Douglas Partners
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REPORT
on
PRELIMINARY GEOTECHNICAL ASSESSMENT

PROPOSED RESIDENTIAL SUBDIVISION
LOTS 93 TO 96, DP 753194
BOUNDARY ROAD, MEDOWIE

Prepared for

EUREKA 1 PROJECT 10 PTY LTD

Project 39519 – Rev 1

SEPTEMBER 2009

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ATTACHMENTS

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REPORT ON
PRELIMINARY GEOTECHNICAL ASSESSMENT
LOTS 93-96, DP 753194 BOUNDARY ROAD
MEDOWIE

1. INTRODUCTION

This report presents the findings of a Preliminary Geotechnical Assessment for Lots 93 to 96, DP 753194, Boundary Road, Medowie, New South Wales. The assessment was carried out for Eureka 1 Project 10 Pty Ltd.

It is understood that the site is proposed to be subdivided to accommodate future residential landuse (approximately 1050 to 1200 residential lots).

The objective of the investigation was to provide a preliminary assessment of the suitability of the site for future development with respect to geotechnical conditions.

The assessment comprised the following tasks:

- Desktop study, including review of previous investigations on the site, aerial photographs, topographic, orthophoto, geological and soil landscape maps;
- Site inspections on 30 June 2006 and on 4 July 2006, which included in situ measurement of pH and Electrical Conductivity (EC) of surface waters;
- Excavation of 13 test pits across the site to assess subsurface conditions;
- Laboratory testing of selected samples for a range of geo-environmental parameters.

2. SITE IDENTIFICATION

The site has a total area of approximately 126.7 ha and comprises four lots as shown on Drawing 1, attached. The site is identified as Lots 93 to 96, DP 753194, Boundary Road, Medowie.

The main site area is bounded by Boundary Road to the south, and vacant bushland to the north, east and west. Unformed roads adjoin the northern and western boundaries.

3. DESKTOP REVIEW

Previous Investigations

A search of Douglas Partners Pty Ltd (DP) records identified that an investigation has been previously undertaken for part of the site by DP, titled "Interim Report on Geotechnical Investigation – Stage 1, Proposed Putrescible Landfill Study, Ringwood Road, Medowie", Project SSI 9878, December 1986 (Ref 1).

The investigation included site inspection and excavation of 21 test pits within Lots 93 and 94, to broadly define the subsurface strata to a maximum depth of 3 m.

Selected residual clay samples were analysed for the following engineering properties:

- Moisture content;
- Atterberg Limit;
- Linear Shrinkage;
- Particle size distribution (including hydrometer); and
- Standard compaction properties.

The results of the investigation identified the following:

- The site is typically underlain by a thin topsoil layer (0.15 m to 0.3 m thick) underlain by very stiff to hard, high plasticity residual clay, generally to depths of 0.7 m to greater than 3.2 m, overlying weak to medium strength tuffaceous siltstone and sandstone;
- Surface water was observed in the vicinity of the watercourse and free groundwater was observed within clay in only one of the pits. Groundwater was subsequently measured within the three standpipe piezometers at between 0.6 m and greater than 2.9 m depth;
- Gradings indicate that soils have a high clay fraction (generally 50% to 60%), with only minor silt and sand;
- Moisture content of clays ranged from 18% to 33%;
- Plasticity Index ranged from 35% to 50%;
- Standard maximum dry density ranged from 1.37 (t/m^3) to 1.71 (t/m^3);
- Standard Optimum moisture content ranged from 20% to 31%.

Topography

Reference to the 1:25,000 Topographical sheet for Karuah (Sheet 9231-1-S) indicates that a gully drains to the south-east through the site. The surface of Lots 93 and 94 (i.e. the western lots) slopes towards the main gully to the north-east. Lots 95 and 96 (i.e. the eastern lots) slope generally towards the gully to the south-west.

The site generally falls towards the main gully at slopes between approximately 1° and 3°. The topographical map indicates surface levels between 30 AHD with levels of less than 20 AHD in the vicinity of the main gully.

Drainage

The predominant surface water drainage paths within the site comprise a low lying gully running south-east through the centre of the site. The gully starts in the north-eastern corner of Lot 93 and traverses the site, exiting in the south-eastern portion of Lot 96. A secondary surface water flow path runs from the western boundary of Lot 93, joining the main gully in the northern portion of Lot 94. The gullies at the time of the inspection contained ponded surface water in the northern and western portion of the site and a running stream in the south-eastern portion of the site. Soils within the gully were generally saturated, with very soft (boggy) conditions encountered within some areas of the gully. The gullies are shown on Drawing 1 attached.

A number of farm dams are located across the site, including two small dams within the gullies. The dams contained water at the time of the walkover survey (refer to Section 6).

Soils generally appeared to be well drained on the upper slopes, however, with the recent rainfall and predominantly clayey topsoils, damp surface conditions were encountered across the majority of the site, with boggy saturated conditions encountered within the gullies and areas with minimal vegetation cover as discussed in Section 6.

Geology / Hydrogeology

Reference to the 1:100 000 Newcastle Coalfield Regional Geology Series Sheet 9231 published by the Department of Mineral Resources indicates the site is underlain by the late Permian Aged Tomago Coal Measures. The main rock types of this formation are siltstone, sandstone, coal, tuff and claystone.

Geological mapping in the abandoned quarry to the south of the site, undertaken for the 1986 report, showed that the bedding of the rock strata dips at gentle angles (ie. 18° to 25°) to the south-east. Bedding planes are frequently iron stained indicating groundwater movement. Major joint sets trends north-west south-east with minor joint sets trending north-east south-west.

The regional groundwater flow regime is possibly to the south-east towards the Tomago Sandbeds and Tilligerry Creek which is located approximately 9 km south-east of the site.

Soil Landscape

Reference to the 1:100,000 Soil Landscape Series Sheet for Newcastle (Sheet 9232) prepared by the Department of Land & Water Conservation of NSW (DLWC, now DNR), indicates that the site is underlain by the Medowie soil landscape. The Medowie Landscape is generally defined as having the following properties:

- Gently undulating low hills on relict sediments in the Medowie lowlands region;
- Very broad, flat crests and long, gently inclined side slopes, typically between 2% and 15%;
- Elevations of 30 m to 70 m, with local relief to 30 m;
- Partially cleared open-forest;
- The soil types are deep >150 cm, well drained red and yellow structured loams on deeply weathered clay deposits and moderately deep to deep (60 cm to > 200 cm) well drained Red Podzolic soils and deep (200 cm to >300cm) yellow podzolic soils with some shallow well drained Lithosols on sandy /pebbly deposits with clay lenses;
- The Medowie Landscape is limited by seasonal waterlogging (localised, lower slopes), water erosion hazard (localised), strongly acidic soils with low inherent fertility and high potential aluminium toxicity.

Acid Sulphate Soils

Reference to the Karuah Acid Sulphate Soil Risk Map prepared by the Department of Conservation and Land Management of NSW indicates that site lies within an area of “no known occurrence” of acid sulphate soil conditions.

Salinity

Searches with DNR indicates that the site has no identified mapped salinity occurrences.

4. SITE CONDITION

The dominant topographical feature of the site is the low-lying gully system which enters the site in the north-eastern corner of Lot 93 and falls to the south-east, exiting the site in the south-east portion of Lot 96.

A number of intermittent minor gullies / surface water flow paths connect with the central gully, including a low lying gully running west to east through the northern portion of Lot 93 and a minor gully / surface water flow path running south from the northern boundary of Lot 96.

The main gully and intersecting side gullies generally comprise either a 1 m to 2 m wide shallow creek bed or a series of staggered pools within the lower portions of the gully. Surface water was observed within the shallow pools and running surface water observed in the creek within the south-eastern portion of the site (Photos 1 to 3).

Photo 1 – Flowing creek within gully at transmission easement (looking north Lot 96)

Photo 2 – Creek within gully (looking north-west Lot 95)

Photo 3 – Ponds within minor gully (looking east Lot 93)

Saturated near surface soils were observed across the majority of the site due to recent rainfall. Saturated topsoils / underlying clays (boggy conditions) were encountered within the following areas:

- Main gully - extending 50 m to 100 m from the gully's centreline in some areas (typically within areas with paperbark trees) (Photo 4);
- Cleared area within Lot 94, which has formerly been ploughed / ripped for cropping (Photo 5);
- Unsealed access tracks and localised unsealed cleared areas of the site which comprise minimal vegetation cover (including site boundaries which had recently been cleared for fencing).

Photo 4 – Boggy ground within gully (looking north-east Lot 95)

Photo 5 – Formerly ploughed / ripped area (Looking east Lot 94)

The gully system within the site typically comprised a very broad, relatively flat gully with gently inclined side slopes, typically between 1º and 2º. Localised steeper areas were observed in the north-east portion of the site with slopes observed up to 4º. The gully was generally vegetated with a dense cover of semi-mature paperbark trees and / or scattered to medium dense semi-mature to mature trees at the time of the inspection.

Vegetation across the remainder of the site typically comprised scattered semi-mature to mature trees with grass cover in open semi-cleared areas of the site (Photo 6) to medium dense to dense semi-mature to mature trees in relatively undisturbed areas of the site.

Photo 6 – Semi-cleared area within Lot 93 (looking north)

Minor soil erosion was observed within some gullies and in areas of sparse vegetation (Photo 7).

Photo 7 – Minor soil erosion within transmission easement (looking north-east Lot 96)

Seven dams were observed on the site. Three small dams were located in Lot 93, three dams were located within Lot 94 and one dam was located on Lot 95. All dams contained water and were relatively full at the time of inspection.

Dam walls typically appeared to be constructed from clays and siltstone materials (Photo 8), likely to be cut / fill, with embankment heights of up to 2 m. Waters within farm dams at the time of inspection ranged from relatively clear within dams closer to site gullies (Photo 9), to turbid within the larger dams in the southern portion of the site (Photo 10). Minor soil erosion was also observed in some of the dam embankments, especially where vegetation was sparse.

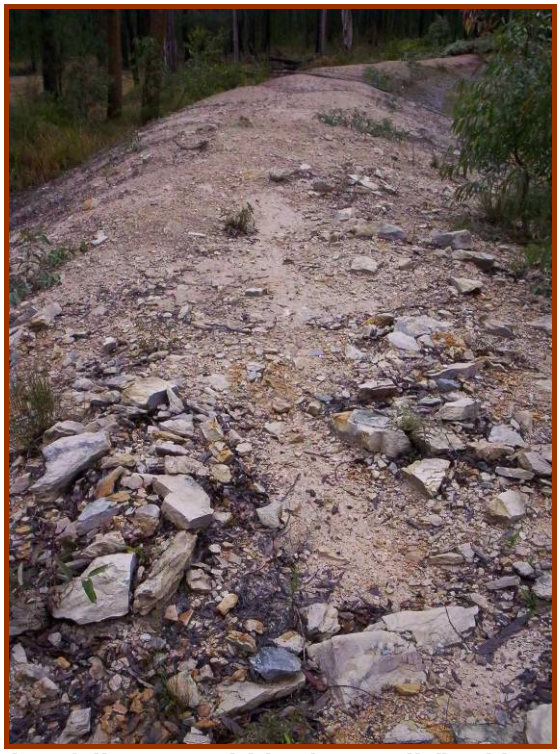

Photo 8 – Clays/siltstone within dam wall (looking east Lot 95)

Photo 9 – Dam within gully (looking north-west Lot 94)

Photo 10 – Turbid dam (looking north-east Lot 95)

Imported filling was observed in a number of areas across the site including the following:

- Fill hardstand located to the east of the workshop/shed within Lot 94. The fill was observed to comprise various inclusions such as bricks, concrete, ceramic tiles, gravel, plastic, metal, rubbish in a clay matrix. Hydrocarbon staining and hydrocarbon odour was observed at the ground surface in the vicinity of the fill pad and workshop (Photo 11);
- Fill stockpiles adjacent to the fill pad within Lot 94. The fill stockpiles were observed to contain clays, gravel and sand fill with some concrete, piping and metal inclusions (Photo 12);
- Fill stockpiles to the north of the fill pad within Lot 94. The fill stockpiles comprised a silty sand material with abundant feathers (possibly manure and feather waste from trucks following transport of poultry) (Photo 13);
- Surface fill between fill pad and residence to the south-east, comprising sand and gravel filling (Photo 13);
- Fill stockpiles in the vicinity of the residence (Lot 95), generally comprising stockpiles of woodchips, roadbase fill and siltstone (Photo 14);
- Fill stockpile comprising hardened bitumen adjacent to the western boundary of Lot 93 (Photo 15);

- Surficial fill placed along the transmission easement in the south-east corner of the site, generally comprising granular slag and gravel fill (Photo 16);
- Granular filling used to construct internal access roads to residences within Lots 93 to 95.

Photo 11 – Fill pad adjacent to workshop / shed within Lot 94 (looking north)

Photo 12 – Fill stockpile adjacent fill pad (looking east Lot 94)

Photo 13 – Surface fill to south-east of fill pad (looking north-west Lot 94)

Photo 14 – Stockpile comprising weathered siltstone (looking south-west Lot 95)

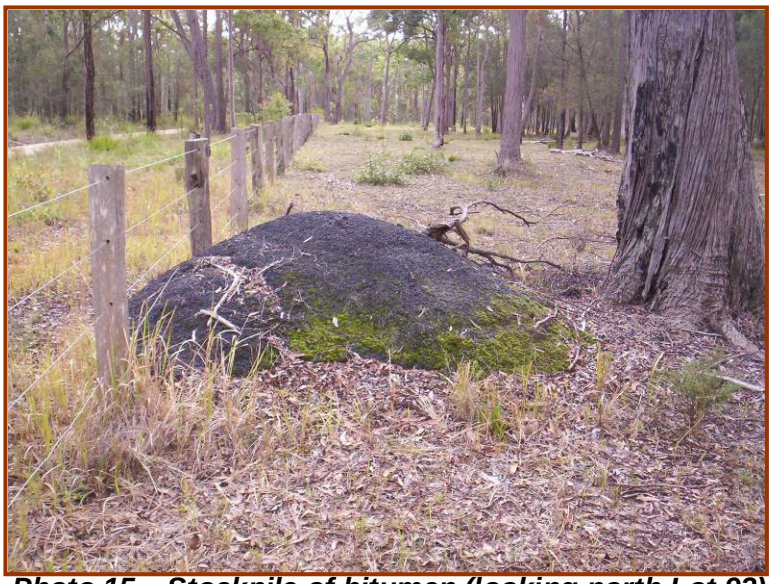

Photo 15 – Stockpile of bitumen (looking north Lot 93)

Photo 16 – Surficial filling along transmission easement (looking north-east Lot 96)

Structures across the site include:

- Brick residences and double garages within Lots 93, 94 and 95. All residences have adjacent septic / aerated wastewater treatment systems;
- Large workshop with inspection pit within Lot 94;
- Swimming pools within Lots 94 and 95;
- Small sheds within Lots 93 and 94;
- Trailer/caravan within Lot 94;
- Overhead transmission lines within Lot 95 and 96.

