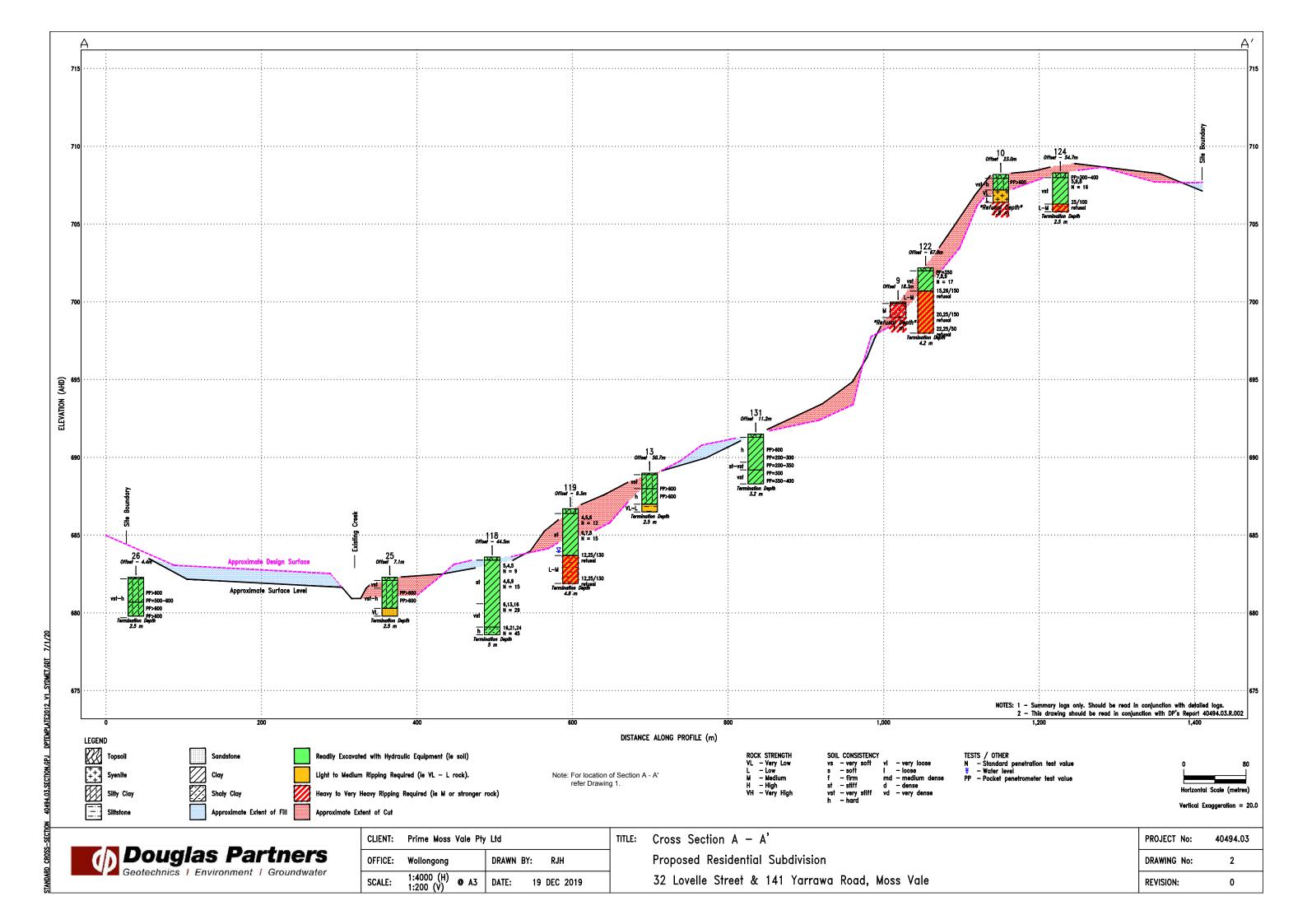
Tuff, breccia

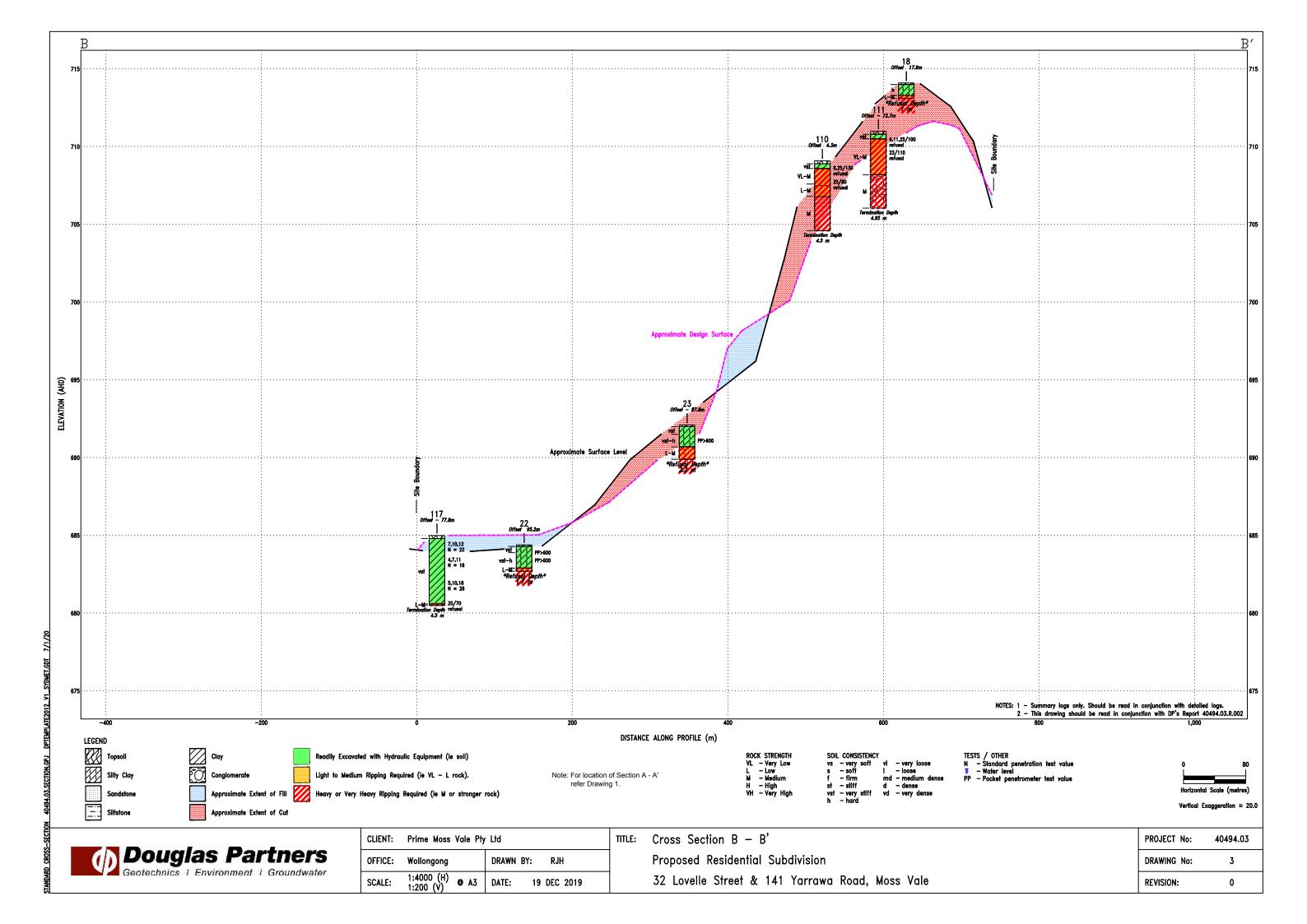
Porphyry

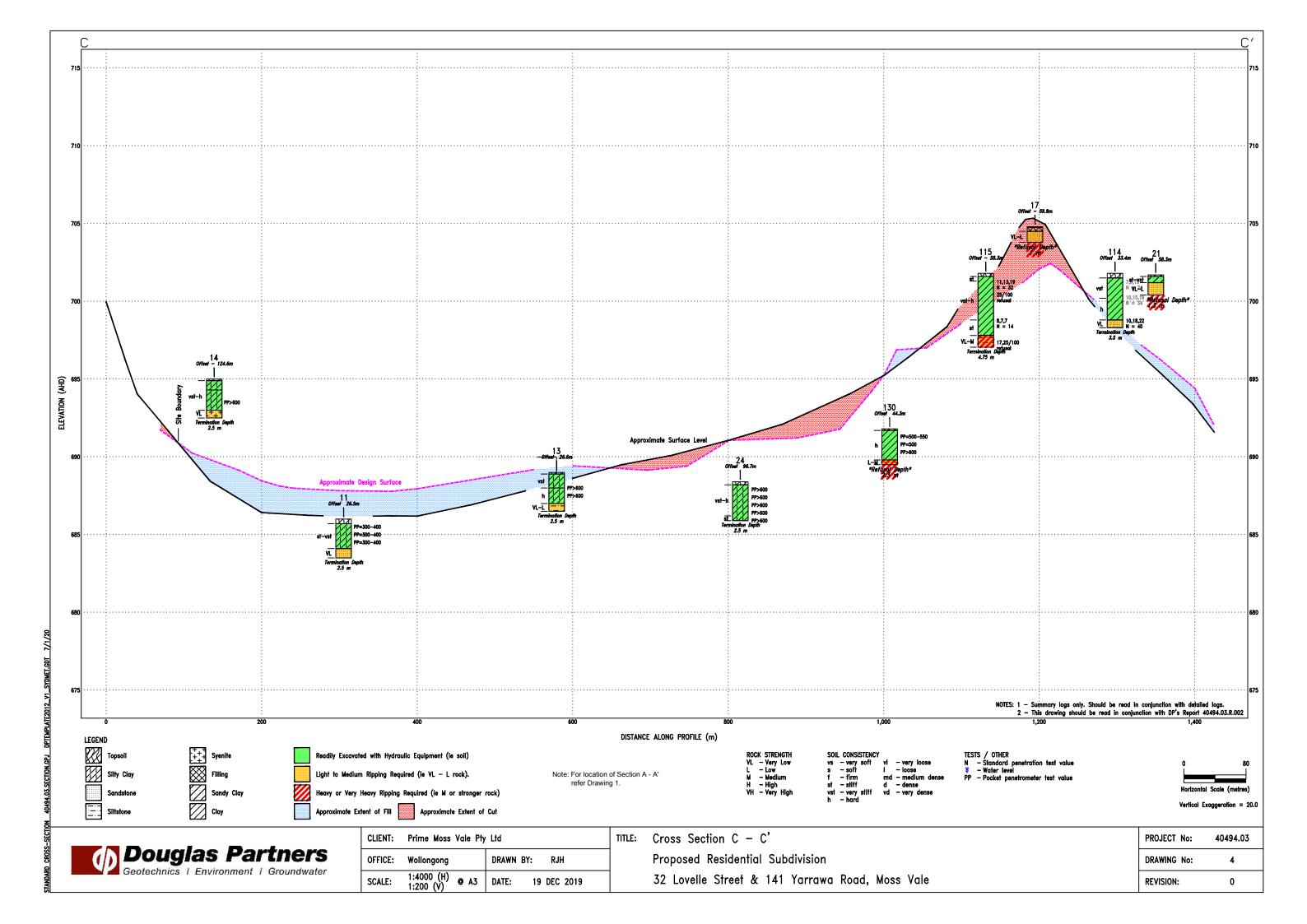
# Appendix B

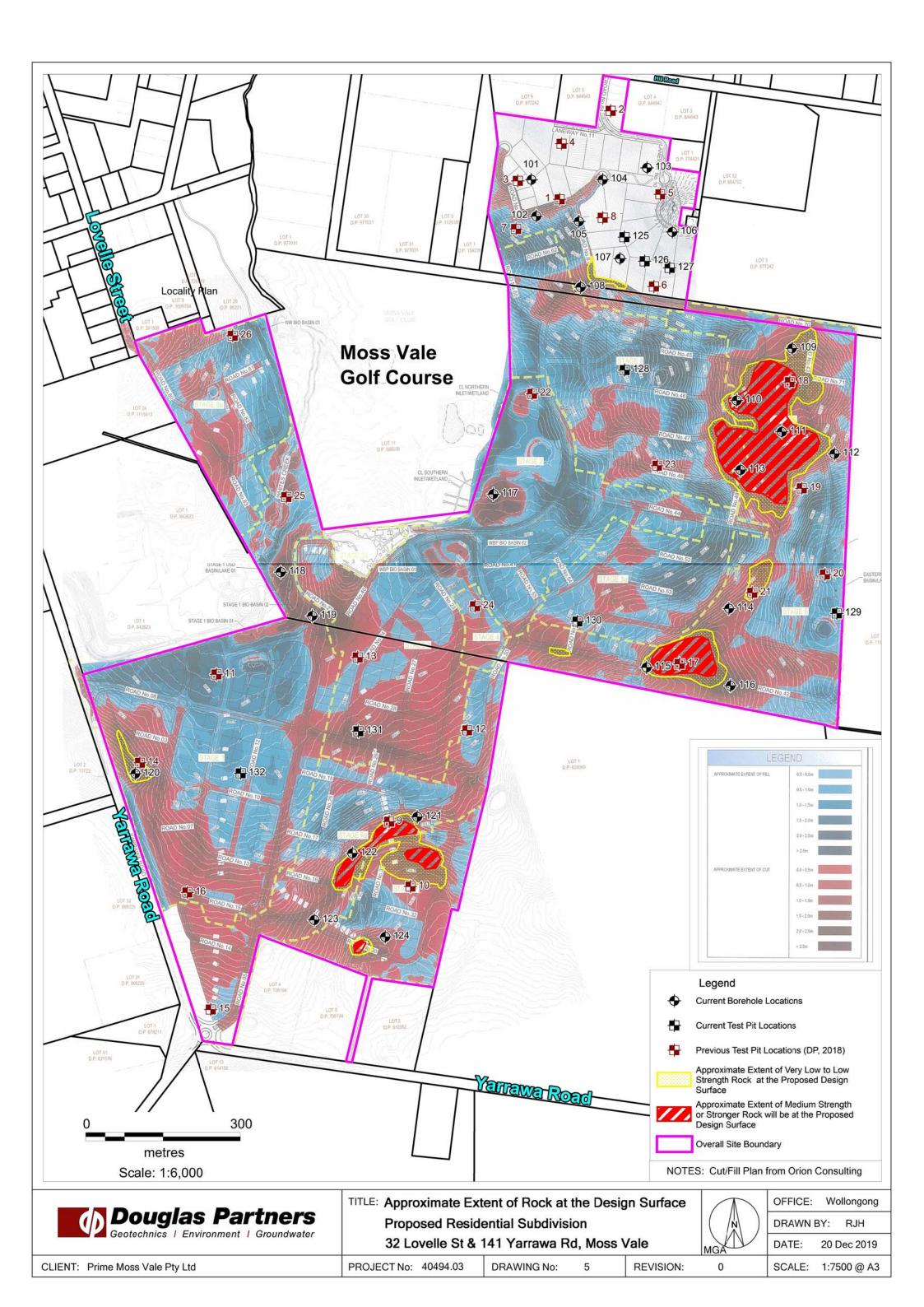
Drawing 1 - 5 Results of Current Field Work (Bores 101 – 124 & Pits 125 – 132) Results of Previous Field Work (Pits 1 – 26) Photos 1 – 16 (Plates 1 – 5)













# **BOREHOLE LOG**

SURFACE LEVEL: 708.6 AHD **EASTING:** 259542 **NORTHING:** 6172772 **DIP/AZIMUTH:** 90°/--

**BORE No:** 101 **PROJECT No:** 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

$\square$		Description	Degree of	. <u>0</u>	Rock Strength	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
R	Depth (m)	of	Weathering	Log		Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	åD %	Test Results
	()	Strata	H M M M M M M M M M M M M M M M M M M M	Ū	Very Low Very Low Medium Very High Ex High	0.01 0.10 0.50	S - Shear F - Fault	Ţ	Rec	8~	& Comments
708	0.2	CLAY CL: low to medium plasticity, dark brown, trace silt, w>PL, stiff, colluvium						A A S			pp = 100-150 3,4,4 N = 8
707	-2	CLAY CI - medium plasticity, brown mottled grey orange, with trace fine gravel, w~PL, stiff, possible colluvium grey mottled orange, below 1.5m						s	-		5,5,9 N = 14
706	-3	- w <pl 2.6m<="" below="" td=""><td></td><td></td><td>06-11-19</td><td></td><td></td><td>S</td><td>-</td><td></td><td>5,7,9 N = 16</td></pl>			06-11-19			S	-		5,7,9 N = 16
705	-4							S	-		5,6,8 N = 14
704	4.4 -5 5.1	CLAY CH - medium to high plasticity, grey, with trace fine gravel, w~PL, very stiff, residual Shaly CLAY CH: high plasticity, dark						s	-		6,11,15 N = 26
702 703	6	grey and pale grey, with silt, w~PL, hard, with low to medium strength, highly weathered siltstone bands						S	-		21,25/150 refusal
701	-7 7.5 8 8.3							С	100	10	
669	- 9 - 10	SILTSTONE: coarse grained, dark grey and pale grey, thinly bedded, low to medium strength, moderately weathered, slightly fractured, Wianamatta Group					9.85m: Cs 10mm	С	92	78	PL(A) = 0.3 PL(A) = 0.4 PL(A) = 0.8
697 698	10.45 10.8 11	SILTSTONE: coarse grained, dark grey and pale grey, thinly bedded, very low strength, highly weathered, fractured with extremely low strength bands, Wianamatta Group Bore discontinued at 10.8m (Limit of Investigation)		• •							
	RIG:       Hanjin       DRILLER:       Total Drilling       LOGGED:       FH/IKA       CASING:       HWT to 5.6m         TYPE OF BORING:       110mm solid flight auger 'TC bit' to 5.8m, coring 'NMLC' from 6.5m to 10.8m       10.8m       10.8m										

WATER OBSERVATIONS: Groundwater observed between 4.0m and 4.5m during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 5.0-11.0m. nit

w = field moisture content	PL = plastic lim

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT:

PROJECT:

LOCATION:

Vale

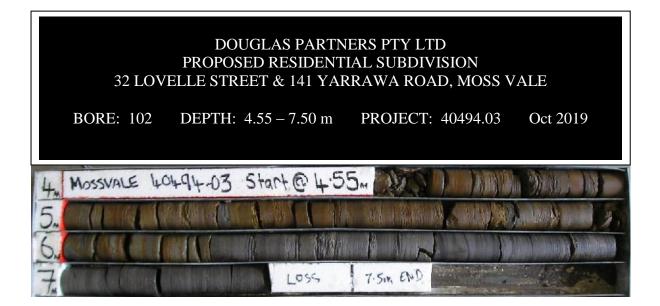
SAMPLING & IN SITU G Gas sample P Piston samp U<sub>x</sub> Tube sample W Water samp P Water seep mple ¥ Water level A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample

		-
SITU TESTING	LEGI	ΞN
ample	PID	Ρ
sample	PL(A PL(C	) F
sample (x mm dia.)	PL(C	) P
sample	pp S	P
seep	S	S
level	V	S

Douglas Partners 1 Geotechnics | Environment | Groundwater



Imm
 Imm
 Photo ionisation detector (ppm)
 Point load axial test Is(50) (MPa)
 Point load diametral test Is(50) (MPa)
 Pocket penetrometer (kPa)
 Standard penetration test
 Shear vane (kPa)



