Douglas Partners
Geotechnics • Environment • Groundwater

Integrated Practical Solutions

REPORT
on
PRELIMINARY SITE ASSESSMENT

LOT 219 DP 755218, COORANBONG
PROPOSED REZONING FROM RURAL TO URBAN

Prepared for
JW PLANNING PTY LTD
on behalf of
JOHNSON PROPERTY GROUP

Project 39229
JULY 2005

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TABLE OF CONTENTS

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Project No: 39229

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8 July 2005

REPORT ON
PRELIMINARY SITE ASSESSMENT
PROPOSED REZONING FROM RURAL TO URBAN
LOT 219 DP 755218, COORANBONG

1. INTRODUCTION

This report presents the findings of a preliminary site assessment for Lot 219 DP 755218, Cooranbong North, New South Wales. The assessment was carried out at the request of Mr Jason Wasiak of J W Planning Pty Ltd on behalf of Johnson Property Group.

It is understood that the site is proposed to be rezoned from rural to allow urban development, and is an extension to the current proposed North Cooranbong investigation area. Douglas Partners Pty Ltd (DP) has recently undertaken various site assessments for the North Cooranbong investigation area. The results of previous assessments are summarised in DP Report 31920A titled "Summary Report on Site Assessments, North Cooranbong Investigation Area", of March 2005 (Ref 1).

The investigation was undertaken to assess geotechnical and contamination issues / constraints to development as follows:

- Surface soils and surface topographical units;
- Areas containing rock outcrops or likely to contain outcrops or likely to contain shallow bedrock;

- Areas with potential slope instability issues;
- Erosion and dispersion potential;
- Areas of poor geotechnical conditions and implications to development;
- Areas likely to contain acid sulphate soils;
- Potential areas of natural gravel and clay resources;
- Discussions with Mine Subsidence Board (MSB) regarding past and future mining activities and likelihood of mine subsidence;
- Past and present potentially contaminating activities (i.e. preliminary contamination assessment).

The assessment comprised the following:-

- Desktop study and brief site history review;
- Site inspection;
- Preliminary subsurface investigation via test pits;
- Laboratory testing.

The Preliminary Contamination Assessment (PCA) component was undertaken with reference to NSW EPA "Guidelines for Consultants Reporting on Contaminated Sites" (Ref 2).

For the purpose of this investigation a site plan showing contours, drawn by Surdevel Surveyors, was supplied by the client (Ref 1295, 9/6/05).

2. CHARACTERISTICS OF SITE

2.1 Description / Location

The site is identified as Lot 219 DP 755218, Cooranbong, New South Wales, and is shown on Drawing 1, Appendix A.

The site is located approximately 450 m to the north of Alton Road, Cooranbong near the intersection with Bushland Road. The site is triangular in shape and is bound by the Olney State Forest to the west, farmland to the north and by the Cooranbong Airport to the east. The site is approximately 1 km on the north south axis and 1.1 km on the east west axis and covers an area of about 58.3 ha.

2.2 Geology and Hydrogeology

The 1:100 000 scale Newcastle Coalfields Regional Geology Sheet 9231 indicates the site is located near the boundary of the Early Mesozoic Aged Narrabeen Subgroup which generally comprises sandstone, siltstone, conglomerate and claystone, and Quaternary Aged alluvial deposits comprising sand silt clay and gravels.

The local groundwater flow within the site is likely to be towards the gully line bisecting the site. The regional groundwater flow is likely to be towards Felled Timber Creek to the south, which is located about 400 m from the site. Felled Timber Creek and its tributaries are considered to be the nearest sensitive receptors. Based on the geography of the site, a shallow water table is not expected at the site. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

Preliminary subsurface investigation was undertaken across the site as discussed below.

2.3 Topography / Site Features

Site topography is dominated by a north-east to south-west trending gully with minor tributaries/gullies. Site slopes are in the order of 2° to 4° and generally fall towards the gullies within the site. The eastern and western portions of the site are elevated and are located on local ridgelines/hillslopes.

