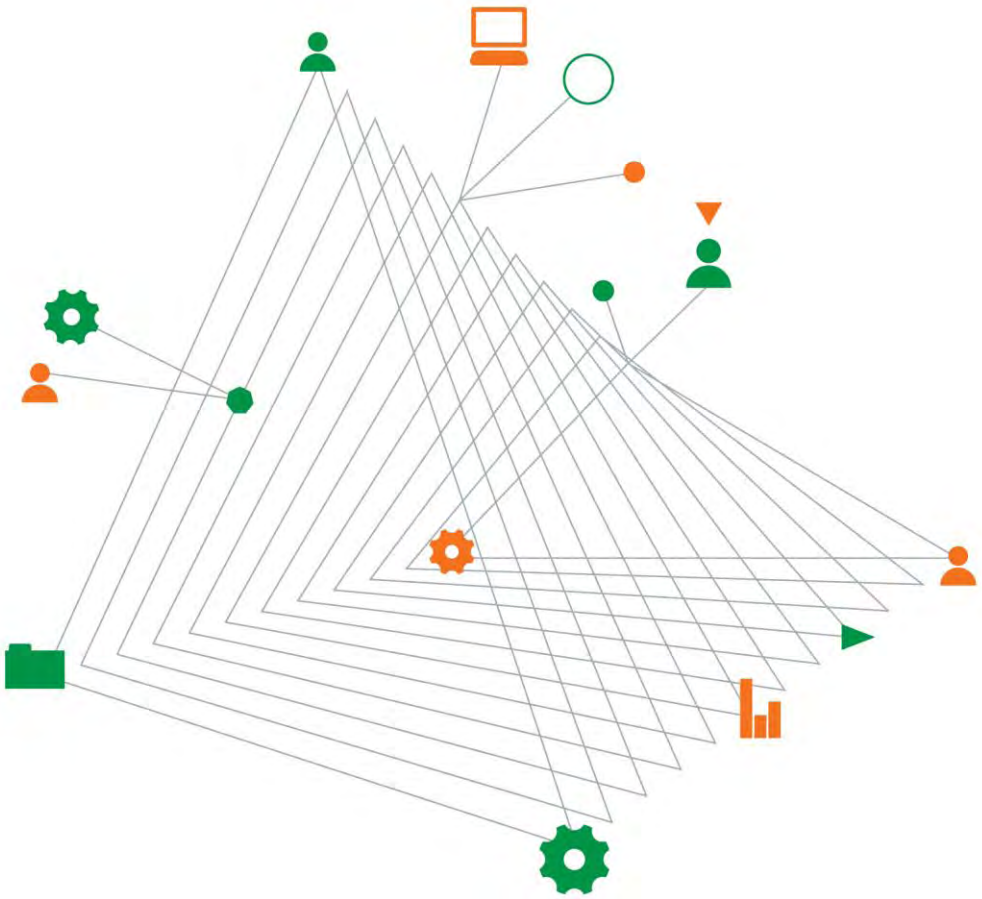
Western Sydney Parklands Trust

Bringelly Road Business Hub

Geotechnical Investigation Report

10 September 2014



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Bringelly Road Business Hub

Prepared for
Western Sydney Parklands Trust

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For and on behalf of Coffey

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Quality information

Revision history

Revision	Description	Date	Author	Reviewer	Signatory
Rev.1	Geotechnical Investigation Report	20 June 2014	Gurpreet Singh	Peter Waddell	Sven Padina
Rev 2	Geotechnical Investigation Report to include review comments	3 Sept 2014	Sven Padina	Peter Waddell	Sven Padina

Distribution

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1. INTRODUCTION

This report presents the results of a geotechnical site investigation carried out by Coffey Geotechnics Pty Ltd (Coffey) for Western Sydney Parklands Trust for the proposed Bringelly Road Business Hub development located at Leppington in New South Wales.

This work was commissioned by Mr Tim Colless of Western Sydney Parklands Trust on 17 April 2014. This report is prepared and is to be read subject to the terms and conditions contained in our proposal dated 4 March 2014 (Ref. GEOTLCOV25068AA-AA)

In conjunction with this geotechnical investigation Coffey has also completed a Phase 1 Environment Site Assessment report. The results of this assessment are presented in the Coffey report Ref GEOTLCOV25068AA-AF, dated 11 September 2014.

2. PROPOSED DEVELOPMENT

It is understood the project comprises the development and preparation of relatively large commercial and/or industrial lots for subsequent release to the market. Development structures are expected to include warehouses, industrial sheds, freight handling facilities and internal access roads for the handling and storage of bulky goods. The land designated for development is approximately 21 ha in area measuring approximately 800m long and 300m to 350m wide. As part of the site development Bringelly Road will also be re-aligned to run along the southern site boundary.

Due to site slopes the developed lots will have differing finished formation levels which are expected to range between RL 61mAHD and RL 80mAHD. This will require a cut and fill earthworks with cuts up to 12m high and fills up to 8m deep, with batters slopes and retaining walls being used between lots.

Attached as Appendix A is the current site development and lot layout plan

3. OBJECTIVES

The geotechnical investigation will be used to support a planning application (State Significant Development) for lodgement with the Department of Planning and Environment. As required under the NSW Planning and Environment Director General's Requirements, an initial site geotechnical assessment is required. The objectives of our geotechnical investigation were to make assessments of the following:

- Soil, rock and groundwater conditions across the site;
- Topsoil thickness across the site and potential suitability for the adoption of limited topsoil blending in earthworks;
- Earthworks requirements and suitability of site-won material for reuse in bulk earthworks;
- Excavation conditions and rock excavatability;
- Feasible excavation retention systems and indicative geotechnical retention wall and batter design parameters;
- Building footing options and geotechnical design parameters for pad and pile foundations;

- Groundwater levels and environment;
- Discussion on design soil modulus values;
- Design CBR for pavements and subgrade preparatory requirements; and
- Erosion potential of clay materials and recommendations for soil management.

4. FIELDWORK

4.1. General

Fieldwork was carried out on 28 May 2014 and 4 June 2014 in the full time presence of personnel from Coffey. Boreholes were carried out on 28 May 2014 followed by test pits and Dynamic Cone Penetrometers (DCP) on 4 June 2014. Investigation locations were measured by tape measurement relative to the site boundaries. The approximate investigation elevations were inferred from supplied topographic plans.

Water level readings were made in the boreholes at times and under conditions stated on the borehole logs. It must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors. Standpipe piezometers were installed in 4 boreholes.

Approximate investigation locations are shown in Figure 1

4.2. Boreholes, Sampling and Testing

The fieldwork included the drilling of seven boreholes (BH1 to BH6) to depths varying from 1.6m to 4.6m below existing ground surface using a track mounted site investigation drilling rig and solid flight augers with a Tungsten Carbide (TC) drill bit.

Standard Penetration Tests (SPTs) were carried out during auger drilling at selected intervals to assess soil strength and obtain soil samples. Two samples of groundwater were obtained for chemical analyses.

On completion, all boreholes were backfilled with cuttings. Fieldwork was observed by a Coffey Geotechnical Engineer who was present throughout the drilling operations to undertake sampling and testing, record test results and log materials encountered.

The records of boreholes showing detailed descriptions of the major strata encountered, the depths at which the samples were taken, the depths at which the in situ tests were carried out, and the results of these tests are presented in Appendix B.

4.3. Dynamic Cone Penetrometer Testing

Dynamic Cone Penetrometer (DCP) tests were carried out at three (3) locations to depths varying from 1m to 1.4m below the existing ground surface.

The results of these tests are presented in Appendix B.

4.4. Test Pitting

A total of eight test pits (TP1 to TP8) were excavated by backhoe to depths varying from 2m to 3m below the existing ground surface.

Disturbed samples were taken from each test pit of representative soil types for laboratory testing.

The records of the test pit logs showing the major strata that were intersected, the depths at which the samples were taken, and the results of these tests, together with Explanation Sheets defining the terms used, are presented in Appendix B.

4.5. Groundwater Monitoring

To observe groundwater levels at the site standpipes were installed into four boreholes (BH1A, BH2, BH5 and BH6) to depths varying from 1.6m to 3.7m below ground surface. Each piezometer comprised PVC slotted pipes fitted with PVC end caps. The slotted sections were sand packed and sealed with bentonite plugs.

A total of two groundwater samples were obtained for chemical analyses.

5. DESCRIPTION OF LABORATORY TESTING

The extent of laboratory testing carried out for this study is presented in Table 1.

Table 1 - Extent of Laboratory Testing

Type of Test	Number
Atterberg Limits tests	3
Standard Compaction (SMDD) tests	5
Emerson Dispersion tests	5
Soaked CBR tests	5
Moisture Content tests	20

Test results for the above mentioned tests are attached in Appendix C.

6. ENCOUNTERED SITE CONDITIONS

6.1. Site Description

The topography of the area comprises rolling hills with grades up to 20°. The subject site has an area of 21 ha and measures approximately 800m long, and is 300m to 350m wide. The ground surface grades down from west to east across the site with a change in elevation of approximately 30m, and slopes of up to approximately 10°. There are no permanent watercourses on the site but the site is crossed by a number of east to west natural drainage lines with existing small farm dams within them.

At the time of our investigation the majority of the site, and surrounding lands, was undeveloped comprising vacant farm land. However there are four residential houses / small properties along Bringelly Road which passes through the southern part of the proposed development site.

Neighbouring the site to the north east (i.e. lower end of site) is Bedwell Park which includes a number of permanent ponds.

6.2. Geology

Reference to the Penrith 1:100,000 Series Geological Sheet indicates the site is underlain by Ashfield Shale bedrock. However, previous work by Coffey near the eastern corner of the site indicates the underlying Minchinbury Sandstone may also be present. Residual clay soils are expected to overlie this unit as a result of natural weathering. Residual soil derived from Ashfield Shale is typically of high plasticity, moderately to highly reactive and around 2m to 3m deep over the shale bedrock. The Ashfield Shale is described as black to dark grey shale and laminate.

6.3. Subsurface Conditions

The subsurface conditions encountered at the site were relatively consistent, and typically comprised approximately 0.15m to 0.2m of topsoil overlying approximately 0.5m to 4m of residual clay of high plasticity and stiff to hard strength which is underlain by extremely weathered, very low strength shale. Fill was only encountered in TP1. The residual silty clay layers were thickest towards the north-west corner of the site.

The upper layers of shale bedrock was assessed to be extremely weathered and of very low strength. With increasing depth, the shale is likely to be less weathered and is anticipated to be moderately weathered to fresh and of at least medium strength within 1m to 4m of the top of the bedrock profile, with the deeper areas of weathered shale located in the lower parts of site.

Groundwater was not observed in any of the boreholes or test pits during drilling/excavation. Table 2 overleaf summarises the groundwater level observations made in the standpipe approximately 1 week following installation.

Table 2 – Observed groundwater levels

Borehole Standpipe	Standpipe depth (m)	Observed water level 06/06/14 (m)	Approximate RL of observed water level (mAHD)
BH1A	4.0	2.4	52.1
BH2	1.6m	dry	-
BH5	4.0	dry	-
BH6	4.0	2.7	67.3

Based on the field investigation the site has a generalised subsurface profile presented in Table 3. It should be noted that the depths and layer thicknesses provided in Table 3 are based on subsurface conditions as observed at the investigation locations and may not be representative of all areas of the site.