Some farm equipment, stored machinery, scrap metal, 44 gallon drums etc were stored within Lot 93 and 94 at the time of the site inspection.

Adjacent landuses comprise the following:

- Unsealed Boundary Road, residential subdivision and former quarry to the south;
- Unsealed road and bushland to the west and north;
- Bushland and transmission easement to the east.

5. FIELD WORK

5.1 Methods

A site walkover was undertaken by a geo-environmental engineer on 30 June 2006 and 4 July 2006 to assess dominant geomorphologies, site slopes, and site features such as eroded areas, gullies, wet ground, existing dams and presence of filling. Field measurements of surface waters for pH and electrical conductivity (EC) were also undertaken using calibrated portable meters.

Following the site walkover, subsurface investigation was conducted on 4 July 2006 by excavating a total of 13 test pits (Pit 101 to Pit 113) over the site. Test pits were positioned to assess general soil conditions within the main topographical units, including areas likely to encounter soft soils (i.e. gullies) and within the fill pad within Lot 94.

The pits were set-out by a geo-environmental engineer, who also logged the subsurface profile and collected regular samples for laboratory testing and identification purposes. Pits were surveyed (i.e. located and levelled) by Pulver, Cooper & Blackley surveyors (PCB).

The approximate test and sample locations and general site features are indicated on Drawing 1, attached.

5.2 Results

The results of the walk-over survey including slope measurement and site observations are presented on Drawing 1 attached, are described in Section 4 and are discussed further in Section 7.

The results of in situ pH and EC testing of surface waters at selected locations are summarised in Table 1 below.

Table 1 – Surface Water pH and EC Testing

Location[1]	pH	EC (µS/cm)
1	7.6	156
2	7.5	105
3	7.4	106
4	7.4	73
5	7.3	460
6	7.3	162
7	6.7	1250
8	7.0	710
9	6.7	1410
10	7.7	220

Notes to Table 1:
EC – Electrical Conductivity
1 - Refer to Drawing 1 attached for test locations

The results of surface water testing generally indicate that surface waters are close to neutral pH and generally fresh. It is noted that the site inspection and surface water testing were conducted following rainfall.

The subsurface conditions encountered at the test locations are presented in detail in the test pit report sheets attached. These should be read in conjunction with the general notes preceding them, which explain the descriptive terms and classification methods.

The following is a summary of the subsurface conditions encountered within the main terrain units observed:

TOPSOIL Silty clay, clayey silt and clayey sand topsoil was encountered in the majority of pits to depths between 0.05 m and 0.2 m.

SILTY CLAY/CLAY Firm to very stiff clays were encountered beneath the topsoil in the majority of the pits. Clays extended to between 0.8 m to greater than 3 m depth.

BEDROCK Extremely low to medium strength siltstone and sandstone bedrock was encountered in all pits except Pits 107, 109, 110, 111 and 113 at depths of 0.8 m to 1.8 m. The majority of the bedrock was tuffaceous and fractured. Deeper clays were generally encountered within gullies.

Some clayey sands and silty sands were encountered within the upper soil profile and deeper sandy clays were encountered in a few of the test pits.

Pit 104 encountered clayey sand filling with some brick and ceramic fragments to 0.55 m depth. The filling was underlain by stiff to very stiff natural clays.

Groundwater seepage was encountered in Pit 103 at 0.6 m depth. Groundwater was not encountered in the remaining test pits during excavation. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

6. LABORATORY TESTING

Laboratory testing comprised the following:

- 20 soil EC tests to assess potential soil salinity;
- Four Emerson tests to provide a preliminary assessment of soil dispersivity;
- Four shrink swell tests to provide a preliminary assessment of soil reactivity;
- Four gradings and hydrometer tests to assess soil erosivity and 'K' value (Universal soil loss equivalent);
- Four standard compaction and four California bearing ratio (CBR) tests to provide preliminary design parameters for pavement thickness design.

The results of the laboratory testing are summarised in Tables 2 to 5 below.

Emerson, shrink swell, gradings and CBR testing was undertaken by the NATA approved DP laboratory. Detailed results are presented in the laboratory report sheets attached.

The EC testing to assess potential soil salinity was undertaken by SGS Australia Pty Limited, a National Association of Testing Authorities, Australia (NATA) registered laboratory. Analytical Methods used are shown on the laboratory sheets attached. EC results have been multiplied by an appropriate soil texture conversion factor in accordance with Reference 3, to give the Extract Electrical conductivity (EC_e).

Table 2 – Results of Soil EC Testing

Pit	Depth (m)	ECe (dS/m)
101	0.1	0.26
102	0.5-0.9	0.25
103	0.1	0.36
103	1	1.74
104	1.1	0.60
105	0.1	0.46
105	0.3-0.55	0.66
106	0.1	0.20
106	0.3-0.5	0.31
107	0.1	**2.70**
107	0.9	5.80
108	0.3-0.5	0.15
108	1	0.72
109	0.2	1.26
109	1.2	**2.16**
110	0.1	0.18
110	0.3-0.5	0.13
111	0.3-0.5	0.12
112	0.3-0.5	0.29
113	0.3-0.5	1.80

Notes to Table 2:
ECe – Extract Electrical Conductivity
Bold Results indicates slightly saline soils (Ref 3)
Shaded results indicates moderately saline soils (Ref 3)

Table 3 – Results of Emerson Testing and K Value Analysis

Pit	Depth (m)	Description	Emerson Number	"K Value"[1]
101	0.4-0.75	CLAY – Grey mottled orange	6	-
103	0.5-0.8	SILTY CLAY – Light grey brown mottled orange with some sand	6	0.27
104	0.7	SANDY CLAYEY SILT - Grey	-	0.4
105	0.5	CLAY – Dark grey brown, slightly silty	5	-
108	0.3-0.5	SANDY SILTY CLAY – Light grey brown mottled yellow brown	6	0.3
112	0.2	SILTY SAND & CLAY – Grey brown	-	0.32

Notes to Table 3:
1 – Estimated 'K' value

Table 4 – Results of CBR Testing

Pit	Depth (m)	Description	CBR (%)	FMC (%)	SOMC (%)	SMDD (t/m^3)
103	0.5-0.8	SILTY CLAY – Light grey brown mottled orange with some sand	5.0	23.4	21.0	1.66
107	0.3-0.5	CLAY – Grey mottled yellow brown	1.5	18.9	17.0	1.76
109	0.6-0.8	CLAY – Light grey borwn mottled orange/red, slightly sandy	3.0	13.3	20.0	1.66
113	0.3-0.5	CLAY – Light grey brown mottled orange	1.0	25.6	24.0	1.52

Notes to Table 4:
FMC - Field Moisture Content
CBR - California Bearing Ratio (4 day soak)
SOMC - Standard Optimum Moisture Content
SMDD - Standard Maximum Dry Density

Table 5 – Results of Shrink-Swell

Pit	Depth (m)	Description	I_{ss} (%)
102	0.5-0.85	CLAY – Grey mottled orange, slightly sandy	4.1
106	0.3-0.65	CLAY – Grey brown mottled orange	4.5
108	0.2-0.55	SANDY SILTY CLAY – Light grey brown mottled yellow brown	4.7
110	0.6-0.95	CLAY – Light grey mottled orange	5.4

Notes to Table 5:
Iss – Shrink Swell index

7. COMMENTS

Slope Stability

There were no overt signs of slope instability at the time of the assessment and no historical evidence of past slope instability. Based on site observations and topographical / geological information, the site is regarded as having a low risk of slope instability.

Site slopes were generally 1° to 3° with localised slopes of up to 5° observed within the north-eastern portion of the site and some localised steeper slopes associated with dam embankments.

Dam embankments are typically between 1 m and 2 m in height. Further assessment of the long term stability will be required for on-site dams if they are to be retained in the development. Some remedial works, such as reducing batter slopes and erosion protection may be required if dams are retained.

Development of the site should be undertaken with reference to good engineering practice, including limiting the depth of cuts and fills, adoption of safe batter slopes and provision of adequate drainage.

Rock Outcrops

Rock outcrops were not observed within the site.

Bedrock was encountered, however, within the majority of test pits excavated within the site. Shallow refusal was encountered within siltstone/sandstone encountered in three pits at less than 1.5 m depth. Five of the 21 test pits previously excavated in Lot 93 and 94 also encountered shallow refusal (Ref 1).

The presence of bedrock should be taken into consideration for footing design, earthworks procedures and location of structures during the design stage of development.

Footings / Subgrade Conditions

Based on site observations, it is anticipated that footings for the majority of the site will comprise shallow footings in residual or alluvial soils. The results of the preliminary assessment of shrink swell potential indicate that the site soils are reactive. A preliminary site classification, with respect to AS2870-1996, indicates that a site classification of Class M to Class H would apply to the site depending on the depth to bedrock. This classification may change if significant cutting or filling is proposed for the development. Allowances should be made during the design to accommodate the reactivity of site clays. Specific assessment as to the reactivity of site clays is recommended to be undertaken once the allotment layout and proposed earthworks are finalised.

Wet, soft soil was encountered at the surface in relativity large areas of the site, especially those cleared of vegetation where surface grades are relatively flat.

Development of the site for houses, roads and services will require vegetation clearing that could lead to wet, soft surface soil under adverse weather conditions. Temporary and permanent drains, if the form of open, unlined channels, should be installed to improve site traffickability.

Laboratory testing for a preliminary assessment of the CBR value of subgrade soils indicate a range of CBR values from 1% to 5%. The moisture condition of subgrade clays were also generally wet of optimum. Further assessment of subgrade conditions is recommended to be undertaken during the design stage of the development once road locations are confirmed.

Road pavements will probably require the inclusion of a select subgrade layer to facilitate pavement construction and layer compaction.

Acid Sulphate Soils

Acid sulphate soils are not present within the site as described previously.

Erosion Potential

Near surface soils within the site were observed to be slightly erodable where vegetation was sparse, including the gullies and within the banks of on-site dams.

The Emerson number for site clays ranged from 5 to 6. Emerson numbers of 5 to 8 are typical of non-dispersive soils.

The estimated 'K' values of site clays were in the range of 0.27 to 0.4 which indicate moderately to highly erosive soils.

The results of the preliminary assessment of soil erosion indicates that site erosion would undergo a two stage process. Stage one would be relatively quick and comprise the erosion of the upper silty / sandy soils. Stage two would be a slightly slower process and comprise the erosion of the clay materials.

Provision of an adequate vegetation cover would aid in preventing large scale erosion at the site. It should also be noted that erosive soils are readily amenable to standard mitigation measures such as silt fences, revegetation / reshaping batters, drainage structures (catch drains), sediment traps and sedimentation basins during and following construction.

Salinity Potential

During the site inspection, there were no obvious indicators of gross salinity such as impacted vegetation or salt scalds. In addition, preliminary water testing in major creeks and dams on site indicated that generally fresh surface water was present (i.e. no indication of saline surface waters). It is noted, however, that testing was conducted following a period of rainfall.

Based on the desktop review (i.e. DNR and soil landscape mapping) there is no identified or potential for salinity issues within the site.

The results of preliminary screening tests on site soils typically indicates the absence of saline soils within the site, with the exception of sandier soils within Pit 107, and Pit 109 which comprised slightly to moderately saline soils. Pit 107 and 109 were located within the main gully.

Based on the above results, if development / construction activities are proposed within gullies, additional more detailed investigation is recommended. It is noted that the presence of such soils in these areas will not preclude development, however, standard ameliorative methods and construction procedures should be conducted to minimise potential impacts associated with such soils.

8. CONCLUSION

The results of the preliminary geotechnical assessment have identified the presence of soft saturated soils, relatively shallow bedrock, reactive clay soils, moderately to highly erodible soils and minor uncontrolled imported filling.

These factors are considered to be minor and readily addressed through detailed investigation and design, and sound construction practice.

Overall the site is considered to be suitable for future residential housing development, from a geotechnical perspective, subject to appropriate engineering design and construction.

9. LIMITATIONS OF THIS REPORT

This preliminary assessment included a programme of field and laboratory sampling and testing, but conditions different to those identified during these tasks may exist. Therefore DP cannot provide unqualified warranties nor does DP assume any liability for site conditions not observed, or accessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change over time in response to variations in natural conditions, such as groundwater movement and vegetation clearing. These changes may occur subsequent to DP's investigations and assessment. If fill conditions other than those observed are encountered DP should be called for re-assessment.

This report and associated documentation and the information herein have been prepared solely for the use of Eureka 1 Project 10 Pty Ltd. Any reliance assumed by other parties on this report shall be at such party's own risk. Any ensuing liability resulting from use of the report by other parties cannot be transferred to DP.

DOUGLAS PARTNERS PTY LTD

Reviewed by:

Matthew Blackert
Geo-Environmental Engineer

John Harvey
Principal

REFERENCES:

1. D.J.Douglas & Partners Pty Ltd, “Interim Report on Geotechnical Investigation – Stage 1, Proposed Putrescible Landfill Study Ringwood Road, Medowie”, Report SSI/9878, December 1986.

2. D.J.Douglas & Partners Pty Ltd, “Preliminary Hydrogeological / Geotechnical Study of Future Sanitary Landfill Site, Medowie Quarry, NSW”, June 1986.

3. Department of Land and Water Conservation, “Site Investigations for Urban Salinity”, 2002.

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NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the Discussion and Comments section. Not all, of course, are necessarily relevant to all reports.

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

Description and Classification Methods

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

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Undrained Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q_c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

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

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

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

Details of the type and method of sampling are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water

table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling — the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling — similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling — a continuous core sample is obtained using a diamond-tipped core barrel, usually 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" — Test 6.3.1.

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

The test results are reported in the following form.

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

  as 4, 6, 7
  N = 13

- In the case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm

  as 15, 30/40 mm.

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

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone — abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35 mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20 mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises: —

- Cone resistance — the actual end bearing force divided by the cross sectional area of the cone — expressed in MPa.
- Sleeve friction — the frictional force on the sleeve divided by the surface area — expressed in kPa.
- Friction ratio — the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0—5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main scale (0—50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%—2% are commonly encountered in sands and very soft clays rising to 4%—10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:—

q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:—

q_c = (12 to 18) c_u

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150 mm increments of penetration. Normally, there is a depth limitation of 1.2 m but this may be extended in certain conditions by the use of extension rods.

Two relatively similar tests are used.

- Perth sand penetrometer — a 16 mm diameter flat-ended rod is driven with a 9 kg hammer, dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
- Cone penetrometer (sometimes known as the Scala Penetrometer) — a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ratio have been published by various Road Authorities.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms.

Bore Logs

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

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

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems;

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

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

Engineering Reports

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.

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

- unexpected variations in ground conditions — the potential for this will depend partly on bore spacing and sampling frequency
- changes in policy or interpretation of policy by statutory authorities
- the actions of contractors responding to commercial pressures.

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

Site Anomalies

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

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section

is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS IN THE SYDNEY AREA

This classification system provides a standardized terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable.

Under this system rocks are classified by Rock Type, Degree of Weathering, Strength, Stratification Spacing, and Degree of Fracturing. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc.) where these are relevant.