SURFACE LEVEL: 700.5 AHD **EASTING:** 259552 **NORTHING: 6172702 DIP/AZIMUTH:** 90°/--

**BORE No: 102 PROJECT No:** 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

		Description	Degree of Weathering 은 _	Rock Strength	<u> </u>	Fracture	Discontinuities	Sa	amplir	ng & I	n Situ Testing
RL	Depth (m)	of			/ate	Spacing (m)	B - Bedding J - Joint	ЭС	re . %	D,	Test Results
	()	Strata	G G	Strength Kery Low Medium High Ex High	> <sup>100</sup>		S - Shear F - Fault	Type	ပိမ္မ	RQD %	& Comments
	0.2	TOPSOIL/Silty CLAY CL - low			Ĩ			A			
200	0.4	│plasticity, dark brown, with root │ │fibres, w <pl td="" │ſ<=""><td></td><td></td><td></td><td></td><td></td><td>A</td><td></td><td></td><td>pp = 500</td></pl>						A			pp = 500
Ř		Silty CLAY CL: low to medium						s	1		4,5,7
ĒĒ	-1	plasticity, brown mottled dark brown, trace root fibres, hard, colluvium			l li						N = 12
ĒĒ		CLAY CL - medium to high									
669		plasticity, brown, trace fine gravel, \stiff, probable colluvium			l li				-		
ļ ļ		- brown mottled orange below 1.5m						s			4,6,9 N = 15
FF	-2				İ				1		
Ē											
698		- very stiff, trace fine sand below			İ			s			5,10,11
ĒĒ	-3 3.0	2.5m									N = 21
łł	5 5.0	CLAY CL - medium to high plasticity, grey mottled orange, trace			li	ii ii					
692		fine gravel, very stiff, residual									
					ļļį			s			7,11,17 N = 28
ĒĒ	- 4										
Ē											
696	4.55	SHALE - fine grained, brown, thinly									
ļ ļ	F	laminated to laminated, low strength then medium strength, highly then	│╎ <b>╙</b> ┪╎╎╎╞═╼								PL(A) = 0.4
FF	-5	moderately weathered, slightly			l li						PL(A) = 0.6
695		fractured, Wianamatta Group			 ₹						
Ē						لينيا					
ŧŧ	-6				06-11-19		∫5.77m: B 0° pl, ro, cly 5.84m: J 75° pl, ro, cln	с	100	72	PL(A) = 0.9
<b> </b>		- dark grey and fresh below 6.28m	╎╷╽┿┿┓╧═╛								T E(A) = 0.3
69											
ĒĒ	_				ļ	ii ii	6.66m: J 65° pl, ro, cln				
ĒĒ	-7										PL(A) = 0.6
693	7.5										
l <sup>®</sup>	1.0	Bore discontinued at 7.5m (Limit of Investigation)									
ŀ	-8										
ĒĒ											
692											
ĒĒ											
ŧŧ	-9										
Ę-											
- <u>6</u>											
ĘĘ	- 10				i	ii ii					
ĒĒ											
069					i						
<u></u>											
f F	- 11				i						
5											
689											
ĒĒ											

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: HWT to 4.6m TYPE OF BORING: 110mm solid flight auger TC bit from 0.0m to 4.5m, coring 'NMLC' from 4.55m to 7.5m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 3.8-6.8m.

w = field moisture content PL = plastic limit

G P U<sub>x</sub> W

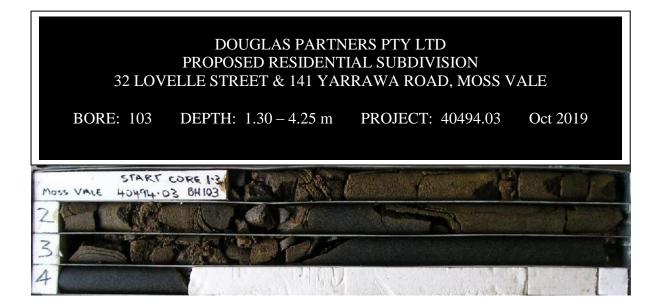
₽

A Auger sample B Bulk sample BLK Block sample Block sample Core drilling Disturbed sample Environmental sample CDE

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level

LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa)





SURFACE LEVEL: 732.1 AHD EASTING: 259765 NORTHING: 6172795 DIP/AZIMUTH: 90°/--

**BORE No: 103 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

#### Rock Degree of Weathering Fracture Discontinuities Sampling & In Situ Testing Description Strength Water Depth Spacing Core Rec. % RQD % Test Results 8 , Light 님 of Very Low Low Medium Very High Ex High N Type B - Bedding J - Joint (m) (m) §| & ቫ S - Shear F - Fault Strata 102 020 E S W W Comments TOPSOIL/Silty CLAY CL: low Α 732 plasticity, dark brown, trace root 0.3 Note: Unless otherwise fibres, w<PL A S pp = 350 stated rock is fractured 18,25/100 CLAY CL: Low to medium plasticity, along curved, rough, réfusal dark brown mottled brown, w<PL, iron stained, healed, very stiff, residual ioint 731 brown mottled orange, trace fine 1.3 grained sand below 0.5m <1.43m: 2J 25-35° DOLERITE: medium to coarse <discing grained, dark grey, green and pale grey, medium strength, highly weathered, slightly fractured, <-1.65m:̈́ J 80-85° С 100 92 PL(A) = 0.5-2 1.95m: J 80-85° 230 X Jurassic Volcanics $\times$ 2.25m: 2J 15-25° 2.38m: J 75-80° X 2.64m: 2J 75-85° $\scriptstyle \prec$ 100 С 96 PL(A) = 0.4X - 3 729 3.06m: 2J 85-90° X discing -3.25m: J 75° 3.45 DOLERITE: medium to coarse <grained, pale grey, very high strength, fresh, slightly fractured, 3.65m: J 65° $\boldsymbol{\prec}$ С 100 100 <Jurassic Volcanics 728 PL(A) = 7.44.25 Bore discontinued at 4.25m (Limit of Investigation) Т 5 727 6 726 7 725 8 724 9 723 10 122 11 721 Т

RIG: Hanjin

TYPE OF BORING:

DRILLER: Total Drilling

LOGGED: FH

CASING: HWT to 1.3m 110mm solid flight auger TC bit from 0.0m to 1.3m, coring 'NMLC' from 1.3m to 4.25m

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT: PROJECT:

LOCATION:

Vale

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 4.0-10.0m.

w = field moisture content PL = plastic limit

G P U, W

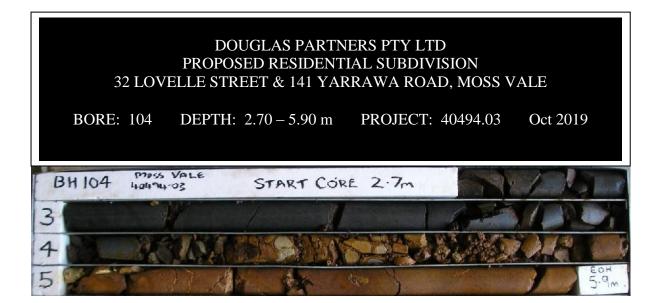
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A Auger sample B Bulk sample BLK Block sample Core drilling Disturbed sample Environmental sample CDF

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level

LECERNU PIID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) Standard penetration test V Shear vane (kPa)





SURFACE LEVEL: 716.8 AHD EASTING: 259680 NORTHING: 6172772 DIP/AZIMUTH: 90°/--

BORE No: 104 PROJECT No: 40494.03 DATE: 23/10/2019 SHEET 1 OF 1

		Description	Degree of Weathering	.c	Rock Strength	Fracture	Discontinuities			-	n Situ Testing
	Depth ( (m)	of	Weathering	Log	Strendth Very Low Medium High Ex High Ex High 001	Spacing (m)	B - Bedding J - Joint	Type	Sre : %	RQD %	Test Results &
	(,	Strata	FIS N MW	Ū	Ex Lo Very Low Very F Ex High	0.05 0.10 1.00	S - Shear F - Fault	È	ပိမ္ရွိ	R0%	∝ Comments
	0.15 0.45	TOPSOIL/Silty CLAY CL: low plasticity, dark brown with root fibres, w <pl (topsoil)<="" td=""><td></td><td></td><td></td><td></td><td></td><td>A</td><td></td><td></td><td>pp = 100-150</td></pl>						A			pp = 100-150
1		Silty CLAY CL: low to medium plasticity, dark brown mottled brown, w~PL, stiff, colluvium						s			2,3,4 N = 7
	-	CLAY CL: medium plasticity, brown, trace fine grained sand, w <pl, stiff,<br="">residual</pl,>							-		
212	2	w~PL below 1.5m					Note: Unless otherwose stated, rock fractured	S	-		3,5,7 N = 12
	2.7	- with low to dolerite corestones					along planar, rough, iron stained joint.	S	-		25/90 refusal
		DOLERITE: fine grained, dark grey brown, high strength, slightly weathered, slightly fractured, Jurassic Volcanics		× ` × ` × `			2.75m: J 60° 2.79m: Ds pl, ro, cly 2.84m: J 40° 3.2m: J 15°	С	100	100	PL(A) = 8.1
€1∠ - 4				\ \ \ \			3.49m: J 20° 3.74m: J 70°	с	100	100	PL(A) = 9.6
	4.29-	DOLERITE: fine to medium grained, pale brown orange, medium to high		× ` × ` × `			4.1m: J 90°	с	100	100	
12	4.93	strength, highly weathered, highly fractured, Jurassic Volcanics DOLERITE: fine to medium grained,		$\mathbf{X}$			4.6m: Cz ir, ro, fe stn, 600mm 5.08m: J 75° pl, ro, cln				
		pale brown orange, high strength, moderately weathered, slightly fractured, Jurassic Volcanics		× ` × `			5.42m: J 60°	с	100	100	
[ <u>+</u> 	5.9	Bore discontinued at 5.9m		× `			_5.84m: J 30°				PL(D) = 1.4
1 1 200 200 200 200 200 200 200 200 200	0	(Limit of Investigation)									

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: HWT to 5.9m

TYPE OF BORING: 110mm solid flight auger TC bit from 0m to 2.5m, coring 'NMLC' from 2.7m to 5.9m

LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 2.5-5.5m.

 w = field moisture content
 PL = plastic limit

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PILO
 Photo is

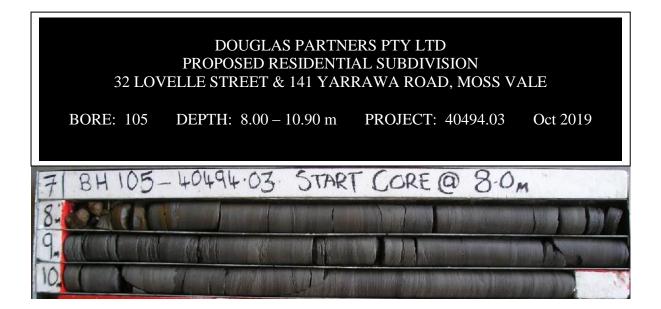
 B
 Bulk sample
 P
 Piston sample
 PL(D) Photo is
 PL(D) Photo is

 C
 Core drilling
 W
 Water sample
 P
 Pc(D) Photo is

 D
 Disturbed sample
 P
 Water seep
 S
 S tanda

 E
 Environmental sample
 ¥
 Water level
 V
 Shear

**Douglas Partners** Geotechnics | Environment | Groundwater



**SURFACE LEVEL**: 705.5 AHD **EASTING**: 259634 **NORTHING**: 6172692 **DIP/AZIMUTH**: 90°/-- BORE No: 105 PROJECT No: 40494.03 DATE: 23/10/2019 SHEET 1 OF 1

<b>–</b> I	Description	Weathering	ie i	Strength ក្រ	Fracture	Discontinuities			-	n Situ Testing
Depth (m)	of		Log	Vate	Spacing (m)	B - Bedding J - Joint	be	ore :. %	DG °	Test Results &
		EW MW FS SW	Q		0.05	S - Shear F - Fault	Тy	ပိမ္မိ	R ~	∝ Comments
0.2 -	dark brown, with trace silt and fine grained sand, w <pl (topsoil)<br="">CLAY CL: low to medium plasticity, dark brown, w<pl, stiff="" stiff,<="" td="" to="" very=""><td></td><td></td><td></td><td></td><td></td><td>A A S</td><td></td><td></td><td>pp = 350-400 3,4,5 N = 9</td></pl,></pl>						A A S			pp = 350-400 3,4,5 N = 9
2	- brown mottled dark brown, trace fine sand - dark brown below 1.5m						S			4,7,9 N = 16
	- with trace fine grained sand below 2.3m						S			7,10,12 N = 22
3	CLAY CH: medium to high plasticity, grey/dark grey mottled orange, w~PL, stiff to very stiff, probable						S			3,6,9 N = 15
4	colluvium						s			3,5,8
5	CLAY CH: medium to high plasticity									N = 13
6	grey/dark grey mottled orange, with trace fine grained sand, w~PL, stiff to very stiff, residual						S			6,8,11 N = 19
7	- with trace fine gravel, stiff below 6.5m						S			5,7,8 N = 15
8 8.0	- with ironstone gravel below 7.7m						S			5,9,25 N = 34
9	thinly laminated to laminated, medium strength, slightly weathered, slightly fractured to unbroken, Wianamatta Group									PL(A) = 0.6
10						9.88m: J 40° pl, ro, cln	С	100	84	PL(A) = 0.6
10.0	- high strength below 10.3m				<b>   </b>                       	9.89m: J 40° pl, ro, cln 10.13m: J 55° pl, ro, cln 10.43m: J 55° pl, ro, cln				PL(A) = 1.4
11	Bore discontinued at 10.9m (Limit of Investigation)									
	0.2 1 2 3 3.3 4 5 5.5 6 7 8 8.0 9 10	0.2       TOPSOIL/CLAY CL: low plasticity, dark brown, with trace silt and fine grained sand, w <pl (topsoil)<="" td="">         CLAY CL: low to medium plasticity, dark brown, w<pl, colluvium<="" probable="" stiff="" stiff,="" td="" to="" very="">         - brown mottled dark brown, trace fine sand         - dark brown below 1.5m         - with trace fine grained sand below 2.3m         3         3.3         CLAY CH: medium to high plasticity, grey/dark grey mottled orange, w-PL, stiff to very stiff, probable colluvium         5         5.5         CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual         - with trace fine grained sand, w-PL, stiff to very stiff, residual         - with ironstone gravel, stiff below 6.5m         7         8       8.0         SHALE: fine grained, grey brown, thinly laminated to laminated, medium strength, slightly weathered, slightly fractured to unbroken, Wianamatta Group         9       - high strength below 10.3m         11       10.9</pl,></pl>	0.2       TOPSOIL/CLAY CL: low plasticity, dark brown, with trace silt and fine grained sand, w <pl (topsoil)<="" td="">         CLAY CL: low to medium plasticity, dark brown, w<pl, colluvium<="" probable="" stiff="" stiff,="" td="" to="" very="">       1         1       - brown mottled dark brown, trace fine sand       1         2       - with trace fine grained sand below       1         3       - with trace fine grained sand below       1         3       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, w-PL, stiff to very stiff, probable colluvium       1         4       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, probable colluvium       1         5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1         6       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1         6       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1         6       • with ironstone gravel below 7.7m       1       1         7       • with ironstone gravel below 7.7m       1       1         8       8.0       SHALE: fine grained, grey brown, thinly laminated to laminated, medium strength, slightl</pl,></pl>	0.2       TOPSOIL/CLAY CL: low plasticity, dark brown, with trace silt and fine grained sand, w <pl (topsoil)<="" td="">       0.1         CLAY CL: low to medium plasticity, dark brown, w<pl, colluvium<="" probable="" stiff="" stiff,="" td="" to="" very="">       1       1         • brown motiled dark brown, trace fine sand       - dark brown trace fine sand       1         • dark brown below 1.5m       1       1       1         2       - with trace fine grained sand below 2.3m       1       1         3       3.3       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, w-PL, stiff to very stiff, probable colluvium       1       1         5       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1       1         6       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1       1         6       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual       1       1         7       8.0       SHALE: fine grained, grey brown, thinly laminated, medium strength, slightly weathered, slightly weathered, slightly weathered, slightly weathered, slightly weathered, slightly medium strength, slightly medium strength, slightly medium strength below 10.3m       1       1         10       h</pl,></pl>	0.2       dark brown, with trace silt and fine CLAY CL: low to medium plasticity, dark brown, w <pl, stiff="" stiff,<br="" to="" very="">probable colluvium brown mottled dark brown, trace fine sand = dark brown below 1.5m         2       - with trace fine grained sand below 2.3m         3       3.3         3.3       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, w-PL, stiff to very stiff, probable colluvium         4       5.5         5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-PL, stiff to very stiff, residual         6       with trace fine gravel, stiff below 6.5m         7       - with trace fine gravel, stiff below 6.5m         7       - with ironstone gravel below 7.7m         8       8.0         5       SHALE: fine grained, grey brown, medium strength, slightly weathered, slightly weathered, slightly weathered, slightly weathered, slightly weathered, slightly weathered, slightly fractured to unbroken, Wianamatta Group         9       - high strength below 10.3m         11       10.9         8       Bore discontinued at 10.9m</pl,>	0.2       TOPSOIL/CLAY CL: low plasticity, dark brown, with zace silt and fine grained sand, w-FL (topsoil)       Image: Clay CL: low to medium plasticity, dark brown, very, stiff to very stiff, probable colluvium.         1       Use the constraint of the grained sand below 2.3m       Image: Clay CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-FL, stiff to very stiff, probable colluvium         5       5.5       CLAY CH: medium to high plasticity, grey/dark grey mottled orange, with trace fine grained sand, w-FL, stiff to very stiff, residual       Image: clay clay clay clay clay clay clay clay	0.2       CLAY CH: two plasticity, grained sand, w-PL, stiff to very stiff, probable colluvium       Image: collucture of the plasticity, grained sand below, 2.3m         1       Ubown motiled dark brown, trace fine sand       Image: collucture of the plasticity, grained sand below, 2.3m         2       - with trace fine grained sand below, 2.3m         3       3.3         3.3       CLAY CH: medium to high plasticity, grey/dark grey motiled orange, w-PL, stiff to very stiff, probable colluvium         6       5.5         5.5       CLAY CH: medium to high plasticity, grey/dark grey motiled orange, with trace fine grained sand, w-PL, stiff to very stiff, probable colluvium         6       5.5         6       5.6         7       6         8       8.0         SHALE: Ine grained, sprey brown, thinky laminated to laminated, multi strength, sliphty weathered, slightly fractured to umbroken, Wianamatta Group         9       - high strength below 10.3m         10       - high strength below 10.3m         11       10.9         Bore discontinued at 10.9m       10.1	0.2       CAP CH: Now, with race stand fine grained sand, w-PL (topsoil)       A.         0.2       CLAY CI: low plasticity, grained sand, w-PL (topsoil)       A.         1       CDOW CI: low plasticity, dark brown, trace fine sand       S         2       - with trace fine grained sand below       S         2.3       - with trace fine grained sand below       S         3       - with trace fine grained sand below       S         2.3m       S       S         5       CLAY CH: medium to high plasticity, grey/dark grey motified orange, with trace fine grained and w-PL stiff to very stiff, probabie colluvium       S         6       trace fine grained, grey below       S         7       S       S         6       S       S         7       S       S         10       - with ironstone gravel below 7.7m       S         8       80       S       S         11       - high strength below 10.3m       S       S         11       - high strength below 10.3m       - High strength below 10.3m       - High strength below 10.3m         11       - high strength below 10.3m       - High strength below 10.3m       - High strength below 10.3m	0.2       Call Coll-Cul-Cul-coll position, with trace still and fine grained sand, were (topsoil)       A         1       CLAY CL: tow to neating upskibly, probable colluvium       S         1       Use of the town, with trace still and the grained sand below 2.3m       S         3       3.3       CLAY CH: medium to high plasticity, greydark prey mothed orange, with to explosible colluvium       S         4       - with trace fine grained sand below 2.3m       S         5       5       CLAY CH: medium to high plasticity, greydark prey mothed orange, with to explicitly to explicitly to explicit to	0.2       CLAY CL: low plasticity, grained sand, were (topsol)       A         1       CLAY CL: low to neatine plasticity, probable colluvium       A         1       brown motified dark brown, trace fine sand       S         2       - with trace fine grained sand below 2.3m       S         3       3.3       CLAY CH: medium to high plasticity, gravidark gray motified orange, with trace fine grained sand below 2.3m       S         3       3.3       CLAY CH: medium to high plasticity, gravidark gray motified orange, with trace fine grained sand below 2.3m       S         5       5.5       CLAY CH: medium to high plasticity, gravidark gray motified orange, with trace fine grained sand, w=PL, stiff to very stiff, probable colluvium       S         6       • with ironstone gravel below 7.7m       S       S         7       • with ironstone gravel below 7.7m       S       S         9       • with ironstone gravel below 7.7m       S       S         10       - high strength below 10.3m       C       100       84         11       0.9       Bore discontinued at 10.9m       C       100       10.45m. J 40° pl. ro. dn         11       0.9       Bore discontinued at 10.9m       10       10       10.45m. J 40° pl. ro. dn