Table 3 – Generalised Subsurface Profile

Layer/Unit	Material / Origin	Description	Depth to Top of Unit (m)	Range of Approximate Unit Thickness (m)
1	Fill (TP1 only) / topsoil	Silty clay with traces of gravel and rootlets, high plasticity	0	0.15 – 0.2 (TP1 fill was 0.6m thick)
2	Residual Soil	Silty clay, high plasticity, stiff to hard consistency	0.15 – 0.2	0.9 – 4.0
3a	Bedrock	Shale: extremely weathered, very low and low strength (Class V Shale)	0.9 – 4.0	Expect to range from 0.2m to 2.5m being thicker in the lower part of site.
3b	Bedrock	Shale: moderately weathered to fresh shale, typically of medium to high strength (Class IV shale or better)	Below Unit 3a, expected from depths of 1.5m to 4m, being deeper in the lower parts of site.	-

6.4. Groundwater

Groundwater was encountered in two of the four piezometers that were installed to depths of 1.6m to 3.7m. Groundwater level measurements made on 6 June 2014 in piezometers installed in BH1A and BH6 encountered water levels at depths of 2.4m and 2.7m respectively. BH1A is located at the north-east corner of the site and BH6 is located close to the existing dam in the western corner of the site.

As part of site investigations development, purging and sampling of the wells was carried and water samples were collected from BH1A and BH6 where groundwater was observed.

The chemistry test results for groundwater and review of these results are presented in the Coffey Phase 1 Environment Site Assessment report Ref GEOTLCOV25068AA-AC, dated 20 June 2014.

6.5. Laboratory Test Results

The laboratory test results indicate that the Unit 2 Residual Soil has Moisture Contents ranging from 12% to 25.5% (averaging 19.7%), with Moisture Contents for the Unit 3a Extremely Weathered Shale ranging 12.3% to 18.4%.

Soil classification tests carried out on Unit 2 Residual Soil resulted in Liquid Limits values ranging 59% to 66% with Plasticity Index ranging 41% to 43% and Linear Shrinkage ranging 12.5% to 14%.

Results from five soaked California Bearing Ratio (CBR) tests on Unit 2 Residual Soils indicate values ranging 0.5% to 3%.

Emerson Class testing was carried out on five samples. The test results indicate an Emerson Class No. 2 for all samples.

7. DISCUSSION AND RECOMMENDATIONS

7.1. Earthworks

Where filling is required to raise site levels and support floor slabs for buildings or pavements we recommend that engineered fill be used. The subgrade for engineered fill should be prepared by stripping topsoil and unsuitable materials, and benching the ground surface so that fill can be placed in near horizontal layers.

We recommend allowance for stripping to an average depth of 0.2m to remove vegetation, roots and organic topsoil. Topsoil and highly silty soil may extend below this stripping depth and localised deeper stripping maybe required, subject to geotechnical assessment.

Each bench should be proof rolled with 4 passes of smooth single-drum, non-vibratory roller of minimum weight 12 tonnes. An experienced earthworks practitioner should observe the proof rolling to detect soft, wet or heaving zones. Where such zones are encountered the affected area should be improved by appropriate methods. These methods may include:

- Excavation of the affected soil and replacement with Engineered Fill;
- Tyning and moisture conditioning of the in-situ material and compaction to achieve the criteria below for Engineered Fill.

Engineered fill required to support structures or pavements should be compacted to at least 98% Standard Maximum Dry Density (SMDD). Engineered Fill should be compacted in layers not exceeding 300mm compacted thickness and moisture conditioned to Standard Optimum Moisture Content (SOMC) ±2% then compacted without delay with appropriate compaction plant.

Fill within 0.3 m depth of floor slab/pavement subgrade level should be compacted to at least 100% SMDD.

Preparation for, and construction of Engineered Fill should be carried out under Level 1 Geotechnical Inspection and Testing as defined in Section 8.2 of *AS 3798 – 2007 Guidelines on earthworks for commercial and residential developments.*

Should filling be required in the vicinity of the dams, once drained all unsuitable materials and any saturated soils must be removed and the earthworks carried out as recommended above. Particular attention will need to be given to ensuring that the moisture content of the subgrade and fill materials being placed is within ±2% of SOMC.

7.2. Soil Dispersivity

The results of the Emerson Class Number tests was 2 indicating that the residual soils are potentially dispersive. Where the residual soils are disturbed by earthworks they may be subject to dispersion that could result in issues such as sediment load in surface runoff and dispersion rills and tunnels if the soils are exposed to surface or groundwater flows. Sediment control and revegetation plans should consider managing the risk of dispersive soil behaviour by maintaining well drained gentle surface slopes and avoiding landform construction that allows significant hydraulic gradients to develop.

When re-using the soils as engineered fill there should be close control of compaction moisture content such that the fill is compacted to achieve low permeability. Low permeability is generally achieved where fill is compacted at or above Standard Optimum Moisture Content (SOMC). Our recommended moisture range of ±2% of SOMC allows fill to be compacted dry of SOMC which often facilitates effective compaction. However, we recommend that careful moisture conditioning should

be carried out such that on average the compaction moisture content is at the upper end of the allowable range, i.e. at or above SOMC and that consistently low compaction moisture contents be rejected.

The risk of dispersive behaviour can often be greatly reduced by blending a small volume of gypsum into the soil at the time of compaction.

7.3. Proposed Excavation Works

The existing topography varies from a reduced level of RL55m in the north-east to RL93m in the south-west. Proposed final platform levels for the lots vary between RL61m in the north-east to RL80m in the south-west. The difference in final platform levels between the lots will result in bulk excavations up to 12m high and fills up to 8m deep.

7.3.1. Excavation Conditions

Earthworks across the site will involve cut to fill in all the proposed lots. Excavations are likely to penetrate through Unit 1 Fill /Topsoil, Unit 2 Residual Soils, Unit 3a Shale and possibly Unit 3b Shale within the lower levels of the bulk excavations. It is expected that Unit 1 Fill / Topsoil, Unit 2 Residual Soils, and some of the weathered upper Unit 3a Shale should be readily excavated using conventional earthmoving plant such as a large excavator with a tooth bucket fitted with rock teeth.

It is expected that excavations of the Unit 3a Shale may be readily carried out using conventional earthmoving plant such a large excavators and bulldozers. Excavations into the higher strength Unit 3b Shale may require the use of excavation plant fitted with rippers or impact hammers particularly if medium and high strength bedrock is encountered in the lower levels of excavation.

Groundwater was observed in the standpipes installed in BH1A and BH6. Groundwater levels may change over time and also occur as perched water within the soil profiles following rainfall events. However, based on our experience in similar projects, it is expected that seepage into excavation should be controllable by gravity drainage where possible or pumping from sumps.

7.3.2. Excavation Support

Temporary unsupported vertical cuts in the Unit 1 Fill, Unit 2 Residual Soil and Unit 3a Shales are not recommended. Geotechnical issues relating to the stability of excavations into the shale rock would also be controlled by the orientation of defects in the rock mass and the occurrence of low strength zones. These can be difficult to predict from isolated boreholes and should be progressively assessed by detailed geological mapping during construction.

On this basis, during construction works where there is sufficient room , unsupported batters cut at 1.5 Horizontal (H): 1 Vertical (V) for Unit 1 and Unit 2 materials, and 1 Horizontal (H): 1 Vertical (V) for Unit 3a material are recommended for the temporary stabilisation of cuts provided surcharge loads are kept clear of batter crests. Where there is insufficient room to form temporary batters, or where excavations form part of the permanent structure, then a full retention system will be required.

Common support systems used for such soil and shale bedrock profiles in Sydney include:

- Soldier pile walls with infill panels (usually shot Crete, timber planks or precast concrete panels)
- Contiguous piled walls
- Cantilevered reinforced concrete retaining walls
- Geogrid tie-back reinforced walls

In the soil and rock profiles that require shoring, lateral and vertical ground movements will be dependent on the design and construction of the shoring retention system. Experience and published data suggest that lateral movements of an adequately designed and installed retention system in soil and weathered rock will be between 0.2% and 0.5% of the retained height. The extent of the horizontal movement behind the excavation face typically varies from 1.5 to 3 times the excavated height.

It is recommended that detailed analysis be undertaken to develop a cost-effective retention support system. As a guide Table 4 below presents typical design parameters that can be adopted for retaining wall design.

Table 4: Design Parameters for Retaining Wall Design

Material	Bulk density γ (kN/m^3)	c' (kPa)	Φ' (degrees)	Coefficient of earth pressure at rest K_o[(2)]	Coefficient of active earth pressure K_a	Coefficient of passive earth pressure K_p	Elastic Modulus (MPa)
Unit 1 Fill	20	0	25	0.5	0.4	2.5	15
Unit 2 Residual Soil	20	5	27	0.5	0.38	2.7	30
Unit 3a Shale[1] (Class V)	23	10	30	0.5	0.33	3.0	100
Unit 3b Shale[1] (Class IV and better)	24	20	35	0.5	0.22	4.6	500

[1] Rock classified as shale in accordance with Pells et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" Aust. Geomech. Jul., Dec 1998

[2] These values assume that some wall movements and relaxation of horizontal stress will occur due to excavation. Actual Koi values may be higher, particularly in the rock units

Retaining wall analyses will also need to consider surcharges, footing loads from adjacent structures, and hydrostatic pressure. If drained walls are to be used then adequate drainage will need to be provided behind the walls, and a permanent water collection system will be required together with flushing points for drainage system periodic maintenance. Nevertheless an allowance of potential water pressure build-up equivalent to one-third the wall height is considered to be prudent with such drainage measures installed.

7.3.3. Potential Effect on Adjacent Structures

The layout of roads surrounding the site should be determined before further excavation commences. Where adjacent roads are located within the zone of influence of the excavation, the road pavement structure may experience horizontal and vertical movements from excavation induced ground movements and this should be assessed as part of excavation retention design. For preliminary design, the zone of influence can be estimated by drawing a line at approximately 2Horizontal:1Vertical from the base of the excavation to the ground surface behind the excavated face.

We recommend that prior to the commencement of the bulk excavation works dilapidation surveys of the adjacent roads be carried out to provide a baseline for excavation monitoring and management works.

We note that if there are sensitive vibration receptors in close proximity to the site it will be necessary to restrict certain excavation plant, such as impact hammers, and/or to limit the use of impact hammers within certain distances of vibration sensitive receptors. Alternatively, rock saws could be used to saw the perimeter of excavations to reduce the lateral transmission of vibrations.

7.3.4. Suitability of Excavated Material for Re-use as Engineered Fill

From a geotechnical viewpoint, Unit 2 Residual Soil and Unit 3 Shale encountered should generally be geotechnical suitable for use as engineered fill. Unit 1 Topsoil is unlikely to be suitable for re-use as engineered fill. Unit 1 Fill may be able to be re-used, provided unsuitable materials such as organics, roots, waste or oversized particles are removed.

7.4. Foundations

Earthworks carried out across the site will involve cut to fill to form the final platform levels. As such, it is anticipated that some building foundations will be in cut and some will be in compacted fill.

Where buildings or structures are to span across areas of cut, fill and/or residual soils we recommend that each structure be supported on a uniform stratum with footings designed to have similar settlements, or alternatively provision for differential settlements be incorporated into the structure. It is expected that where buildings are to span across areas of cut and fill, the foundation solution may comprise a combination of shallow footings to rock constructed in the cut and piles through soils/engineered fill to the bedrock layer below.