ROCK TYPE DEFINITIONS

Rock Type	Definition
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments
Sandstone:	More than 50% of the rock consists of sand sized (.06 to 2mm) fragments
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

DEGREE OF WEATHERING

Term	Symbol	Definition
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	Fs	Rock substance unaffected by weathering, limonite staining along joints.
Fresh	Fr	Rock substance unaffected by weathering.

STRATIFICATION SPACING

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

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics (Reference).

Strength Term	Is(50) MPa	Field Guide	Approx. qu MPa*
Extremely Low:	0.03	Easily remoulded by hand to a material with soil properties	0.7
Very Low:	0.1	May be crumbled in the hand. Sandstone is “sugary” and friable.	2.4
Low:	0.3	A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium:	1	A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
High:	3	A piece of core 150 mm long x 50 mm dia. cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very High:	10	A piece of core 150 mm long x 50 mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely High:		A piece of core 150 mm long x 50 mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	

* The approximate unconfined compressive strength (qu) shownin the table is based on an assumed ratio to the point load index of 24:1. This ratio may vary widely.

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks

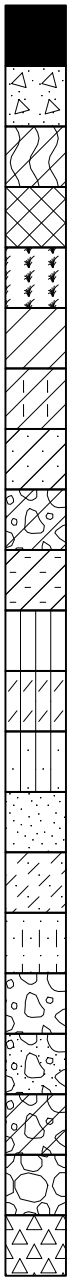
Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300 mm - 1000 mm with occasional longer sections and occasional sections of 100 mm - 300 mm.
Unbroken:	The core does not contain any fracture.

REFERENCE

International Society of Rock Mechanics, Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1 Final Draft October 1972

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

SILT

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

GRAVEL

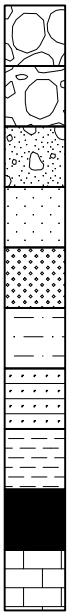
SANDY GRAVEL

CLAYEY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

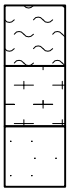
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

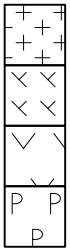


SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL29.76AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 101
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	TOPSOIL: Grey brown clayey silt and fine to medium grained sand topsoil, wet		D	0.1				
		CLAY: Firm to stiff, light grey/grey mottled orange clay, M>Wp			0.4				
				pp	0.5		100-150kPa		
				U_{50}					
		From 0.6m - Very stiff to hard							
	0.8			D	0.75				
		SILTSTONE: (Tuffaceous), low strength, moderately weathered, highly fractured, light grey mottled orange siltstone							
1				D	1.0				1
				D	1.5				
2	2.0	Pit discontinued at 2.0m							2
3									3

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧗ Water level

CHECKED	
Initials:	
Date:	

Douglas Partners
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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 25.27 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 102
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	TOPSOIL: Grey brown, fine to medium grained clayey sand topsoil, some rootlets							
	0.5	CLAYEY SAND: Orange brown, fine to coarse grained clayey sand, gravelly in parts (iron cemented)							
		CLAY: Firm to stiff, grey mottled orange slightly sandy clay, M>Wp		U_{50}	0.5				
	1	From 0.8m depth, very stiff to hard		pp B,pp	0.85 0.9		>400kPa 150-220kPa		1
	1.2	SANDSTONE: Low to medium strength, light grey, orange sandstone		D	1.3				
	1.4	Pit discontinued at 1.4m, slow progress							
	2								2
	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 21.92 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 103
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	TOPSOIL: Grey brown clayey sand topsoil, some rootlets, wet		D	0.1				
	0.2	SILTY CLAY: Stiff, light grey brown mottled orange and orange-brown silty clay, with some sand, M>Wp			0.5			▼	
		From 0.6m depth, very stiff		B					
	0.8	CLAY: Very stiff, grey mottled orange clay, M>Wp		pp	0.8		200kPa		
1				D,pp	1.0		300-400kPa		1
	1.8	SILTSTONE: Low to medium strength, grey and dark brown siltstone		D	2.0				
2				D	2.2				2
	2.3	Pit discontinued at 2.3m, slow progress							
3									3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: Strong seepage from 0.6m depth

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 26.09 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 104
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING: Generally comprising dark grey brown clayey sand filling, some brick and ceramic fragments, moist to wet		D	0.3				
	0.55	CLAYEY SILT: (former topsoil), dark grey clayey silt, M>Wp							
	0.65	SANDY CLAYEY SILT: Stiff to very stiff, grey, fine to medium grained sandy clayey silt, M>Wp		D,pp	0.7		250-350kPa		
	0.8	CLAY: Stiff to very stiff, grey clay, M>Wp							
	1			D,pp	1.1		200-250kPa		
	1.2	SANDSTONE: Medium strength, moderately weathered, light grey/yellow sandstone							
	1.3	Pit discontinued at 1.3m, virtual refusal		D	1.3				
	2								
	3								

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 19.69 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 105
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.15	TOPSOIL: Dark grey brown silty clay topsoil, some organics, wet/M>Wp		D	0.1				
		CLAY: Soft to firm, dark grey brown slightly silty clay, M>Wp			0.3				
				U_{50}					
					0.55				
		From 0.75m depth, very stiff							
	0.9	SILTSTONE/SANDSTONE: (Tuffaceous), low/medium strength, moderately weathered, highly fractrued, light grey/yellow siltstone/sandstone		D	1.1				
		From 1.5m depth, very low strength							
				D	1.7				
	1.8	Pit discontinued at 1.8m, slow progress							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 23.78 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 106
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		TOPSOIL: Grey brown, some rootlets to 0.1m depth		D	0.1				
	0.2	CLAY: Firm to stiff, grey brown mottled orange clay			0.3				
				B					
				U_{50}	0.5				
				pp	0.65		350kPa		
		From 0.7m depth, grey mottled orange/red							
	1	From 1.0m depth, very stiff		D,pp	1.0		350-450kPa		1
	1.3	SILTSTONE: (Tuffaceous), light grey and orange siltstone, highly fractured, some clay in fractures (very low to low strength)		D	1.4				
				D	1.8				
	2 2.0	Pit discontinued at 2.0m, slow progress							2
	3								3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 16.61 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 107
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	TOPSOIL: Dark grey brown silty clayey sand topsoil, some rootlets		D	0.1				
		CLAY: Firm to stiff, grey mottled yellow brown clay		B	0.3				
		From 0.6m depth, very stiff			0.5				
	0.7	SILTY SANDY CLAY: Very stiff, light grey silty sandy clay, M>Wp (crumbly)		D	0.9				
	1.5	SANDY CLAY: Very stiff, light grey silty sandy clay, M>Wp		D,pp	1.6		250kPa		
		From 2.0m depth, mottled yellow brown		D,pp	2.2		250kPa		
				D,pp	2.8		250kPa		
	3.0	Pit discontinued at 3.0m							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧭ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 20.75 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 108
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.1	TOPSOIL: Grey brown clayey sand topsoil, some rootlets							
		SANDY SILTY CLAY: Firm to stiff, light grey brown mottled yellow brown sandy silty clay, M>Wp			0.2		300-350kPa		
				U_{50} B,pp	0.3				
					0.5				
	0.7				0.55				
		CLAY: Firm to very stiff, light grey mottled orange clay, M>Wp							
1				D,pp	1.0		150kPa		1
	1.1	SILTSTONE/SILTY CLAY: Extremely low strength, extremely weathered, highly fractured, light grey mottled red brown siltstone/silty clay							
				D	1.6				
2									2
				D	2.5				
				D	2.8				
	2.9	Pit discontinued at 2.9m							
3									3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧗ Water level

CHECKED
Initials:
Date:

Douglas Partners
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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 15.35 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 109
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		SILTY SAND: Grey brown, fine to medium grained silty sand, some rootlets to 0.15m depth		D	0.2				
	0.4	CLAY: Stiff to very stiff, light grey brown mottled orange red slightly sandy clay, M>Wp			0.5				
					0.6				
				U_{50} B	0.8				
					0.85				
	1	From 0.9m depth, hard		D,pp	1.2		280kPa		
		From 1.5m depth, grey mottled orange clay (no sand)							
	2			D,pp	1.8		320-350kPa		
				D,pp	2.5		300-350kPa		
	2.7	SANDY CLAY: Grey mottled orange sandy clay, M>Wp							
	3			D	2.9				
	3.0	Pit discontinued at 3.0m							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧗ Water level

CHECKED	
Initials:	
Date:	

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 23.02 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 110
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		TOPSOIL: Grey brown clayey silt topsoil, wet Rootlets to 0.1m depth		D	0.1				
	0.2	CLAY: Frim to stiff, light grey brown mottled orange slightly sandy clay			0.3				
				B_{50}					
				pp	0.5		180-220kPa		
	0.6	CLAY: Firm to stiff, light grey mottled orange clay, M>Wp			0.6				
				U_{50}					
	1				0.95				
				D,pp	1.2		200kPa		
		From 1.4m depth, hard, M<Wp (crumbly), some iron staining							
				D	1.6				
	2	From ~2.0m depth, M>Wp, very stiff to hard							
				D,pp	2.5		>400kPa		
	3 3.0	Pit discontinued at 3.0m							

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 31.56 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 111
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		TOPSOIL: Grey brown clayey silt topsoil, wet							
	0.15	Rootlets to 0.1m depth							
		CLAY: Stiff to very stiff, light orange brown slightly sandy clay, M>Wp			0.3				
				B					
				pp	0.5		250kPa		
		From 0.75m depth, very stiff							
	1			D,pp	1.0		300kPa		1
	1.1	CLAY: Very stiff to hard, light grey mottled red clay, some iron cementing, some sand, M<Wp							
				D,pp	1.3		250kPa		
				D,pp	1.9		>400kPa		
	2								2
		Sand conent increasing with depth							
				D,pp	2.4		>400kPa		
	2.5	Pit discontinued at 2.5m, slow progress							
	3								3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 20.37 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 112
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	TOPSOIL: Grey brown clayey silty sand topsoil with organics, wet							
		SILTY SAND & CLAY: Grey brown, fine to medium grained silty sand and clay, damp to moist		D	0.2				
	0.3	CLAY: Stiff to hard, light orange brown clay, M>Wp		B	0.3		>400 kPa		
		From 0.6md epth, light grey mottled orange red		D, pp	0.5 0.8		>400 kPa		
	0.9	SANDSTONE: Low to medium strength, fractured, light grey mottled orange sandstone		D	1.0				
	1.2	Pit discontinued at 1.2m, virtual refusal							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth

LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Eureka 1 Project 10 Pty Ltd
PROJECT: Preliminary Geotechnical Assessment
LOCATION: Lots 93-96, DP753194 Boundary Rd, Medowie

SURFACE LEVEL: RL 15.47 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 113
PROJECT No: 39519
DATE: 04 Jul 06
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	TOPSOIL: Grey brown clayey silty sand with organics, wet							
	0.2	SILTY SAND: Grey brown, fine to medium grained silty sand, moist							
		CLAY: Firm to stiff, light grey brown mottled orange clay, M>Wp			0.3		180-200kPa		
				U_{50} B,pp	0.5		150-200kPa		
					0.65				
	0.8	CLAY/SANDY CLAY: Stiff to very stiff, light grey mottled orange/red clay/sandy clay, M<Wp (crumbly), some iron cementing							
1				D,pp	1.0		300-400kPa		1
				D,pp	1.5		300-400kPa		
2		From 2.0m depth, very stiff to hard		D,pp	2.0		>400kPa		2
				D,pp	2.5		300-400kPa		
	2.8	Pit discontinued at 2.8m							
3									3

RIG: Fermec 860 Backhoe, 600mm bucket with tiger teeth
LOGGED: Heads

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧩ Water level

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT

DATE 22/10/1986 PIT No. 1

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.30	TOPSOIL - hard, grey, clayey silt with fine ferruginous gravel				
0.70	Silty CLAY - very stiff, grey, silty clay with occasional fine ferruginous gravel and roots		D @ 0.50		
	Tuffaceous SILTSTONE - very weak, highly fractured to fractured, grey, fine grained tuffaceous siltstone		D @ 1.00		
			D @ 1.50		
			D @ 2.00		
2.40			D @ 2.40		
	TEST PIT DISCONTINUED AT 2.40 METRES				

0.5 1.0 1.5 2.0 2.5 3.0

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 22/10/1986 PIT No. 2

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.20	TOPSOIL - hard, grey, clayey silt with fine ferruginous gravel				
0.5	Silty CLAY - very stiff, grey and brown mottled silty clay with some ferruginous gravel and roots		D @ 0.50		
0.70					
1.0	CLAY - very stiff, light grey mottled reddish brown clay		D @ 1.0 U50 @ 1.10 to 1.50		
1.40					
1.5	Shaley CLAY - very stiff, grey and mottled reddish brown shaley clay		D @ 1.50		
2.00					
2.0			D @ 2.00		
2.10	Tuffaceous SILTSTONE - medium strong, light brown, fine to medium grained, tuffaceous siltstone				
2.5	REFUSAL AT 2.10 METRES.				
3.0					

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 22/10/1986 PIT No. 3

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.30	TOPSOIL - grey, clayey silt with roots				
0.5	Silty CLAY - very stiff, grey and brown silty clay		D @ 0.50		
0.90			D @ 0.90		
1.0	Tuffaceous SANDSTONE - medium strong, light brown, medium grained tuffaceous sandstone REFUSAL AT 0.90 METRES.				
1.5					
2.0					
2.5					
3.0					

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS Rock surface undulates between 0.50 m and 0.90 m.

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J. Douglas & Partners

TEST PIT REPORT

CLIENT

PROJECT RINGWOOD ROAD

LOCATION MEDOWIE

DATE 22/10/1986 PIT No. 4

PROJECT No SSI/9878

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.30	TOPSOIL – brown clayey silt with roots					
0.70	Silty CLAY – stiff to very stiff, brown silty clay with some ferruginous gravel		D @ 0.50			
	CLAY – very stiff, grey mottled reddish brown clay * grey from 1.50 m * with ferruginous patches and occasional rootlets from 2.70 m		D @ 1.00			24.1
			D @ 1.50			
			D @ 2.00			
			D @ 2.50			
3.20			D @ 3.00			31.8
	TEST PIT DISCONTINUED AT 3.20 METRES.					

0.5
1.0
1.5
2.0
2.5
3.0

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
I - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 22/10/1986 PIT No. 5

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.20	TOPSOIL - brown clayey silt with roots				
0.70	Silty CLAY - hard, yellowish brown silty clay with roots		D @ 0.50		
1.70	CLAY - very stiff, grey, mottled reddish brown and yellowish brown clay		D @ 1.00 D @ 1.50		
2.40	CLAY - hard, grey, slightly fine grained sandy clay with rootlets * with ferruginous patches from 2.10 m		D @ 2.00 D @ 2.40		
	TEST PIT DISCONTINUED AT 2.40 METRES.				