Site soils on the upper hill slopes were generally dry, however within and adjacent to the central gully, wet soils were observed at the surface (Photo 1). Wet surface soils were observed to be

approximately 100 m to 200 m wide within the gully alignment and also extended over the lower slopes to the east of the gully, as shown on Drawing 1, Appendix A.

Photo 1 – Wet soils on lower slopes near gully

The dense vegetation to the west of the central gully precluded visual assessment, however, similar site conditions are likely. Soils within the minor gullies feeding the central gully were observed to be dry at the time of investigation. There was some evidence of recent water flows in the gullies. Drawing 1 indicates the approximate area where wet soils were observed.

There is little development over the site. Within the southern corner of the site is a single storey brick dwelling with metal roof and an associated metal clad shed with gravel floor (Photo 2).

Photo 2 – House and shed in the southern corner of the site

A gravel driveway was present from the boundary fence leading to the shed and house. Minor hydrocarbon staining was observed at one corner of the shed (Photo 3).

Photo 3 – Minor hydrocarbon staining near shed

Near the western corner of the site is an electricity tower alignment with one electricity tower present on the property. Beneath the electricity towers is a small dirt track used for access.

To the north of the dwelling are about five small stockpiles of clay. It is understood that the clay materials were surplus following the construction of the house. Visual inspection of the surface of the stockpiles indicates that the materials are similar to those observed in the current on-site test pits. It appears that the mounds have been utilised for motorbike jumps.

Two fibre cement pipes, 300 mm diameter and about 3 m in length (Photo 4) were observed adjacent to the eastern boundary of the site. The approximate location of the pipes is shown on Drawing 1, Appendix A.

Photo 4 – Fibre cement pipes

The approximate location and orientation of photos are shown on Drawing 1, Appendix A.

2.4 Soil Landscape

Reference to the Lake Macquarie and Gosford Soil Landscape Map prepared by the Department of Land and Water Conservation indicates that the site soils are part of the Doyalson Landscape. The Doyalson Landscape is located on gently undulating rises on Munmorah Conglomerate on broad crests and ridges and long gently inclined slopes. Slopes

are typically <10% with relief to 30 m. Vegetation within the landscape is typically cleared open eucalypt forest. The soils overlying sandstone and conglomerate are typically moderately deep (i.e. 0.5 m to 1.5 m) Yellow Earths, Yellow Podzols and Soloths. Over fine grained siltstones and claystones moderately deep Yellow Podzols, Soloths and some Red Podzols are found. Within gully lines moderately deep to deep (i.e. 1 m to >1.5 m) Yellow Leached Earths, Grey Earths, Soloths and Gleyed Podzols are encountered.

The soils within the Doyalson Landscape are typically defined by the following:

- High erosion hazard;
- Localised foundation hazard;
- Localised high run-on;
- Mine subsidence;
- Localised seasonal waterlogging;
- Hardsetting;
- Stoniness;
- Strongly acidic soils of low fertility.

2.5 Vegetation

Vegetation over the site was observed to range from very dense swamp forest (Photo 5) to cleared pasture land (Photo 6).

Photo 5 – Very dense vegetation within main gully

Photo 6 – Typical vegetation within cleared areas

The very dense forested area is located within the central gully line, primarily to the west of the gully and also within the north-eastern portion of the site. Cleared land with scattered semi mature to mature trees is present on the eastern portion of the site. It appears that cleared

vegetation was placed in windrows along approximate contours of the site, which now also contain semi-mature trees (Photo 7).

Photo 7 – Clearing along site contour

Vegetation on the western portion of the site generally comprises regrowth from past clearing activities. The regrowth comprises moderately dense shrubs and grasses with occasional semi mature to mature trees (Photo 8). Clearing along contour lines, similar to the eastern portion of the site are also present.

Photo 8 – Typical vegetation on the western portion of the site

2.6 Acid Sulphate Soil Conditions

Reference to the Morisset Acid Sulphate Soil Risk Map prepared by the Department of Conservation and Land Management of NSW indicates that there is 'no known occurrence' of acid sulphate soil materials within the site.