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: HWT to 7.6m

TYPE OF BORING: 110mm solid flight auger TC bit from 0-7.6m, coring 'NMLC' from 8.0m-10.9m

WATER OBSERVATIONS: wet zone at ~7.7m

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 7.4-10.4m.

w = field moisture content PL = plastic limit SAMPLING & IN SITU TESTING LEGEND

A Auger sample G B Bulk sample P BLK Block sample U, C Core drilling W D Disturbed sample D E Environmental sample ¥ 
 Standard
 Piton
 Photo ionisation detector (ppm)

 Piston sample
 PiD
 Photo ionisation detector (ppm)

 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 Water sample
 pp
 Pocket penetrometer (kPa)

 Water level
 V
 Shear vane (kPa)





SURFACE LEVEL: 748.5 AHD **EASTING:** 259815 **NORTHING:** 6172672 **DIP/AZIMUTH:** 90°/--

**BORE No: 106 PROJECT No:** 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

			Description	D	egre	e of	Graphic Log		R	ock	( th	Τ.	Fi	acture	e	Discontinuities	Sa	amplii	ng & I	n Situ Testing
R	Dep		of		eatri	ering	inde bo		Stre		ान हि	Water	S	pacing	9	B - Bedding J - Joint			-	Test Results
	(m	1)	Strata	2 3	< 3	≥ ،₀ ₀	_ ج م	Plan	2    2	ediun B	Very High	° ≥	0.01	(m) (m)	8	S - Shear F - Fault	Type	ç Ö	RQD %	&
H	_	_	TOPSOIL/Silty Clay CL: low	۲ آ	12	S S B			11	ž	1	1	0.00		-		A			Comments
ŧ	-	0.2	\plasticity, brown, trace gravel, w <pl <="" td=""><td></td><td>1 I</td><td>1 I</td><td></td><td></td><td></td><td></td><td>11</td><td></td><td>Ì</td><td></td><td>İ.</td><td></td><td><u> </u></td><td>1</td><td></td><td></td></pl>		1 I	1 I					11		Ì		İ.		<u> </u>	1		
748	- - - - - - - - - - - - - - - - - - -	-	CLAY CL - medium plasticity, red brown, with trace fine grained sand, w <pl, hard,="" residual<br="" stiff="" to="" very="">- pale brown mottled grey, very stiff below 0.5m</pl,>														A S			pp = 400-500 7,11,13 N = 24
746 747	-2	1.5-	DOLERITE: fine to medium grained, pale brown grey, very low strength, highly weathered, Jurassic Volcanics													Note: Unless otherwise stated rock is fractured along curved, rough, iron stained, healed, joint	S			25/130 refusal
745	-3	3.5	- core loss probable very low strength dolerite													2.6m: CORE LOSS: 900mm	с	64	100	
	-		DOLERITE: medium to coarse grained, dark grey green and pale grey, medium strength, highly to				$ \times\rangle$						Ì		il.	3.75m: 2J 70-85°				PL(A) = 0.4
744	-4	-	Slightly weathered, slightly fractured, Jurassic Volcanics - very high strength corestone 4.00-4.65m			]										discing 3.88m: 3J 20-30° 4.3m: J 65-70° 4.7m: 2J 75-85° discing 4.86m: 3J 50-70°	с	100	86	PL(A) = 6.8
2 743		5.45-	, - very high strength (possible													5.32m: J 80-85° 5.58m: J 80-90° 5.83m: J 75-85° 5.95m: 3J 20-25° 6.21m: 4J 70-85°	с	100	100	PL(A) = 0.2
738 738 739	-7	5.45 ·	- very high strength (possible corestone) below 6.33m Bore discontinued at 6.45m (Limit of Investigation)													6.21m: 4J 70-85				

RIG: Hanjin

CDE

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

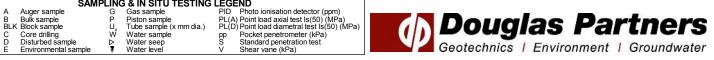
LOGGED: FH

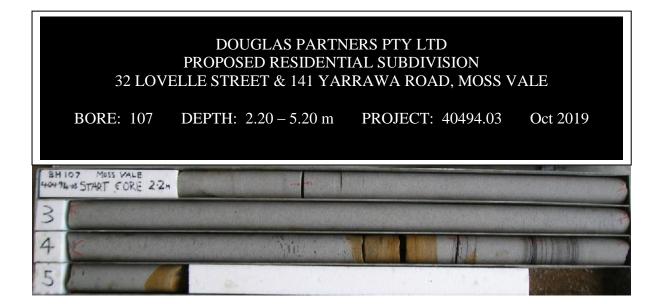
CASING: HWT to 2.55m TYPE OF BORING: 110mm solid flight auger TC bit from 0.0m to 2.5m, coring 'NMLC' from 2.5m to 6.45m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 3.0-6.0m.

w = field moisture content PL = plastic limit SAMPLING & IN SITU TESTING LEGEND





SURFACE LEVEL: 712.2 AHD **EASTING:** 259714 **NORTHING:** 6172621 **DIP/AZIMUTH:** 90°/--

**BORE No: 107 PROJECT No:** 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

			Description	Degree of	.u	Rock Strength ভ	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
RL		epth m)	of	Weathering	Log		Spacing (m)	B - Bedding J - Joint	эс	.%	Q.,	Test Results
	()	"	Strata	FR S W W W	ي م	Very Low Very Low Medium Very High Ex High		S - Shear F - Fault	Type	Core Rec. %	₿ 8%	& Comments
712	-	0.3	TOPSOIL/Clayey SILT ML: brown, trace medium grained sand, w <pl< td=""><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td></td><td></td></pl<>						<u> </u>			
-	-	0.5	Silty CLAY CL: low plasticity, brown grey, w <pl, colluvium<="" stiff,="" td=""><td></td><td></td><td></td><td></td><td></td><td>A S</td><td></td><td></td><td>7,9,15 N = 24</td></pl,>						A S			7,9,15 N = 24
711	-1		CLAY CL - low to medium plasticity, brown mottled grey orange, w <pl, very stiff, residual</pl, 							-		N - 24
710	-2	1.5 2.2	SANDSTONE: fine grained, pale grey, very low to medium strength, highly to moderately weathered, Wianamatta Group						S	-		6,25/130 refusal
12	-3	2.2	SANDSTONE - fine to medium grained, pale grey, medium strength, slightly weathered to fresh stained, slightly fractured, Wianamatta Group						С	100	100	PL(A) = 0.5
708	-4										100	PL(A) = 0.5 PL(A) = 0.5
207	-5	5.2-	- with laminated siltstone bands from 4.81m to 4.91m					4.6m: B 0° sm-ro, pl, fe stn				(, , , , , , , , , , , , , , , , , , ,
704 703 704 704 707 705 707 706			Bore discontinued at 5.2m (Limit of Investigation)					5.2m: B 0° sm-ro, pl, fe stn				

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

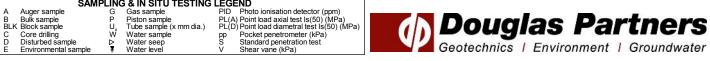
LOGGED: FH

CASING: HWT to 2.2m TYPE OF BORING: 110mm solid flight auger TC bit from 0.0m to 2.2m, coring 'NMLC' from 2.2m to 5.2m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. Standpipe piezometer installed: screen interval 1.7-4.7m.

w = field moisture content PL = plastic limit SAMPLING & IN SITU TESTING LEGEND



SURFACE LEVEL: 699.5 AHD EASTING: 259638 NORTHING: 6172565 DIP/AZIMUTH: 90°/--

**BORE No: 108 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

#### Vale Sampling & In Situ Testing Description Well Graphic Log Water Depth Construction 뭅 Sample of Depth Results & Comments (m) Type Details Strata 0.0 TOPSOIL/Clayey SILT ML: pale brown, trace root fibres, А 0.1 w<PL 0.3 Silty CLAY CL: low plasticity, pale brown, w<PL, very stiff, 0.4 residual А -669 0.5 0.5 CLAY CL: medium plasticity, grey mottled red, w<PL, very stiff, residual 8,8,9 s N = 17 0.95 1 - becoming grey with trace gravel below 1.3m 698 1.5 9,12,14 N = 26 s 1.9 PEL\* 1.95 2.0 -2 -2 <u>3</u>97 .3 3.0 3.0 -3 25/120 SILTSTONE: brown, low to medium strength, highly to А refusal 3.12 moderately weathered, with clay seams, Wianamatta Group \_\_. 696 - becoming brown below 3.6m \_ . -4 40 -4 А 4.1 Bore discontinued at 4.1m (Limit of investigation) 95 5 •5 394 RIG: Hanjin DRILLER: Total Drilling LOGGED: FH CASING: Uncased

TYPE OF BORING: 110mm solid flight auger TC bit

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

PROJECT:

LOCATION:

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND LECERNU PIID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level G P U, W Douglas Partners Core drilling Disturbed sample Environmental sample CDE ₽ Geotechnics | Environment | Groundwater

SURFACE LEVEL: 711.1 AHD EASTING: 260046 NORTHING: 6172451 DIP/AZIMUTH: 90°/-- BORE No: 109 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

#### Sampling & In Situ Testing Description Well Graphic Log Water Depth 뭅 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: brown, trace root fibres, w<PL А 0.1 02 CLAY CL: low to medium plasticity, brown mottled orange, hard, residual 0.4 А 0.5 10 1 - becoming grey mottled orange below 1.0m 7,14,23 s N = 371.45 1.6 SILTSTONE: grey mottled orange, very low to medium strength, highly weathered siltstone, with clay seams, Wianamatta Group \_\_\_\_ 1.9 PEL\* ·2 2 2.0 \_\_\_\_ 709 \_\_ · \_ \_ . . \_\_\_ 2.5 25/120 \_\_\_\_. s refusal 2.62 \_\_\_\_. . \_\_\_\_ . \_\_\_\_. — . .3 -3 \_ 708 \_\_\_\_. \_ . \_ . 3.9 \_ . А - becoming brown below 3.9m -4 40 -4 0 Bore discontinued at 4.0m 707 (Limit of investigation) 5 •5 706 RIG: Hanjin DRILLER: Total Drilling LOGGED: FH CASING: Uncased TYPE OF BORING: 110mm solid flight auger TC bit

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 Ploto ionisation detector (ppm)

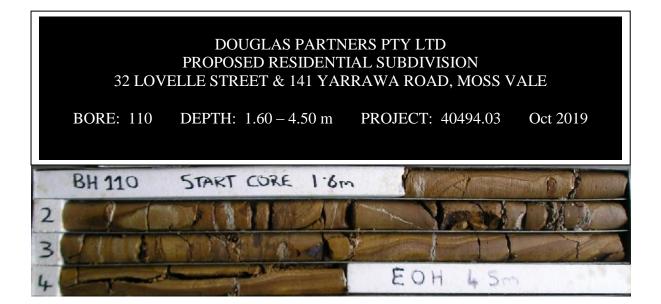
 B
 Buik sample
 Piston sample
 Ploto ionisation detector (ppm)

 BLK
 Biock sample
 P
 Ploto ionisation detector (ppm)

 C Core drilling
 U
 Tube sample (x mm dia.)
 PL(A) Point load axial test Is(50) (MPa)

 D
 Disturbed sample
 P
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)
 Standard penetration test



**SURFACE LEVEL:** 709.1 AHD **EASTING:** 259940 **NORTHING:** 6172349 **DIP/AZIMUTH:** 90°/-- BORE No: 110 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

#### Degree of Weathering Rock Fracture Sampling & In Situ Testing Discontinuities Description raphic Strength Water Depth Spacing Core Rec. % RQD % 6 High Test Results 님 of Very Low Medium High Ex High N N Type B - Bedding J - Joint (m) (m) §| & ტ S - Shear F - Fault Strata 0.10 020 HW NW EN Comments TOPSOIL/Clayey SILT ML: brown, А 709 0.2 with root fibres, w<PL, residual A S 0.5 CLAY CL: low to medium plasticity, 8,25/130 Note: Unless otherwise red brown, w<PL, very stiff refusal stated rock is fractured SANDSTONE: fine to medium along curved, rough, 1 grained, brown mottled grey orange, very low to medium strength, highly 208 iron stained, healed, joint to moderately weathered, with some 1.6 clay bands, Wianamatta Group 25/80 S refusal l pale grey below 1.5m PL(A) = 0.2С 100 95 1.9m: J 25° cly 10mm SANDSTONE: fine to medium -2 6 2.09m: J 20° PL(A) = 0.6grained, pale brown, brown and 2.24m: B 0° fe stn grey, low becoming medium PEL\* strength, moderately to slightly weathered, fractured, Wianamatta 2.26m: Cs 10mm 2.28m: Cs 20mm 2.43m: J 50° cln Group 2.58m: J 60° - 3 medium strength, slightly to 206 2.63m: J 40° fe stn 2.71m: J 90° ro, fe stn 2.8m: J 80° moderately weathered below 2.3m 100 С 81 2.84m: Cs 40mm 2.91m: J 60° 3.02m: J 70° fe stn PL(A) = 0.5705 3.06m: Cs 5mm -3.14m: B cly -3.16m: B 0° fe stn -3.161m: Cs 10mm 45 Bore discontinued at 4.5m 3.17m: B 0° fe stn (Limit of Investigation) 1 Т 1 -3.21m: J 75° 5 3.28m: J 75° 3.47m: J 85° fe stn 704 1 1 3.5m: B 0° 3.65m: B 0° 4.26m: J 90° un 6 703 7 702 1 8 -5 9 -02 10 669 11 698 Т

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

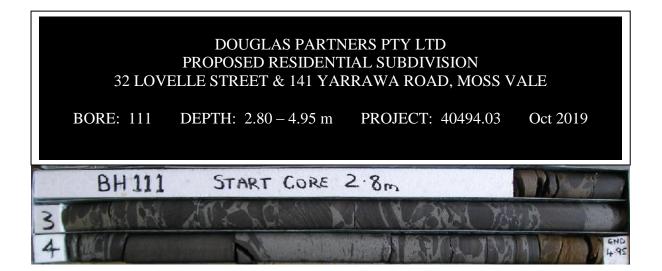
LOGGED: FH/IKA

CASING: HWT to 1.6m

**TYPE OF BORING:** 110mm solid flight auger TC bit from 1.6m, coring 'NMLC' from 1.6m to 4.5m **WATER OBSERVATIONS:** No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND	
A Auger sample G Gas sample PID Photo ionisation detector (ppm)	
B Bulk sample P Piston sample PL(A) Point load axial test Is(50) (MPa)	glas Partners
BLK Block sample U, Tube sample (x mm dia.) PL(D) Point load diametral test Is(50) (MPa)	olas Pariners
C Core drilling W Water sample pp Pocket penetrometer (kPa)	JIGO I GI UIVIO
D Disturbed sample D Water seen S Standard penetration test	-
E Environmental sample Water seep S other van en (kPa)	s   Environment   Groundwater



**SURFACE LEVEL:** 711.0 AHD **EASTING:** 260026 **NORTHING:** 6172288 **DIP/AZIMUTH:** 90°/-- BORE No: 111 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

Π		Description	Degree of Weathering ﷺ ≩ ≩ ⊗ ∞ ᡤ	<u>i</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng & I	n Situ Testing
R	Depth (m)	of	11 out for ing	aph Log	Ex Low Very Low Medium High Ex High Ex High	Spacing (m)	B - Bedding J - Joint	эе	re . %	RQD %	Test Results
	(,	Strata	FIS N W W	Ū	Ex Lo Very L Mediu Very F Ex High		S - Shear F - Fault	Type	ပ်နို	RC %	& Comments
, ,		TOPSOIL/Clayey SILT ML - brown,		XV				A			
Ē	0.2			//							
F	0.5	CLAY CL: low to medium strength		:::::	i i i i i i    i			A	1		6,11,25/100
		stiff, residual						3			refusal
710	-1	SANDSTONE: fine to medium									
		grained, brown, very low to medium strength, highly to moderately		::::							23/110
		weathered, with some clay bands,		::::				S			refusal
602	2	Wianamatta Group = brown mottled grey orange below	İİİİİ	::::							
ĔĔ	- 2	0.6m									
ĒĒ		<sup>L</sup> with trace fine sand below 1.5m									
208	2.8 -3	CONGLOWERATE: fine grained		57							PL(A) = 0.6 <b>PEL</b> *
Ē		sandstone matrix with medium to coarse gravel and cobble clasts,		nor							FCL"
ŧ		pale and dark grey, typically medium strength, fresh stained, slightly									PL(A) = 0.8
Ē		fractured, Wianamatta Group		Ľ		11 11					(/.) 0.0
402	-4			)]				С	100	100	
Ē				p							PL(A) = 1.9
Ē				)00			4.33m: J 50° pl, ro, cln				PL(A) = 0.6
Ę			│┆┆┢┿┛┆│	67	╎╎╠╇┙╎╎╎						
706	5 4.95	below 4.8m									PL(A) = 0.2
Ē		Bore discontinued at 4.95m									
		(Limit of Investigation)									
E											
705	-6		iiiii			ii ii					
ĒĒ											
704	7										
Ĩ											
ĒĒ											
е 2	-8										
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202	-9										
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RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: HWT to 2.8m

TYPE OF BORING: 110mm solid flight auger TC bit from 2.8m, coring 'NMLC' from 2.8m to 4.95m

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content PL = plastic limit, PEL = proposed excavation level

	SAM	PLIN	G & IN SITU TESTING	LEG	END			
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
B	Bulk sample	Р	Piston sample		A) Point load axial test Is(50) (MPa)		-	<b>Partners</b>
BLł	Block sample	U,	Tube sample (x mm dia.)	PL(C	D) Point load diametral test Is(50) (MPa)			Parners
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	Deagia		- ui ui vi v
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			110 11
E	Environmental sample	ž	Water level	V	Shear vane (kPa)	Geotechnics   E	nviro	onment   Groundwater

**SURFACE LEVEL:** 704.2 AHD **EASTING:** 260130 **NORTHING:** 6172243 **DIP/AZIMUTH:** 90°/-- BORE No: 112 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Graphic Log Description Well Water Depth 嵒 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: brown w<PL А 0.1 704 02 CLAY CL: low to medium plasticity, brown orange, w<PL, very stiff, residual PEL\* 0.4 А 0.4 0.5 - becoming orange mottled grey below 0.9m 10 1 703 9,13,18 s N = 31 1.45 2 -2 2.0 SILTSTONE: pale brown grey, very low to medium strength, highly to moderately weathered, with clay seams, 702 Wianamatta Group \_ . \_ 2.5 25/100 S -2.6 2.6 Bore discontinued at 2.6m (Limit of investigation) - 3 .3 5 -4 - 4 200 5 •5 669