Allowable and Limit State geotechnical design parameters for strip, pad, the edge and internal beams of rafts and piles are provided in Table 5 overleaf. Allowable values can be adopted for shallow footings. For piles to comply with AS2159-2011, ultimate limit state design should be adopted.

Table 5: Recommended Footing Geotechnical Design Parameters

Geotechnical Unit[1]	Allowable Bearing Pressure [2] (kappa)	Ultimate End Bearing Pressure [2] (kappa)	Ultimate shaft Adhesion [3] [5] (kappa)	Elastic Modulus[4] (MP)
Unit 2 & Engineered Fill	175	-	50	30
Unit 3a Shale (Class V)	700	3,000	100	100
Unit 3b Shale (Class IV or better)	1,000	3,000	150	500

(1) Rock classified in accordance with Palls et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" Aust. Genomic. Jul., Dec 1998.
(2) Assumes a minimum embedment of at least 0.5m into the relevant bearing stratum. Settlement where allowable bearing pressures are adopted should be less that 1% of footing width.
(3) Assumes a minimum embedment of at least 2 pile diameters into the relevant bearing stratum.
(4) If limit state design is adopted serviceability should be assessed using the modulus value to check that settlements are within tolerable limits.
(5) Shaft adhesion should be ignored for pad footings.

The geotechnical strength reduction factor should be calculated in accordance with AS2159-2011. It is expected that a geotechnical reduction factor ϕ_g in the range 0.5 to 0.7 could be adopted depending on the risk rating assessment and provision for verification of the founding stratum during construction.

For uplift loads, a factor of 0.7 should be applied to the shaft adhesion in addition to the geotechnical strength reduction factor.

Where it is proposed to found on Unit 3b Shale, higher end bearing and shaft adhesion values may be possible if cored boreholes are carried out to better assess rock quality. Footings should be inspected by a geotechnical engineer to confirm that rock exposed in footings is consistent with design assumptions.

7.5. Seismic Design Parameters

Based on AS 1170.4 – 2007, the Earthquake Hazard Factor, Z, for the Sydney region is 0.08. The site is generally classified as Sub-Soil Class B_e – Rock (based on the proposed excavation extending into or near to the rock surface).

7.6. Pavement Design Parameters

CBR testing on soil samples collected from Unit 2 Residual Soil in TP2, TP5, TP6, TP7 and TP8 indicated soaked CBR values ranging 0.5% to 3%, with four of the five test results being less than 3% indicating poor pavement subgrade conditions. Where a CBR value of less than 3% is determined for a pavement subgrade, we recommend improvement by subgrade modification or replacement. The type of appropriate subgrade improvement, depth of replacement, etc. is depended on the proposed

pavement type and design/performance requirements. It is recommended that the final design/specification of building platform/earthworks be prepared in close consultation with pavement designers to confirm that the finished subgrade meets pavement requirements.

As a provisional guide to the feasibility of carrying out subgrade modification it is expected that treatment of the of the upper 300mm of the pavement subgrade by the addition of 2% modifying agent such as cement or lime would allow an overall subgrade design CBR of 3% to be adopted. If inset treatment by ripping and mixing is adopted, it will be necessary to apply more than 2% of the modifying agent (say 4% to 6%) to achieve an average of 2% within the modified material. Trials will be necessary to assess the efficacy of the treatment process.

Pavements constructed on the final finished platforms formed by a combination of cut and fill should be constructed with a uniform subgrade to reduce potential differential settlements that could affect the performance of the pavement. In cut areas, it is expected that the foundation/subgrade for the pavement will need to be over excavated and backfilled with engineered fill to ensure a compatible/uniform subgrade to any adjoin areas of natural soils or engineered fill platform.

Satisfactory performance of pavements will require careful attention to surface and subsurface drainage to prevent the subgrade soil from wetting up. Site landscaping should be designed to prevent the ponding of water adjacent to pavements and also structures. Sub-surface drainage should be provided.

7.7. Groundwater

Groundwater was only observed in two of the four installed standpipes at levels of approximately 0.5m above the top of bedrock in BH 1A, located in lowest part of site, and a level of approximately 1.4m below the top of bedrock in BH6 midway up the site.

It is expected that at this site near surface groundwater seepage would primarily comprise limited transient flows at the soil/rock interface and within the upper layer of bedrock. Such seepage may be assumed as typically flowing downwards toward the local drainage lines, along the soil rock interface and horizontal bedding planes and sub-vertical joints. As the site is located on a local hillside, resulting in a limited catchment area, near surface groundwater flows across the site are expected to be transient and rainfall dependent, rather than there being standing water levels. Any resulting groundwater flows from cuttings should controllable using conventional surface water drainage at the toe of cut batters, and drains from behind retaining walls.

Regional groundwater is expected to be present at depth within bedrock defects. There are a limited number of groundwater bores in the area. We understand that existing bores, screened in the Bringelly Shale provide brackish or marginally saline groundwater with relatively low of <0.5L/s.

8. CONCLUSION

Based our site observations, preliminary geotechnical model, and experience on similar projects, the proposed development is considered feasible from a geotechnical perspective. The proposed development presents a low risk to surrounding structures and the groundwater environment, provided appropriate additional site investigation, design assessments, and construction monitoring normally associated with this type of development are carried out.

9. LIMITATIONS

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

Additional investigations may be required to support detailed design due to factors such as scope limitations and changes to the nature of the project. Coffey should be engaged to assist with detailed design and/or to review designs. During construction Coffey should verify that conditions exposed are consistent with design assumptions.

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

For and on behalf of Coffey

Sven Padina

Associate Geotechnical Engineer

Important information about your Coffey Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples.

These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

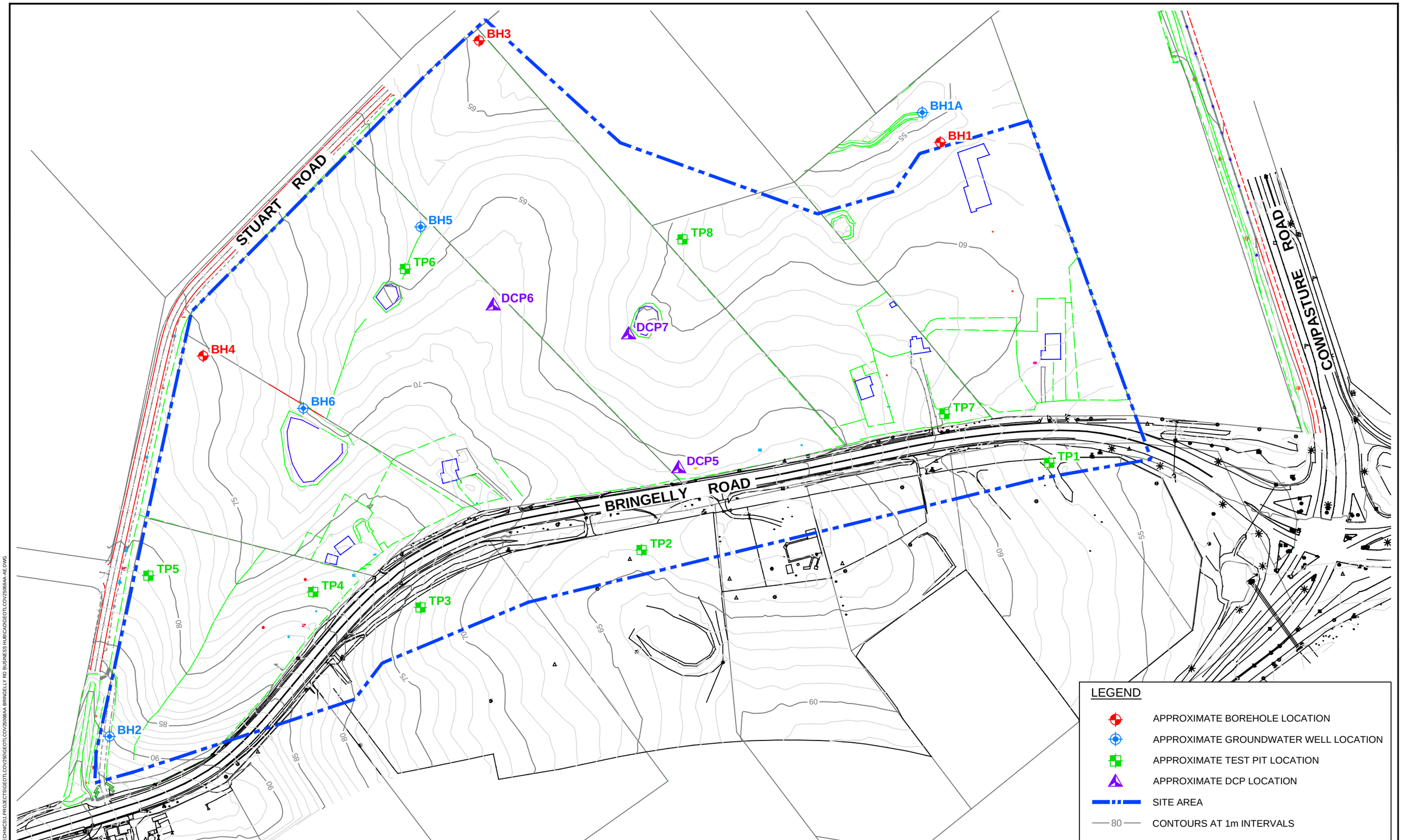
Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.