2.7 Salinity

Searches with DIPNR indicated that the site is not within a known salinity zone.

3. FIELD WORK

3.1 Methods

Field work was conducted on 4 and 6 May 2005, and comprised the following:

- walk-over inspection of the site by an experienced engineer on 4 May 2005;
- excavation of 15 test pits to depths of 1.2 m to 2.8 m using a backhoe (Pits 1 to 16);
- collection of soil samples for laboratory analysis and identification purposes;
- field measurement of pH and electrical conductivity (EC) of surface waters on the site.

The test locations were set-out by an environmental engineer from Douglas Partners Pty Ltd (DP) who also logged the subsurface profile in the pit and collected samples for identification purposes. Following field work, test pits were located by DP using an Axis 3 GPS. The locations of the pits are shown on Drawing 1, Appendix A.

3.2 Results

3.2.1 Walk Over Survey

The general site observations made during the walk over survey are as follows:-

- no observed areas of surface rock outcrops were observed on the site;
- no major signs of erosion were present across the site;
- soft, waterlogged surface conditions were observed near the main gully alignment;
- the ground surface generally slopes at less than 4°;
- no obvious signs of deep seated or active instability were observed during the walk over survey;
- dense vegetation covered the central area of the site.

3.2.2 Subsurface Conditions

The subsurface conditions are presented in detail in the test pit logs (Appendix B). These should be read in conjunction with the general notes preceding them, which explain definitions of the classification methods and descriptive terms used.

Subsurface conditions have been separated into gullies and hill slopes/ridgelines which were the two dominant topographical features. Soil conditions within each topographical unit were observed to be similar as discussed below.

Hill Slopes / Ridgelines (Pits 1, 6 and 9 to 16)

Subsurface conditions over the hill slopes and ridgelines were generally uniform and comprised surficial topsoil or silty sand to up to 0.15 m depth which was then underlain by very stiff to hard clay or sandy clay. Clays were generally light brown in colour with light grey, orange and red mottling. Clays were underlain by bedrock at between 0.7 m and 2.3 m depth in all pits except Pits 9 and 13 which were terminated in clay.

Bedrock comprised siltstone in Pit 1 and sandstone in the remainder of pits. The upper sandstone was generally readily excavated by backhoe, while Pit 1 was terminated due to refusal at 1.2 m depth. The other pits were terminated at between 2.5 m and 2.8 m depth, in extremely low strength and extremely weathered sandstone.

Gullies (Pits 2 to 5, 7 and 8)

Subsurface conditions within the gullies generally comprised grey layered alluvial clays with high silt and sand contents. Upper soils were generally sandier than lower soils. From the surface to up to 0.8 m clayey sands or sands were observed in some pits to be loose / soft to firm. Underlying clays were generally stiff to very stiff in consistency. Soft to firm soils were encountered in areas of surface wetness (i.e. Pits 4, 5 and 8), firm soils were also encountered in Pit 2 from 1.5 m to 2 m depth. Slightly cemented or gravelly layers were encountered within Pits 3 and 4 at greater that 1 m depth.

Groundwater was encountered in Pit 2 at 2.8 m depth during excavation. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

3.2.3 Surface Water Testing

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

Sample[1]	Location	pH	EC (µS/cm)	Comments
1	Main Gully – upstream of site	5.5	245	Low flow, organic rich, tannin stained, clear
2	Main Gully within site	5.4	430	Organic rich, tannin stained, clear
3	Minor Gully within site	6.8	530	Brown turbid water, ponded water
4	Main Gully – downstream of site	5.5	375	Low flow, organic rich, tannin stained, clear

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

The results of surface water testing indicate that waters are fresh and slightly acidic.

4. LABORATORY TESTING

Geotechnical laboratory testing comprised six Emerson tests to assess soil dispersivity. The results of the geotechnical testing undertaken are presented in the laboratory report sheets (Appendix C), and are summarised in Table 2 below.