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Shardard penetroin test

**Douglas Partners** Geotechnics | Environment | Groundwater

**SURFACE LEVEL:** 703.2 AHD **EASTING:** 259947 **NORTHING:** 6172216 **DIP/AZIMUTH:** 90°/-- BORE No: 113 PROJECT No: 40494.03 DATE: 25/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Well Description Graphic Log Water Depth 뭅 Sample Construction of Depth Results & Comments (m) Type Details Strata 0.0 TOPSOIL/Clayey SILT ML: brown, trace root fibres, w<PL А 0.1 703 02 CLAY CL: low to medium plasticity, pale brown mottled grey orange, w<PL, very stiff, residual 0.4 А 0.5 - becoming grey mottled orange, trace gravel below 0.6m 5,6,11 N = 17 s 0.95 1 702 1.5 1.5 25/100 SANDSTONE: fine grained, grey mottled orange, very low to medium strength, highly weathered, Wianamatta Group s 1.61 refusal 2 2.0 -2 А 2.1 5 2.9 PEL<sup>\*</sup> - 3 3.0 3.0 -3 S 25/120 3.12 refusal 200 -4 - 4 - becoming grey below 4m 669 4.5 20,20,23 N = 43 s 4 95 5 5.0 Bore discontinued at 5.0m (Limit of investigation) 698

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Builk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK
 Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 P
 Water level
 V
 Standard penetration test

 E
 Environmental sample
 ¥
 Water level
 V
 Shear vane (kPa)



SURFACE LEVEL: 701.8 AHD EASTING: 259924 NORTHING: 6171949 DIP/AZIMUTH: 90°/-- BORE No: 114 PROJECT No: 40494.03 DATE: 25/10/2019 SHEET 1 OF 1

			vale				1011	<b>H:</b> 90°/		SHEET 1 OF 1
	Dor	oth	Description	hic				& In Situ Testing	er	Well
RL	Dep (m	) 1)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
-	-		TOPSOIL/Clayey SILT ML: dark brown, with root fibres and trace gravel, w <pl< td=""><td></td><td>A</td><td>0.0 0.1</td><td></td><td></td><td></td><td></td></pl<>		A	0.0 0.1				
	-	0.3	CLAY CL: low plasticity, brown, trace gravel, w <pl, residual<="" stiff,="" td="" very=""><td></td><td>A</td><td>0.4 0.5</td><td></td><td></td><td></td><td></td></pl,>		A	0.4 0.5				
701	-		- becoming medium plasticity, brown mottled grey orange below 0.5m		S			7,9,15 N = 24		
×	- - 1					0.95				- 1
	-									-
	-					1.4 1.5 1.5		PEL*		
700	-		- becoming pale grey, hard below 1.6m		S			10,15,19 N = 34		-
	- -2 -					1.95				-2
	-									-
	-									-
669	-									
	- 3 - -	3.0 -	SANDSTONE: fine grained, pale grey mottled brown orange, very low strength, highly weathered, with clay seams, Wianamatta Group		S	3.0		10,18,22 N = 40		-3
	-	3.5				3.45				
	-		Bore discontinued at 3.5m (Limit of investigation)							-
698	- - - 4									-4
	-									-
	-									
697	-									
	- - 5 -									- 5
	-									
	-									
696	-									
	G: Н		DRILLER: Total Drilling			GED		CASING		I

RIG: Hanjin

CLIENT:

**PROJECT:** 

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A Auger sample
 Gas sample
 Ploto ionisation detector (ppm)

 B Buik sample
 Piston sample
 Ploto ionisation detector (ppm)

 BLK Biock sample
 U,
 Tube sample (x mm dia.)

 C Core drilling
 W Water sample
 Ploto point load axial test Is(50) (MPa)

 D Disturbed sample
 V
 Water sample
 Ploto point load diametral test Is(50) (MPa)

 D Disturbed sample
 V
 Water seep
 S
 Standard penetration test

 E Environmental sample
 Water level
 V
 Shear vane (kPa)

SURFACE LEVEL: 701.8 AHD EASTING: 259770 NORTHING: 6171838 DIP/AZIMUTH: 90°/-- BORE No: 115 PROJECT No: 40494.03 DATE: 25/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Description Well Graphic Log Water Depth 뭅 Sample Construction of Depth Results & Comments (m) Type Details Strata 0.0 TOPSOIL/Clayey SILT ML: brown, with root fibres, w<PL А 0.1 02 CLAY CL: low to medium plasticity, orange brown, w<PL, stiff. residual 0.4 А 0.5 - becoming grey mottled orange, trace sand and gravel, very stiff to hard below 0.5m 11,13,19 s N = 32-6-0.95 1 1.5 25/100 S 1.6 refusal .02 2 -2 PFI \* 2.4 25 669 .3 3.0 -3 - becoming stiff below 3.0m 8,7,7 S N = 143.45 698 4 40 - 4 SILTSTONE: dark grey, very low to medium strength, highly to slightly weathered with some sandstone bands, \_\_\_\_ Wianamatta Group \_ 4.5 \_ 17,25/100 S refusal 4.75 4.75 697 Bore discontinued at 4.75m (Limit of investigation) 5 •5 696

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B Bulk sample
 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 C Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D Disturbed sample
 E
 Water level
 V
 Shard ard penetration test



SURFACE LEVEL: 705.0 AHD EASTING: 259930 NORTHING: 6171800 DIP/AZIMUTH: 90°/-- BORE No: 116 PROJECT No: 40494.03 DATE: 25/10/2019 SHEET 1 OF 1

#### Sampling & In Situ Testing Well Description Graphic Log Water Depth 뭅 Sample Construction of Depth (m) Type Results & Comments Details Strata 0.0 TOPSOIL/Clayay SILT ML: dark brown, with root fibres, А 0.1 w<PL 0.3 CLAY CL: low to medium plasticity, dark brown mottled 0.4 orange, w<PL, very stiff, residual А 0.5 - becoming brown mottled orange, very stiff, below 0.5m 5,9,11 N = 20 s 0.95 -§-1 1 - becoming grey mottled orange below 1.4m 1.5 7,10,16 s N = 26 1.95 -ខ្ល-2 -2 2.9 PEL<sup>\*</sup> -2 -3 3.0 3.0 3.0 -3 SILTSTONE: grey mottled orange, very low to medium 9 25/100 S strength, highly to moderately weathered, with clay seams, refusal Wianamatta Group 3.25 \_\_\_\_ . \_\_ . \_ . \_ . \_ . \_ -<u>p</u>-4 - 4 - becoming grey below 4.0m \_\_\_\_ · \_\_ · 4.5 25/110 S \_\_\_\_. 4.61 refusal 200 - 5 5.0 Bore discontinued at 5.0m (Limit of investigation)

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 Piston sample

 B
 Buik sample
 Piston sample
 Piston sample
 Piston sample

 LK
 Biock sample
 U
 Tube sample (x mm dia.)
 PL(A) Point load axial test Is(50) (MPa)

 C
 C core drilling
 W
 Water sample
 PD
 Pocket penetrometer (KPa)

 D
 Disturbed sample
 P
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)

**SURFACE LEVEL:** 685.0 AHD **EASTING:** 259471 **NORTHING:** 6172169 **DIP/AZIMUTH:** 90°/-- BORE No: 117 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Description Well Graphic Log Water Depth Sample 뭅 Construction of Depth Results & Comments (m) Type Details Strata 0.0 А TOPSOIL/Clayey SILT ML: brown, trace root fibres, w<PL 02 CLAY CL: low plasticity, orange brown, w<PL, very stiff, residual 0.4 А 0.5 - becoming medium plasticity orange mottled grey below 0.5m 7,10,12 s N = 220.95 -86-1 1 1.5 4,7,11 N = 18 s 1.95 -86-2 ·2 PFI \* 2.4 2.5 -86 - 3 3.0 -3 5,10,18 S N = 283.45 -86-4 -4 4.4 SANDSTONE: fine grained, pale brown, low to medium .... -25/70 4.5 strength, highly to moderately weathered, Wianamatta S 4.57 refusal Group Bore discontinued at 4.5m (Limit of investigation) -86 - 5 •5

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

**DRILLER:** Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 Ploto ionisation detector (ppm)

 B
 Bulk sample
 Piston sample
 Ploto ionisation detector (ppm)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PL(A) Point load axial test Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 Point point add axial test Is(50) (MPa)

 D
 Disturbed sample
 P
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)

SURFACE LEVEL: 683.6 AHD EASTING: 259062 NORTHING: 6172022 DIP/AZIMUTH: 90°/-- BORE No: 118 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Well Description Graphic Log Water Depth 뭅 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: brown, with trace root fibres, А 0.1 w<PL 02 CLAY CL: low to medium plasticity, brown grey, w<PL, stiff, residual 0.4 А 0.5 - becoming grey mottled orange below 0.5m 683 5,4,5 s N = 90.95 1 - becoming grey, w~PL below 1m 1.5 682 4,6,9 s N = 15 1.95 2 -2 .<u>8</u> 2.9 PEL\* - 3 3.0 3.0 -3 - becoming very stiff below 3m 6,13,16 S N = 293.45 680 -4 - 4 4.5 4.5 Shalv CLAY CL: low to medium plasticity, brown grey, 679 w<PL, hard, with very low strength, highly weathered 16,21,24 N = 45 siltstone bands s 4 95 5 5.0 Bore discontinued at 5.0m (Limit of investigation) 378

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

**TYPE OF BORING:** 110mm solid flight auger TC bit **WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B Bulk sample
 P
 Piston sample
 PL(A) Point bad axial test Is(50) (MPa)

 BLK Block sample
 U,
 Tube sample (x mm dia.)
 PL(A) Point bad axial test Is(50) (MPa)

 C Core drilling
 W
 Water sample (x mm dia.)
 PL (D) Point load diametral test Is(50) (MPa)

 D Disturbed sample
 P
 Water sample
 S Standard penetrometer (kPa)

 E Environmental sample
 ¥
 Water level
 V



SURFACE LEVEL: 686.7 AHD EASTING: 259125 NORTHING: 6171936 DIP/AZIMUTH: 90°/-- BORE No: 119 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Well Description Graphic Log Water Depth Sample 뭅 of Construction Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: brown, w<PI А 0.3 CLAY CL: low to medium plasticity, brown mottled grey, 0.4 w<PL, stiff, residual А 0.5 4,6,6 686 s N = 120.95 1 - becoming grey mottled orange below 1.3m 1.5 6,7,8 N = 15 685 S 1.95 -2 2 684 Ţ 2.9 PEL\* 24-10-19 - 3 3.0 3.0 3.0 -3 SILTSTONE: grey mottled orange, very low to medium 12,25/130 strength, highly to moderately weathered, with clay seams, Wianamatta Group S refusal \_\_\_\_ 3.28 \_\_\_\_ - becoming grey below 3.6m 683 -4 -4 \_\_\_\_ 4.5 \_ . 12,25/130 s 682 refusal \_ . 4.8 4.8 Bore discontinued at 4.8m (Limit of investigation) 5 •5 681

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

TYPE OF BORING: 110mm solid flight auger TC bit WATER OBSERVATIONS: Groundwater observed at 2.8m

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

	SA	AMPLING	& IN SITU TESTIN	G LEGE			
А	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		_
	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)		
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)		
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		0 4
E	Environmental sample	e 📱	Water level	V	Shear vane (kPa)		Geotec



SURFACE LEVEL: 697.6 AHD EASTING: 258778 **NORTHING: 6171632** DIP/AZIMUTH: 90°/--

**BORE No: 120 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

### Sampling & In Situ Testing Graphic Log Well Description Water Depth 嵒 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: red brown, trace root fibres, А w<PL 02 Silty CLAY CL: low plasticity, red brown, w<PL, stiff to very stiff, residual 0.4 0.4 А CLAY CL: low plasticity, red brown, w<PL, stiff to very stiff 0.5 697 8,7,9 N = 16 s 0.95 1 1.5 - becoming orange red mottled grey below 1.5m 696 5,6,7 N = 13 s 1.95 2 -2 395 2.9 PEL\* - 3 3.0 3.0 -3 4,6,8 s N = 143.45 694 -4 - 4 4.5 - becoming w~PL below 4.5m 693 5,6,7 N = 13 s 4 95 5 5.0 Bore discontinued at 5.0m (Limit of investigation) <u>3</u>

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling 110mm solid flight auger TC bit

LOGGED: FH

CASING: Uncased

TYPE OF BORING: WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level LECERNU PIID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample G P U, W Core drilling Disturbed sample Environmental sample CDE ₽



**SURFACE LEVEL:** 699.8 AHD **EASTING:** 259328 **NORTHING:** 6171546 **DIP/AZIMUTH:** 90°/-- BORE No: 121 PROJECT No: 40494.03 DATE: 24/10/2019 SHEET 1 OF 1

### Vale Sampling & In Situ Testing Graphic Log Description Well Water Depth 嵒 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: brown, with root fibres, w<PL А 02 Silty CLAY CL: low plasticity, brown mottled grey orange, w<PL, stiff, residual 0.4 А 0.5 5,5,6 N = 11 s 669 PEL\* 0.9 0.95 1.0 698 2 2.0 -2 2.0 25/150 SILTSTONE: brown mottled grey orange, very low to S refusal medium strength, highly to moderately weathered, with 2.15 clay seams, Wianamatta Group \_ . \_ . 697 \_ - 3 3.0 -3 25/150 S refusal 3.1 3.1 Bore discontinued at 3.1m (Limit of investigation) 696 4 - 4 695 5 •5 -89 RIG: Hanjin DRILLER: Total Drilling LOGGED: FH CASING: Uncased TYPE OF BORING: 110mm solid flight auger TC bit

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

PROJECT:

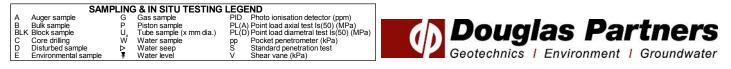
LOCATION:

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

**REMARKS:** Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level



SURFACE LEVEL: 702.2 AHD EASTING: 259202 NORTHING: 6171482 DIP/AZIMUTH: 90°/--

**BORE No: 122 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

### Vale Sampling & In Situ Testing Description Well Graphic Log Water Depth 嵒 Sample Construction of Depth Results & Comments (m) Type Details Strata 0.0 TOPSOIL/Clay CL: low plasticity, dark brown, with root А 0.1 fibres and trace silt, w<PL 702 02 CLAY CL: low plasticity, brown mottled grey, w<PL, very stiff, residual 0.4 А pp = 350 0.5 - becoming brown mottled pale brown below 0.6m 7,8,9 s N = 170.95 1 701 1.5 1.5 SANDSTONE: fine grained, brown mottled grey, very low to medium strength, highly to moderately weathered with 15,26/150 s refusal clay seams, Wianamatta Group 18 1.9 PEL\* 2 2.0 -2 -02 - 3 3.0 -3 20,25/150 S 669 refusal 3.35 -4 40 -4 22 25/50 S refusal 698 4.2 4.2 Bore discontinued at 4.2m (Limit of investigation) 5 •5 697

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

TYPE OF BORING: 110mm solid flight auger TC bit WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level LECERNU PIID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample G P U,x W Core drilling Disturbed sample Environmental sample CDE ₽



SURFACE LEVEL: 701.1 AHD EASTING: 259133 NORTHING: 6171354 DIP/AZIMUTH: 90°/--

**BORE No: 123 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

#### Vale Sampling & In Situ Testing Graphic Log Description Well Water Depth 嵒 Sample Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: pale brown, w<PL А -102 0.1 0.3 CLAY CL: medium plasticity, brown mottled orange, 0.4 w<PL, stiff to hard, residual А pp = 500 0.5 4,5,5 s N = 100.95 1 1 - becoming grey mottled orange below 1m -00 1.5 6,8,10 N = 18 S PEL\* 1.9 1.95 2.0 2 -2 669 2.9 SILTSTONE: brown mottled orange, very low to medium - 3 strength, highly to moderately weathered, with clay seams, Wianamatta Group 3.0 -3 698 \_\_\_\_ 7,18,27 S \_ . N = 45\_ 3.45 . \_\_\_\_ . \_ . . \_\_ . \_\_\_\_ \_ . -4 40 - 4 697 12.21.25/70 \_ . S refusal \_\_\_\_. 4.37 4.37 Bore discontinued at 4.37m (Limit of investigation) 5 •5 -969

RIG: Hanjin

CLIENT:

PROJECT:

LOCATION:

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

DRILLER: Total Drilling

LOGGED: FH

CASING: Uncased

TYPE OF BORING: 110mm solid flight auger TC bit WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level A Auger sample B Bulk sample BLK Block sample G P U,x W Core drilling Disturbed sample Environmental sample CDE ₽

LECERNU PIID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) Standard penetration test V Shear vane (kPa)



SURFACE LEVEL: 708.3 AHD EASTING: 259265 NORTHING: 6171320 DIP/AZIMUTH: 90°/--

**BORE No: 124 PROJECT No: 40494.03** DATE: 24/10/2019 SHEET 1 OF 1

### Vale Sampling & In Situ Testing Description Well Graphic Log Water Depth Sample 嵒 Construction of Depth Results & Comments (m) Type Strata Details 0.0 TOPSOIL/Clayey SILT ML: dark brown, trace root fibres, А 0.1 w<PL -28-0.3 CLAY CI: medium plasticity, red brown, w<PL, very stiff, pp = 300-400 0.4 residual А 0.4 0.4 PEL\* 0.5 5,8,8 0.5 s N = 160.95 1 -6 1.4 А 1.5 1.9 А -2 2.0 -2 2.0 25/100 S SILTSTONE: red brown, low to medium strength, 2.1 refusal moderately weathered, with clay seams, Wianamatta Group 8 2.5 Bore discontinued at 2.5m (Limit of investigation) - 3 -3 705 -4 - 4 704 - 5 •5 703 RIG: Hanjin DRILLER: Total Drilling LOGGED: FH

TYPE OF BORING: 110mm solid flight auger TC bit

CASING: Uncased

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

PROJECT:

LOCATION:

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

REMARKS: Location coordinates are in MGA94 Zone 56. w = field moisture content, PL = plastic limit, PEL = proposed excavation level

SAMPLING & IN SITU TESTING LEGEND Gas sample Piston sample Tube sample (x mm dia.) Water sample Water seep Water level LEGENU PID Photo ionisation detector (ppm) PL(A) Point bad axial test Is(50) (MPa) PL(D) Point bad diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample G P U,x W Douglas Partners Core drilling Disturbed sample Environmental sample CDE ₽ Geotechnics | Environment | Groundwater