0.5

1.0

1.5

2.0

2.5

3.0

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 22/10/1986 PIT No. 6

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.25	TOPSOIL - brown clayey silt with roots					
0.70	CLAY - very stiff, grey, mottled reddish brown clay with rootlets		D @ 0.50			28.9
2.10	CLAY - stiff to very stiff, light grey, mottled reddish brown clay * light grey mottled yellowish brown from 1.80 m		D @ 1.00 D @ 1.50 D @ 2.00			33.0 34.2
2.70	Tuffaceous SILTSTONE - weak to medium strong, light brown, fine grained, tuffaceous siltstone with some zones of extremely weak tuffaceous sandstone		D @ 2.70			
	TEST PIT DISCONTINUED AT 2.70 METRES.					

0.5 1.0 1.5 2.0 2.5 3.0

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partner

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 7

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.20	TOPSOIL - brown, clayey silt					
0.5	CLAY - very stiff, grey, mottled reddish brown clay with occassional ferruginous gravel		D @ 0.50			
1.0			U50 @ 0.90 to 1.20 D @ 1.00			
1.40						
1.5	Shaley CLAY - very stiff, grey, yellowish brown and reddish brown mottled shaley clay with occasional ferruginous gravel		B @ 1.50			31.4
1.90						
2.0	Tuffaceous SILTSTONE - very weak to weak, reddish brown and grey, tuffaceous siltstone with many medium strong ferruginous zones		D @ 2.00			
2.5	* with some extremely weak siltstone from 2.90 m		D @ 2.50			
3.00			D @ 3.00			
3.0	TEST PIT DISCONTINUED AT 3.00 METRES.					

EQUIPMENT Ford Backhoe, 600 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(xl - x mm tube
( )- nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 8

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.15	TOPSOIL - brown clayey silt					
	CLAY - very stiff, grey, mottled reddish brown clay with roots decreasing with depth		D @ 0.50			
	* grey mottled reddish brown and yellowish brown from 1.20 m		D @ 1.00			
			D @ 1.50			
			D @ 2.00			27.4
			D @ 2.50			
2.90			D @ 2.90			28.6
	TEST PIT DISCONTINUED AT 2.90 METRES.					

0.5 1.0 1.5 2.0 2.5 3.0

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U[x] - x mm tube
[ ] - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 9

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.20	TOPSOIL - brown clayey silt				
0.5	CLAY - very stiff, grey, mottled yellowish brown clay with roots decreasing with depth		D @ 0.50		
1.0			U50 @ 0.90 to 1.25 D @ 1.00		
1.20					
1.5	Tuffaceous SANDSTONE - very weak to weak, grey, tuffaceous sandstone * 1.20 m, 100 mm very weak tuffaceous sandstone with weak ferruginous zones		D @ 1.50		
2.0					
2.5			D @ 2.50		
2.60	TEST PIT DISCONTINUED AT 2.60 METRES.				
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS Joints: 67/140, 90/222, Bedding is 16/185, 35/160
Joints are smooth, curved and coated with 1mm dark grey clay, spacing 50 - 100 mm.

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partne

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 10

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.20	TOPSOIL - brown, clayey silt					
	CLAY - very stiff, grey, mottled yellowish brown and reddish brown clay with roots		D @ 0.5			
			B @ 1.0			25.0
			D @ 1.50			
1.90						
	Sandy Shaley CLAY - hard, yellowish brown and grey, medium grained sandy shaley clay		D @ 2.00			
2.20						
2.30	Tuffacous SANDSTONE - medium strong, yellowish brown, medium grained, tuffaceous sandstone with many ferruginous zones		D @ 2.30			
	REFUSAL AT 2.30 METRES.					

0.5

1.0

1.5

2.0

2.5

3.0

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U[x]- x mm tube
[ ]- nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 11

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.20	TOPSOIL - brown clayey silt				
0.5	CLAY - stiff to very stiff, grey clay with occasional gravel up to 30 mm and roots		D @ 0.50		
0.90					
1.0					
1.05	Tuffaceous SILTSTONE - medium strong, grey and yellowish brown tuffaceous siltstone		D @ 1.00		
	REFUSAL AT 1.05 METRES.				
1.5					
2.0					
2.5					
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 12

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing: Strata	Type & Depth	Dynamic Penetrometer: Depth	Dynamic Penetrometer: Blows/150 mm
0.20	TOPSOIL - brown clayey silt				
0.5	CLAY - very stiff, light grey, mottled reddish brown clay		D @ 0.50		
	* with ferruginous gravel up to 40 mm from 1.30 m				
1.0			D @ 1.00		
1.5			D @ 1.50		
1.60	Tuffaceous SILTSTONE - very weak, grey tuffaceous siltstone				
2.0	* 1.60 m, 50 mm ferruginous siltstone		D @ 2.00		
2.5			D @ 2.50		
2.60	TEST PIT DISCONTINUED AT 2.60 METRES.				
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS Joints: 61/338, 76/204, 77/305, 80/215 curved, smooth, clay infilled (3mm). Spacing: 100 - 200 mm. (NOTE: Rock surface undulates from 1.30 m to 1.60 m in this pit)

SAMPLE TYPE
D - disturbed
B - bulk
U[illegible] - [illegible] mm tube
( ) - nil recovery

D.J.Douglas & Partner

TEST PIT REPORT

CLIENT

DATE 23/10/1986 PIT No. 13

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.15	TOPSOIL - grey clayey silt					
	CLAY - very stiff, light grey clay with roots		D @ 0.50			30.4
0.90			U50 @ 0.70 to 0.95			
1.10	Tuffaceous SILTSTONE - very weak, brown tuffaceous siltstone		D @ 1.00			17.9
	Tuffaceous SILTSTONE - weak to medium strong, brown tuffaceous siltstone with leaf fossils					
1.50			D @ 1.50			
	REFUSAL AT 1.50 METRES.					

0.5 1.0 1.5 2.0 2.5 3.0

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partne

TEST PIT REPORT

CLIENT

DATE 23/10/1986

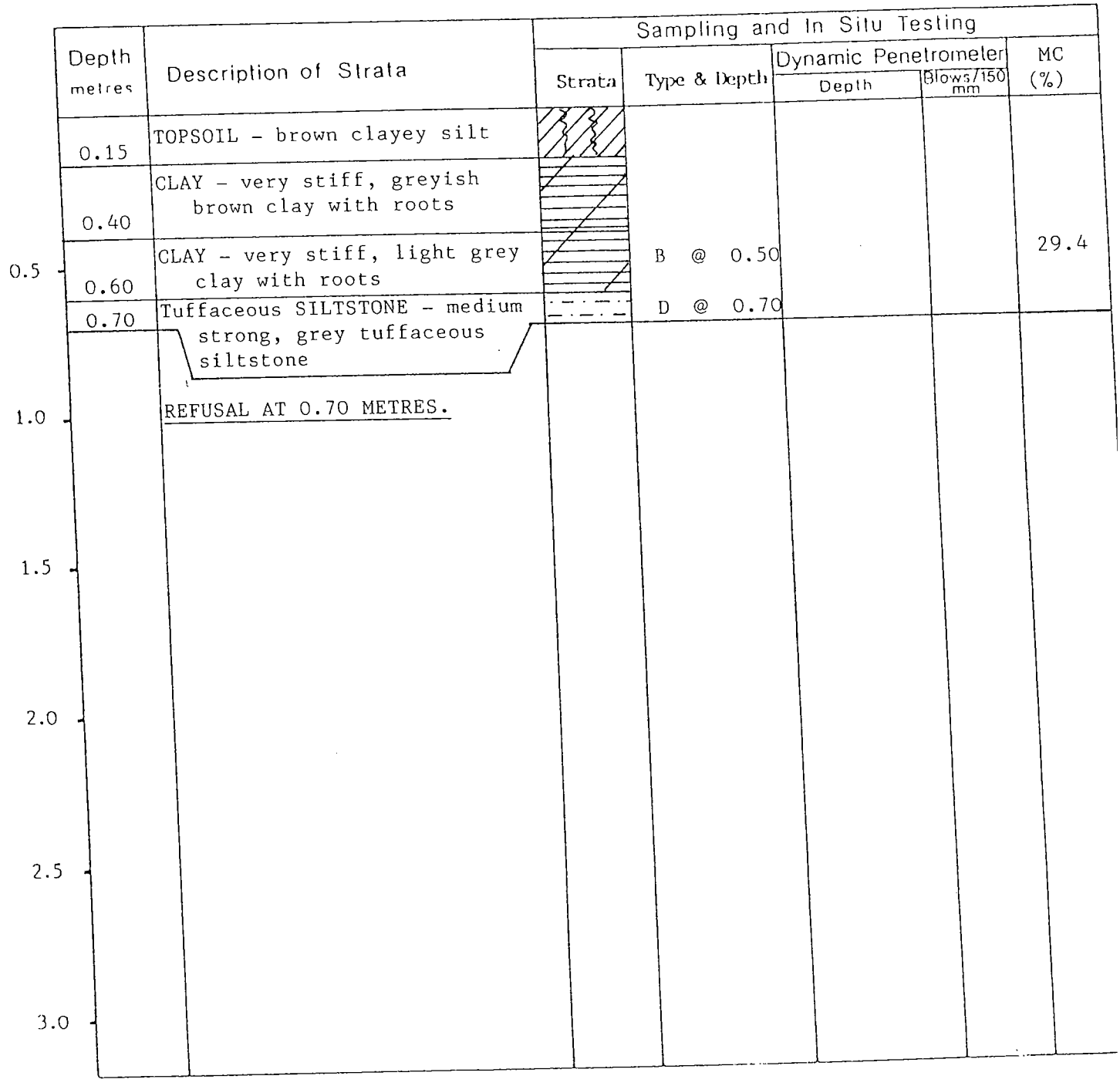
PIT No. 14

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL



EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partne

TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 15

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm
0.25	TOPSOIL - brown clayey silt				
0.5	CLAY - very stiff, brown and grey clay with roots * light grey from 0.60 m		D @ 0.50		
0.80					
0.95	SILTSTONE - medium strong, brown siltstone		D @ 0.95		
1.0	REFUSAL AT 0.95 METRES.				
1.5					
2.0					
2.5					
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 16

PROJECT RINGWOOD ROAD PROJECT No. SSI/9878

LOCATION MEDOWIE SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing: Strata	Type & Depth	Dynamic Penetrometer: Depth	Dynamic Penetrometer: Blows/150 mm
0.15	TOPSOIL - brown clayey silt				
0.40	Silty CLAY - very stiff, brown silty clay with roots				
0.5	CLAY - very stiff, grey, mottled reddish brown clay with rootlets * hard from 0.80 m		U50 @ 0.40 to 0.80 D @ 0.50		
1.0	* grey mottled yellowish brown from 1.20 m		D @ 1.00		
1.30					
1.50	Shaley CLAY - hard, grey, shaley clay with fragments of medium strong, light brown siltstone		D @ 1.50		
1.65					
2.0	SILTSTONE - medium strong, fragmented, light brown siltstone with clay infilled joints				
	REFUSAL AT 1.65 METRES.				
2.5					
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 17

PROJECT RINGWOOD ROAD

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.15	TOPSOIL - brown clayey silt with roots					
0.50	Silty CLAY - very stiff, brown silty clay		D @ 0.30 D @ 0.50			18.2
0.5	CLAY - very stiff, grey, mottled reddish brown clay with ferruginous gravel up to 20 mm					
1.0	* light grey, mottled reddish brown and yellowish brown from 1.30 m		D @ 1.00 B @ 1.00			
1.5			D @ 1.50			
2.0			D @ 2.00			
2.30						
2.5	Shaley CLAY - very stiff, grey, shaley clay with medium strong ferruginous zones up to 70 mm		D @ 2.50			
2.90	(NOTE: moist along joints in shaley clay)		D @ 2.90			
3.0	TEST PIT DISCONTINUED AT 2.90 METRES.					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS Piezometer installed at 2.90 m. (NOTE: Surface water 5 m from pit. 0.60 m below surface level)

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

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TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 18

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.20	TOPSOIL - brown clayey silt with roots					
0.80	CLAY - very stiff, brown and grey mottled reddish brown clay with roots		D @ 0.50			36.3
	Shaley CLAY - very stiff, grey, mottled reddish brown shaley clay * with weak ferruginous zones up to 60 mm from 1.30 m * hard from 2.00 m		D @ 1.00			31.4
			D @ 1.50			
			D @ 2.00			23.7
			D @ 2.50			
2.80			D @ 2.80			22.6
	TEST PIT DISCONTINUED AT 2.80 METRES.					

0.5

1.0

1.5

2.0

2.5

3.0

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

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TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No.19

PROJECT RINGWOOD ROAD PROJECT No SSI/9878

LOCATION MEDOWIE SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing				
		Strata	Type & Depth	Dynamic Penetrometer Depth	Dynamic Penetrometer Blows/150 mm	MC (%)
0.20	TOPSOIL - brown clayey silt					
0.5	Sandy CLAY - stiff, brownish grey, coarse grained sandy clay with roots		D @ 0.50			
1.00			D @ 1.00 U50 @ 1.10 to 1.35			
1.5	Shaley CLAY - stiff to very stiff, light grey shaley clay with medium strong ironstone zones up to 200 mm		D @ 1.50			
2.0			B @ 2.00			32.7
2.5			D @ 2.50			
2.70						
3.0	TEST PIT DISCONTINUED AT 2.70 METRES.					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed. Piezometer installed at 2.70 m.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - pit recovery

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TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 20

PROJECT RINGWOOD ROAD

PROJECT No. SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing: Strata	Type & Depth	Dynamic Penetrometer: Depth	Dynamic Penetrometer: Blows/150 mm	MC (%)
0.15	TOPSOIL - brown clayey silt with roots					
0.5	Silty CLAY - hard, grey and yellowish brown silty clay with roots		D @ 0.50			16.9
0.75						
1.0	CLAY - hard, grey, mottled reddish brown and yellowish brown clay with roots		D @ 1.00			25.9
	* very stiff and grey, mottled yellowish brown from 1.20 m					
1.5	* medium strong ferruginous zones up to 200 mm		D @ 1.50			
2.0			D @ 2.00			37.7
2.5			D @ 2.50			
2.70						
	Shaley CLAY - stiff to very stiff, light grey and grey shaley clay with medium strong ferruginous zones up to 200 mm					
3.00			D @ 3.00			36.1
3.0	TEST PIT DISCONTINUED AT 3.00 METRES.					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS Free groundwater observed at 2.50 m.
Piezometer installed at 3.00 m (very little flow).

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
L - oil recovery

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TEST PIT REPORT

CLIENT

DATE 24/10/1986 PIT No. 21

PROJECT RINGWOOD ROAD -

PROJECT No SSI/9878

LOCATION MEDOWIE

SURFACE LEVEL

Depth metres	Description of Strata	Sampling and In Situ Testing			
		Strata	Type & Depth	Dynamic Penetrometer Depth	Blows/150 mm
0.20	TOPSOIL - brown clayey silt				
0.5	Silty CLAY - hard, brown, silty clay with roots		D @ 0.50		
0.70					
0.90	Shaley CLAY - hard, light grey shaley clay		D @ 0.80		
0.95			D @ 0.90		
1.0	SANDSTONE - medium strong, light brown, fine to medium grained sandstone				
1.5	REFUSAL AT 0.95 METRES.				
2.0					
2.5					
3.0					

EQUIPMENT Ford Backhoe, 350 mm bucket LOGGED P. Willey

GROUND WATER OBS No free groundwater observed.