Table 2 – Results of Geotechnical Testing

Location	Depth (m)	Description	Emerson Number
Pit 1	0.5	Light grey mottled light brown and orange clay	6
Pit 2	0.7	Light grey mottled orange sandy clay	2
Pit 4	0.2	Light grey clayey sand	6
Pit 9	0.3	Light brown sandy clay	6
Pit 10	0.5	Light brown clay	6
Pit 16	0.4	Light brown mottled red sandy clay	6

One sample of fibre cement pipe (AC1) was also submitted to SGS Environmental for asbestos identification. The result of the asbestos testing indicated the absence of asbestos fibres. Detailed laboratory report sheets are contained in Appendix C.

5. URBAN CAPABILITY ASSESSMENT

5.1 Erosion Potential

Minor erosion of surface soils was observed where vegetation was sparse, and where concentrated water flows are present (ie within the gully alignments). The results of Emerson testing indicates that the soils are generally Emerson Class 6, which is typical of non-dispersive soils. A sandy clay sample however, indicated an Emerson Class 2, which suggests some propensity to erode in water. Erodable soils are readily amenable to standard mitigation measures for erosion control, which should be addressed during and following construction.

5.2 Slope Stability

There was generally no evidence of previous or incipient deep seated instability observed over the site. The site is generally considered to have a low risk of instability with respect to the natural topography. In the event that significant cuts or fills are proposed for the site, further geotechnical investigation to specifically assess slope stability issues should be undertaken.

5.3 Salinity Potential

Information provided by DIPNR, site observations and surface water screening results suggests the absence of soil salinity issues at the site.

5.4 Excavatability

Soils observed within test pits comprised silty sands and silty / sandy clays to depths ranging from 1 m to 3.5 m. It is anticipated that these materials together with weathered / weak underlying bedrock can readily be excavated by conventional earthmoving equipment. However, excavatability of the underlying rock should be assessed on a site specific basis during detailed investigations prior to development, if deep excavation is proposed.

5.5 Soil Reactivity

Foundation design for future structures and pavement construction will be influenced by a number of factors including the reactivity of site soils. Laboratory testing of soil properties has not been undertaken as part of this assessment. The soil landscape maps indicate that the clays may have a moderate to high shrink-swell characteristics.

Soil reactivity can readily be accommodated in design, and should be confirmed during future detailed investigations prior to development by classifying building sites in accordance with AS 2870-1996 (Ref 3).

5.6 Saturated Soils

Soft / saturated soils were observed within the main gully alignment and on lower site slopes. Should development be proposed within the area currently occupied by the main gully alignment or within the area identified as being soft/wet (see Drawing 1, Appendix A), appropriate drainage control, and engineering design will be required to facilitate development.

5.7 Acid Sulphate Soils

Acid sulphate soils are not expected to be encountered within the site, based on the Morisset Acid Sulphate Soil Risk Map.

5.8 Mine Subsidence

Discussions with Mr Paul Grey of the Mine Subsidence Board indicated that the site does not lie within a proclaimed mine subsidence district and is not undermined. It is also unlikely that the site may be undermined in the future.

5.9 Clay / Gravel Resources

Based on the results of the investigation, subsurface conditions across the site are anticipated to generally comprise surficial sandy material underlain by clays overlying sandstone.

The suitability of this material as a resource will depend on the proposed use. Additional laboratory testing may be required to assess the materials suitability for specific uses.

6. PRELIMINARY CONTAMINATION ASSESSMENT

6.1 Introduction

The preliminary contamination assessment comprised the following:

- Brief discussions with the current owners Rob and Janelle Cawthorne;
- Lake Macquarie City Council (LMCC) records search;
- Review of historical aerial photos;
- Searches with NSW Department of Environment and Conservation (DEC);
- Search of nearby registered groundwater bores through DIPNR.

6.2 Site History Interviews

The historical information presented below was a result of and interview with the current owners, Rob and Janelle Cawthorne, conducted on 4 May 2005.