**SURFACE LEVEL:** 720.0 AHD **EASTING:** 259722 **NORTHING:** 6172662

PIT No: 125 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

$\square$			Description	. <u>ಲ</u>		Sam	npling &	& In Situ Testing					
RL	De (I	epth m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water			s per mm	)
720			Strata TOPSOIL/Silty CLAY CL: low plasticity, brown, with root	NN		0.1	Se				5 10	15	20
		0.15	fibres, w <pl Silty CLAY CL: low to medium plasticity, brown, with trace</pl 			0.1				-			
			Silty CLAY CL: low to medium plasticity, brown, with trace root fibres, w <pl, hard,="" residual<="" td=""><td></td><td>D</td><td>0.5</td><td></td><td>pp &gt;600</td><td></td><td>l</td><td></td><td>•</td><td></td></pl,>		D	0.5		pp >600		l		•	
-						0.5		μη 2000					
-										-		•	
719	1	1.0	SILTSTONE: brown, very low strength, highly weathered, with clay seams, Wianamatta Group	<u> </u>	D	1.0				-1			
-			with clay seams, Wianamatta Group							-		•	
			<ul> <li>becoming low to medium strength, moderately weathered below 1.3m</li> </ul>	 		4.5				-		•	
					D	1.5				-			
		1.8	SANDSTONE: fine grained, orange brown, low to medium	· — ·						-		-	•
718	2		SANDSTONE: fine grained, orange brown, low to medium strength, moderately weathered, Wianamatta Group		D	2.0				-2			
		2.1	Pit discontinued at 2.1m (Refusal on medium strength sandstone)	•						-			
			· · · · · · · · · · · · · · · · · · ·							-			
										-		• • •	•
										-			
717	3									-3		•	•
										-		•	•
										-		•	
										-		•	
716	4									-4			•
										-			
										-		•	•
										-		•	
ţ										-		•	•
715	5									- -5		•	•
										-		•	•
										-			•
ţţ										-			•
										-		•	•
										-			

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT:

PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SAM	PLING	<b>3 &amp; IN SITU TESTING</b>	LEGE	END			
Α	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
В	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)			
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)	1	1.1	
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		/ / 1	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test			
Е	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Ge



**SURFACE LEVEL:** 720.6 AHD **EASTING:** 259761 **NORTHING:** 6172616 PIT No: 126 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

Π			Description		Sampling & In Situ Testing									
RL	De	epth	Description of	Graphic Log	¢				Water	Dynamic Penetrometer - (blows per mm)			Test	
	1)	m)	Strata	Gra	Type	Depth	Sample	Results & Comments	Ň				15	20
$\left  \right $	-	0.1	TOPSOIL/Silty CLAY CL: low plasticity, brown, with root \fibres, w <pl <="" td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td> </td><td>:</td><td>:</td><td></td><td>:</td></pl>		D	0.1					:	:		:
	-		Silty CLAY CL: low to medium plasticity, brown, with cobbles and boulders, w <pl, colluvium<="" hard,="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>F</td><td></td><td></td><td></td><td></td></pl,>							F				
	-				D	0.5		pp >600		-				
720										-		-		÷
	-									-				
	-1				D	1.0		pp = 350-400		-1				
ŀ		1.3								ŀ		:		
-		1.5	Silty CLAY CL: low to medium plasticity, dark grey mottled brown, w <pl,very residual<="" stiff,="" td=""><td></td><td></td><td>4.5</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td></pl,very>			4.5				-				
719	-		- with bands of very low strength, highly weathered siltstone below 1.4m		D	1.5				F				:
										-	:	:	:	:
	-2	1.9-	SILTSTONE: grey brown, very low strength, highly weathered, with clay seams, Wianamatta Group		D	2.0				-2				
	-			·						-	:			
										-	:	:		:
718	-	2.5	Pit discontinued at 2.5m	<u> · — · ·</u>	—D—	-2.5-				-		:	:	:
	-		(Refusal on medium strength siltstone)							l	:	:		
	- 3									-3				
											:	:	:	÷
-	-									-				
										F				
12	-									-				
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716										-				:
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										F		:	•	
715	-									ŀ		:	•	
										-		:	•	
ŀ	-									-		:		

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT:

PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SA	MPLING	& IN SITU TESTIN	G LEG			
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
в	Bulk sample	P	Piston sample		A) Point load axial test Is(50) (MPa)		
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(E	D) Point load diametral test Is(50) (MPa)		
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geote



**SURFACE LEVEL:** 722.9 AHD **EASTING:** 259810 **NORTHING:** 6172603 PIT No: 127 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

Π		Description	Graphic Log		Sampling & In Situ Testing									
RL	Depth (m)	of Strata		Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20					
	. 0.1	TOPSOIL/Silty CLAY CL: low plasticity, brown, with root	Ň	D	0.1				-					
		Silty CLAY CL: low to medium plasticity, red brown, with cobbles, boulders and trace fine grained sand, w <pl, colluvium<="" stiff,="" td="" very=""><td></td><td>D</td><td>0.5</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td></pl,>		D	0.5				-					
722	0.7 - 1	<sup>75</sup> Silty CLAY CL: low to medium plasticity, dark grey mottled brown, w <pl, hard,="" p="" residual<=""></pl,>		D	1.0		pp >600		- - - 1 -					
		- extremely low strength, residual soil siltstone bands below 1.3m		D	1.5				-					
721		SILTSTONE: pale grey brown, very low strength, moderately weathered, with clay seams, Wianamatta		D	2.0				-2					
	• • •	Pit discontinued at 2.15m (Refusal on low to medium strength siltstone)							-					
720	- 3 - 3 -								-3					
719	- - - - 4 -													
718	- 5													
717									-					

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT: PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SA	MPLING	& IN SITU TESTIN	g lege	IND			
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)			
В	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)			
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)			
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		A 1	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		/	
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)			Geot



**SURFACE LEVEL:** 693.2 AHD **EASTING:** 259724 **NORTHING:** 6172407 PIT No: 128 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

		Description	. <u>c</u>		Sam		& In Situ Testing				
ᆋ	Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic (blo	Penetror ows per i	meter Test mm)
		Strata	G	Тy	De	San	Comments	-	5	10 1	5 20
693	0.1	TOPSOIL/Silty CLAY CL: low plasticity, pale brown, with root fibres, w <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td></td><td></td></pl<>		D	0.1				-		
-		CLAY CH: medium to high plasticity, brown mottled orange, w <pl, hard,="" residual<br="">- becoming grey mottled orange below 0.5m</pl,>		D	0.5		pp >500		-		
-		- becoming grey mouled orange below 0.5m							-		
- 1				D	1.0		pp >500		- -1 -		
692									-		
-				D	1.5		pp >600		-		
-2	2			D	2.0		pp >600		-2		
- 691		with these first and halow 0 day							-		
-		- with trace fine sand below 2.4m		D	2.5		pp = 600		-		
-		- becoming very stiff below 2.8m							-		
-3	3.0-	Pit discontinued at 3.0m (Limit of investigation)		—D—	-3.0-		pp = 300-400		-3		
-											
-											
-4 0	Ļ								-4		
-									-		
- 5	5								-5		
- 688											
-											
										:	

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT:

PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SA	MPLING	6 & IN SITU TESTIN	G LEGE	END		
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	P	Piston sample		) Point load axial test Is(50) (MPa)		
BL	< Block sample	U,	Tube sample (x mm dia.)	) PL(D	) Point load diametral test Is(50) (MPa)		
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	9 ₹	Water level	V	Shear vane (kPa)		
						_	



**SURFACE LEVEL:** 692.0 AHD **EASTING:** 260136 **NORTHING:** 6171941 PIT No: 129 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

		Description	U		Sam	pling a	& In Situ Testing						
	epth	of	Graphic Log	e				Water	Dy	namic l	Penetro	meter Tea	st
- ( 8	m)	Strata		Type	Depth	Sample	Results & Comments	∣≥				5 20	
8	0.2	TOPSOIL/Silty CLAY CL: low plasticity, brown, with root fibres, w>PL		D	0.1				-				
[	0.2	CLAY CH: high plasticity, brown mottled grey orange, w <pl, hard,="" residual<="" stiff="" td="" to="" very=""><td></td><td></td><td></td><td></td><td></td><td></td><td>[</td><td></td><td>•</td><td></td><td></td></pl,>							[		•		
-				D	0.5		pp >400		-		•		
-		- becoming grey mottled orange, very stiff below 0.7m							-		•		
				D	1.0		pp = 400		-1		•		
-									-				
-		- with very low to medium strength, highly weathered		D	1.5		pp = 200-300						
-		siltstone bands below 1.5m							-		•		
-069 - 2				D	2.0				-2		•		
	2.3-								ļ		•		
-	2.5	SILTSTONE: grey brown, low to medium strength, slightly weathered to moderately weathered, Wianamatta Group	· _ · ·	D	-2.5-				-				
-		Pit discontinued at 2.5m (Refusal on medium strength siltstone)							-		•		
- - - 3									-3		•		
-									-		•		
-									-		•		
											•		
-									-	:	•		
88 - 4									-4				
ŀ											•		
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				I					L	•	•	• •	

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT:

PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SAM	PLING	<b>&amp; IN SITU TESTING</b>				
А	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	Р	Piston sample		Point load axial test Is(50) (MPa)		
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)	1.	
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	/ 🖌 🛯	
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)		Geo



**SURFACE LEVEL:** 691.8 AHD **EASTING:** 259635 **NORTHING:** 6171925 PIT No: 130 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

Π			Description	0		Sam	iplina 8	& In Situ Testing						
R	Dep	oth	Description of	Graphic Log	0				Water	Dy	namic	Penetro	ometer	Test
ſĽ.	(m	1)	Strata	Gra	Type	Depth	Sample	Results & Comments	Ŵ			ows per	15	20
	-	0.1	TOPSOIL/Silty CLAY CL: low plasticity, brown, with root	$\mathcal{D}$	D	0.1							:	
	-		CLAY CH: high plasticity, brown mottled orange, w <pl, hard,="" residual<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td>:</td><td>:</td><td></td><td>:</td></pl,>							-	:	:		:
-	-				D	0.5		pp = 500-550		-				
691	-		- becoming orange mottled grey below 0.8m								•		:	:
	- 1 -				D	1.0		pp = 500		-1			:	:
										-	•			
			- becoming grey mottled orange below 1.4m		D	1.5		pp >600						
- 069										-		•		
	- -2	2.0	SILTSTONE: grey, low to medium strength, slightly weathered, Wianamatta Group		D	2.0				-2	•	•	:	:
	-	2.3		· _ · _						-			<u> </u>	
			Pit discontinued at 2.3m (Refusal on medium strength siltstone)							-	•			
689										-				
╞╞	- - 3									- 3	•	•	:	:
										-			:	:
										-				
688											•	•		:
	-4 - -									-4			:	:
	-									-			:	
										-				:
687										-	•	•		
	-5									-5		•	:	:
												•	:	:
										-	•		:	
686										-	•	•	:	:
	-									[]	:	:	<u> </u>	

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

CLIENT: PROJECT:

LOCATION:

Vale

**REMARKS:** w = field moisture content, PL = plastic limit

	SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	END		
Α	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)		
В	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)		
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)		
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)		
D	Disturbed sample	⊳	Water seep	S	Standard penetration test		
E	Environmental sample	¥	Water level	V	Shear vane (kPa)		Geotec



**SURFACE LEVEL:** 691.5 AHD **EASTING:** 259214 **NORTHING:** 6171714 PIT No: 131 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

Depth	Description	i.≅		San		& In Situ Testing	5	Dumanuia Da		
(m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Pe (blows	s per mm)	)
	Strata		É.	ă	Sa	Comments		5 10	15	20
0.2	fibres, w <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td>•</td><td>:</td></pl<>		D	0.1				-	•	:
	CLAY CL: low to medium plasticity, orange mottled brown, w <pl, hard,="" residual<="" td=""><td></td><td></td><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>			0.5						
			D	0.5					•	
	-becoming grey mottled orange, hard below 0.7m		_					-	•	
1			D	1.0		pp >600		-1	•	
			_	1.4		PEL*			•	
			D	1.5 1.5		pp = 200-300			•	
	-becoming stiff to very stiff below 1.8m		-						• • • •	
2			D	2.0		pp = 200-350		-2	•	
2.3-	CLAY CH: high plasticity, grey mottled orange, w <pl, residual<="" stiff,="" td="" very=""><td></td><td>D</td><td>2.5</td><td></td><td>pp = 300</td><td></td><td></td><td></td><td></td></pl,>		D	2.5		pp = 300				
3			D	3.0		pp = 350-400		-3		
3.2	Pit discontinued at 3.2m							-		
	(Limit of investigation)							-	•	
									•	
1								-4		
								-		
									•	
5								-5		
									• • • •	
									• • • •	•
									•	
3	2 2.3 - 3 3.2 -	1       TOPSOIL/Silty CLAY CL: low plasticity, brown, with root fibres, w <pl< td="">         CLAY CL: low to medium plasticity, orange mottled brown, w<pl, hard,="" residual<="" td="">         -becoming grey mottled orange, hard below 0.7m         -becoming stiff to very stiff below 1.8m         2.3         CLAY CH: high plasticity, grey mottled orange, w<pl, residual<="" stiff,="" td="" very="">         3.2         Pit discontinued at 3.2m (Limit of investigation)</pl,></pl,></pl<>	10PSOIL/Silty CLAY CL: low plasticity, brown, with root         ibres, w <pl< td="">         CLAY CL: low to medium plasticity, orange mottled brown, w<pl, hard,="" residual<="" td="">         -becoming grey mottled orange, hard below 0.7m         -becoming stiff to very stiff below 1.8m         2.3         CLAY CH: high plasticity, grey mottled orange, w<pl, residual<="" stiff,="" td="" very="">         3.2         Pit discontinued at 3.2m         (Limit of investigation)</pl,></pl,></pl<>	02       TOPSOIL/Silty CLAY CL: low plasticity, brown, with root fibres, w-PL.       D         CLAY CL: low to medium plasticity, orange mottled brown, w-PL, hard, residual       D         -becoming grey mottled orange, hard below 0.7m       D         -becoming stiff to very stiff below 1.8m       D         2.3       CLAY CH: high plasticity, grey mottled orange, w-PL, very stiff, residual       D         9       3.2       Pit discontinued at 3.2m (Limit of investigation)       D	D2       TOPSOIL/Silty CLAY CL: low plasticity, brown, with root fibres, w <pl< td="">       D       0.1         CLAY CL: low to medium plasticity, orange mottled brown, w<pl, hard,="" residual<="" td="">       D       0.5         -becoming grey mottled orange, hard below 0.7m       D       1.0         -becoming stiff to very stiff below 1.8m       D       2.0         2.3       CLAY CH: high plasticity, grey mottled orange, w<pl, residual<="" stiff,="" td="" very="">       D       2.0         3.4       Pit discontinued at 3.2m (Limit of investigation)       D       3.0</pl,></pl,></pl<>	1000000000000000000000000000000000000	TOPSOL/SIN CLAY CL: low plasticity, orange motiled brown, with root fbres, w <pl, hard,="" residual<="" td="">       D       0.1         D       CLAY CL: low to medium plasticity, orange motiled brown, w<pl, hard,="" residual<="" td="">       D       0.5         -becoming grey motiled orange, hard below 0.7m       D       1.0       pp &gt;600         -becoming stiff to very stiff below 1.8m       D       1.4       PEL*         -becoming stiff to very stiff below 1.8m       D       2.0       pp = 200-330         2.3       CLAY CH: high plasticity, grey motiled orange, w<pl, residual<="" stiff,="" td="" very="">       D       2.5       pp = 300         3.2       Pit discontinued at 3.2m (Limit of investigation)       I       I       I       I</pl,></pl,></pl,>	1DPSQL/Sity CLAY CL: low plasticity, orange mottled brown, w-PL, hard, residual       D       0.1         -becoming grey mottled orange, hard below 0.7m       D       1.0       pp >600         -becoming grey mottled orange, hard below 0.7m       D       1.4       PEL*         -becoming stiff to very stiff below 1.8m       D       2.0       pp = 200-300         -becoming stiff to very stiff below 1.8m       D       2.0       pp = 200-300         2.3       CLAY CH: high plasticity, grey mottled orange, w <pl, residual<="" stiff,="" td="" very="">       D       2.5       pp = 300         2.3       PIt discontinued at 3.2m       D       3.0       pp = 350-400         3.1       PIt discontinued at 3.2m       IIII of investigation)       IIII of investigation       IIII of investigation</pl,>	02       TOPSOIL/SINCLAY CL: low plasticity, orange motifed brown.       0       0.1       0       0.1         02       CLAY CL: low to medium plasticity, orange motifed brown.       0       0.5       0       0         -becoming grey motifed orange, hard below 0.7m       0       10       pp >600       1         -becoming stiff to very stiff below 1.8m       0       10       pp =200-300       1         -becoming stiff to very stiff below 1.8m       0       2.5       pp = 200-300       2         23       CLAY CH: high plasticity, grey motifed orange, w <pl, residual<="" stiff,="" td="" very="">       0       3.0       pp = 360-400       -3         32       Pit discontinued at 3.2m (Limit of investigation)       I       I       I       I       I</pl,>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

32 Lovelle Street & 141 Yarrawa Road, Moss

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** w = field moisture content, PL = plastic limit, PEL = proposed excavation level

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PIL
 Pionit bad axial test Is(50) (MPa)

 BLK
 Block sample
 U
 Tube sample (xmm dia.)
 PL(A) Point load diametral test Is(50) (MPa)

 D
 Disturbed sample
 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 ¥
 Water level
 V
 Shear vane (kPa)



**SURFACE LEVEL:** 688.8 AHD **EASTING:** 258987 **NORTHING:** 6171633

PIT No: 132 PROJECT No: 40494.03 DATE: 22/10/2019 SHEET 1 OF 1

Π		Description	0		Sam	nolina ƙ	& In Situ Testing					
RL	Depth (m)	Description of	Graphic Log	e				Water	Dy	namic P/	enetror	neter Test nm)
	(m)	Strata	С В С	Type	Depth	Sample	Results & Comments	3		5 1		
-	0.1	TOPSOIL/Silty CLAY CL: low plasticity, brown, with root \fibres, w <pl <="" td=""><td><math>\mathcal{D}</math></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td></pl>	$\mathcal{D}$	D	0.1				-			
		CLAY CH: high plasticity, brown mottled grey orange, w <pl, hard,="" residual<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>ļ</td><td></td><td></td><td></td></pl,>							ļ			
		w <pl, hard,="" residual<="" td=""><td></td><td>D</td><td>0.5</td><td></td><td>pp = 450</td><td></td><td></td><td>: :</td><td></td><td></td></pl,>		D	0.5		pp = 450			: :		
688		- becoming orange mottled grey, w <pl, 0.7m<="" below="" stiff="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl,>										
ŀ	- 1			D	1.0		pp = 150-200		-1			
-									-			
		- becoming grey mottled orange below 1.4m							F			
				D	1.5		pp = 100-150		-			
687									-	: :		
	-2	<ul> <li>with very low strength, highly weathered sandstone bands below 1.8m</li> </ul>		D	2.0				-2			
									-			
				D	2.5							
									-			
686				_								
	-3 3.0	Pit discontinued at 3.0m (Limit of investigation)		—D—	-3.0-				-3			
									F			
									-	: :		
									-	:		
685									ļ			
	- 4								-4			
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683									[			
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RIG: JCB 3CX-4 Backhoe with 450mm toothed bucket

CLIENT:

PROJECT:

LOCATION:

Vale

Prime Moss Vale Pty Ltd

Proposed Residential Subdivision

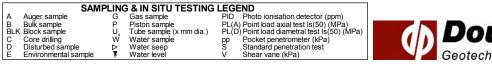
32 Lovelle Street & 141 Yarrawa Road, Moss

LOGGED: FH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** w = field moisture content, PL = plastic limit





SURFACE LEVEL: 707.4 AHD EASTING: 259597 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172734

**PIT No:** 1 **PROJECT No:** 40494.01 DATE: 18/9/2018 SHEET 1 OF 1

	Description	ic		San		& In Situ Testing			
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Per (blows p	netrometer 1 per 150mm)
0.1	TOPSOIL - dark brown mottled grey and red brown, silty \clay, moist, FMC~PL /		D	0.1				-	
	SILTY CLAY - soft, dark grey mottled green grey and orange brown, silty clay, moist, FMC>PL (COLLUVIUM)		D	0.5		pp = 0-50		-	
0.6	SILTY CLAY - stiff to hard, dark grey mottled brown, silty clay with iron indurations, moist, FMC <pl (POSSIBLE COLLUVIUM)</pl 		D	1.0					
			D				-		٦
1.6	SILTY CLAY - hard, grey mottled orange brown, silty clay with some extremely low strength, extremely weathered siltstone bands, moist, FMC <pl< td=""><td></td><td>D</td><td>1.5</td><td></td><td></td><td></td><td>-</td><td></td></pl<>		D	1.5				-	
2 2.1	(RESIDUAL) SILTSTONE - very low strength, moderately weathered, grey with orange brown bands siltstone with some extremely low strength, extremely weathered bands		D	2.0				-2	
2.5	Pit discontinued at 2.5m (Limit of Investigation)		—D—	-2.5-					

RIG: Yanmar 5T excavator- 600mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: Ground water ingress at 2.5m

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

	SAM	PLING	& IN SITU TESTING			1
А	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)	
В	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)	L
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test Is(50) (MPa)	L
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)	L
D	Disturbed sample	⊳	Water seep	S	Standard penetration test	L
E	Environmental sample	¥	Water level	V	Shear vane (kPa)	

**Douglas Partners** Geotechnics | Environment | Groundwater

SURFACE LEVEL: 739.3 AHD **EASTING:** 259694 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172904

**PIT No:** 2 **PROJECT No: 40494.01 DATE:** 18/9/2018 SHEET 1 OF 1

#### Vale Sampling & In Situ Testing Description Graphic Log Dynamic Penetrometer Test Water Depth Ъ of Sample Type (blows per 150mm) Depth (m) Results & Comments Strata 10 20 TOPSOIL - dark brown, silty clay with some sandstone cobbles, moist, FMC<PL 0.1 D 0.1 < < DOLERITE - medium strength, moderately weathered, $\times$ $\boldsymbol{\times}$ .8 grey brown dolerite $\times$ $\times$ 0.5 -D -0.5 Pit discontinued at 0.5m : (Refusal on medium strength dolerite)



Pit 2 excavation.