REMARKS

SAMPLE TYPE
D - disturbed
B - bulk
U(x) - x mm tube
( ) - nil recovery

D.J.Douglas & Partners

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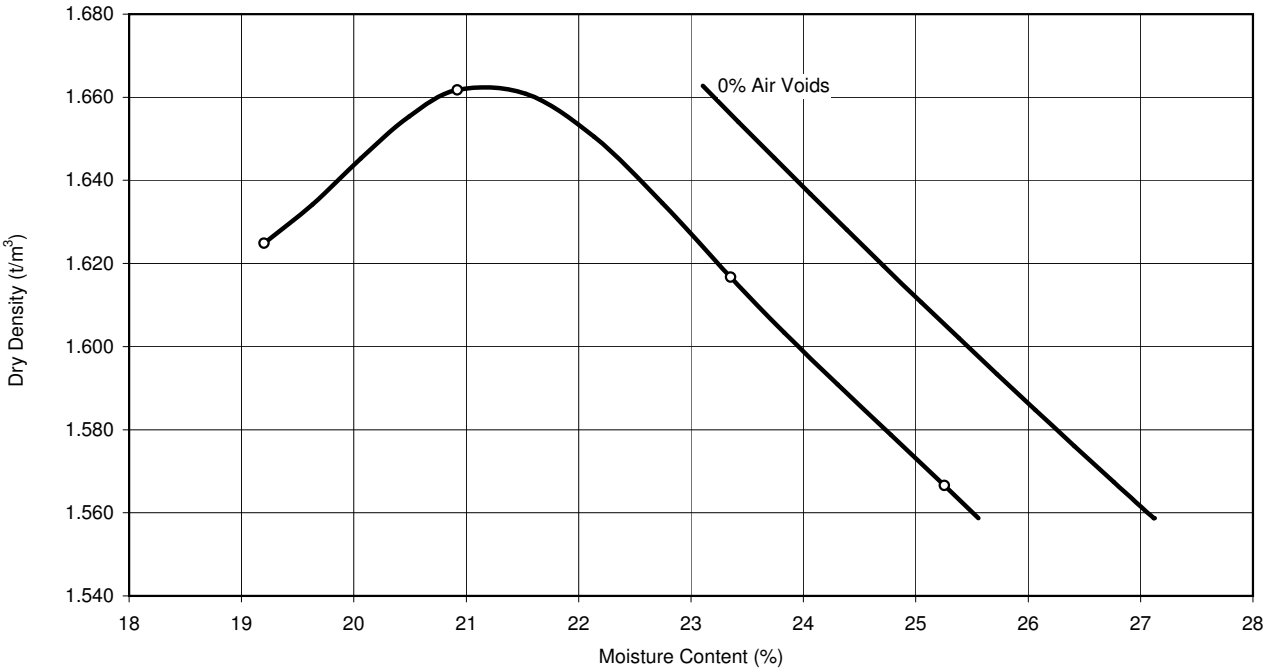
RESULTS OF COMPACTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	25/07/2006
		Page:	1 of 1



Sample Details **Location:** Pit 103
Depth: 0.5-0.8m

Particles > 19mm: 0%

Description: Silty CLAY - Light grey brown mottled orange, some sand

Maximum Dry Density:	**1.66 t/m^3**
Optimum Moisture Content:	**21.0 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS 1289.2.1.1 - 2005

Sampling Methods: AS 1289.1.1.1-1998, AS1289.1.2.1-2001

NATA Accredited Laboratory Number 828

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Approved Signatory:

Tested:	JL
Checked:	DM

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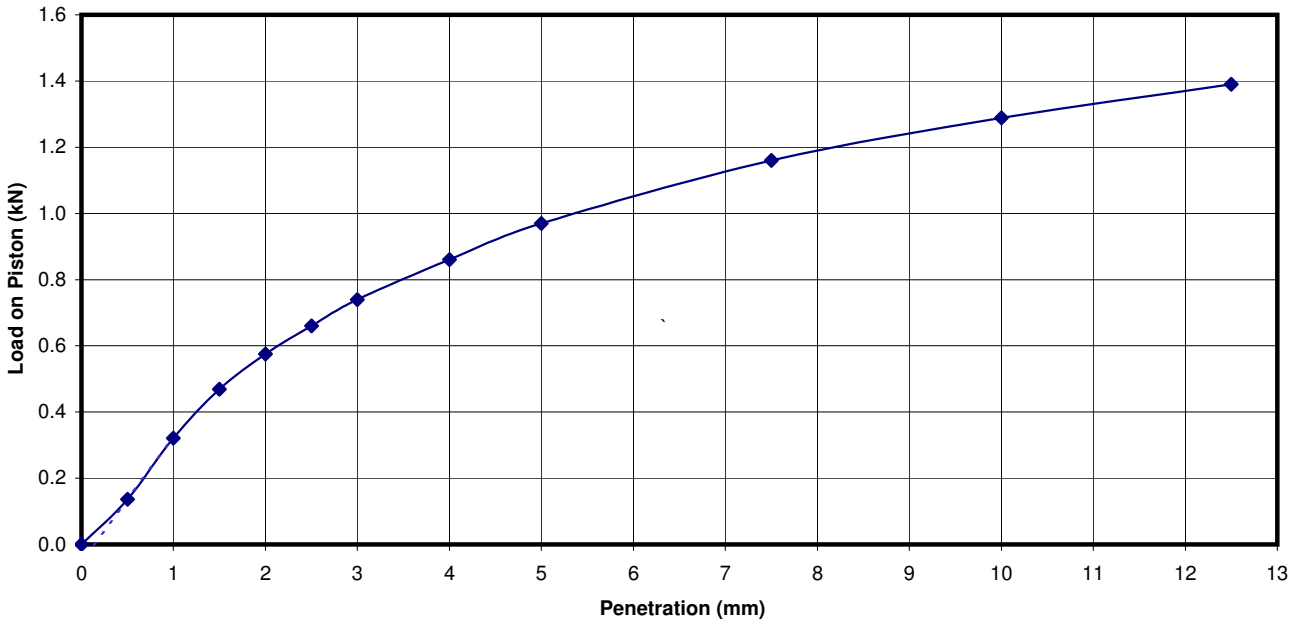
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175a
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
		Date Sampled :	7/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	15/08/2006
Test Location :	Pit 103		
Depth / Layer :	0.5-0.8m	**Page:**	1 of 1



Description: Silty CLAY - Light grey brown mottled orange, some sand

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 100% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 0.8%
MOISTURE RATIO: 100% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		21.1	1.66
After soaking		22.5	1.65
After test	Top 30mm of sample	22.1	-
	Remainder of sample	20.4	-
Field values		23.4	-
Standard Compaction		21.0	1.66

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**5**
	5.0 mm	**5.0**

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Approved Signatory:

Tested:	DB
Checked:	DM

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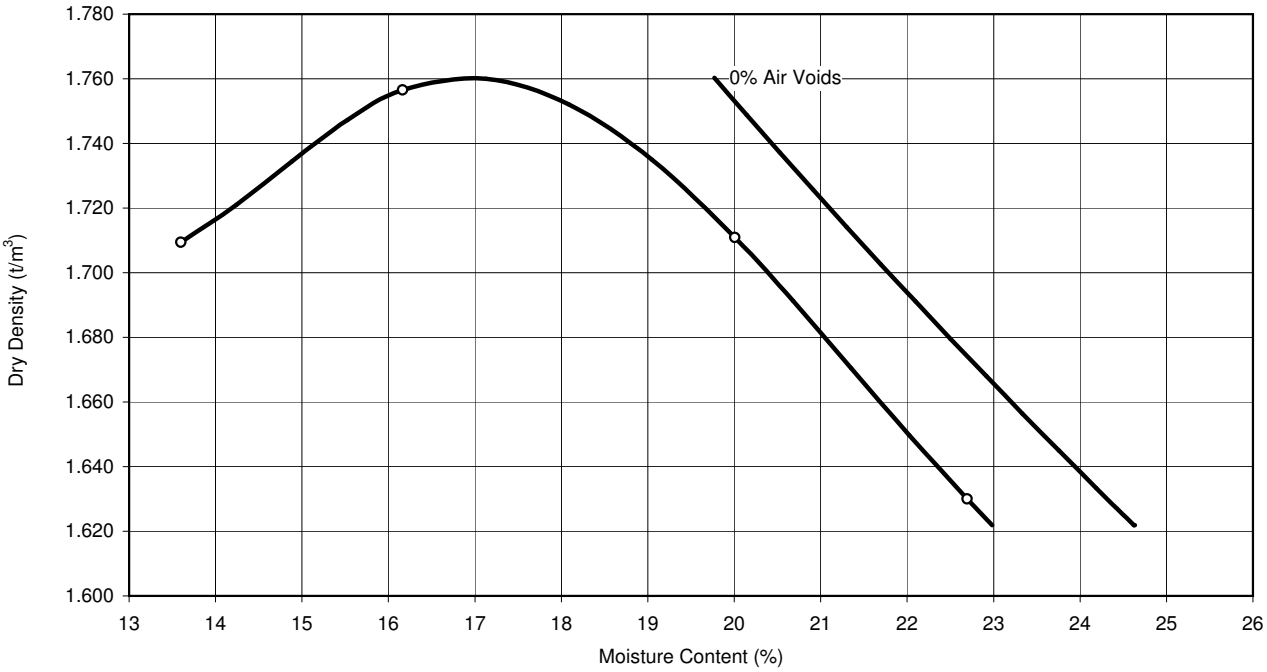
RESULTS OF COMPACTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175b
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	25/07/2006
		Page:	1 of 1



Sample Details **Location:** Pit 107
Depth: 0.3-0.5m

Particles > 19mm: 0%

Description: CLAY - Grey mottled yellow brown

Maximum Dry Density:	**1.76 t/m^3**
Optimum Moisture Content:	**17.0 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS 1289.2.1.1 - 2005

Sampling Methods: AS 1289.1.1.1-1998, AS1289.1.2.1-2001

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Approved Signatory:

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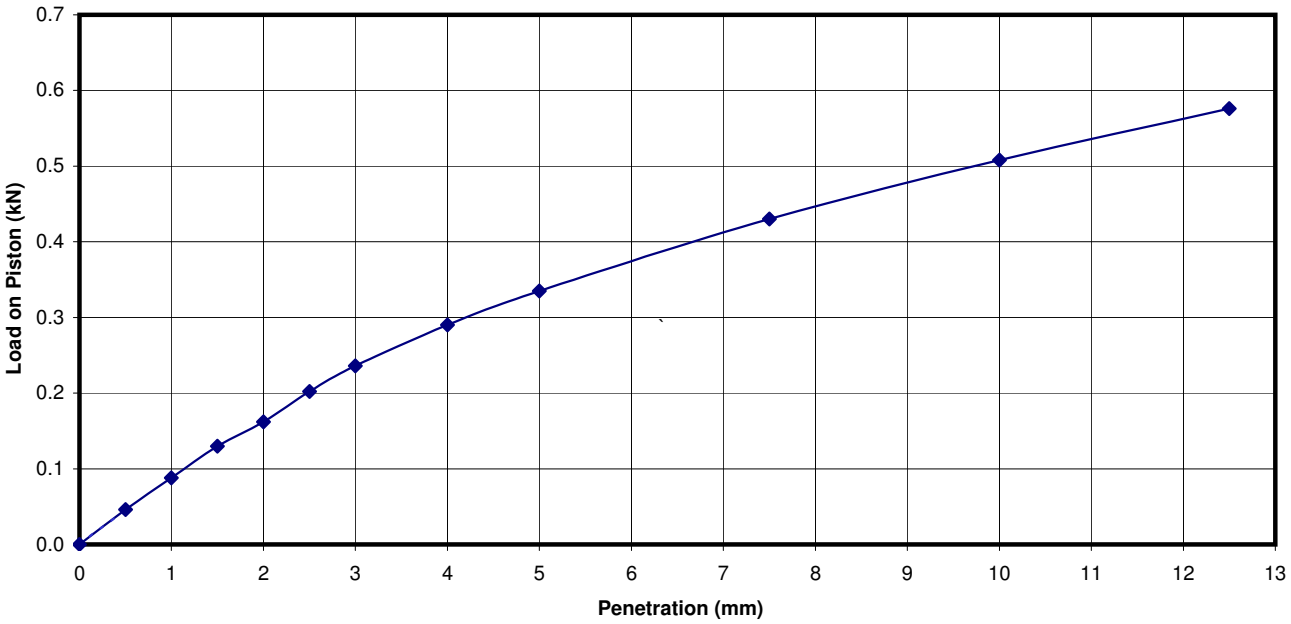
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175c
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
		Date Sampled :	7/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	15/08/2006
Test Location :	Pit 107		
Depth / Layer :	0.3-0.5m	**Page:**	1 of 1



Description: CLAY - Grey mottled yellow brown

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 100% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 4.7%
MOISTURE RATIO: 102% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		17.3	1.76
After soaking		20.7	1.68
After test	Top 30mm of sample	22.1	-
	Remainder of sample	18.6	-
Field values		18.9	-
Standard Compaction		17.0	1.76

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**1.5**
	5.0 mm	**1.5**

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Approved Signatory:

Tested:	DB
Checked:	DM

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Laboratory Manager

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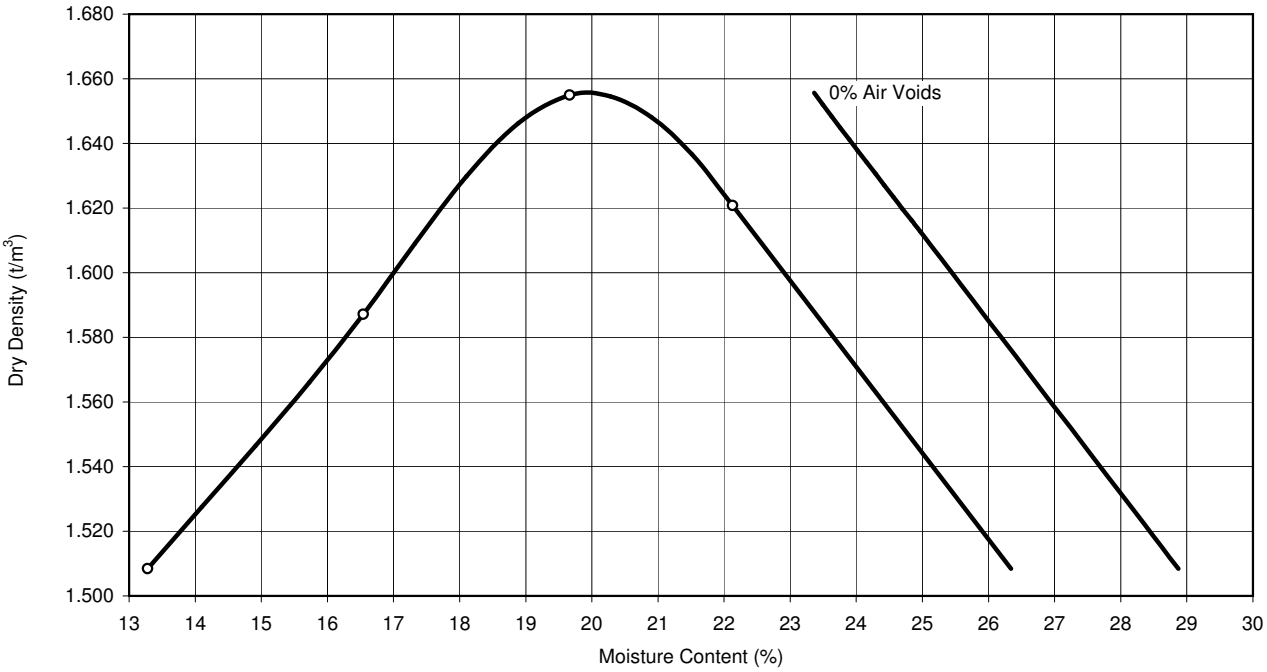
RESULTS OF COMPACTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175d
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	25/07/2006
		Page:	1 of 1