- The site was vacant prior to development in the early 1990's;
- Mr Cawthorne cleared some of the site for cattle grazing, although no cattle are kept on the site now;

- The house was built on cut to fill, with excess filling utilised to construct motorbike jump located to the north of the house (approximate location of soil mounds are shown on Drawing 1, Appendix A);
- The metal clad shed with gravel floor is utilised for storage of equipment (ie tractor, boat, motor bikes and minor fuel, etc), and minor servicing of vehicles;
- Waste oil from servicing is applied to fence posts to protect them from termites.
- Chemicals used on-site is limited to minor quantities of Roundup used near the house to control weeds;
- The creek line is generally un-trafficable due to wet surface soils.

6.3 Council Records Search

Correspondence with LMCC indicated that the following approvals have been recorded on the site based on the records the LMCC held:

- 1989 – DA 812/1989 – Construction of a road;
- 1991 – DA 48/1991 – Construction of farm shed, new dwelling and pool;
- 1991 – LA 126/1991 – Septic tank installation.

Review of individual Section 149 Planning Certificates for the site, indicated that the site is not affected by the Unhealthy Building Land policy and has no matters arising under the Contaminated Land Management Act 1997.

6.4 Review of Historical Aerial Photos

The following historical aerial photos were reviewed for the assessment:

Table 3 – Aerial Photo Review

Year	Approximate Scale	Black and White/Colour
1966	1:40 000	B & W
1975	1:40 000	B & W
1984	1:40 000	B & W
1996	1: 25 000	Colour
2000 (Approx)*	Digital	Colour

*Source *iplan.australis.net.au* (2.5.2005)

1966 Aerial Photograph

- The site is vacant and covered by dense bushland and is similar to the surrounding land;
- A small track is visible along the boundary with the Olney State Forest;
- The north-south runway of the neighbouring Cooranbong Airport is present.

1975 Aerial Photograph

- The site and surrounds are similar to the 1966 photograph;
- A cleared area of land (possibly grazing) is present adjacent to the north eastern boundary.

1984 Aerial Photograph

- The site and surrounds are similar to the 1975 photograph;
- A small track is visible along the eastern boundary;
- The transmission easement is present in the western portion of the site;
- The east-west runway is present at Cooranbong Airport;
- Increased development within Cooranbong.

1996 Aerial Photograph

- The site has been partially cleared, the area near the gully remains vegetated;
- The site appears to be being used for grazing;
- Trees are present along site contours over the cleared areas;

- A house and large shed are present in the south eastern corner of the site;
- Land to the north is vegetated on the boundary with the site and the remainder is cleared for grazing;
- A large dam is present to the north west of the site;
- The site is generally similar to the present condition (see Section 2).

2000 Aerial Photo

- Similar to 1996 photograph

It is noted that the review of aerial photos was difficult due to the relatively small scale and poor resolutions.

6.5 Enquiries With DEC

A review of the NSW DEC public register indicated the site has no statutory notices issued under the provision of the Contaminated Land and Management Act.

6.6 Groundwater Bore Search (DIPNR)

A groundwater bore search undertaken by the Department of Infrastructure Planning and Natural Resources (DIPNR) in May 2005 indicates that the nearest groundwater bore is located 1.7 km to the north east of the site. The bore is licenced for domestic, farming and stock uses and the intended purpose is for farming. The drillers log indicates that water was found within fractured shale from 15 m to 16 m depth with a standing water level of 6 m below ground level. There are no registered groundwater wells between the site and downgradient Felled Timber Creek (ie nearest receptor).

6.7 Potential Contaminants

Based on the available site history information and observations made during the site inspection, the potential for gross contamination at the site is considered to be low. Minor localised contamination may be associated with the following:

- minor hydrocarbon and heavy metal impact within and in the vicinity of the shed near the dwelling where surface staining was observed;
- minor hydrocarbon and heavy metal impact in the vicinity of fence posts treated with waste oil;
- possible nutrient and heavy metal impact within the domestic effluent disposal area;
- localised near surface impact on soils around the perimeter of the dwelling due to minor herbicide / pesticide use;
- surficial filling from unknown origin associated with the driveway.