RIG: Yanmar 5T excavator- 600mm toothed bucket

CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

Proposed Residential Subdivision

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** FMC = field moisture content; PL = plastic limit

SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	ND
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A)	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



SURFACE LEVEL: 708.2 AHD **EASTING:** 259515

**PIT No:** 3 **PROJECT No: 40494.01 DATE:** 18/9/2018 SHEET 1 OF 1

		Description	<u>.</u>		Sam	pling 8	k In Situ Testing				
. D(	epth m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		Oynamic Per (blows p 5 10	netrometer Tes er 150mm) 15 20
	0.1	_ TOPSOIL - brown grey, silty clay, moist, FMC <pl< td=""><td>XX</td><td>D</td><td>0.01</td><td>0,</td><td></td><td></td><td></td><td>1</td><td></td></pl<>	XX	D	0.01	0,				1	
-	0.1	SILTY CLAY - stiff to hard, grey mottled orange brown, silty clay, moist, FMC <pl (COLLUVIUM)</pl 		B D	0.4 0.5 0.6		pp = 400-500		-		
- - - 1 - -	1.0 - 1.1 -	SILTY CLAY - very stiff, grey mottled orange brown, silty clay with some gravel-sized ironstone fragments, moist, FMC <pl (RESIDUAL)</pl 		D	1.0				- - -1 - -	Γ	
- - -		SILTSTONE - very low strength, moderately weathered, dark grey siltstone with extremely low strength, extremely weathered bands		D	1.5				-		
-2			   	D	2.0				-2		
-	2.5	- becoming extremely low strength, extremely weathered, grey with orange brown bands siltstone with very low strength bands below 2.4m	· — · ·	—D—	-2.5-				-		
		Pit discontinued at 2.5m (Limit of Investigation)									
		(Limit of Investigation)	Pit 3 exc	cavatic	n.						

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND 

 LEGEND

 PID
 Photo ionisation detector (ppm)

 PL(A) Point load axial test Is(50) (MPa)

 PL(D) Point load diametral test Is(50) (MPa)

 pp
 Pocket penetrometer (kPa)

 S
 Standard penetration test

 V
 Shear vane (kPa)

 A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample LING & IN SITUTESTING G Gas sample P Piston sample U, Tube sample (x mm dia.) W Water sample D Water seep Water seep

Douglas Partners Geotechnics | Environment | Groundwater

CLIENT: PROJECT:

LOCATION:

Vale

Moss Vale Pty Ltd Proposed Residential Subdivision 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172770

SURFACE LEVEL: 729.7 AHD EASTING: 259600 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172841

PIT No: 4 **PROJECT No:** 40494.01 DATE: 18/9/2018 SHEET 1 OF 1

Dant		Description	<u>io</u>		Sam	pling &	In Situ Testing		
Dept (m)	th )	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer T (blows per 150mm) 5 10 15 2
0.	.05 -	TOPSOIL - brown, sandy clay with some boulders (dolerite), moist, FMC <pl (COLLUVIUM)</pl 		D	0.1				
		SANDY CLAY - stiff, brown orange, friable, sandy clay, moist, FMC <pl (COLLUVIUM)</pl 		D	0.5				
1	0.8-	SANDY CLAY - stiff, orange brown, sandy clay with iron indurations, moist, FMC <pl (RESIDUAL)</pl 		D	1.0				-1
		DOLERITE - very low strength, highly weathered, orange brown dolerite with extremely low strength, extremely weathered bands	× × × × × ×	6	45				-
		<ul> <li>becoming low strength, moderately weathered brown orange with very low strength, highly weathered bands below 1.2m</li> </ul>	× × × × × × × × × ×	D	1.5				
2 :	2.0-	Pit discontinued at 2.0m (Refusal on medium strength dolerite)		—D—	-2.0-				
				「日本の					
		and work and	1	in h					

RIG: Yanmar 5T excavator- 600mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

SA	<b>IPLING</b>	<b>3 &amp; IN SITU TESTING</b>	LEGE	END
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	ž	Water level	V	Shear vane (kPa)



SURFACE LEVEL: 738.7 AHD EASTING: 259791 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172744

**PIT No:** 5 **PROJECT No: 40494.01** DATE: 18/9/2018 

Depth (m) Description Strata 0.05 TOPSOIL - brown, silty clay, moist, FMC <pl< th=""><th></th><th></th><th></th><th></th><th>-</th><th></th><th></th><th>1</th><th></th></pl<>					-			1	
0.05 TOPSOIL - brown, silty clay, moist, FMC <pl< th=""><th></th><th>Sam</th><th></th><th>&amp; In Situ Testing</th><th>_</th><th>_</th><th></th><th></th><th></th></pl<>		Sam		& In Situ Testing	_	_			
	Type	Depth	Sample	Results & Comments	Water	Dynam (bl	ic Pene ows per	tromete 150mr	er Test n) 20
SANDY CLAY - stiff to hard, brown mottled orange brown, sandy clay with some cobbles (dolerite) and iron indurations, moist, FMC <pl (COLLUVIUM) DOLERITE - very low strength, highly weathered, brown orange dolerite with some ironstone and extremely low strength, extremely weathered bands</pl 	D	0.1	<u>0</u>			0 			

Pit 5 excavation.

RIG: Yanmar 5T excavator- 600mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

	SAM	PLING	& IN SITU TESTING	LEGE	IND
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
в	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test Is(50) (MPa)
C	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)



SURFACE LEVEL: 710.7 AHD **EASTING:** 259779 LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172567

**PIT No:** 6 **PROJECT No: 40494.01** DATE: 18/9/2018

							SHEET 1 OF 1		
Description	<u>ic</u>		Sam	ipling &	& In Situ Testing		Durania Desetarantes Test		
of Strata	Graph Log	Type	Depth	Sample	Results & Comments	Wate	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20		
TOPSOIL - brown, silty clay, moist, FMC <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td></td></pl<>		D	0.1						
SILTY CLAY - very stiff to hard, brown, silty clay, moist, FMC <pl (COLLUVIUM)</pl 		D	0.5		pp >600				
- becoming orange brown with iron indurations and some cobbbles (dolerite) below 0.7m		D	1.0			-	-1		
SILTSTONE - low strength, moderately weathered, grey siltstone with extremely low strength, extremely weathered bands	· _ · ·	D	1.5		pp >600	-			
Pit discontinued at 1.6m (Refusal on medium strength siltstone)									
	of Strata TOPSOIL - brown, silty clay, moist, FMC <pl SILTY CLAY - very stiff to hard, brown, silty clay, moist, FMC<pl (COLLUVIUM) - becoming orange brown with iron indurations and some cobbbles (dolerite) below 0.7m SILTSTONE - low strength, moderately weathered, grey siltstone with extremely low strength, extremely weathered bands</pl </pl 	of     Go       Strata     Strata       TOPSOIL - brown, silty clay, moist, FMC <pl< td="">     Image: Comparison of the strate of th</pl<>	TOPSOIL - brown, silty clay, moist, FMC <pl< td="">       D         SILTY CLAY - very stiff to hard, brown, silty clay, moist, FMC<pl< td="">       D         (COLLUVIUM)       1         - becoming orange brown with iron indurations and some cobbbles (dolerite) below 0.7m       D         SILTSTONE - low strength, moderately weathered, grey siltstone with extremely low strength, extremely weathered bands       D         Pit discontinued at 1.6m       D</pl<></pl<>	of       a       fa         Strata       a       fa         TOPSOIL - brown, silty clay, moist, FMC <pl< td="">       D       0.1         SILTY CLAY - very stiff to hard, brown, silty clay, moist, FMC<pl< td="">       D       0.5         (COLLUVIUM)       1       D       0.5         - becoming orange brown with iron indurations and some cobbbles (dolerite) below 0.7m       D       1.0         SILTSTONE - low strength, moderately weathered, grey siltstone with extremely low strength, extremely weathered bands       D       1.5         Pit discontinued at 1.6m       I       D       1.5</pl<></pl<>	of       Image: Construct of the second	Survey State       Image: Constraint of the strength o	Of       Image: Strata        SILTSTONE - Iow strength, moderately w		



Pit 6 excavation.

RIG: Yanmar 5T excavator- 600mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

**REMARKS:** FMC = field moisture content; PL = plastic limit

SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	ND
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A)	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



CLIENT:

PROJECT:

Moss Vale Pty Ltd

Vale

Proposed Residential Subdivision

SURFACE LEVEL: 696.5 AHD EASTING: 259513 LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172677

**PIT No:** 7 **PROJECT No:** 40494.01 **DATE:** 18/9/2018 SHEET 1 OF 1

	vale							
	Description	jc		San		& In Situ Testing		
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
- 0.1 - - - - - - - -	TOPSOIL - brown, silty clay, moist, FMC <pl SILTY CLAY - stiff, dark brown, silty clay, moist, FMC<pl (POSSIBLE COLLUVIUM/SLOPEWASH)</pl </pl 		D	0.1 0.4 0.5 0.5		PEL*	=	
- - - 1 - - - - - - - - - - - - - - - -	- becoming very stiff to hard, grey mottled orange brown below 0.8m SILTSTONE - low to medium strength, moderately		D	1.0		pp >600		
- 	veathered, brown grey siltstone with very low strength, highly weathered bands Pit discontinued at 1.5m (Refusal on medium strength siltstone)		D-	1.5				
		Pit 7 ex	cavati	on.				
IG: Vann	nar 5T excavator- 600mm toothed bucket			OGGEI	אויר	\/FH	SUP	Vey Datum: Mga94
				JGGEI	J. 11\/-	VI I I	JUR	VLIDAIONI. MGA94
	BSERVATIONS: No free groundwater observed : FMC = field moisture content; PL = plastic limit							Sand Penetrometer AS1289.6.3
A Auger sar	SAMPLING & IN SITU TESTING LEGEND mole G Gas sample PID Photo ionisation detec	ctor (ppm)					M	Cone Penetrometer AS1289.6.3

	SAMPL	.ING	i& IN SITU TESTING I	LEGE	:ND
Α	Auger sample	G	Gas sample		Photo ionisation detector (ppm)
	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
	Disturbed sample	⊳	Water seep	S	Standard penetration test
Е	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



SURFACE LEVEL: 712.3 AHD EASTING: 259680 LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172699

**PIT No:** 8 **PROJECT No:** 40494.01 DATE: 18/9/2018

- "	Description	. <u>e</u>		Sam		In Situ Testing		Dunamia Panatromator 7
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer (blows per 150mm) 5 10 15
	TOPSOIL- brown, silty clay, moist, FMC <pl< td=""><td>M</td><td>D</td><td>0.1</td><td></td><td></td><td></td><td></td></pl<>	M	D	0.1				
0.2	SILTY CLAY - hard, dark brown, silty clay with some ironstone gravel, moist, FMC <pl (COLLUVIUM)</pl 		D	0.5		pp >600	-	
0.8	SILTY CLAY - very stiff to hard, brown mottled grey and orange brown, silty clay with some sandy clay bands and sub-rounded to rounded gravel, moist, FMC <pl (COLLUVIUM)</pl 		D	1.0		pp >600	-	1 J
1.3	SILTY CLAY - very stiff to hard, grey mottled orange brown, moist, FMC <pl (RESIDUAL)</pl 		D	1.5		pp >600		
	SANDSTONE - low to medium strength, moderately weathered, grey, brown and orange brown, fine to medium-grained sandstone						-	
2 2.0	Pit discontinued at 2.0m (Refusal on medium strength sandstone)			-2.0-				
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					

Pit 8 excavation.

RIG: Yanmar 5T excavator- 600mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

SAM	PLIN	<b>3 &amp; IN SITU TESTING</b>	LEGE	END
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A)	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test Is(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)

**Douglas Partners** Geotechnics | Environment | Groundwater

SURFACE LEVEL: 700.0 AHD **EASTING:** 259274 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171541

**PIT No:** 9 **PROJECT No: 40494.01** DATE: 14/9/2018 

Image: marked back display="background-color: blackground-color: black display="background-color: black display="bl
0.1     TOPSOIL - brown, silty clay with cobbles (syenite), moist, FMC <pl< td="">     P     0.1     0.1       SYENITE - medium strength, slightly weathered to fresh stained, grey syenite with very low to low strength, moderately to highly weathered bands     0.1     0.1       1.0     Pit discontinued at 1.0m     0.9     PEL*</pl<>

Pit 9 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

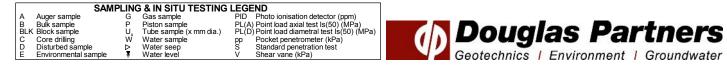
Proposed Residential Subdivision

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



SURFACE LEVEL: 708.2 AHD **EASTING:** 259317 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171416

**PIT No:** 10 **PROJECT No: 40494.01 DATE:** 14/9/2018 

	Description	. <u>e</u>		Sam		In Situ Testing	L			
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynar (t	llows per	trometer T 150mm)
0.25	TOPSOIL - light brown, silty clay with some cobbles (syenite), moist, FMC <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td></td><td>• • • • •</td></pl<>		D	0.1				-		• • • • •
0.23	SILTY CLAY - very stiff to hard, light brown mottled red brown, silty clay with trace ironstone gravel, moist, FMC <pl (RESIDUAL)</pl 		B D	0.4 0.5 0.6		pp >600		-		
1 1.0	SYENITE - very low strength, highly weathered, light brown, iron indurated syenite with extremely low strength, extremely weathered bands		D	0.9 1.0 1.0		PEL*	=	-1-1		
	- becoming low strength with very low strength bands below 1.4m		D	1.5				-		

Pit 10 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

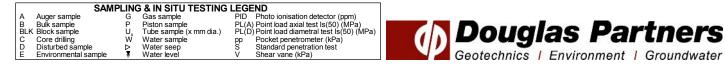
Proposed Residential Subdivision

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



SURFACE LEVEL: 686.0 AHD EASTING: 258940

**PIT No:** 11 **PROJECT No:** 40494.01 **DATE:** 14/9/2018 SHEET 1 OF 1

Depth (m)         Description of Strata         of Strata         of Strata           0.3         SILTY CLV - stiff to very stiff, light brown, silty clay, moist, FMC-PL (POSSIBLE ALLUVIUM)         D           - becoming slightly sandy below 1.5m (PROBABLE RESIDUAL)         D           - becoming slightly sandy below 1.5m (PROBABLE RESIDUAL)         D           - becoming slightly sandy below 1.5m (PROBABLE RESIDUAL)         D           - becoming slightly sandy below 1.6m         D           - 2.5         Pit discontinued at 2.5m (Limit of investigation)         D		SHEET 1 OF 1
0.1     TOPSOIL - dark brown, silty clay with some root fibres, moist, FMC <pl< td="">     D       0.3     SILTY CLAY - stiff to very stiff, light brown, silty clay, moist, FMC<pl< td="">     D       9     -1     SILTY CLAY - stiff to very stiff, light brown, silty clay, moist, FMC<pl< td="">     D       9     -1     - becoming slightly sandy below 1.5m     D       9     -2     1.9     SANDSTONE - very low strength, highly weathered, grey medium to coarse-grained sandstone with extremely low strength extremely weathered bands     D       2.5     Pit discontinued at 2.5m     D</pl<></pl<></pl<>	Sampling & In Situ Testing	يغ Dynamic Penetrometer Test
0.3     SILTY CLAY - stiff to very stiff, light brown, silty clay, moist, FMC <pl< td="">     D       0.3     SILTY CLAY - stiff to very stiff, light brown, silty clay, moist, FMC<pl< td="">     D       (POSSIBLE ALLUVIUM)     111     D       1     D     D       2</pl<></pl<>	Hand Band Results & Comments	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
SILTY CLAY - stiff to very stiff, light brown, silty clay, moist, FMC~PL (POSSIBLE ALLUVIUM) - becoming slightly sandy below 1.5m (PROBABLE RESIDUAL) - becoming light brown mottled grey below 1.6m 1.9 SANDSTONE - very low strength, highly weathered, grey medium to coarse-grained sandstone with extremely low strength extremely weathered bands D D D	0.1	
<ul> <li>becoming slightly sandy below 1.5m</li> <li>- becoming slightly sandy below 1.5m</li> <li>(PROBABLE RESIDUAL)</li> <li>- becoming light brown mottled grey below 1.6m</li> <li>1.9 SANDSTONE - very low strength, highly weathered, grey medium to coarse-grained sandstone with extremely low strength extremely weathered bands</li> <li>2.5 Pit discontinued at 2.5m</li> </ul>	0.5 pp = 300-400	
- becoming slightly sandy below 1.5m     (PROBABLE RESIDUAL)     - becoming light brown mottled grey below 1.6m     1.9     SANDSTONE - very low strength, highly weathered, grey     medium to coarse-grained sandstone with extremely low     strength extremely weathered bands     D     Pit discontinued at 2.5m	1.0 pp = 300-400	
SANDSTONE - very low strength, highly weathered, grey medium to coarse-grained sandstone with extremely low strength extremely weathered bands	1.5 pp = 300-400	
Pit discontinued at 2.5m	2.0	-2
	-2.5	
Pit 11 spoil.		
RIG: Backhoe 3CX-4-550mm toothed bucket LO	OGGED: IKA/FH	SURVEY DATUM: MGA94

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

	SAMF	LING	& IN SITU TESTING	LEGE	ND
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
В	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)		Point load diametral test Is(50) (MPa)
	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)

**Douglas Partners** Geotechnics | Environment | Groundwater

#### CLIENT: PROJECT:

Vale

Moss Vale Pty Ltd Proposed Residential Subdivision LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171823

SURFACE LEVEL: 694.3 AHD EASTING: 259424 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171716