Sample Details **Location:** Pit 109
Depth: 0.6-0.8m

Particles > 19mm: 0%

Description: CLAY - Light grey brown mottled orange/red, slightly sandy

Maximum Dry Density:	**1.66 t/m^3**
Optimum Moisture Content:	**20.0 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS 1289.2.1.1 - 2005

Sampling Methods: AS 1289.1.1.1-1998, AS1289.1.2.1-2001

NATA Accredited Laboratory Number 828

NATA endorsed test report. This document shall not be reproduced except in full

Approved Signatory:

Tested:	JL
Checked:	DM

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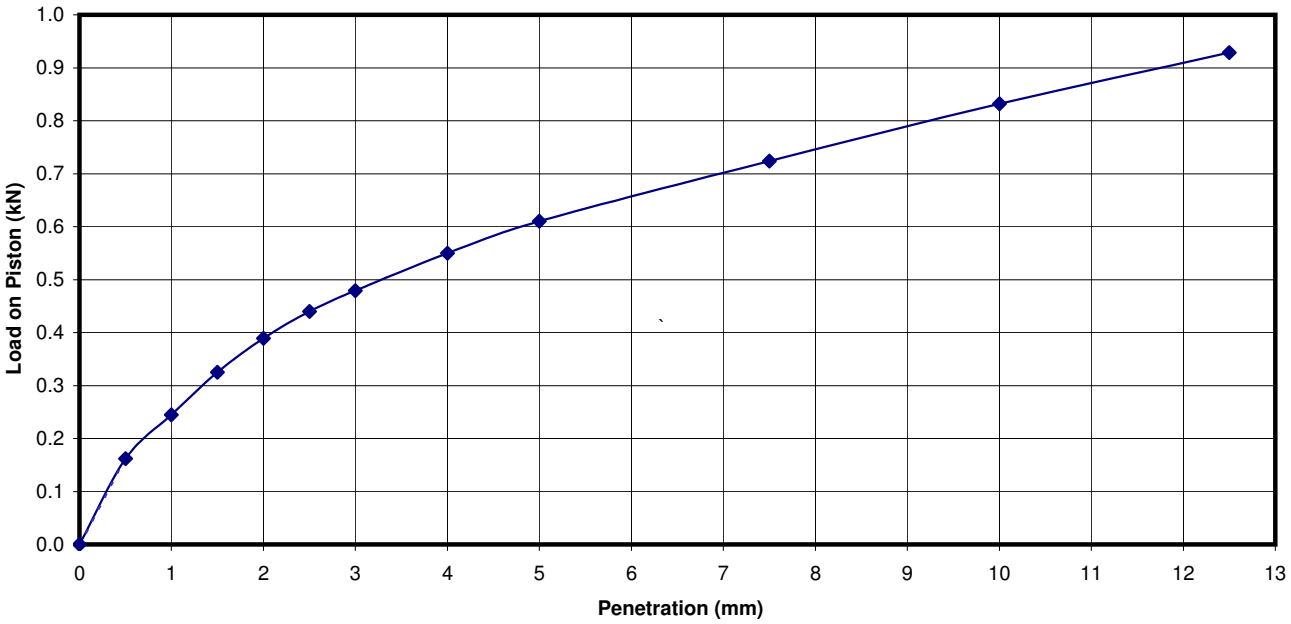
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175e
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
		Date Sampled :	7/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	15/08/2006
Test Location :	Pit 109		
Depth / Layer :	0.6-0.8m	**Page:**	1 of 1



Description: CLAY - Light grey brown mottled orange/red, slightly sandy

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 99% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 0.8%
MOISTURE RATIO: 101% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		20.1	1.64
After soaking		22.9	1.63
After test	Top 30mm of sample	24.2	-
	Remainder of sample	20.7	-
Field values		13.3	-
Standard Compaction		20.0	1.66

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**3.5**
	5.0 mm	**3.0**

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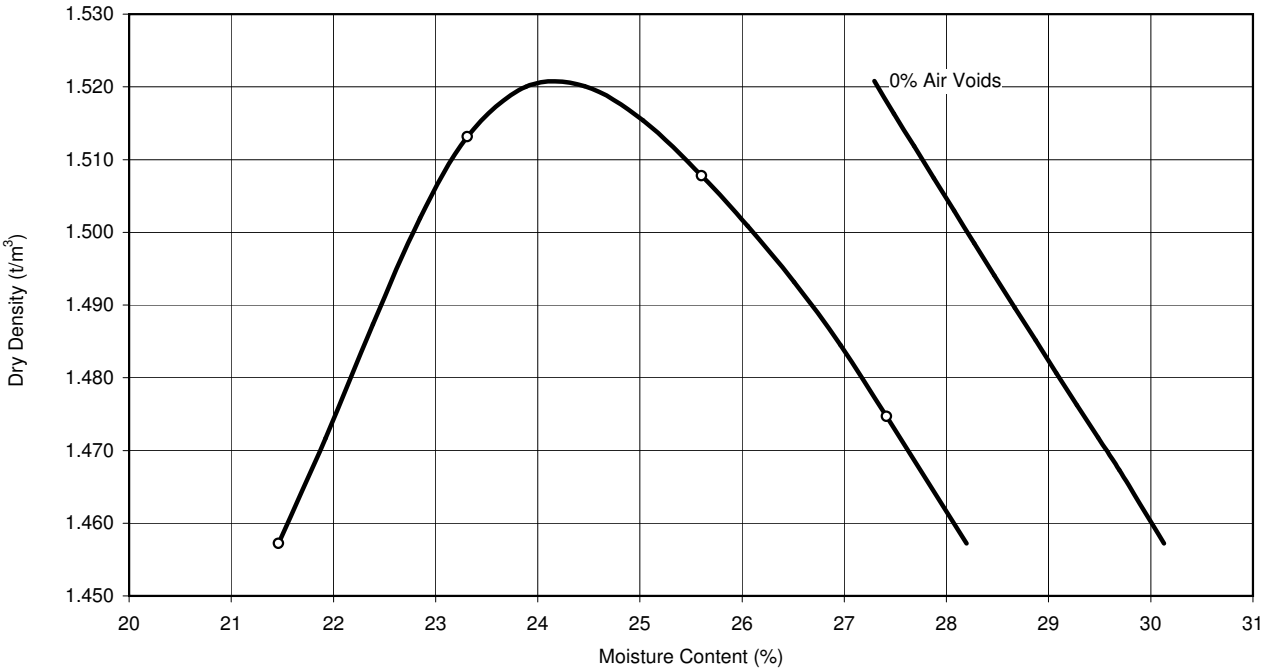
RESULTS OF COMPACTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175f
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	25/07/2006
		Page:	1 of 1



Sample Details **Location:** Pit 113
Depth: 0.3-0.5m

Particles > 19mm: 0%

Description: CLAY - Light grey brown mottled orange

Maximum Dry Density:	**1.52 t/m^3**
Optimum Moisture Content:	**24.0 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS 1289.2.1.1 - 2005

Sampling Methods: AS 1289.1.1.1-1998, AS1289.1.2.1-2001

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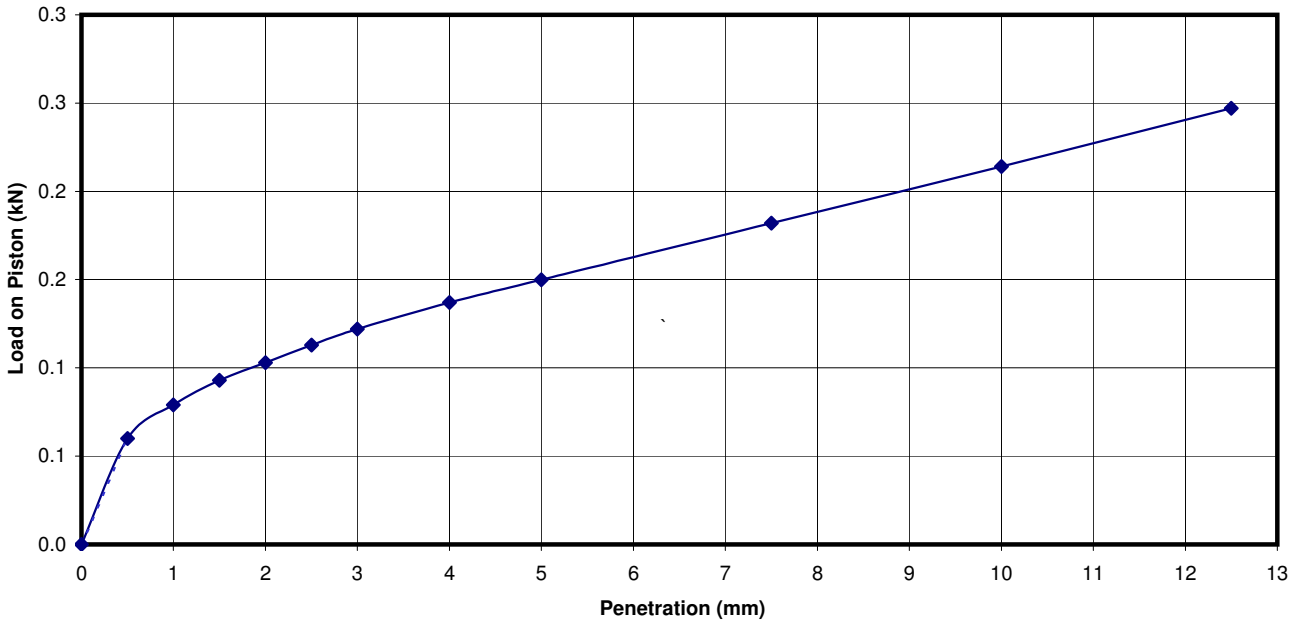
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175g
Project :	Preliminary Geotechnical Assessment	**Report Date :**	21/08/2006
		Date Sampled :	7/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	15/08/2006
Test Location :	Pit 113		
Depth / Layer :	0.3-0.5m	**Page:**	1 of 1



Description: CLAY - Light grey brown mottled orange

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 99% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 5.3%
MOISTURE RATIO: 100% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		24.1	1.50
After soaking		32.0	1.43
After test	Top 30mm of sample	38.2	-
	Remainder of sample	27.6	-
Field values		25.6	-
Standard Compaction		24.0	1.52

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**1.0**
	5.0 mm	**1.0**

NATA Accredited Laboratory Number 828

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RESULT OF SHRINK-SWELL INDEX DETERMINATION

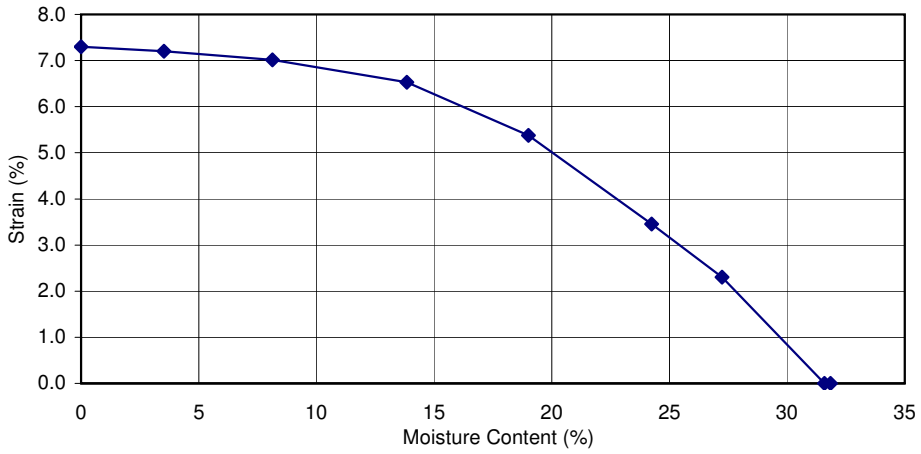
Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175h
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
		Date Sampled :	4/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	17/08/2006
Test Location :	Pit 102		
Depth / Layer :	0.50-0.85m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	7.2 %
Shrinkage - oven dried	7.3 %
Significant inert inclusions	<5 %
Extent of cracking	MC
Extent of soil crumbling	Nil %
Moisture content of core	31.6 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	330 kPa
Pocket penetrometer reading at final moisture content	310 kPa
Initial Moisture Content	31.4 %
Final Moisture Content	31.8 %
Swell under 25kPa	0.0 %



SHRINK-SWELL INDEX Iss 4.1% per Δ pF

Description: CLAY - Grey mottled orange, slightly sandy

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking:
UC - Uncracked
SC - Slightly cracked
MC - Moderately cracked
HC - Highly cracked
FR - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

NATA Accredited Laboratory Number: 828

Approved Signatory:

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RESULT OF SHRINK-SWELL INDEX DETERMINATION

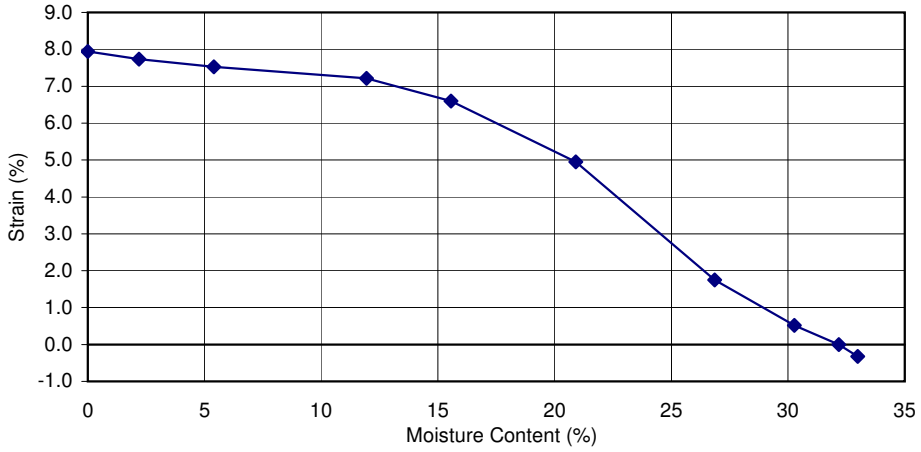
Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175i
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
		Date Sampled :	4/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	17/08/2006
Test Location :	Pit 106		
Depth / Layer :	0.30-0.65m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	7.7 %
Shrinkage - oven dried	7.9 %
Significant inert inclusions	<5 %
Extent of cracking	HC
Extent of soil crumbling	Nil %
Moisture content of core	32.2 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	280 kPa
Pocket penetrometer reading at final moisture content	150 kPa
Initial Moisture Content	29.5 %
Final Moisture Content	33.0 %
Swell under 25kPa	0.3 %