It is noted that, there were no visual or olfactory signs of gross contamination (ie staining or odour) within the pits excavated within the site.

7. RECOMMENDATIONS / CONCLUSIONS

The results of this preliminary geotechnical and contamination assessment have identified minor issues that should be considered prior to development. The site is considered suitable for future urban development, subject to the identified issues being addressed and appropriate engineering design.

Further investigation is recommended to enable more detailed design for future development as follows:

- Further assessment of potential contamination as outlined in Section 6.6, and possible localised remedial measures, which are likely to be limited / minor (if any), and can be readily achieved using standard remedial activities during construction;

- Lot classification to AS 2870-1996 (Ref 3) for footing design;
- Earthworks procedures and specifications;
- Pavement thickness design for new internal roads.

The above investigations could be undertaken concurrently, and would involve subsurface investigation, in situ testing, laboratory testing of soil samples and engineering analysis.

8. LIMITATIONS OF THIS REPORT

DP have performed investigation and consulting services for this project in general accordance with current professional and industry standards for land contamination investigation.

Whilst every effort has been made to ensure a representative programme of field and laboratory sampling and testing, conditions different to those identified during these tasks may exist. Therefore DP, or any other reputable consultant, 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 and concentrations of contaminants measured 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, chemical reactions and other events, eg. groundwater movement and/or spillages of contaminating substances. These changes may occur subsequent to DP's investigations and assessment.

This report and associated documentation and the information herein have been prepared solely for the use of Johnson Property Group and J W Planning Pty Ltd. Any reliance assumed by other parties on this report shall be at such parties 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:

Greg Taylor
Environmental Engineer

Stephen Jones
Principal

REFERENCES

1. Douglas Partners Pty Ltd, "Summary Report on Site Assessments, North Cooranbong Investigation Area", March 2005.

2. NSW EPA Contaminated Sites. "Guidelines for Consultants Reporting on Contaminated Sites", November 1997.

3. Australian Standard AS 2870-1996, "Residential Slabs and Footings – Construction ", June 1996, Standards Australia.

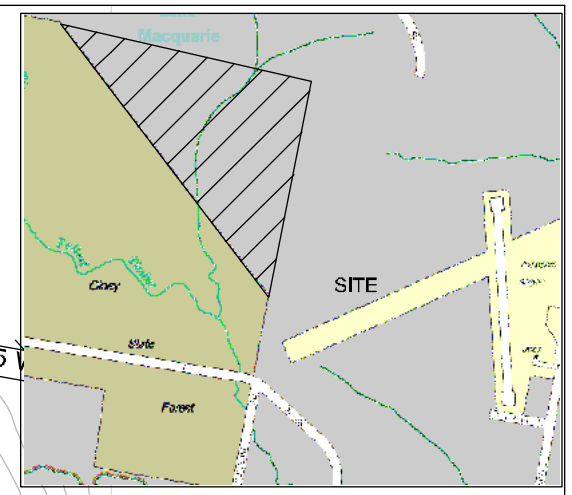
APPENDIX A

DRAWING 1 – TEST LOCATION PLAN

NORTH POINT (MGA)

N

W — E



LOCALITY PLAN

ROAD (20.115 WIDE, UNFORMED)

ROAD (20.115 WIDE, UNFORMED)

SEPTIC SYSTEM

HOUSE & SHED

SOIL MOUNDS

LEGEND

- APPROXIMATE TEST PIT LOCATION
- X APPROXIMATE FIBRE CEMENT PIPE SAMPLE LOCATION (AC1)
- 3° APPROXIMATE SLOPE ANGLE AND DIRECTION
- APPROXIMATE SURFACE WATER TEST LOCATION
- (1) APPROXIMATE PHOTO DIRECTION AND NUMBER
- APPROXIMATE EXTENT OF OBSERVED WET SURFACE SOILS
- APPROXIMATE CREEK/CREEK LINE
- VEGETATION (FROM SURVEY)
- APPROXIMATE LOCATION OF DENSE VEGETATION (FROM FIELD OBVSERVATIONS)
- SITE BOUNDARY