revision	no.	description	drawn	approved	date

10 0 10 30 50

Scale (metres) 1:2500

drawn	CL / AW
approved	STP
date	03 / 09 / 14
scale	AS SHOWN
original size	A3

coffey

client: WESTERN SYDNEY PARKLANDS TRUST

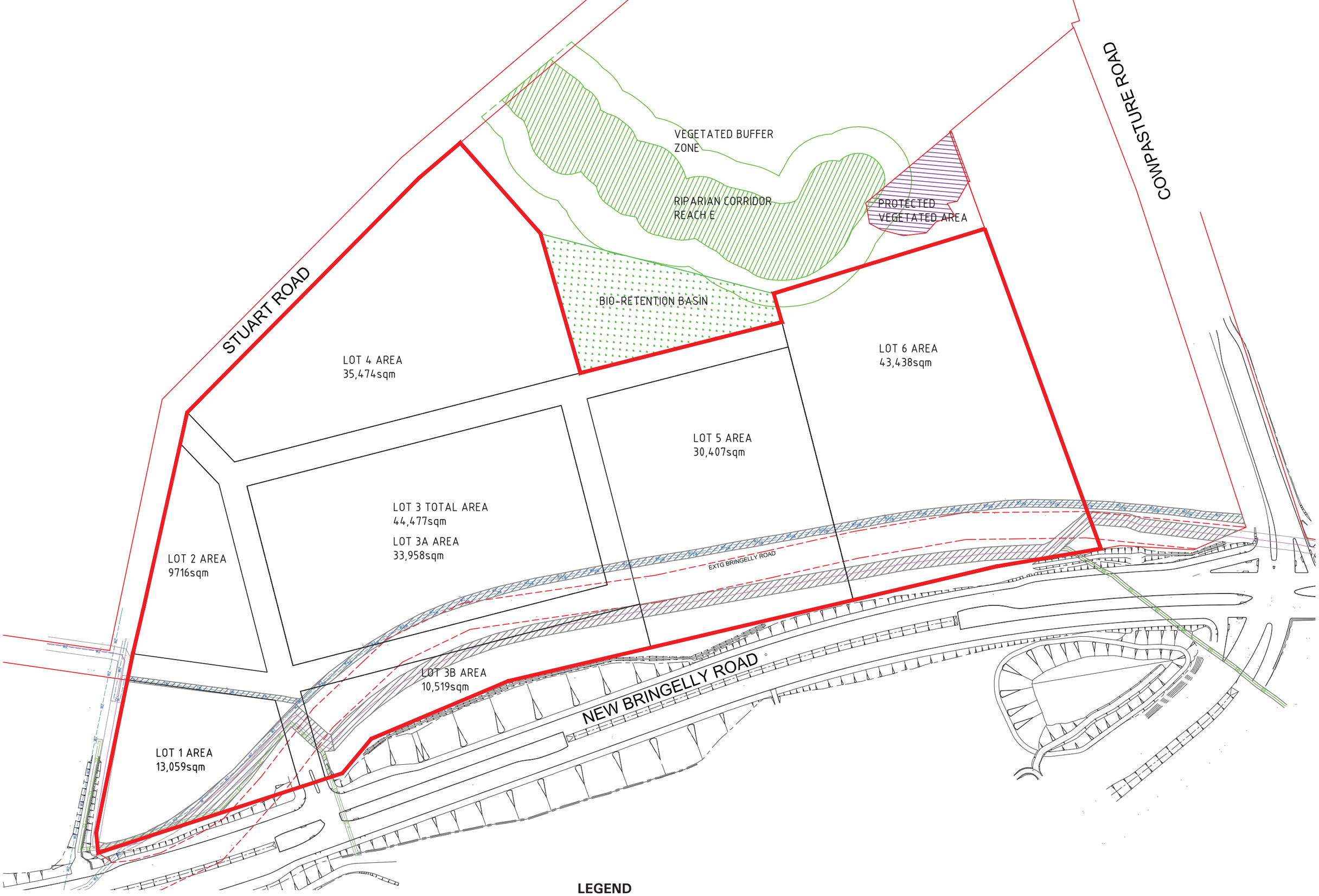
project: BRINGELLY ROAD BUSINESS HUB
BRINGELLY ROAD, BUSINESS PARK, NSW

title: INVESTIGATION LOCATION PLAN

project no: GEOTLCOV25068AA-AE | figure no: FIGURE 1 | rev: A

PLOT DATE: 3/09/2014 8:34:00 AM DWG FILE: F:\GEOTECHNICS\1.PROJECTS\GEOTLCOV25\GEOTLCOV25068AA BRINGELLY RD BUSINESS HUB\CAD\GEOTLCOV25068AA-AE.DWG

Appendix A - Site development and lot layout plan



LEGEND

- Boundary
- Easements
- Existing Bringelly Road
- Lot Lines

JBA

Prepared for : Western Sydney Parklands Trust

JBA - Urban Development Services
ABN 84 060 735 104 ACN 060 735 104 www.jbaaust.com
Level 7, 77 Berry Street North Sydney NSW 2060 t +61 2 9956 6962

Revision No.	Revision Date:	Revision Details:	Approved By:	File name:
1	22_07_14	FINAL DRAFT	GK	SITE PLAN_22_07_14

Site Plan

13525 | Bringelly Road, Leppington

Scale: 1:2500

Drawing No.: A

Appendix B - Engineering Borehole Logs, Test Pits and Explanation Sheets

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Engineering Log - Borehole

Borehole ID.	***BH1***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date started: ***28 May 2014***
principal:	date completed: ***28 May 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***AH***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	SPT 3, 8, 10 N*=18		1.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of rootlets.	<Wp	St / VSt		**TOPSOIL**
								Silty CLAY: high plasticity, red brown and pale grey.				**RESIDUAL SOIL**
					2.0			**SHALE**: extremely weathered, brown and yellow brown, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
			SPT 15/90mm N*=R		3.0			Borehole BH1 terminated at 2.75 m Refusal				
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

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

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

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH1A**
sheet:	1 of 1
project no.	**GEOTLCOV25068AA**
client:	**Western Sydney Parklands Trust**
date started:	**28 May 2014**
principal:	
date completed:	**28 May 2014**
project:	**Bringelly Park Business Hub**
logged by:	**CL**
location:	**Bringelly Road, Business Park, NSW**
checked by:	**AH**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered 06/06/14	SPT 6, 7, 8 N*=15		1.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	<Wp	St / VSt		**TOPSOIL**
								Silty CLAY: high plasticity, yellow brown and brown, with some iron induration.				**RESIDUAL SOIL**
			SPT 3, 7, 12 N*=19		2.0							
			D		3.0		CH	**Silty CLAY**: high plasticity, pale grey and yellow brown, with some iron induration.		H		**EXTREMELY WEATHERED BEDROCK**
								SHALE: extremely weathered, brown and grey, estimated very low strength. 3.3 m: becoming dark grey				Hammer bouncing at 2.9m
					4.0			Borehole BH1A terminated at 4.0 m Refusal				
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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Engineering Log - Borehole

Borehole ID.	**BH2**
sheet:	1 of 1
project no.	**GEOTLCOV25068AA**
client:	**Western Sydney Parklands Trust**
date started:	**28 May 2014**
principal:	
date completed:	**28 May 2014**
project:	**Bringelly Park Business Hub**
logged by:	**CL**
location:	**Bringelly Road, Business Park, NSW**
checked by:	**AH**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered					CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	<Wp	VSt		**TOPSOIL**
								Silty CLAY: high plasticity, brown, with a trace of fine grained gravel and some iron induration.				**RESIDUAL SOIL**
			SPT 3, 9, 16 N*=25		1.0		CH	**Silty CLAY**: high plasticity, red brown and pale grey.		H		
								SHALE: extremely weathered, grey, extimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
					2.0			Borehole BH2 terminated at 1.6 m Refusal				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

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

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

support
- M mud
- C casing
- N nil

penetration (1 2 3) — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	***BH3***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date started: ***28 May 2014***
principal:	date completed: ***28 May 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***AH***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	SPT 2, 2, 2 N*=4		1.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	=Wp	S		**TOPSOIL**
								Silty CLAY: high plasticity, red brown and orange brown.				**RESIDUAL SOIL**
					2.0		CH	**Silty CLAY**: high plasticity, pale grey, red brown and yellow brown.	<Wp	H		
			SPT 5, 6, 10 N*=16		3.0							
			SPT 15/80mm N*=R		4.0			**SHALE**: extremely weathered, pale grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
					5.0			Borehole BH3 terminated at 4.6 m Refusal				
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:25

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

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

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH4**
sheet:	1 of 1
project no.	**GEOTLCOV25068AA**
client:	**Western Sydney Parklands Trust**
date started:	**28 May 2014**
principal:	
date completed:	**28 May 2014**
project:	**Bringelly Park Business Hub**
logged by:	**CL**
location:	**Bringelly Road, Business Park, NSW**
checked by:	**AH**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	SPT 4, 17 N*=R		1.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of rootlets.	<Wp	St / VSt		**TOPSOIL**
								Silty CLAY: high plasticity, red brown, pale grey, orange brown and yellow brown, with some iron induration.				**RESIDUAL SOIL**
					2.0			**SHALE**: extremely weathered, pale grey and grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
			SPT 5/0mm N=R					Borehole BH4 terminated at 2.5 m Refusal				
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

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

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

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH5**
sheet:	1 of 1
project no.	**GEOTLCOV25068AA**
client:	**Western Sydney Parklands Trust**
date started:	**28 May 2014**
principal:	
date completed:	**28 May 2014**
project:	**Bringelly Park Business Hub**
logged by:	**CL**
location:	**Bringelly Road, Business Park, NSW**
checked by:	**AH**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered			0.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of rootlets.	<Wp	St		**TOPSOIL**
								Silty CLAY: high plasticity, red brown, with a trace of fine grained gravel.				**RESIDUAL SOIL**
			SPT 4, 5, 7 N*=12		1.0		CH	**Silty CLAY**: high plasticity, pale grey and red brown.		VSt		
			SPT 10/60mm N*=R		2.0			**SHALE**: extremely weathered, brown and grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
					3.0			3.1 m: becoming brown				
								3.7 m: becoming dark grey				
					4.0			Borehole BH5 terminated at 4.0 m Refusal				
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

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

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

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH6**
sheet:	1 of 1
project no.	**GEOTLCOV25068AA**
client:	**Western Sydney Parklands Trust**
date started:	**28 May 2014**
principal:	
date completed:	**28 May 2014**
project:	**Bringelly Park Business Hub**
logged by:	**CL**
location:	**Bringelly Road, Business Park, NSW**
checked by:	**AH**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

drill model: Drillcat, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered 06/04/14	SPT 5, 13, 15/80mm N*=R		0.0		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of rootlets.	<Wp	VSt		**TOPSOIL**
								Silty CLAY: high plasticity, red brown and orange brown.				**RESIDUAL SOIL**
					1.0		CH	**Silty CLAY**: high plasticity, grey mottled yellow brown.				
			SPT 10/50mm N*=R		2.0			**SHALE**: extremely weathered, grey and brown, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
					3.0			3.7 m: becoming dark grey				
					4.0			Borehole BH6 terminated at 4.0 m Refusal				
					5.0							
					6.0							
					7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 15:23

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

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

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation ID.	***TP1***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date excavated: ***04 Jun 2014***
principal:	date completed: ***04 Jun 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.2 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered			0.5			**FILL: CLAY**: low plasticity, brown, with some silt and fine to medium grained gravel and a trace of rootlets.	<Wp			**FILL**
						1.0		CH	**Silty CLAY**: high plasticity, red brown and grey.		VSt		**RESIDUAL SOIL**
				B		1.5		CH	**Silty CLAY**: high plasticity, grey mottled red brown and yellow brown.		H		
				D		2.0			**SHALE**: extremely weathered, grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						2.5							
						3.0			Test pit TP1 terminated at 2.9 m Refusal				
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration (1 2 3)
- no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

		Excavation ID.	***TP2***
		sheet:	1 of 1
		project no.	***GEOTLCOV25068AA***
client:	***Western Sydney Parklands Trust***	date excavated:	***04 Jun 2014***
principal:		date completed:	***04 Jun 2014***
project:	***Bringelly Park Business Hub***	logged by:	***CL***
location:	***Bringelly Road, Business Park, NSW***	checked by:	***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.1 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered	B		0.0			**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of rootlets.	<Wp			**TOPSOIL**
								CH	**Silty CLAY**: high plasticity, red brown and grey.		H		**RESIDUAL SOIL**
						0.5			0.7 m: becoming grey mottled red brown				
				D		1.0			**SHALE**: extremely weathered, grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						1.5							
						2.0			2.1 m: becoming dark grey/grey				
						2.5							
						3.0			Test pit TP2 terminated at 2.7 m Refusal				
						3.5							

CDF_0_9_04BB.GLB Log COF EXCAVATION GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 11:06