SHRINK-SWELL INDEX Iss 4.5% per Δ pF

Description: CLAY - Grey brown mottled orange

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking:
UC - Uncracked
SC - Slightly cracked
MC - Moderately cracked
HC - Highly cracked
FR - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

NATA Accredited Laboratory Number: 828

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RESULT OF SHRINK-SWELL INDEX DETERMINATION

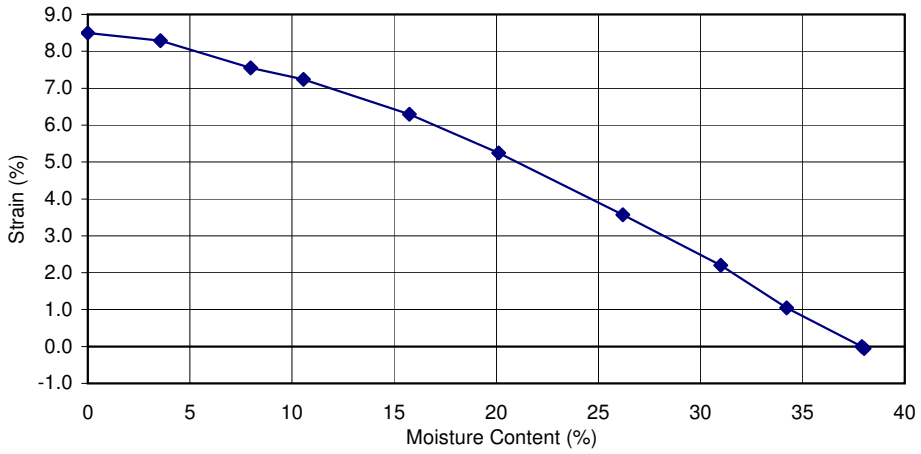
Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175j
Project :	Preliminary Geotechnical Assesment	**Report Date :**	22/08/2006
		Date Sampled :	4/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	17/08/2006
Test Location :	Pit 108		
Depth / Layer :	0.20-0.55m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	8.3 %
Shrinkage - oven dried	8.5 %
Significant inert inclusions	<5 %
Extent of cracking	HC
Extent of soil crumbling	Nil %
Moisture content of core	37.9 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	150 kPa
Pocket penetrometer reading at final moisture content	150 kPa
Initial Moisture Content	37.2 %
Final Moisture Content	38.0 %
Swell under 25kPa	0.1 %



SHRINK-SWELL INDEX Iss 4.7% per Δ pF

Description: Sandy Silty CLAY - Light grey brownmottled yellow brown

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking:
UC - Uncracked
SC - Slightly cracked
MC - Moderately cracked
HC - Highly cracked
FR - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

NATA Accredited Laboratory Number: 828

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Approved Signatory:

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RESULT OF SHRINK-SWELL INDEX DETERMINATION

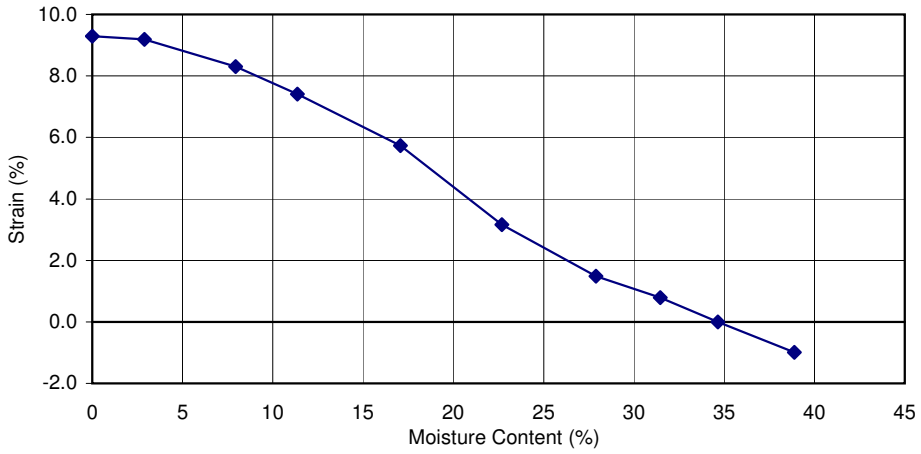
Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175k
Project :	Prelimiinary Geotechnical Assessment	**Report Date :**	22/08/2006
		Date Sampled :	4/07/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	17/08/2006
Test Location :	Pit 110		
Depth / Layer :	0.60-0.95m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	9.2 %
Shrinkage - oven dried	9.3 %
Significant inert inclusions	<5 %
Extent of cracking	HC
Extent of soil crumbling	Nil %
Moisture content of core	34.6 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	210 kPa
Pocket penetrometer reading at final moisture content	150 kPa
Initial Moisture Content	34.4 %
Final Moisture Content	38.9 %
Swell under 25kPa	1.0 %



SHRINK-SWELL INDEX Iss 5.4% per Δ pF

Description: CLAY - Light grey mottled orange

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking:
UC - Uncracked
SC - Slightly cracked
MC - Moderately cracked
HC - Highly cracked
FR - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

NATA Accredited Laboratory Number: 828

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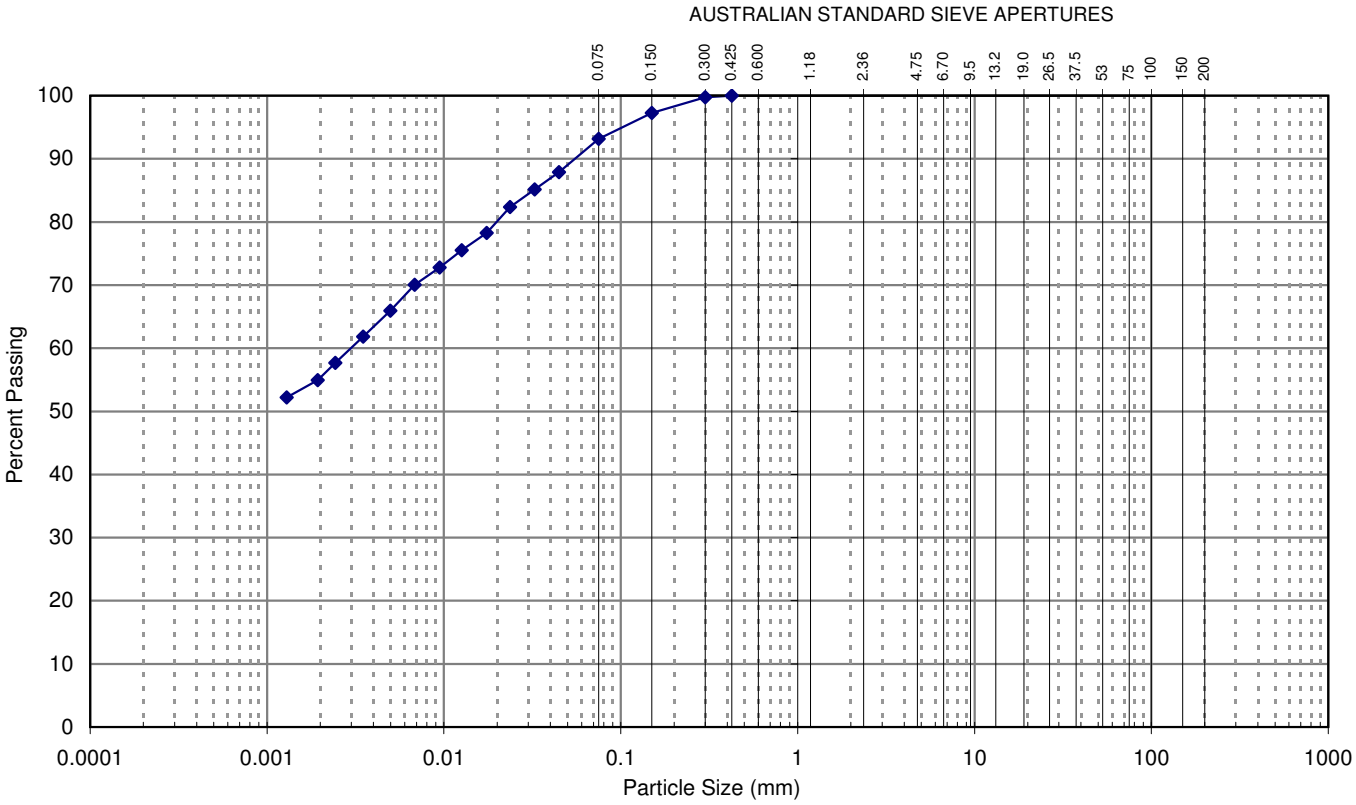
RESULTS OF PARTICLE SIZE DISTRIBUTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175l
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date Sampled:**	4/07/2006
Test Location :	Pit 103	**Date of Test:**	21/08/2006
Depth / Layer :	0.50-0.80m	**Page:**	1 of 1



CLAY FRACTION	SILT FRACTION			SAND FRACTION			GRAVEL FRACTION			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	0.002	0.006	0.02	0.06	0.2	0.6	2.0	6.0	20	60

Description: Silty CLAY - Light grey brown mottled orange, some sand

Test Method(s): AS 1289.3.6.2-1995, 3.6.3-1995 **Loss in pretreatment:** N/A

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Type of Hydrometer:** g/l

Method of Dispersion: Sodium Hexametaphosphate

Remarks:

NATA Accredited Laboratory
Number 828

Approved Signatory:

Tested:	DM
Checked:	DM

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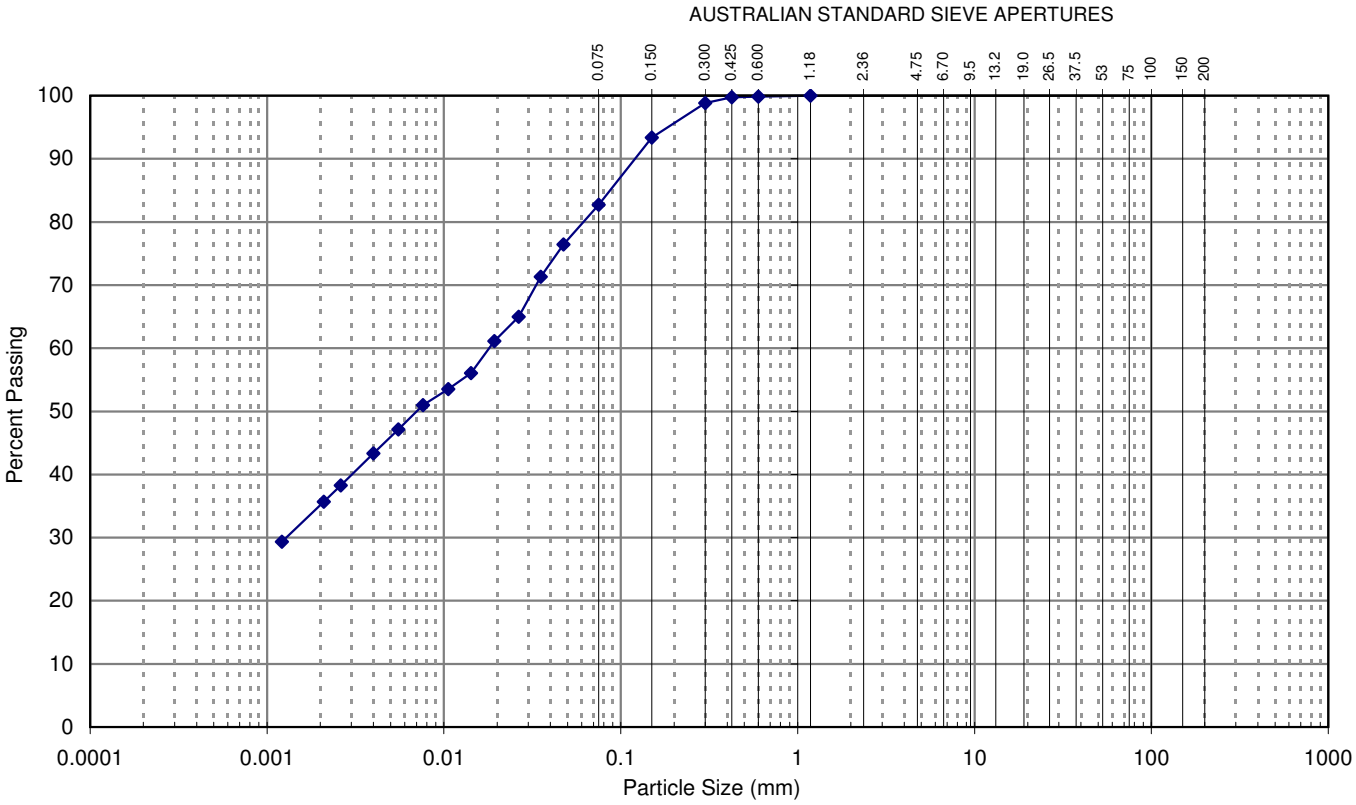
RESULTS OF PARTICLE SIZE DISTRIBUTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175m
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date Sampled:**	4/07/2006
Test Location :	Pit 104	**Date of Test:**	21/08/2006
Depth / Layer :	0.70m	**Page:**	1 of 1



CLAY FRACTION	SILT FRACTION			SAND FRACTION			GRAVEL FRACTION			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.002	0.006	0.02	0.06	0.2	0.6	2.0	6.0	20	60	

Description: Sandy Clayey SILT

Test Method(s): AS 1289.3.6.2-1995, 3.6.3-1995

Loss in pretreatment: N/A

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001

Type of Hydrometer: g/l

Method of Dispersion: Sodium Hexametaphosphate

Remarks:

NATA Accredited Laboratory
Number 828

Approved Signatory:

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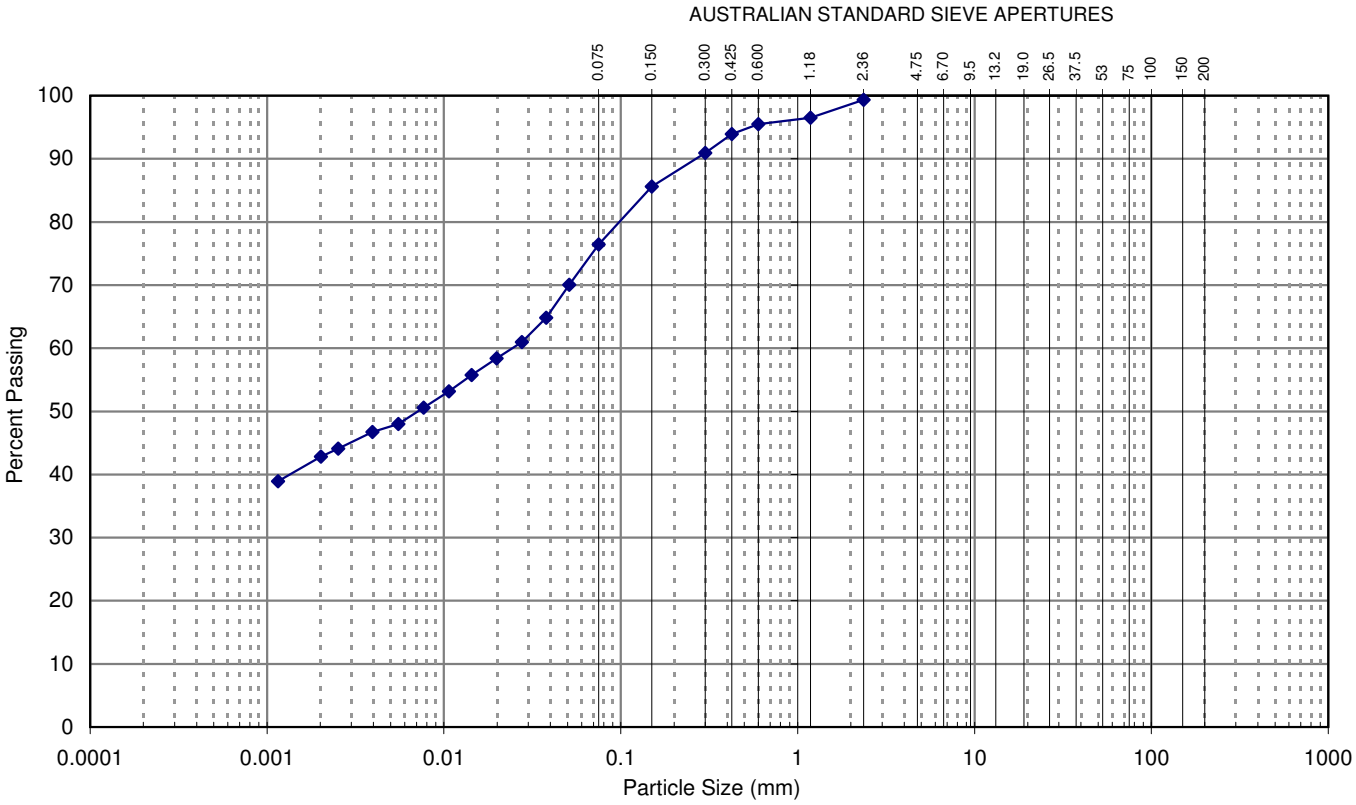
RESULTS OF PARTICLE SIZE DISTRIBUTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175n
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date Sampled:**	4/07/2006
Test Location :	Pit 108	**Date of Test:**	21/08/2006
Depth / Layer :	0.30-0.50m	**Page:**	1 of 1



CLAY FRACTION	SILT FRACTION			SAND FRACTION			GRAVEL FRACTION			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
0.002	0.006	0.02	0.06	0.2	0.6	2.0	6.0	20	60	

Description: Sandy Silty CLAY - Light grey brown mottled yellow brown

Test Method(s): AS 1289.3.6.2-1995, 3.6.3-1995 **Loss in pretreatment:** N/A

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Type of Hydrometer:** g/l

Method of Dispersion: Sodium Hexametaphosphate

Remarks:

NATA Accredited Laboratory Number 828

Approved Signatory:

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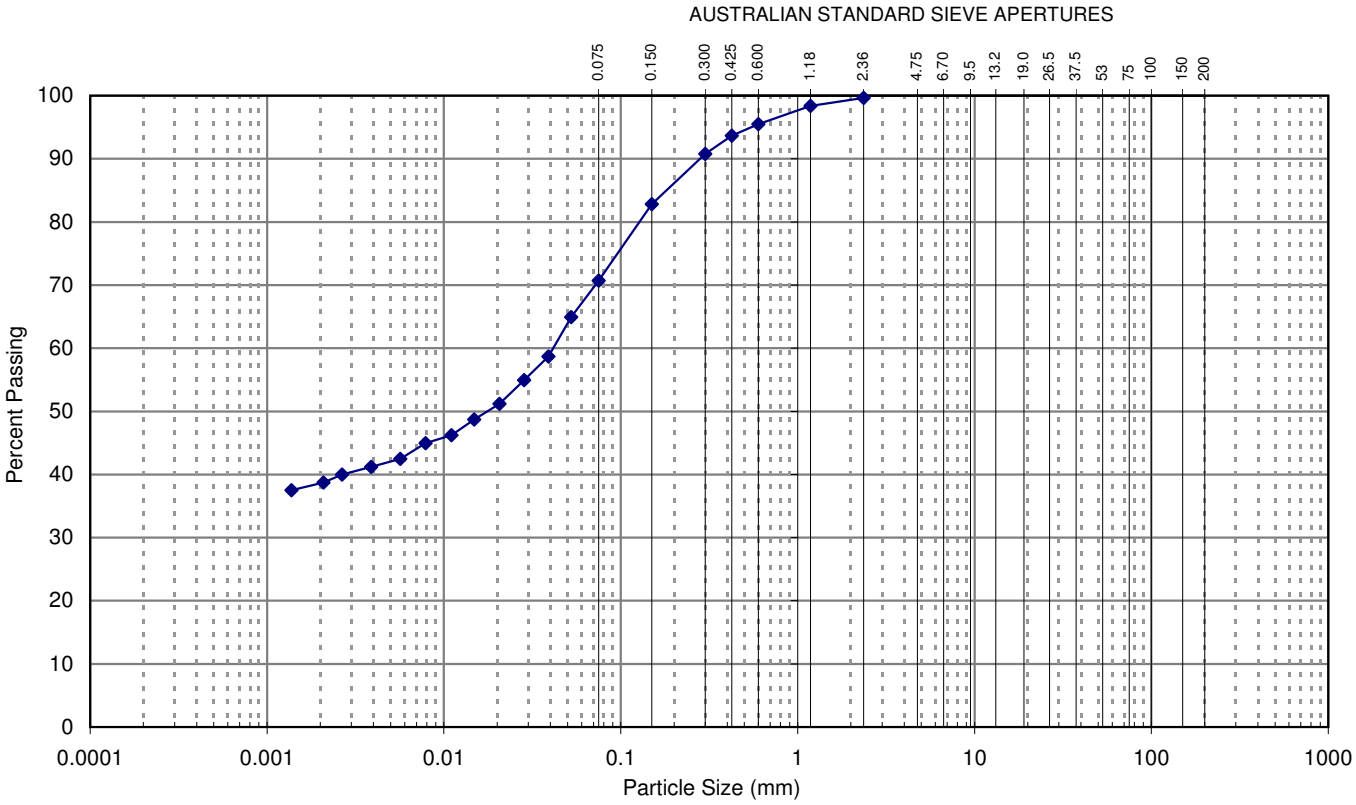
RESULTS OF PARTICLE SIZE DISTRIBUTION TEST

Client :	Eureka 1 Project 10 Pty Ltd	**Project No. :**	39519
		Report No. :	N06-175o
Project :	Preliminary Geotechnical Assessment	**Report Date :**	22/08/2006
Location :	Lots 93-96 Boundary Road, Medowie	**Date Sampled:**	4/07/2006
Test Location :	Pit 112	**Date of Test:**	21/08/2006
Depth / Layer :	0.2m	**Page:**	1 of 1



CLAY FRACTION	SILT FRACTION			SAND FRACTION			GRAVEL FRACTION			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	0.002	0.006	0.02	0.06	0.2	0.6	2.0	6.0	20	60

Description: Silty SAND & CLAY - Grey brown

Test Method(s): AS 1289.3.6.2-1995, 3.6.3-1995

Loss in pretreatment: N/A

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001

Type of Hydrometer: g/l

Method of Dispersion: Sodium Hexametaphosphate

Remarks:

NATA Accredited Laboratory
Number 828

Approved Signatory:

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DETERMINATION OF EMERSON CLASS NUMBER OF SOIL

Client:	**Eureka 1 Project 10 Pty Ltd**	**Project No:**	39519
		Report No:	N06-175p
Project:	Preliminary Geotechnical Assessment	**Report Date:**	22/8/2006
Location:	Lots 93-96 Boundary Road, Medowie	**Date of Test:**	17/8/2006
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	WATER TYPE	WATER TEMP	CLASS NO.
Pit 101	0.40-0.75	CLAY – Grey mottled orange	Distilled	20^0C	6
Pit 103	0.50-0.80	Silty CLAY – Light grey brown mottled orange, some sand	Distilled	20^0C	6
Pit 105	0.5	CLAY – Dark grey brown, slightly silty	Distilled	20^0C	5
Pit 108	0.30-0.50	Sandy Silty CLAY – Light grey brown mottled yellow brown	Distilled	20^0C	6

Test Method(s): AS 1289 3.8.1 - 1997

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001

Remarks:

Approved Signatory:

NATA Accredited Laboratory
Number: 828
NATA endorsed test report. This document shall not be reproduced, except in full.

Tested: DM/DB
Checked: DM

D Millard
Laboratory Manager

19 July 2006 **TEST REPORT**

Douglas Partners Pty Ltd
Box 324
Hunter Region Mail Centre
NSW 2310

Your Reference: 39519, Medowie
Report Number: 46315

Attention: Patrick Heads

Dear Patrick
The following samples were received from you on the date indicated.

Samples: Qty.	20 Soils
Date of Receipt of Samples:	11/07/06
Date of Receipt of Instructions:	11/07/06
Date Preliminary Report Faxed:	Not Issued

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

Edward Ibrahim
Approved Signatory

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 16, 33 Maddox Street, Alexandria Australia
t (02) 8594 0400 f (02) 8594 0499
www.au.sgs.com
Member of the SGS Group

Inorganics						
Our Reference:	UNITS	46315-1	46315-2	46315-3	46315-4	46315-5
Your Reference	----------	Pit101/0.1	Pit102/0.5-0.9	Pit103/0.1	Pit103/1.0	Pit104/1.1
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Electrical Conductivity 1:5 soil:water	µS/cm	29	28	36	290	100

Inorganics						
Our Reference:	UNITS	46315-6	46315-7	46315-8	46315-9	46315-10
Your Reference	----------	Pit105/0.1	Pit105/0.3-0.55	Pit106/0.1	Pit106/0.3-0.5	Pit107/0.1
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Electrical Conductivity 1:5 soil:water	µS/cm	66	110	22	52	270

Inorganics						
Our Reference:	UNITS	46315-11	46315-12	46315-13	46315-14	46315-15
Your Reference	----------	Pit107/0.9	Pit108/0.3-0.5	Pit108/1.0	Pit109/0.2	Pit109/1.2
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Electrical Conductivity 1:5 soil:water	µS/cm	580	25	120	140	360

Inorganics						
Our Reference:	UNITS	46315-16	46315-17	46315-18	46315-19	46315-20
Your Reference	----------	Pit110/0.1	Pit110/0.3-0.5	Pit111/0.3-0.5	Pit112/0.3-0.5	Pit113/0.3-0.5
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Electrical Conductivity 1:5 soil:water	µS/cm	20	22	20	48	300

Moisture						
Our Reference:	UNITS	46315-1	46315-2	46315-3	46315-4	46315-5
Your Reference	----------	Pit101/0.1	Pit102/0.5-0.9	Pit103/0.1	Pit103/1.0	Pit104/1.1
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Moisture	%	20	29	20	23	25

Moisture						
Our Reference:	UNITS	46315-6	46315-7	46315-8	46315-9	46315-10
Your Reference	----------	Pit105/0.1	Pit105/0.3-0.55	Pit106/0.1	Pit106/0.3-0.5	Pit107/0.1
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Moisture	%	33	29	20	27	27

Moisture						
Our Reference:	UNITS	46315-11	46315-12	46315-13	46315-14	46315-15
Your Reference	----------	Pit107/0.9	Pit108/0.3-0.5	Pit108/1.0	Pit109/0.2	Pit109/1.2
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Moisture	%	18	25	29	16	15

Moisture						
Our Reference:	UNITS	46315-16	46315-17	46315-18	46315-19	46315-20
Your Reference	----------	Pit110/0.1	Pit110/0.3-0.5	Pit111/0.3-0.5	Pit112/0.3-0.5	Pit113/0.3-0.5
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		4/07/2006	4/07/2006	4/07/2006	4/07/2006	4/07/2006
Moisture	%	18	20	25	28	24

Method ID	Methodology Summary
AN106	Conductivity and TDS by Calculation (cTDS) - Conductivity is measured using a conductivity cell and dedicated meter, in accordance with APHA Method 2510, 20th edition. TDS is calculated by TDS(mg/L)=0.6 x Conductivity(µS/cm).
SEP-001	Moisture content at 103-105C, compositing and preparation on a 1:5 soil suspension.

QUALITY CONTROL Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	1	AN106	<1.0	46315-1	29 || 28 || RPD: 4

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Moisture	%		SEP-001	[NT]

QUALITY CONTROL Inorganics	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	46315-11	580 || 580 || RPD: 0

Result Codes

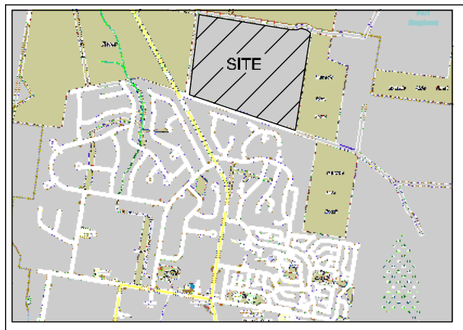
[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Accreditation
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

Date Organics extraction commenced: N/A
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Dioxins/Furans* and PAH in XAD and PUF).
Terms and conditions are available from www.au.sgs.com

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.
Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 10 samples.
Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.
Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.
Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.
Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.



LOCALITY PLAN

LEGEND

- Approximate Test Pit Location (former investigation - 1986)
- Approximate Test Pit Location (current investigation)
- Approximate Surface Water Test Location
- Approximate Slope Direction & Angle
- Approximate Photo Location & Orientation
- Approximate Location of Localised Surface Filling / Fill Stockpiles
- Approximate Surface Water Flow Path (i.e. creek/gully)

Drawing adapted from Survey Plan supplied by Buildev Developments (CM) Pty Ltd, Ref No. 0653_Bore_Hole_Plan.dwg

0 100 200 300 m

SCALE 1:5000 (A3 SHEET)

Douglas Partners
Geotechnics Environment Groundwater

Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Campbelltown, Townsville, Cairns, Wollongong, Darwin

TITLE: TEST LOCATION PLAN
PRELIMINARY GEOTECHNICAL ASSESSMENT
LOTS 93 TO 96, DP 753194, BOUNDARY ROAD, MEDOWIE

CLIENT: EUREKA 1 PROJECT 10 PTY LTD			REF:\P\39519\DRAWINGS\39519
DRAWN BY: PLH	SCALE: 1:5000	PROJECT No: 39519	OFFICE: NEWCASTLE
APPROVED BY:		DATE:	DRAWING No: 1