DRAWING ADAPTED FROM PLAN BY SURDEVEL SURVEYORS, JOB NUMBER 1295, DATED 9/6/05

NOTE: SITE OBSERVATIONS WITHIN DENSE VEGETATION WAS LIMITED DUE TO ACCESS CONSTRANTS

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 SITE ASSESSMENT
LOT 219, DP755218, COORANBONG NORTH

CLIENT: JOHNSON PROPERTY GROUP			REF: P:\39229\DRAWINGS\39229-1
DRAWN BY: PLH	SCALE: 1:500	PROJECT No: 39229	OFFICE: NEWCASTLE
APPROVED BY:		DATE:	DRAWING No: 1

APPENDIX B

NOTES RELATING TO THIS REPORT
TEST PIT LOGS – PITS 1 TO 16

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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

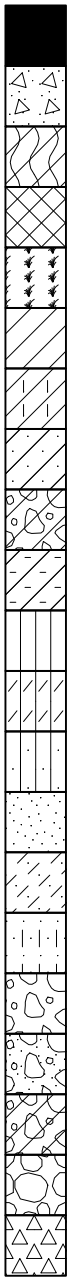
Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with 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

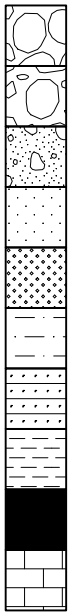
SANDY GRAVEL

CLAYEY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

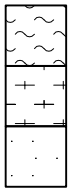
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

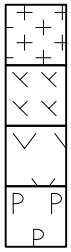


SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

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TEST PIT LOG

CLIENT: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 23.7m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 1
PROJECT No: 39229
DATE: 06 May 05
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 mm) 5 10 15 20
	0.05	TOPSOIL - Grey-brown clay topsoil with some rootlets, M<Wp							
		CLAY - Very stiff to hard, light grey mottled dark brown-orange clay, M>Wp		D,pp	0.5		400-500 kPa		
	0.8	SILTSTONE - Extremely low to very low strength, extremely weathered, light grey siltstone		D	0.9				
1		becoming sandy with depth from 1m, very low strength							1
	1.2	Pit discontinued at 1.2m, refusal							
2									2

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 15.5m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 2
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SILTY SAND - Light grey silty sand with some clay and trace rootlets to 0.05m, moist		D	0.2				
	0.4	SANDY CLAY - Very stiff, light grey mottled orange sandy clay, M>Wp		D,pp	0.7		350-410 kPa		
	1			D,pp	1.2		350-380 kPa		1
	1.5	SILTY SANDY CLAY - Firm, light grey silty sandy clay, M>Wp		D,pp	1.7		40-90 kPa		
	2	from approximately 2m, very stiff		D,pp	2.2		250-300 kPa		2
				D,pp	2.7		200-270 kPa	▼	
	2.8	Pit discontinued at 2.8m							

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: Free groundwater observed at 2.8m