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

		Excavation ID.	***TP3***
		sheet:	1 of 1
		project no.	***GEOTLCOV25068AA***
client:	***Western Sydney Parklands Trust***	date excavated:	***04 Jun 2014***
principal:		date completed:	***04 Jun 2014***
project:	***Bringelly Park Business Hub***	logged by:	***CL***
location:	***Bringelly Road, Business Park, NSW***	checked by:	***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.3 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E			Not Encountered	B + D		0.0			**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	<Wp			**TOPSOIL**
								CH	**Silty CLAY**: high plasticity, red brown, with a trace of fine grained ironstone gravel.		H		**RESIDUAL SOIL**
				D		0.5			0.8 m: becoming mottled grey, red brown and yellow brown				
				D		1.0			**SHALE**: extremely weathered, grey and red brown, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
				D		1.5							
						2.0							
						2.5							
						3.0			Test pit TP3 terminated at 2.8 m Refusal				
						3.5							

CDF_0_9_04BB.GLB Log COF EXCAVATION GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 11:06

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

		Excavation ID.	***TP4***
		sheet:	1 of 1
		project no.	***GEOTLCOV25068AA***
client:	***Western Sydney Parklands Trust***	date excavated:	***04 Jun 2014***
principal:		date completed:	***04 Jun 2014***
project:	***Bringelly Park Business Hub***	logged by:	***CL***
location:	***Bringelly Road, Business Park, NSW***	checked by:	***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.3 m long 0.6 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered			0.0			**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	<Wp			**TOPSOIL**
				B				CH	**Silty CLAY**: high plasticity, red brown.		H		**RESIDUAL SOIL**
				D		0.5			0.8 m: becoming grey mottled red brown				
				D		1.0			**SHALE**: extremely weathered, grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						1.5							
						2.0							
						2.5							
						3.0			Test pit TP4 terminated at 3.0 m Target depth				
						3.5							

CDF_0_9_04BB.GLB Log COF EXCAVATION GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 11:06

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	***TP5***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date excavated: ***04 Jun 2014***
principal:	date completed: ***04 Jun 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.3 m long 0.6 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered	B		0.0			**TOPSOIL: Silty CLAY**: high plasticity, brown, with some rootlets.	<Wp			**TOPSOIL**
								CH	**Silty CLAY**: high plasticity, red brown, yellow brown and grey, with a trace of ironstone gravel.		VSt / St		**RESIDUAL SOIL**
				D		0.5							
				B + D		1.0			**SHALE**: extremely weathered, grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						1.5							
						2.0							
						2.5							
						3.0			Test pit TP5 terminated at 2.8 m Refusal				
						3.5							

hand penetrometer (kPa) scale: 100 200 300 400

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear peak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	***TP6***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date excavated: ***04 Jun 2014***
principal:	date completed: ***04 Jun 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.1 m long 0.6 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered	B + D		0.5		CH	**TOPSOIL: Silty CLAY**: high plasticity, brown, with a trace of gravel and some rootlets.	<Wp			**TOPSOIL**
									Silty CLAY: high plasticity, red brown mottled grey.		VSt		**RESIDUAL SOIL**
				D		1.0		CH	**Silty CLAY**: high plasticity, grey mottled red brown, with a trace of fine grained ironstone gravel.		St		
				B		1.5							
				D		2.0			**SHALE**: extremely weathered, grey, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						2.5			Test pit TP6 terminated at 2.5 m Refusal				
						3.0							
						3.5							

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method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
N none
S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear peak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
W_P plastic limit
W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	***TP7***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date excavated: ***04 Jun 2014***
principal:	date completed: ***04 Jun 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.1 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E			Not Encountered	B		0.0			**TOPSOIL: Silty CLAY**: high plasticity, brown and dark brown, with a trace of fine grained gravel and rootlets.	<Wp			**TOPSOIL**
								CH	**Silty CLAY**: high plasticity, red brown mottled grey.		VSt		**RESIDUAL SOIL**
						0.5							
						1.0			1 m: becoming red brown and grey				
						1.5			**SHALE**: extremely weathered, pale grey and red brown, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						2.0							
						2.5			Test pit TP7 terminated at 2.5 m Refusal				
						3.0							
						3.5							

hand penetrometer (kPa): 100 200 300 400

CDF_0_9_04BB.GLB Log COF EXCAVATION GEOTLCOV25068AA.GPJ <<DrawingFile>> 20/06/2014 11:06

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Excavation

Excavation ID.	***TP8***
sheet:	1 of 1
project no.	***GEOTLCOV25068AA***
client: ***Western Sydney Parklands Trust***	date excavated: ***04 Jun 2014***
principal:	date completed: ***04 Jun 2014***
project: ***Bringelly Park Business Hub***	logged by: ***CL***
location: ***Bringelly Road, Business Park, NSW***	checked by: ***PLV***

position: Not Specified | surface elevation: Not Specified | pit orientation:

equipment type: Backhoe | excavation method: | excavation dimensions: 3.4 m long 0.6 m wide

excavation information | **material substance**

method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E			Not Encountered	B + D		0.5			**TOPSOIL: Silty CLAY**: high plasticity, brown and dark brown, with a trace of fine gravel and rootlets.	<Wp			**TOPSOIL**
									Silty CLAY: high plasticity, red brown mottled grey.		VSt		**RESIDUAL SOIL**
				D		1.0			**Silty CLAY**: high plasticity, grey mottled red brown and yellow brown, with some ironstone gravel.		St		
				D		1.5			**SHALE**: extremely weathered, grey and brown, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
						2.0			Test pit TP8 terminated at 2.0 m Refusal				
						2.5							
						3.0							
						3.5							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix C – Laboratory Test Results

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00416-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00416
Client Sample:	BH1A 1.0 to 1.45 m
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH1A (1.00 to 1.45 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	15.2	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00418-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00418
Client Sample:	BH1A (3.4 to 3.5 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH1A (3.4 to 3.5 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	11.4	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00421-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00421
Client Sample:	BH3 (2.5 to 2.95 m
Date Sampled:	06/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH3 (2.50 to 2.95 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.8	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00417-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00417
Client Sample:	BH3 (1.00 to 1.45 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH3 (1.00 to 1.45 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	20.5	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00421-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00421
Client Sample:	BH3 (2.5 to 2.95 m
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH3 (2.50 to 2.95 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.8	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
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Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00420-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00420
Client Sample:	BH6 (1.00 to 1.38m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	BH6 (1.00 to 1.38 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	12.0	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00424-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00424
Client Sample:	TP1 (1.5 to 1.8 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP1 (1.5 to 1.8 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.8	

Comments

N/A

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Report No.: IOLT 7394

EMERSON CLASS NUMBER REPORT

Client:	Coffey Geotechnics Pty Ltd
Principal:	Western Sydney Parkland Trust
Project:	GEOTLCOV25068AA - Bringelly Business Hub
Location	Bringelly Road
Job No.:	INFOARTA01220AA

Approved Signatory: Alex Munoz
Senior Technical Officer
NATA Accredited Laboratory Number: 431
Date of Issue: 13/06/2014

Sample Details

Test procedure	AS1289 3.8.1	**Date sampled**	4/06/2014
Sample number	ARTA14S-00408	**Material source**	Ex Job Site
Sample identification	**TP1 (2.00 to 2.10 m)**		

Test Data

Air Dried Crumbs

time start of test:	10/06/2014 9:15
time dispersion commences:	10/06/2014 9:15:00
time dispersion completed:	Not Observed

Remoulded Material

time start of test:	-
time dispersion commences:	-
time dispersion completed:	-

Material Description

(CI/CH) SILTY CLAY - medium to high plasticity, grey brown.

type of water used:	Distilled
water temperature	20.0 °c

Immersion of air dried crumbs

- does not slake ☐
- slakes ☒
  - swell ☐ → 7
  - does not swell ☐ → 8
  - complete dispersion ☐ → 1
  - partial dispersion ☒ → 2
  - no dispersion ☐

Immersion of remoulded material

- disperses ☐ → 3
- does not disperse ☐
  - calcite or gypsum present ☐ → 4
  - calcite or gypsum absent ☐
    - vigorous shaking ☐
    - disperses ☐ → 5
    - flocculates ☐ → 6

Emerson class number
2

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00408-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00408
Client Sample:	TP1 (2.0 to 2.1 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP1 (2.0 to 2.1 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.5	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00413-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00413
Client Sample:	TP2 (0.5 to 0.7 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP2 (0.5 to 0.7 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.7	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	12.5	
Mould Length (mm)		249.9	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	59	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	41	
Date Tested		13/06/2014	
Standard Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.63	
Standard Optimum Moisture Content (%)		20.0	
Retained Sieve 19mm (%)		0	
Compactive Effort		Standard	
Date Tested		6/06/2014	
CBR At 2.5mm (%)	AS 1289.6.1.1	2.0	
Maximum Dry Density (t/m³)		1.63	
Optimum Moisture Content (%)		20.2	
Dry Density before Soaking (t/m³)		1.63	
Density Ratio before Soaking (%)		100	
Moisture Content before Soaking (%)		20.0	
Moisture Ratio before Soaking (%)		99	
Dry Density after Soaking (t/m³)		1.58	
Density Ratio after Soaking (%)		97	
Swell (%)		3.0	
Moisture Content of Top 30mm (%)		26.2	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00413-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00413
Client Sample:	TP2 (0.5 to 0.7 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP2 (0.5 to 0.7 m)

Test Results

Description	Method	Result	Limits
Moisture Content of Remaining Depth (%)		22.6	
Compactive Effort		Standard	
Surcharge Mass (kg)		4.50	
Period of Soaking (Days)		4	
Oversize Material		Excluded	
Oversize Material (%)		0.3	
Date Tested		16/06/2014	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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California Bearing Ratio Test Report

Report No: CBR:ARTA14S-00413
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

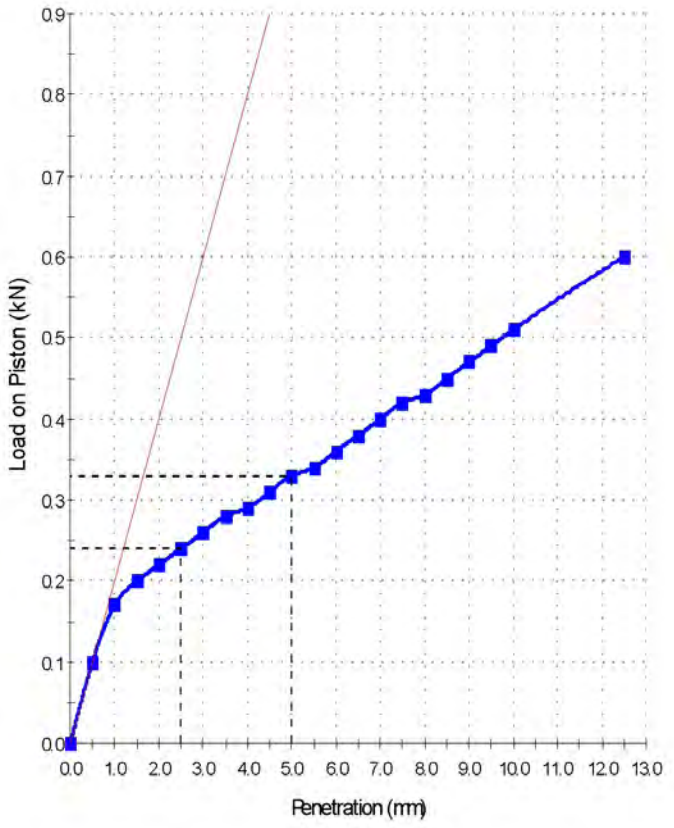
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00413	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	16/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP2 (0.5 to 0.7 m)		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR At 2.5mm (%):	2.0
Maximum Dry Density (t/m³):	1.63
Optimum Moisture Content (%):	20.2
Dry Density before Soaking (t/m³):	1.63
Density Ratio before Soaking (%):	100
Moisture Content before Soaking (%):	20.0
Moisture Ratio before Soaking (%):	99
Dry Density after Soaking (t/m³):	1.58
Density Ratio after Soaking (%):	97
Swell (%):	3.0
Moisture Content of Top 30mm (%):	26.2
Moisture Content of Remaining Depth (%):	22.6
Compactive Effort:	Standard
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.3