**PIT No:** 12 **PROJECT No:** 40494.01 **DATE:** 14/9/2018 SHEET 1 OF 1

	Description	Graphic Log		Sam		& In Situ Testing	<u> </u>	Dumenuia Demotre meter Te
Depth (m)	of Strata		Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Te (blows per 150mm) 5 10 15 20
0.1	TOPSOIL - light grey, silty clay, moist, FMC <pl< td=""><td><math>\Delta \lambda</math></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td></td></pl<>	$\Delta \lambda$	D	0.1				
	SILTY CLAY - very stiff to hard, light brown mottled orange red grey, silty clay, moist, FMC <pl (RESIDUAL)</pl 		D	0.5		pp >600		
1	- becoming grey mottled orange brown with trace ironstone gravel below 0.7m		D	1.0		pp >600		
	- becoming grey mottled light brown below 1.4m		D	1.5		pp >600		
 2	- becoming slightly sandy, grey mottled light brown below 2.1m, moist, FMC~PL		D	2.0		pp = 500-600		-2
	becoming very stiff below 2.4m			0.5				-
2.5-	Pit discontinued at 2.5m (Limit of Investigation)		—D—	-2.5-		pp = 200-300		



Pit 12 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Proposed Residential Subdivision

CLIENT:

PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	ND
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)



SURFACE LEVEL: 689.0 AHD **EASTING:** 259212

**PIT No:** 13 **PROJECT No: 40494.01 DATE:** 14/9/2018 SHEET 1 OF 1

Description of Sitial       Description of Sitial       Section (Sitial       Section (Sitial       Section (Sitial       Section (Sitial       Section (Sitial       Description (Sitial       Descrit (Sitial       Description (Sitial <thdescri< th=""><th>Vale</th><th></th><th></th><th></th><th></th><th></th><th></th><th>SHEET 1 OF 1</th><th></th></thdescri<>	Vale							SHEET 1 OF 1	
1       0	Description	jc		Sam		& In Situ Testing	<u> </u>		
<form></form>	Depth (m) of	Graph Log	Type	Depth	Sample	Results & Comments	Wate		1)
<form></form>	SILTY CLAY - very stiff, light brown mottled red brown and grev, silty clay with some sand and trace ironstone gravel.		D						
<form>       in the the the the the the the the the the</form>	moist, FMC <pl< td=""><td></td><td>B D</td><td>0.5</td><td></td><td></td><td></td><td></td><td>•</td></pl<>		B D	0.5					•
1       0       15       p > 600       1         2       20       1       1       0       20       1       2         3       1       1       0       20       1	brown, silty clay with trace gravel-sized ironstone fragments, moist, FMC~PL		D	1.0		pp >600			
1       1	$\int^{L}$ - with some ironstone gravel below 1.2m		D	1.5		pp >600			
25       Pt discontinued at 2.5 m         (Limit of Investigation)       P         25       Pt discontinued at 2.5 m         1       Pt discontinued at 2	to moderately weathered, grey siltstone with extremely low	v	D	2.0				-2	
IG: Backhoe 3CX-4-550mm toothed bucket LOGGED: IKA/FH SURVEY DATUM: MGA94	Pit discontinued at 2.5m		D	-2.5-				-	
IG: Backhoe 3CX-4-550mm toothed bucket LOGGED: IKA/FH SURVEY DATUM: MGA94									
		Pit 13 ex					<u> </u>		
			LC	OGGEI	D: IKA	VFH	SUR	EVEY DATUM: MGA94	

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample LING & IN SITUTESTING G Gas sample P Piston sample U, Tube sample (x mm dia.) W Water sample P Water seep Water level

Douglas Partners Geotechnics | Environment | Groundwater



Proposed Residential Subdivision

Vale

Moss Vale Pty Ltd

141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171856

SURFACE LEVEL: 695.0 AHD **EASTING:** 258793 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171653

**PIT No:** 14 **PROJECT No: 40494.01 DATE:** 14/9/2018 SHEET 1 OF 1

			Vale						SHEET 1 OF 1
	De	epth	Description	hic		-		& In Situ Testing	ອ Dynamic Penetrometer Test
5 RL	(1	m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
695		0.1	TOPSOIL - brown, silty clay, moist, FMC <pl< th=""><th>XX</th><th></th><th></th><th></th><th></th><th></th></pl<>	XX					
-	-	0.1	SILTY CLAY - very stiff to hard, red brown, silty clay with some ironstone gravel, and cobble and boulder-sized fragmants (syenite), moist, FMC~PL (RESIDUAL)		D	0.5			
694	- - -1	0	SILTY CLAY - very stiff to hard, red brown, silty clay with some gravel-sized ironstone fragments, moist, FMC <pl (RESIDUAL) - becoming orange red brown below 1.1m</pl 		D	1.0			
- - -	-		- becoming orange brown mottled grey below 1.4m		D	1.5		pp >600	
	-2	2.0	SYENITE - very low strength, highly weathered, light brown syenite with extremely low strength, extremely		D	2.0			-2
-	-	2.5	weathered bands		—D—	2.4 		PEL*	
			(Limit of Investigation)			2.0			
				きましたい					
	C ·	Pac	where 20X 4 550mm toothed burliet	Pit 14					
ĸ	G:	Back	khoe 3CX-4-550mm toothed bucket		LC	JGGE	D: IKA	VERI S	SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

CLIENT:

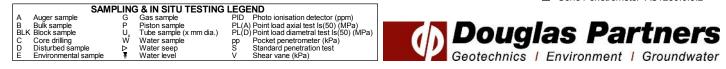
PROJECT:

LOCATION:

Moss Vale Pty Ltd

Proposed Residential Subdivision

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

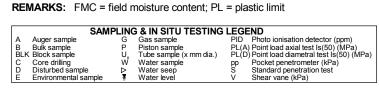
Vale

Proposed Residential Subdivision

SURFACE LEVEL: 704.8 AHD **EASTING:** 258932 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171180

**PIT No:** 15 **PROJECT No:** 40494.01 **DATE:** 14/9/2018 SHEET 1 OF 1

	vale							SHEET 1 OF 1
	Description	jc		Sam		& In Situ Testing		
교 Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
- 0.1	TOPSOIL light brown grey silty clay moist EMC <pl< td=""><td><math>\chi</math></td><td>D</td><td>0.1</td><td>0,</td><td></td><td></td><td></td></pl<>	$\chi$	D	0.1	0,			
	SILTY CLAY - very stiff to hard, brown, silty clay, moist, FMC <pl (RESIDUAL)</pl 		D	0.5				
- <b>1</b>	<ul> <li>becoming grey mottled orange below 0.9m</li> <li>becoming stiff to very stiff and FMC~PL below 1.1m</li> </ul>		D	1.0		pp = 500-600		
703			D	1.5		pp = 200-300		
-2 -2 -2.7	SYENITE - very low strength, highly weathered, grey syenite with clay bands		D	2.0		pp = 200-300		-2
- 2.5	5 Pit discontinued at 2.5m (Limit of Investigation)		D	-2.5-				
		Pit 15 ex	cavat	ion.				
<b>RIG:</b> Bac	khoe 3CX-4-550mm toothed bucket		LC	GGEI	<b>)</b> : IK/	VFH	SUR\	/EY DATUM: MGA94
	<b>DBSERVATIONS:</b> No free groundwater observed						_	
KEMARK	S: FMC = field moisture content; PL = plastic limit							Sand Penetrometer AS1289.6.3.3 Cone Penetrometer AS1289.6.3.2



Douglas Partners Geotechnics | Environment | Groundwater

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Vale

Proposed Residential Subdivision

CLIENT:

PROJECT:

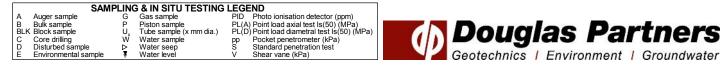
LOCATION:

SURFACE LEVEL: 696.2 AHD **EASTING:** 258885 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171404

**PIT No:** 16 **PROJECT No: 40494.01 DATE:** 14/9/2018 SHEET 1 OF 1

			Vale							SHE	EI 1 OF 1
	-		Description	jc		Sam		& In Situ Testing	,		momio Donotromotor Toot
RL	De (n	pth n)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		ynamic Penetrometer Test (blows per 150mm) 5. 10. 15. 20.
	-		TOPSOIL - grey, silty clay, moist, FMC <pl< th=""><th>Ŵ</th><th>D</th><th>0.1</th><th></th><th></th><th></th><th>-</th><th></th></pl<>	Ŵ	D	0.1				-	
6969		0.2-	SILTY CLAY - very stiff, brown, silty clay, FMC <pl (RESIDUAL)</pl 		D	0.4 0.5 0.5		PEL*		-	
695	- - - 1 -		- becoming orange brown mottled brown with some gravel-sized ironstone fragments below 0.8m - becoming orange brown mottled grey and iron-indurated,		D	1.0				- - - 1 - -	
			moist, FMČ~PL below 1.2m - becoming hard below 1.5m		D	1.5		pp >600		- - -	
694	-2 -	2.0	- becoming slightly sandy with some very low to low strength, highly weathered, siltstone bands below 1.9m / SILTSTONE - very low to low strength, highly to		D	2.0		pp = 500-600		-2	
 		0.5	moderately weathered siltstone with extremely low strength, extremely weathered bands	· · ·		25		an - 400 500		-	
	-	2.5-	Pit discontinued at 2.5m (Limit of Investigation)			-2.5-		pp = 400-500			
				Pit 16 ex							
RIC	G: E	Backh	noe 3CX-4-550mm toothed bucket		LC	GGEI	<b>D:</b> IK/	VFH	SUR	VEY D	ATUM: MGA94
w	ATE	r of	<b>SSERVATIONS:</b> No free groundwater observed								

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

Proposed Residential Subdivision

SURFACE LEVEL: 704.8 AHD **EASTING:** 259833 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171844

**PIT No:** 17 **PROJECT No: 40494.01** DATE: 17/9/2018 SHEET 1 OF 1

		Vale							SHEET 1	OF 1	
$\square$		Description	. <u>0</u>		Sam	pling &	In Situ Testing				
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		Penetrometer vs per 150mm) 10 15	Test
H	0.05		$\bigotimes$	D	0.1						
	- - 0.3 -	FILLING - dark brown, silty clay with trace anthropogenic (bricks and concrete) and bones (probably cattle), moist, FMC~PL			0.1						
704	- - -	SANDSTONE - very low to low strength, highly to moderately weathered, grey sandstone with extremely low strength, extremely weathered bands		D	0.5				-		
	-1 1.0	Pit discontinued at 1.0m (Refused on low to medium strength sandstone)		<u> </u>	2.9		PEL*				
			Pit 17	' spoil							
		khoe 3CX-4-550mm toothed bucket		LC	GGE	D: IKA	/FH	SUR\	/EY DATUM	: MGA94	
		BSERVATIONS: No free groundwater observed 5: FMC = field moisture content; PL = plastic limit; PEL = P	ropose	d Exca	avatior	1 Level				meter AS1289 meter AS1289	

IC = field molsure ..... SAMPLING & IN SITU TESTING LEGEND G Gas sample PI(A) Point load axial test Is(50) (MPa) U Tube sample (x mm dia.) W Water sample pp Pocket penetrometer (kPa) W Water seep S Standard penetration test Water level V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample Douglas Partners Geotechnics | Environment | Groundwater

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Proposed Residential Subdivision

CLIENT:

**PROJECT:** 

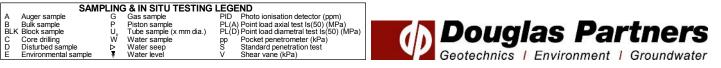
LOCATION:

SURFACE LEVEL: 714.1 AHD **EASTING:** 260043 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172384

**PIT No:** 18 **PROJECT No: 40494.01 DATE:** 17/9/2018 SHEET 1 OF 1

	Description	U		San	npling	& In Situ Testing					
Dept	h of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic P (blows	enetro per 15	meter Te: 50mm)	st
	Strata	G	L _	De	San	Comments	-	5 10	) 1	15 20	
714	TOPSOIL - brown, silty clay, moist, FMC <pl< th=""><th><math>\Delta</math></th><th>D</th><th>0.1</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></pl<>	$\Delta$	D	0.1							
	SILTY CLAY - hard, orange grey, silty clay with some sand, moist, FMC <pl (RESIDUAL)</pl 						-				
			D	0.5							
	SANDSTONE - low to medium strength, slightly weathered, brown grey sandstone with very low strength, highly weathered bands	/	B D	0.9				-1			
	Pit discontinued at 1.0m (Refusal on medium strength sandstone)										
				2.9		PEL*					
		Pit 18 ex									
	ckhoe 3CX-4-550mm toothed bucket		LC	OGGEI	D: IK/	VFH	SURV	EY DATUM:	MGAS	<del>)</del> 4	
WAIER	<b>OBSERVATIONS:</b> No free groundwater observed										

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



SURFACE LEVEL: 700.3 AHD EASTING: 260067 LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172181

**PIT No:** 19 **PROJECT No:** 40494.01 **DATE:** 17/9/2018 SHEET 1 OF 1

D D D	Sam <u>4</u> <u>4</u> <u>4</u> <u>6</u> 0.1 0.5 1.0 1.5 2.0	8 all	& In Situ Testing Results & Comments pp = 400-500 pp = 400-500 pp = 400-500	Water	Dyn 5 - - - - - - - - - - - - - - - - - -	namic Penel (blows per 5 10 	trometer T 150mm) 15 2
D D D	0.1 0.5 1.0 1.5	Sample	pp = 400-500 pp = 400-500	Wate		(blows per	150mm)
D	0.5		pp = 400-500		- 1 - 1 1		
D	1.5		pp = 400-500		-1-1		
D			pp = 400-500		-		•
—D—					-2		
D	-2.5-				-		
	2.0						
	ion.						
cavati		<b>)</b> : IKA	/FH	SURV	/EY DA	TUM: MG	A94
Cash and	excavat	excavation.		excavation. LOGGED: IKA/FH			

CLIENT:

PROJECT:

Moss Vale Pty Ltd

Vale

Proposed Residential Subdivision

**REMARKS:** FMC = field moisture content; PL = plastic limit

	SAMPLING & IN SITU TESTING LEGEND										
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)						
В	Bulk sample	Р	Piston sample	PL(A)	Point load axial test Is(50) (MPa)						
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)						
C	Core drilling	Ŵ	Water sample	рр	Pocket penetrometer (kPa)						
D	Disturbed sample	⊳	Water seep	S	Standard penetration test						
E	Environmental sample	Ŧ	Water level	V	Shear vane (kPa)						



SURFACE LEVEL: 691.4 AHD EASTING: 260113

**PIT No:** 20 **PROJECT No:** 40494.01 DATE: 17/9/2018 SHEET 1 OF 1

	Vale							SHE	ET	1 OF	- 1	
	Description	D		Sam		& In Situ Testing	_			_		- ·
Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water		nami (blc	c Pene ws pe	trometer 150m	er Lest m)
	Strata	0	Ļ	De	Sar	Comments	_		5	10	15	20
- 0.1	TOPSOIL - brown grey, silty clay, moist, FMC <pl SILTY CLAY - very stiff to hard, orange brown grey, silty clay, moist, FMC<pl (PROBABLE RESIDUAL)</pl </pl 		D	0.1 0.5		pp = 500-600		-				
- 1	- becoming orange brown mottled grey below 0.9m		D	1.0		pp = 500-600		-1		• • • • • • • • • • • • • • • • • • • •		
- - -	<ul> <li>becoming grey mottled orange brown below 1.2m</li> </ul>		D	1.5		pp = 300-400		-	· · · ·			
- - -2 - -			D	2.0				- 2				
- 2.5	- with extremely low strength, extremely weathered siltstone bands below 2.4m Pit discontinued at 2.5m (Limit of Investigation)	<u>,                                    </u>										

Pit 20 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

	SAM	PLING	& IN SITU TESTING	LEGE	ND
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
В	Bulk sample	Р	Piston sample		) Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D	Point load diametral test Is(50) (MPa)
С	Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	¥	Water level	V	Shear vane (kPa)





Moss Vale Pty Ltd Proposed Residential Subdivision

Vale

141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172016

CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

Proposed Residential Subdivision

SURFACE LEVEL: 701.7 AHD **EASTING:** 259973 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171980

**PIT No:** 21 **PROJECT No:** 40494.01 DATE: 17/9/2018 SHEET 1 OF 1

	Vale							SHEET 1 OF	
	Description	lic		Sam		& In Situ Testing	<u>ب</u>		
Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetro (blows per 15	neter Les 0mm)
. ,	Strata	G	Τy	De	San	Comments		5 10 1	5 20
0.1	TOPSOIL - brown, silty clay, moist, FMC <pl< td=""><td>XX.</td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td></td></pl<>	XX.	D	0.1				-	
	SANDY CLAY - stiff to very stiff, orange brown, sandy clay, moist, FMC <pl (RESIDUAL)</pl 								
0.5	SANDSTONE - very low to low strength, highly to moderately weathered, light brown, fine-grained sandstone with extremely low strength, extremely weathered bands		D	0.5 0.9 1.0 1.0		PEL*	=		
	(Refusal on low strength sandstone)								
		Pit 21 ex							
		FIL 21 ex	cavati	on.					
: Back	hoe 3CX-4-550mm toothed bucket	FILZTEX		on. GGEI	<b>)</b> : IKA	VFH	SUR\	<b>/EY DATUM</b> : MGA9	4
		Fil 21 ex			<b>)</b> : IKA	VFH	SUR\	<b>/ey datum</b> : Mgas	4

 
 SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 P
 Piston sample
 PL(A) Point load axial test Is(50) (MPa)

 Ux
 Tube sample (x mm dia.)
 PL(D) Point load diametral test Is(50) (MPa)

 W
 Water sample
 pp
 Pocket penetrometer (kPa)

 P
 Water level
 V
 Standard penetration test
 A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample Douglas Partners Geotechnics | Environment | Groundwater

SURFACE LEVEL: 684.4 AHD EASTING: 259546 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172361

**PIT No: 22 PROJECT No: 40494.01** DATE: 17/9/2018 SHEET 1 OF 1

		vale							
$\square$		Description	ici		Sam		& In Situ Testing	5	Dumonia Danatamatan Tant
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
683	- 0.1 - - - - - - - - - - - - - - - - - - -	TOPSOIL- brown, silty clay, moist, FMC <pl SILTY CLAY - very stiff, dark brown grey, silty clay, moist, FMC<pl (POSSIBLE ALLUVIUM) - becoming very stiff to hard below 0.5m - becoming grey mottled with orange below 0.7m (RESIDUAL) SANDSTONE - low to medium strength, slightly weathered, grey and orange brown, fine-grained sandstone with some ironstone bands</pl </pl 		D	0.1 0.5 1.0		рр >600 рр >600		
		Pit discontinued at 1.7m (Refusal on medium strength sandstone)							



Pit 22 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

LOGGED: IKA/FH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

Moss Vale Pty Ltd

Vale

Proposed Residential Subdivision

CLIENT: PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	END
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	¥	Water level	V	Shear vane (kPa)



CLIENT:

PROJECT:

LOCATION:

Moss Vale Pty Ltd

Vale

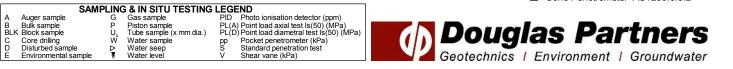
Proposed Residential Subdivision

SURFACE LEVEL: 692.1 AHD **EASTING:** 259788 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172224

**PIT No: 23 PROJECT No: 40494.01** DATE: 17/9/2018 SHEET 1 OF 1

		vale							SHL	
	Death	Description	- Jic		San		& In Situ Testing	<u>۲</u>		ynamic Penetrometer Test
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		(blows per 150mm) 5 10 15 20
692	- 0.1	TOPSOIL - brown, silty clay, moist, FMC <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>+</td><td></td></pl<>		D	0.1				+	
-		SILTY CLAY - very stiff, orange grey, friable, silty clay, moist, FMC <pl (RESIDUAL)</pl 							F	
ł		(RESIDUAL)		D	0.4 0.5 0.5		PEL*	==	F	
-		- becoming very stiff to hard below 0.6m			0.5				F	l
-									F.	
691	- 1	- becoming grey mottled with orange brown below 1.1m		D B	1.0		pp >600			
-	-				1.2				F	
ŀ	· 1.4	SILTSTONE - low to medium strength, slightly weathered, orange grey siltstone with very low strength, highly weathered bands	· _ ·	D	1.5				F	
-		weathered bands							F	
-	-2				2.0				-2	
069	- 2.2	- with some ironstone bands below 2.0m	· _ · ·		2.0					
	2.2	Pit discontinued at 2.2m (Refusal on medium strength siltstone)								
			Pit 23 ex							
		hoe 3CX-4-550mm toothed bucket		LC	GGEI	<b>):</b> IK/	VFH	SUR	VEY D	ATUM: MGA94
W	ATER O	BSERVATIONS: No free groundwater observed								

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



SURFACE LEVEL: 688.4 AHD **EASTING:** 259438 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6171954

**PIT No: 24 PROJECT No: 40494.01** DATE: 17/9/2018 SHEET 1 OF 1

	Vale							SHEET 1 OF 1
	Description	<u>i</u>		Sam	ipling &	& In Situ Testing		
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
-	TOPSOIL - light brown, silty clay, moist, FMC <pl< td=""><td>Ø</td><td>D</td><td>0.1</td><td></td><td></td><td></td><td></td></pl<>	Ø	D	0.1				
- 0.2 - - - - -	SILTY CLAY - very stiff to hard, light brown grey mottled orange brown, silty clay, moist, FMC <pl (PROBABLE ALLUVIUM)</pl 		B D	0.4 0.5 0.6		pp >600		
- - - 1 -			D	1.0		pp >600		
			D	1.5		pp >600		
-2			D	2.0		pp >600		-2
	<ul> <li>becoming stiff, grey mottled orange brown, moist, FMC~PL below 2.2m</li> </ul>							
- 2.5	Pit discontinued at 2.5m (Limit of Investigation)	<u> </u>	—D—	-2.5-		pp >600		
			A CARLEN AND A CARLENA					
		Pit 24	l spoil	•				
<b>IG:</b> Back	hoe 3CX-4-550mm toothed bucket		LC	OGGE	D: IKA	/FH	SUR\	Vey Datum: MGA94
ATER O	<b>BSERVATIONS:</b> No free groundwater observed							

Moss Vale Pty Ltd

Vale

Proposed Residential Subdivision

CLIENT:

PROJECT:

LOCATION:

**REMARKS:** FMC = field moisture content; PL = plastic limit

□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND LEGEND PID Photo ionisation detector (ppm) PL(A) Point load axial test Is(50) (MPa) PL(D) Point load diametral test Is(50) (MPa) pp Pocket penetrometer (kPa) S Standard penetration test V Shear vane (kPa) A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sample E Environmental sample LING & IN SITUTESTING G Gas sample P Piston sample U, Tube sample (x mm dia.) W Water sample P Water seep Water level



Moss Vale Pty Ltd

Vale

Proposed Residential Subdivision

CLIENT:

**PROJECT:** 

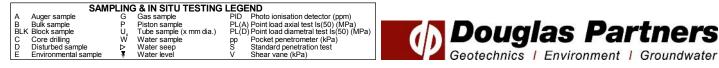
LOCATION:

SURFACE LEVEL: 682.3 AHD **EASTING:** 259073 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172163

**PIT No: 25 PROJECT No: 40494.01 DATE:** 17/9/2018 SHEET 1 OF 1

		vale							UNE		I
	Denth	Description	hic				& In Situ Testing		Dv	namic Penetro	meter Test
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		(blows per 15	5 20
	-	TOPSOIL - light brown grey, silty clay with some root fibres, moist, FMC <pl< td=""><td></td><td>D</td><td>0.1</td><td></td><td></td><td></td><td>-</td><td>L</td><td></td></pl<>		D	0.1				-	L	
. 682	- 0.2 - -	SILTY CLAY - very stiff, light brown grey, friable, silty clay, moist, FMC <pl (ALLUVIUM)</pl 		D	0.4 0.5		PEL*			ſ	
-	- - - - 1 -	- becoming very sitff to hard, orange grey, silty clay, moist, FMC <pl 0.7m<="" below="" th=""><th></th><th>D</th><th>0.5</th><th></th><th>pp &gt;600</th><th></th><th>- - - - - 1 -</th><th></th><th></th></pl>		D	0.5		pp >600		- - - - - 1 -		
	- - - -	- becoming slightly sandy with very low strength, highly weathered sandstone bands below 1.7m		D	1.5		pp >600		-		
680	- 2 2.0 - - -	(RESIDUAL) SANDSTONE - very low strength, highly weathered, light brown sandstone with extremely low strength, extremely weathered bands		D	2.0				- -2 - -		
-	- 2.5	Pit discontinued at 2.5m (Limit of Investigation)		—D—	-2.5-						
			Pit 25 e)	ccavat	ion.						
RI	G: Back	hoe 3CX-4-550mm toothed bucket		LC	OGGEI	D: IK/	VFH	SUR	VEY DA	TUM: MGAS	94
w	ATER O	BSERVATIONS: No free groundwater observed									

REMARKS: FMC = field moisture content; PL = plastic limit; PEL = Proposed Excavation Level



SURFACE LEVEL: 682.3 AHD PIT No: 26 EASTING: 258967 LOCATION: 141 Yarrawa Road and 32 Lovelle Street, Moss NORTHING: 6172472

**PROJECT No:** 40494.01 **DATE:** 17/9/2018

Depth (m)     or     fill       Strata     5       0.1     TOPSOLL - light brown grey, silly clay, FMC-PL       0.1     SLTY CLAY - very tift brand, light town orange grey, friable, silty clay, moist, FMC-PL (RESIDUAL)       - becoming hard and orange brown below 0.6m       1       1.6       SLTY CLAY - hard, grey mottled orange brown, silty clay, with extremely weathered, extremely low strength siltstone bands, FMC-PL (RESIDUAL)       2       2.6       Pt discontinued at 2.5m (Limit of Investigation)		Description	. <u>e</u>		Sam		In Situ Testing		
0.1       TOPSOIL - light brown grey, silty clay, FMC <pl< td="">       D       0.1         SILTY CLAY - very stiff to hard, light brown orange grey, friable, silty clay, moist, FMC<pl< td="">       D       0.1         (RESIDUAL)       D       0.5       D       0.5         - becoming hard and orange brown below 0.6m       D       1.0       pp &gt;600       1         1       SILTY CLAY - hard, grey mottled orange brown, silty clay with extremely weathered, extremely low strength siltstone bands, FMC<pl (residual)<="" td="">       D       1.5       pp = 500-600         2       Pit discontinued at 2.5m       D       2.5       pp &gt;600       -2</pl></pl<></pl<>	Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Te (blows per 150mm) 5 10 15 20
0.1       SILTY CLAY - very stiff to hard, light brown orange grey, friable, silty clay, moist, FMC <pl (residual)<="" td="">       0       0.1         1       - becoming hard and orange brown below 0.6m       0       0.5         1       D       1.0       pp &gt;600       -1         1.6       SILTY CLAY - hard, grey mottled orange brown, silty clay with extremely weathered, extremely low strength siltstone bands, FMC<pl (residual)<="" td="">       D       1.5       pp = 500-600         2       Pit discontinued at 2.5m       D       2.5       pp &gt;600       -2</pl></pl>	0.1	_ TOPSOIL - light brown grey, silty clay, FMC <pl< td=""><td>XX</td><td>Б</td><td>0.1</td><td></td><td></td><td></td><td></td></pl<>	XX	Б	0.1				
1     1     0     1.0     pp >600     -1       1.6     SILTY CLAY - hard, grey mottled orange brown, silty clay with extremely weathered, extremely low strength siltstone bands, FMC <pl (residual)<="" td="">     0     1.5     pp = 500-600       2     Pit discontinued at 2.5m     0     2.5     pp &gt;600     -2</pl>	0.1	SILTY CLAY - very stiff to hard, light brown orange grey, friable, silty clay, moist, FMC <pl< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl<>							
1.6     SILTY CLAY - hard, grey mottled orange brown, silty clay with extremely weathered, extremely low strength siltstone bands, FMC <pl (residual)<="" td="">     1       2      D     2.0       2.5     Pit discontinued at 2.5m     D     2.5</pl>	1	- becoming hard and orange brown below 0.6m		D	1.0		pp >600		-1
2 (RESIDUAL) 2.5 Pit discontinued at 2.5m	1.6	SILTY CLAY - hard, grey mottled orange brown, silty clay		D	1.5		pp = 500-600		
Pit discontinued at 2.5m	2	with extremely weathered, extremely low strength siltstone bands, FMC <pl (RESIDUAL)</pl 		D	2.0		pp >600		-2
	2.5	Pit discontinued at 2.5m		—D—	-2.5-		pp >600		

Pit 26 excavation.

RIG: Backhoe 3CX-4-550mm toothed bucket

CLIENT:

PROJECT:

Moss Vale Pty Ltd

Proposed Residential Subdivision

LOGGED: IKA/FH

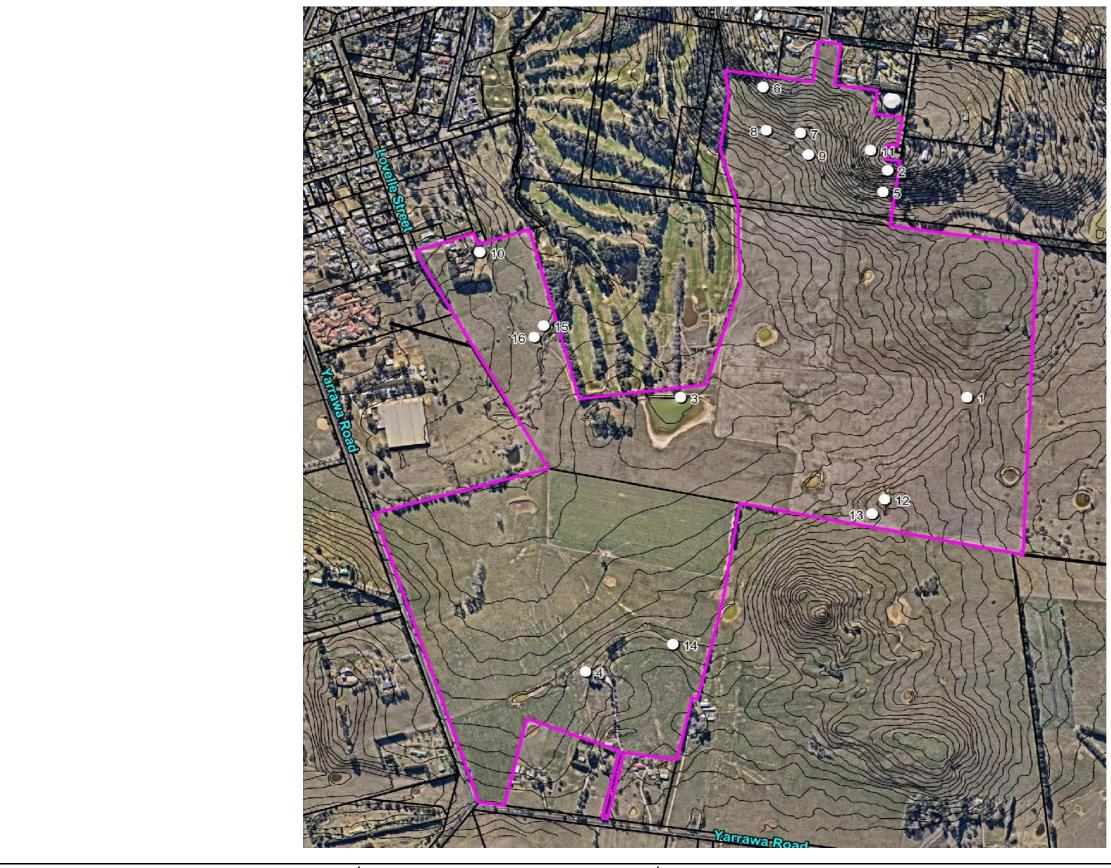
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** FMC = field moisture content; PL = plastic limit

SAM	PLINC	<b>3 &amp; IN SITU TESTING</b>	LEGE	END
A Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B Bulk sample	Р	Piston sample	PL(A	) Point load axial test Is(50) (MPa)
BLK Block sample	U,	Tube sample (x mm dia.)	PL(D	) Point load diametral test ls(50) (MPa)
C Core drilling	Ŵ	Water sample	pp	Pocket penetrometer (kPa)
D Disturbed sample	⊳	Water seep	S	Standard penetration test
E Environmental sample	Ŧ	Water level	V	Shear vane (kPa)





	CLIENT:	Moss Vale Pty Lto	ł		Photo
<b>Douglas Partners</b>	OFFICE:	Wollongong	DRAWN BY:	RJH	Propo
Geotechnics   Environment   Groundwater	SCALE:		DATE:	11 Dec 2019	32 Lo

	Photo Locations
ХJН	Proposed Residential Subdivision
1 Dec 2019	32 Lovelle Street and 141 Yarrawa Road, Moss Vale

PROJECT No:	40494.03
PLATE No:	1
REVISION:	-



Photo 1: View looking west across the central part of the site from the low ridge lines in the eastern part of the site.



Photo 3: View looking east from the large farm dam in the central part of the site. Note: the low ridge line in the background of the photo.





site.



CLIENT: Moss Vale Pty Ltd				Site Photographs 1 to 4	PROJECT No:	40494.03
OFFICE:	Wollongong	DRAWN BY:	RJH	Proposed Residential Subdivision	PLATE No:	2
SCALE:	NTS	DATE:	11 Sep 2018	32 Lovelle Street and 141 Yarrawa Road, Moss Vale	REVISION:	-



Photo 5: View looking north at the smaller of the two water reservoirs at the top of the hill iadjacent to the northern part of the site.

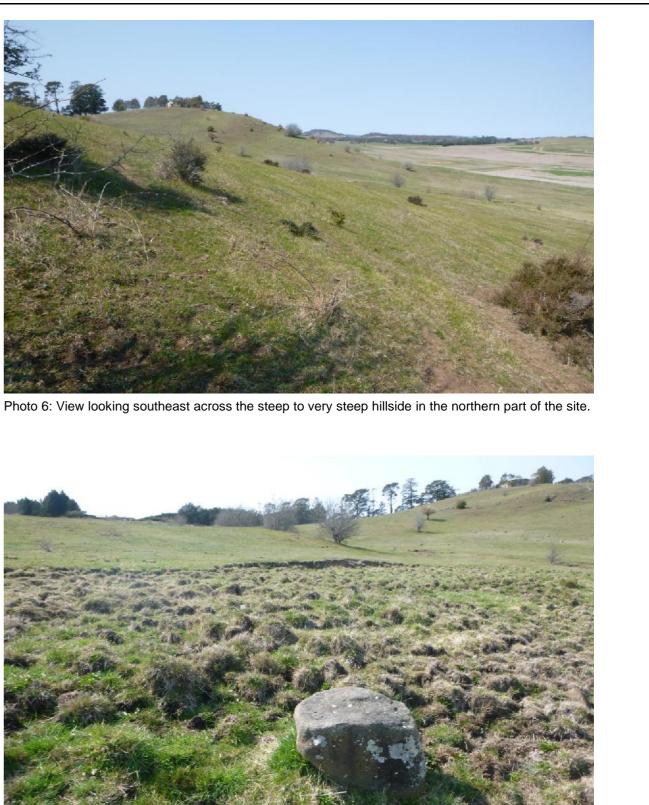




Photo 7: View looking northwest across the active scarp in the lower-middle part of the hillside in the northern part of the site.



Photo 8: View looking northeast across the active scarp in the lower-midlle part of the hillside in the northern part of the site. Note: the igneous boulders lying on the surface.



CLIENT: Moss Vale Pty Ltd				Site Photographs 5 to 8	PROJECT No:	40494.03
OFFICE:	Wollongong	DRAWN BY:	RJH	Proposed Residential Subdivision	PLATE No:	3
SCALE:	NTS	DATE:	11 Sep 2018	32 Lovelle Street and 141 Yarrawa Road, Moss Vale	REVISION:	-



Photo 9: View looking at slumping in a drainage depression in the steep to very steep hillside in the northern part of the site.



Photo 11: View looking at bedrock exposed near the crest of the steep to very steep hillside near the small water reservoir in the northern part of the site.





Photo 12: View looking at fine-grained sandstone exposed in a cutting in the eastern part of the site.



CLIENT: Moss Vale Pty Ltd				Site Photographs 9 to 12	PROJECT No:	40494.03
OFFICE:	Wollongong	DRAWN BY:	RJH	Proposed Residential Subdivision	PLATE No:	4
SCALE:	NTS	DATE:	11 Sep 2018	32 Lovelle Street and 141 Yarrawa Road, Moss Vale	REVISION:	-

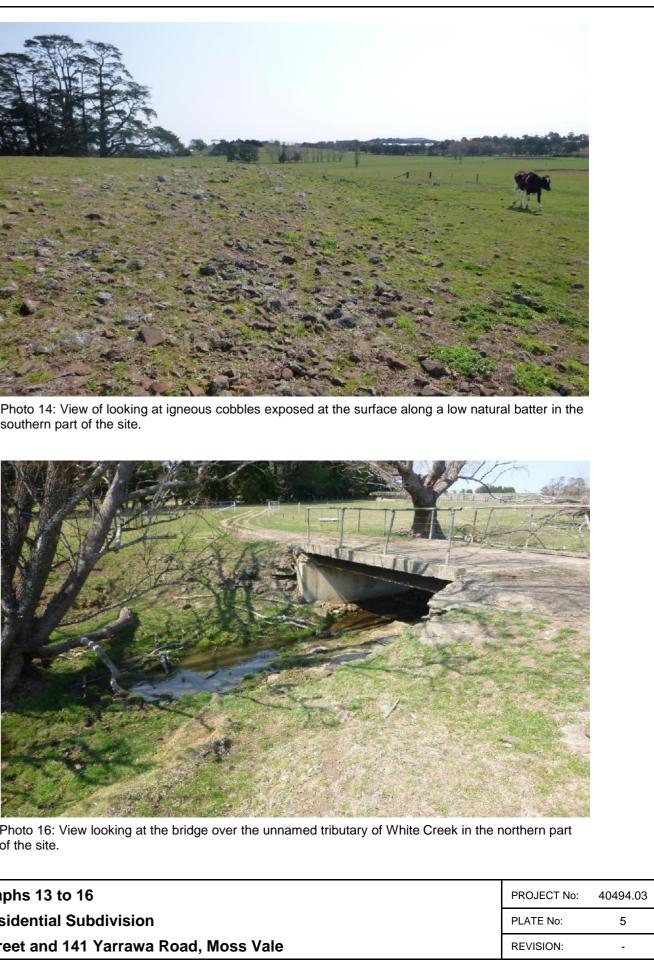


Photo 13: View looking at a cutting in the low ridgeline in the eastern part of the site. Note: the anthropenic material in the right of the photo.



Photo 15: View looking at a back scarp in the creek bank in the northern part of the site..





of the site.



CLIENT: Moss Vale Pty Ltd				Site Photographs 13 to 16
OFFICE:	Wollongong	DRAWN BY:	RJH	Proposed Residential Subdivision
SCALE:	NTS	DATE:	11 Sep 2018	32 Lovelle Street and 141 Yarrawa Road, Moss Vale