AS 1289.2.1.1

Field Moisture Content (%):	16.7

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Maximum Dry Density Report

Report No: MDD:ARTA14S-00413
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

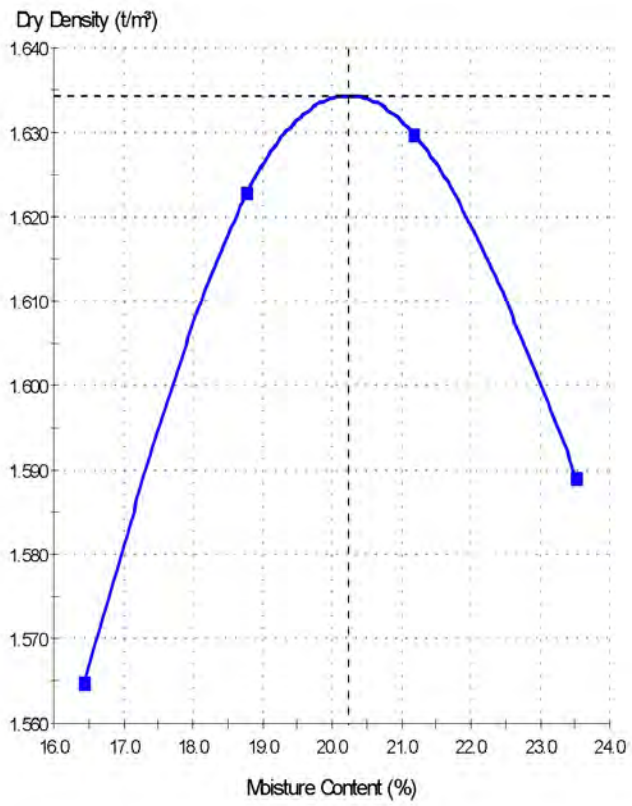
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00413	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	6/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP2 (0.5 to 0.7 m)		

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1

Standard MDD (t/m³):	1.63
Standard OMC (%):	20.0
Retained Sieve 19mm (%):	0

Comments

Artarmon Laboratory
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Report No.: IOLT 7393

EMERSON CLASS NUMBER REPORT

Client:	Coffey Geotechnics Pty Ltd
Principal:	Western Sydney Parkland Trust
Project:	GEOTLCOV25068AA - Bringelly Business Hub
Location	Bringelly Road
Job No.:	INFOARTA01220AA

Approved Signatory: Alex Munoz
Senior Technical Officer
NATA Accredited Laboratory Number: 431
Date of Issue: 13/06/2014

Sample Details

Test procedure	AS1289 3.8.1	**Date sampled**	4/06/2014
Sample number	ARTA14S-00407	**Material source**	Ex Job Site
Sample identification	**TP3 (1.20 to 1.30 m)**		

Test Data

Air Dried Crumbs

time start of test:	10/06/2014 9:20
time dispersion commences:	10/06/2014 9:20:00
time dispersion completed:	Not Observed

Remoulded Material

time start of test:	-
time dispersion commences:	-
time dispersion completed:	-

Material Description

(CI/CH) SILTY CLAY - medium to high plasticity, grey

type of water used:	Distilled
water temperature	20.0 °c

Immersion of air dried crumbs

- does not slake ☐
- slakes ☒
  - swell ☐ → 7
  - does not swell ☐ → 8
  - complete dispersion ☐ → 1
  - partial dispersion ☒ → 2
  - no dispersion ☐
    - **Immersion of remoulded material**
      - disperses ☐ → 3
      - does not disperse ☐
        - calcite or gypsum present ☐ → 4
        - absent ☐
          - vigorous shaking ☐
          - disperses ☐ → 5
          - flocculates ☐ → 6

Emerson class number
2

Artarmon, Sydney Laboratory

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Report No: ARTA14S-00407-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00407
Client Sample:	TP3 (1.2 to 1.3m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP3 (1.2 to 1.3 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	14.9	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
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Phone: +61 2 9437 0137

Report No: ARTA14S-00410-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00410
Client Sample:	TP4 (1.0 to 1.1 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP4 (1.0 to 1.1 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.1	

Comments

N/A

Artarmon Laboratory
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Report No.: IOLT 7395

EMERSON CLASS NUMBER REPORT

Client:	Coffey Geotechnics Pty Ltd
Principal:	Western Sydney Parkland Trust
Project:	GEOTLCOV25068AA - Bringelly Business Hub
Location	Bringelly Road
Job No.:	INFOARTA01220AA

Approved Signatory: Alex Munoz
Senior Technical Officer
NATA Accredited Laboratory Number: 431
Date of Issue: 13/06/2014

Sample Details

Test procedure	AS1289 3.8.1	**Date sampled**	4/06/2014
Sample number	ARTA14S-00410	**Material source**	Ex Job Site
Sample identification	**TP4 (1.00 to 1.10 m)**		

Test Data

Air Dried Crumbs

time start of test:	10/06/2014 9:25
time dispersion commences:	10/06/2014 9:25:00
time dispersion completed:	Not Observed

Remoulded Material

time start of test:	-
time dispersion commences:	-
time dispersion completed:	-

Material Description

(CI/CH) SILTY CLAY - medium to high plasticity, mottled grey brown.

type of water used:	Distilled
water temperature	20.0 °c

Immersion of air dried crumbs

- does not slake ☐
- slakes ☒
  - swell ☐ → 7
  - does not swell ☐ → 8
  - complete dispersion ☐ → 1
  - partial dispersion ☒ → 2
  - no dispersion ☐

Immersion of remoulded material

- disperses ☐ → 3
- does not disperse ☐
  - calcite or gypsum present ☐ → 4
  - calcite or gypsum absent ☐
    - vigorous shaking ☐
    - disperses ☐ → 5
    - flocculates ☐ → 6

Emerson class number
2

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00412-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00412
Client Sample:	TP5 (0.3 to 0.5 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP5 (0.3 to 0.5 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	24.6	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	13.5	
Mould Length (mm)		250.1	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	66	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	23	
Plasticity Index (%)	AS 1289.3.3.1	43	
Date Tested		13/06/2014	
Standard Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.61	
Standard Optimum Moisture Content (%)		20.5	
Retained Sieve 19mm (%)		0	
Compactive Effort		Standard	
Date Tested		8/06/2014	
CBR At 2.5mm (%)	AS 1289.6.1.1	0.5	
Maximum Dry Density (t/m³)		1.61	
Optimum Moisture Content (%)		20.4	
Dry Density before Soaking (t/m³)		1.61	
Density Ratio before Soaking (%)		100	
Moisture Content before Soaking (%)		20.2	
Moisture Ratio before Soaking (%)		99	
Dry Density after Soaking (t/m³)		1.51	
Density Ratio after Soaking (%)		94	
Swell (%)		6.5	
Moisture Content of Top 30mm (%)		33.5	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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47 - 49 Carlotta Street
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Phone: +61 2 9437 0137

Report No: ARTA14S-00412-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00412
Client Sample:	TP5 (0.3 to 0.5 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP5 (0.3 to 0.5 m)

Test Results

Description	Method	Result	Limits
Moisture Content of Remaining Depth (%)		23.7	
Compactive Effort		Standard	
Surcharge Mass (kg)		4.50	
Period of Soaking (Days)		4	
Oversize Material		Excluded	
Oversize Material (%)		0.2	
Date Tested		16/06/2014	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
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California Bearing Ratio Test Report

Report No: CBR:ARTA14S-00412
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

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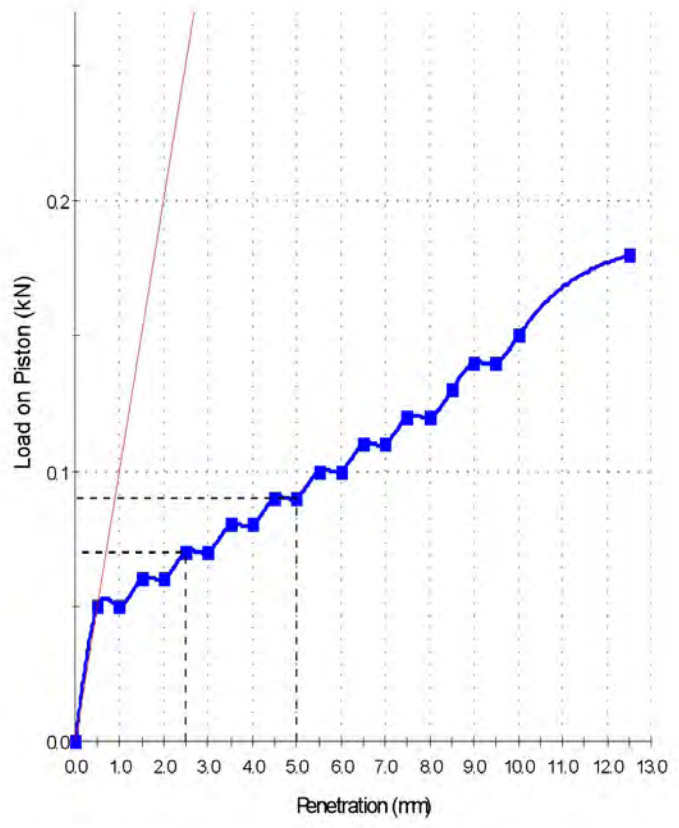
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00412	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	16/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP5 (0.3 to 0.5 m)		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR At 2.5mm (%):	0.5
Maximum Dry Density (t/m³):	1.61
Optimum Moisture Content (%):	20.4
Dry Density before Soaking (t/m³):	1.61
Density Ratio before Soaking (%):	100
Moisture Content before Soaking (%):	20.2
Moisture Ratio before Soaking (%):	99
Dry Density after Soaking (t/m³):	1.51
Density Ratio after Soaking (%):	94
Swell (%):	6.5
Moisture Content of Top 30mm (%):	33.5
Moisture Content of Remaining Depth (%):	23.7
Compactive Effort:	Standard
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.2

AS 1289.2.1.1

Field Moisture Content (%):	24.6

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Maximum Dry Density Report

Report No: MDD:ARTA14S-00412
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

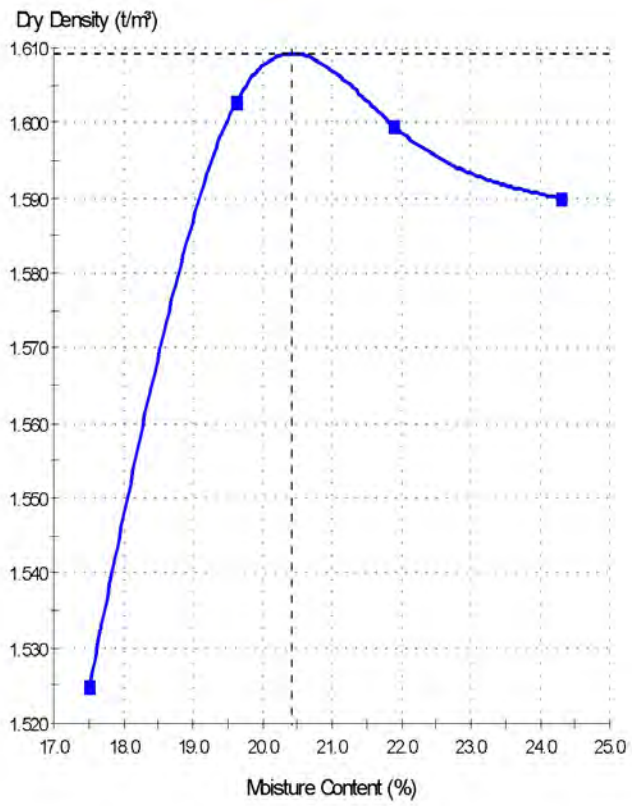
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00412	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	8/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP5 (0.3 to 0.5 m)		

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1

Standard MDD (t/m³):	1.61
Standard OMC (%):	20.5
Retained Sieve 19mm (%):	0

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00406-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00406
Client Sample:	TP5 (1.0 to 1.2 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP5 (1.0 to 1.2 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.4	

Comments

N/A

Artarmon Laboratory
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Report No.: IOLT 7392

EMERSON CLASS NUMBER REPORT

Client:	Coffey Geotechnics Pty Ltd
Principal:	Western Sydney Parkland Trust
Project:	GEOTLCOV25068AA - Bringelly Business Hub
Location	Bringelly Road
Job No.:	INFOARTA01220AA

Approved Signatory: Alex Munoz
Senior Technical Officer
NATA Accredited Laboratory Number: 431
Date of Issue: 13/06/2014

Sample Details

Test procedure	AS1289 3.8.1	**Date sampled**	4/06/2014
Sample number	ARTA14S-00406	**Material source**	Ex Job Site
Sample identification	**TP5 (1.10 to 1.20 m)**		

Test Data

Air Dried Crumbs

time start of test:	10/06/2014 9:30
time dispersion commences:	10/06/2014 9:30:00
time dispersion completed:	Not Observed

Remoulded Material

time start of test:	-
time dispersion commences:	-
time dispersion completed:	-

Material Description

(CI/CH) SILTY CLAY - medium to high plasticity, grey-orange brown.

type of water used:	Distilled
water temperature	20.0 °c

Immersion of air dried crumbs

- does not slake ☐
- slakes ☒
  - swell ☐ → 7
  - does not swell ☐ → 8
  - complete dispersion ☐ → 1
  - partial dispersion ☒ → 2
  - no dispersion ☐

Immersion of remoulded material

- disperses ☐ → 3
- does not disperse ☐
  - calcite or gypsum present ☐ → 4
  - calcite or gypsum absent ☐
    - vigorous shaking ☐
    - disperses ☐ → 5
    - flocculates ☐ → 6

Emerson class number
2

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

California Bearing Ratio Test Report

Report No: CBR:ARTA14S-00411
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

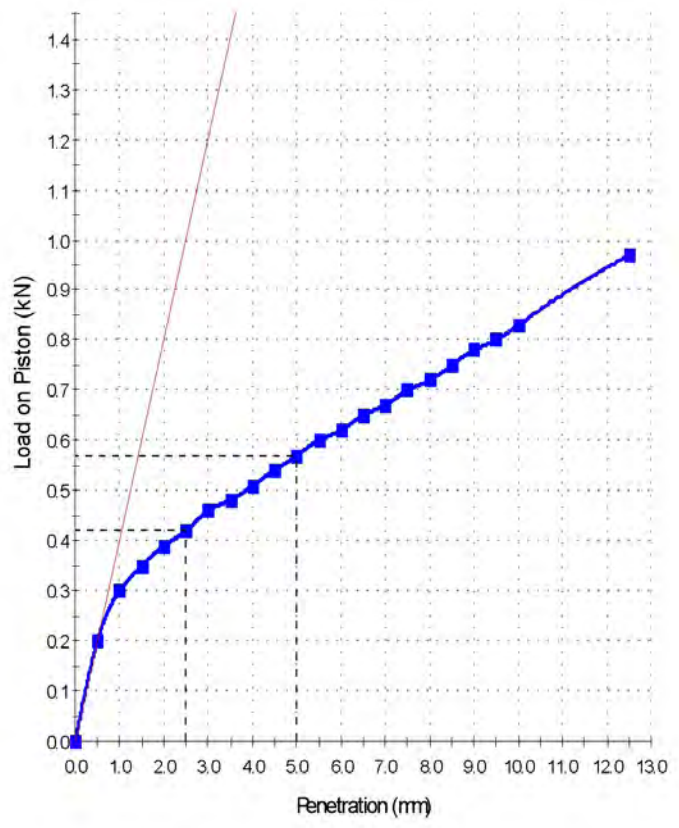
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00411	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	16/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP6 (0.3 to 0.6 m)		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR At 2.5mm (%):	3.0
Maximum Dry Density (t/m³):	1.57
Optimum Moisture Content (%):	23.8
Dry Density before Soaking (t/m³):	1.57
Density Ratio before Soaking (%):	100
Moisture Content before Soaking (%):	23.6
Moisture Ratio before Soaking (%):	99
Dry Density after Soaking (t/m³):	1.53
Density Ratio after Soaking (%):	97
Swell (%):	3.0
Moisture Content of Top 30mm (%):	29.5
Moisture Content of Remaining Depth (%):	26.2
Compactive Effort:	Standard
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	0.2

AS 1289.2.1.1

Field Moisture Content (%):	25.5

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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47 - 49 Carlotta Street
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Phone: +61 2 9437 0137

Maximum Dry Density Report

Report No: MDD:ARTA14S-00411
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

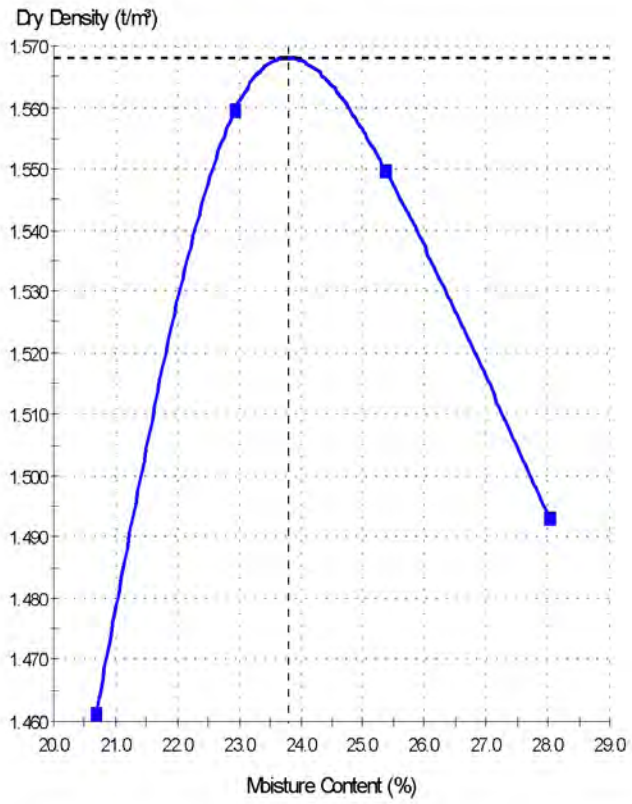
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00411	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	8/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP6 (0.3 to 0.6 m)		

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1

Standard MDD (t/m³):	1.57
Standard OMC (%):	24.0
Retained Sieve 19mm (%):	0

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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Phone: +61 2 9437 0137

Report No: ARTA14S-00422-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00422
Client Sample:	TP6 (1.2 to 1.3 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP6 (1.2 to 1.3 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.6	

Comments

N/A

Artarmon Laboratory
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Report No.: IOLT 7395

EMERSON CLASS NUMBER REPORT

Client:	Coffey Geotechnics Pty Ltd
Principal:	Western Sydney Parkland Trust
Project:	GEOTLCOV25068AA - Bringelly Business Hub
Location	Bringelly Road
Job No.:	INFOARTA01220AA

Approved Signatory: Alex Munoz
Senior Technical Officer
NATA Accredited Laboratory Number: 431
Date of Issue: 13/06/2014

Sample Details

Test procedure	AS1289 3.8.1	**Date sampled**	4/06/2014
Sample number	ARTA14S-00409	**Material source**	Ex Job Site
Sample identification	**TP6 (1.90 to 2.00 m)**		

Test Data

Air Dried Crumbs

time start of test:	10/06/2014 9:35
time dispersion commences:	10/06/2014 9:35:00
time dispersion completed:	Not Observed

Remoulded Material

time start of test:	-
time dispersion commences:	-
time dispersion completed:	-

Material Description

(CI/CH) SILTY CLAY - medium to high plasticity, grey brown.

type of water used:	Distilled
water temperature	20.0 °c

Immersion of air dried crumbs

- does not slake ☐
- slakes ☒
  - swell ☐ (7)
  - does not swell ☐ (8)
  - complete dispersion ☐ (1)
  - partial dispersion ☒ (2)
  - no dispersion ☐

Immersion of remoulded material

- disperses ☐ (3)
- does not disperse ☐
  - calcite or gypsum present ☐ (4)
  - calcite or gypsum absent ☐
    - vigorous shaking ☐
    - disperses ☐ (5)
    - flocculates ☐ (6)

Emerson class number
2

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00409-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00409
Client Sample:	TP6 (1.9 to 2.0 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP6 (1.9 to 2.0 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.9	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
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Phone: +61 2 9437 0137

California Bearing Ratio Test Report

Report No: CBR:ARTA14S-00415
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

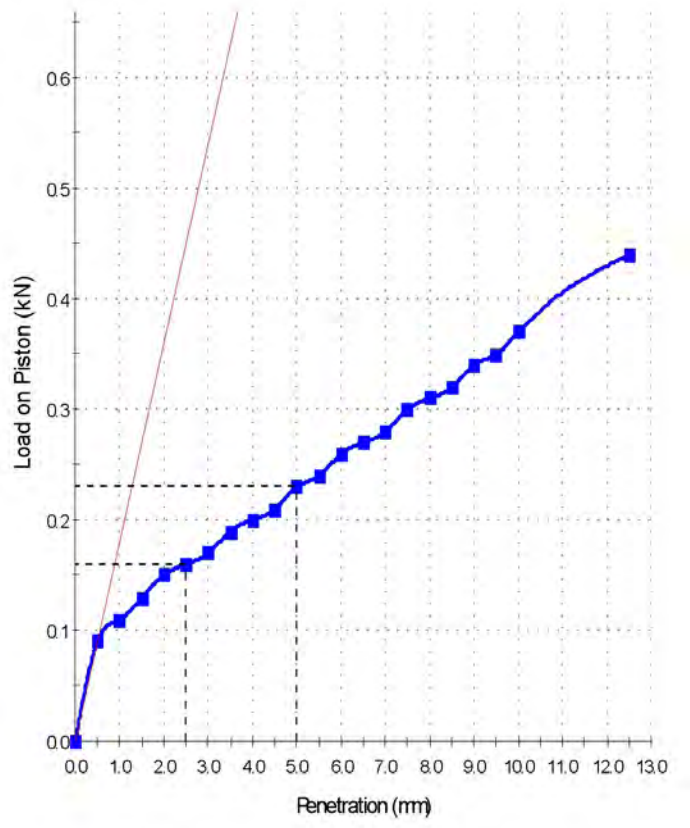
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00415	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	16/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP7 (0.4 to 0.7 m)		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR At 2.5mm (%):	1.0
Maximum Dry Density (t/m³):	1.67
Optimum Moisture Content (%):	18.3
Dry Density before Soaking (t/m³):	1.67
Density Ratio before Soaking (%):	100
Moisture Content before Soaking (%):	18.5
Moisture Ratio before Soaking (%):	101
Dry Density after Soaking (t/m³):	1.61
Density Ratio after Soaking (%):	97
Swell (%):	3.5
Moisture Content of Top 30mm (%):	26.4
Moisture Content of Remaining Depth (%):	20.1
Compactive Effort:	Standard
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material (%):	0.0

AS 1289.2.1.1

Field Moisture Content (%):	20.9

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: MDD:ARTA14S-00415
Issue No: 1

Maximum Dry Density Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

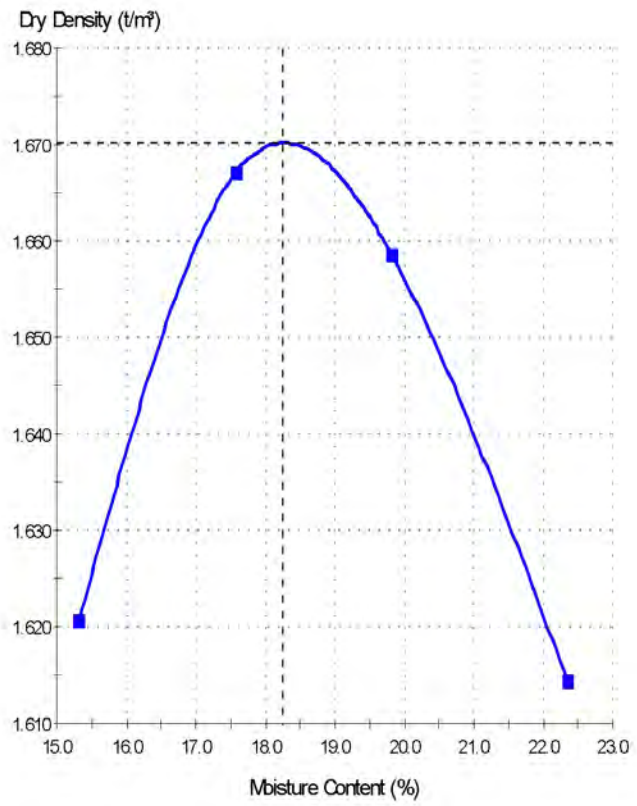
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00415	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	10/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP7 (0.4 to 0.7 m)		

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1

Standard MDD (t/m³):	1.67
Standard OMC (%):	18.5
Retained Sieve 19mm (%):	0

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
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47 - 49 Carlotta Street
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Phone: +61 2 9437 0137

Report No: ARTA14S-00414-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00414
Client Sample:	TP8 (0.4 to 0.5 m
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP8 (0.4 to 0.5 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	25.5	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	14.0	
Mould Length (mm)		254.2	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	66	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	23	
Plasticity Index (%)	AS 1289.3.3.1	43	
Date Tested		13/06/2014	
Standard Maximum Dry Density (t/m³)	AS 1289.5.1.1	1.59	
Standard Optimum Moisture Content (%)		24.5	
Retained Sieve 19mm (%)		1	
Compactive Effort		Standard	
Date Tested		8/06/2014	
CBR At 2.5mm (%)	AS 1289.6.1.1	2.5	
Maximum Dry Density (t/m³)		1.59	
Optimum Moisture Content (%)		24.3	
Dry Density before Soaking (t/m³)		1.59	
Density Ratio before Soaking (%)		100	
Moisture Content before Soaking (%)		24.5	
Moisture Ratio before Soaking (%)		101	
Dry Density after Soaking (t/m³)		1.53	
Density Ratio after Soaking (%)		96	
Swell (%)		3.5	
Moisture Content of Top 30mm (%)		31.4	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
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Phone: +61 2 9437 0137

Report No: ARTA14S-00414-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00414
Client Sample:	TP8 (0.4 to 0.5 m
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP8 (0.4 to 0.5 m)

Test Results

Description	Method	Result	Limits
Moisture Content of Remaining Depth (%)		25.0	
Compactive Effort		Standard	
Surcharge Mass (kg)		4.50	
Period of Soaking (Days)		4	
Oversize Material		Excluded	
Oversize Material (%)		1.2	
Date Tested		16/06/2014	

Comments

N/A

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

California Bearing Ratio Test Report

Report No: CBR:ARTA14S-00414
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

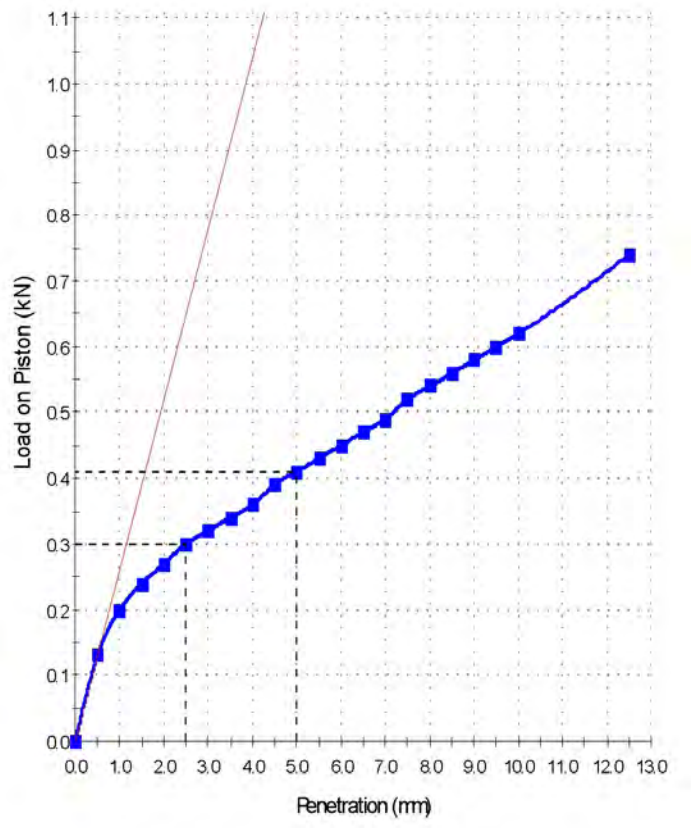
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 17/06/2014

Sample Details

Sample ID:	ARTA14S-00414	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	16/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP8 (0.4 to 0.5 m)		

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR At 2.5mm (%):	2.5
Maximum Dry Density (t/m³):	1.59
Optimum Moisture Content (%):	24.3
Dry Density before Soaking (t/m³):	1.59
Density Ratio before Soaking (%):	100
Moisture Content before Soaking (%):	24.5
Moisture Ratio before Soaking (%):	101
Dry Density after Soaking (t/m³):	1.53
Density Ratio after Soaking (%):	96
Swell (%):	3.5
Moisture Content of Top 30mm (%):	31.4
Moisture Content of Remaining Depth (%):	25.0
Compactive Effort:	Standard
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Oversize Material:	Excluded
Oversize Material (%):	1.2

AS 1289.2.1.1

Field Moisture Content (%):	25.5

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Maximum Dry Density Report

Report No: MDD:ARTA14S-00414
Issue No: 1

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

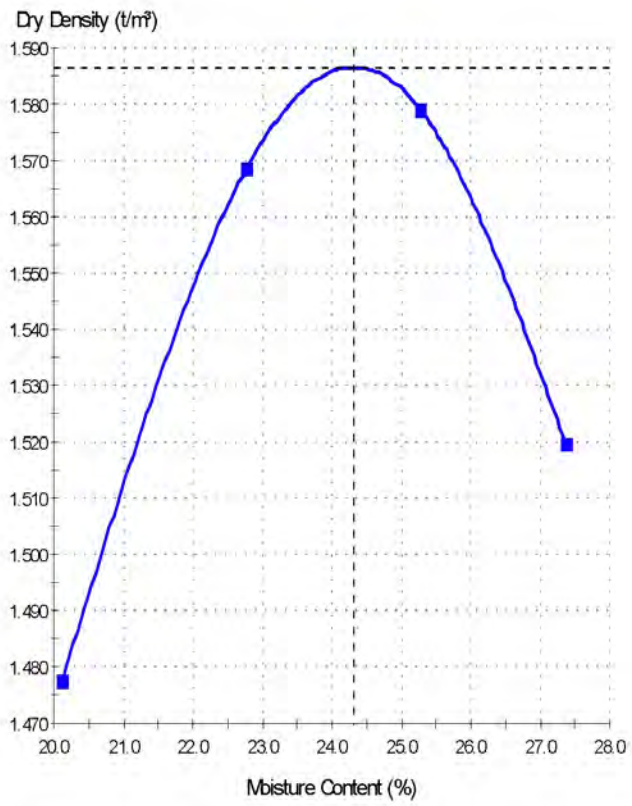
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00414	Sampling Method:	Submitted by client
Date Sampled:	4/06/2014	Material:	Subgrade
Date Submitted:	4/06/2014	Source:	Ex job site
Date Tested:	8/06/2014	Specification:	No Specification
Project Location:	Bringelly Road		
Sample Location:	TP8 (0.4 to 0.5 m)		

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1

Standard MDD (t/m³):	1.59
Standard OMC (%):	24.5
Retained Sieve 19mm (%):	1

Comments

Artarmon, Sydney Laboratory

Coffey Testing Pty Ltd
ABN 92 114 364 046
47 - 49 Carlotta Street
Artarmon SYDNEY NSW 2064

Phone: +61 2 9437 0137

Report No: ARTA14S-00423-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

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Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00423
Client Sample:	TP8 (1.0 to 1.1 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP8 (1.0 to 1.1 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.7	

Comments

N/A

Artarmon, Sydney Laboratory

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ABN 92 114 364 046
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Report No: ARTA14S-00419-1
Issue No: 1

Material Test Report

Client:	Coffey Geotechnics Pty Ltd (Chatswood) PO Box 5275 West Chatswood NSW 1515
Principal:	Western Sydney Parklands Trust
Project No.:	INFOARTA01220AA
Project Name:	GEOTLCOV25068AA - Bringelly Road Business Hub
Lot No.:	TRN:

Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Approved Signatory: Garry Collins
(Specialised Testing Manager)
NATA Accredited Laboratory Number:431
Date of Issue: 13/06/2014

Sample Details

Sample ID:	ARTA14S-00419
Client Sample:	TP8 (1.7 to 1.8 m)
Date Sampled:	04/06/2014
Source:	Ex job site
Material:	Subgrade
Specification:	No Specification
Sampling Method:	Submitted by client
Project Location:	Bringelly Road
Sample Location:	TP8 (1.7 to 1.8 m)

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	12.3	

Comments

N/A