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 12m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 3
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SILTY CLAY - Stiff, brown mottled orange silty clay with trace rootlets, M>Wp		D,pp	0.2		100-170 kPa		
	0.35	CLAY - Stiff, light grey mottled orange clay with some silt, M>Wp		D,pp	0.6		160 kPa		
	0.85	SILTY CLAY - Stiff, light grey silty clay with trace to some sand, M>Wp		D,pp	1.2		90-150 kPa		
	1.55	CEMENTED SAND - Light grey cemented sand, moist		D	1.6				
	1.7	SILTY CLAY - Very stiff, light grey silty clay with trace sand, M>Wp becoming sandy with depth		D,pp	2.0		200-310 kPa		
				D,pp	2.5		300-400 kPa		
	2.6	Pit discontinued at 2.6m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 11.7m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 4
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		CLAYEY SAND - Light grey clayey sand, moist to wet (loose / soft)		D	0.2				
	0.35	CLAY - Firm, light grey mottled orange clay, M>Wp		D,pp	0.5		50-100 kPa		
	0.7	CLAY - Stiff grey clay, M>Wp		D,pp	0.9		100-150 kPa		
	1.1	CEMENTED SAND - Light grey slightly cemented sand, damp		D	1.2				
	1.3	SANDY CLAY - Very stiff, light grey sandy clay, M>Wp		D,pp	1.8		440-490 kPa		
	2.0	CLAY - Very stiff, light grey clay, M>Wp		D,pp	2.2		300-320 kPa		
	2.3	CEMENTED SAND - Light grey cemented sand		D	2.4				
	2.5	Pit discontinued at 2.5m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 14.2m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 5
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SANDY CLAY - Firm, grey-brown sandy clay with trace rootlets, M>>Wp		D,pp	0.2		50-80 kPa		
	0.25	CLAYEY SAND - Light grey clayey sand with clay lenses, moist (loose / firm)		D	0.6				
	0.8	SANDY CLAY - Very stiff, light grey mottled orange sandy clay, M>Wp		D,pp	0.9		200-250 kPa		
	1	from 1m, gravelly							1
		from 1.2m, with trace gravel		D,pp	1.5		420-450 kPa		
	2								2
				D,pp	2.2		220-350 kPa		
	2.6	Pit discontinued at 2.6m							

5 10 15 20

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 18.5m AHD**
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 6
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.05	SILTY SAND - Light brown silty sand, dry							
		CLAY - Very stiff, light brown clay, M>Wp		D,pp	0.4		280-290 kPa		
	0.7	SANDY CLAY - (Very stiff)*, light brown sandy clay with some gravel, M>Wp		D,pp	1.0				
		from 1.1m, mottled light grey							
	1.4	PEBBLY SANDSTONE - Extremely low strength, extremely weathered, light grey pebbly sandstone		D	1.5				
				D	2.3				
	2.6	Pit discontinued at 2.6m							

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Visual assessment, ** Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 17m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 7
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.0	SANDY CLAY - Stiff, light brown mottled light grey sandy clay with trace gravel, M>Wp		D,pp	0.4		140 kPa		
	0.9	SANDY CLAY - Very stiff, light grey sandy clay with trace gravel		D,pp	1.2		280-360 kPa		
	1.3	SANDY CLAY - Very stiff, light grey silty clay, slightly cemented to 1.5m		D,pp	1.4		>600 kPa		
		becoming mottled orange from 1.8m		D,pp	2.0		250-300 kPa		
				D,pp	2.4		340-400 kPa		
	2.5	Pit discontinued at 2.5m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 15.8m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 8
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		CLAYEY SAND - Loose / soft to firm, grey clayey sand with trace organics, wet		D,pp	0.2		40-70 kPa		
	0.4	SAND - Light grey medium to coarse sand with trace gravel and clay, wet to moist		D	0.5				
	0.7	CLAY - Very stiff, light grey mottled orange clay with trace sand, M>Wp		D,pp	0.8		250-310 kPa		
1	0.9	CLAY - Very stiff, light grey clay with trace sand and gravel, M>Wp							1
		sand content increasing with depth		D,pp	1.2		350-380 kPa		
	1.5	SANDY CLAY - Very stiff, light grey sandy clay with trace gravel, M>Wp		D,pp	1.7		350-390 kPa		
2	2.0	SANDY CLAY - Very stiff, light grey mottled orange sandy clay with trace gravel, M>Wp							2
				D,pp	2.3		360-500 kPa		
	2.5	Pit discontinued at 2.5m							

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 21.8m AHD**
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 9
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.05	SILTY SAND - Light brown silty sand with trace rootlets, dry							
		SANDY CLAY - Very stiff, light brown sandy clay, M>Wp		D,pp	0.3		220-290 kPa		
	0.5	CLAY - Hard, light brown mottled red clay, M>Wp		D,pp	0.6		400-550 kPa		
	0.8	SANDY CLAY - (Very stiff to hard)*, light brown mottled light grey sandy clay with trace fine to medium gravel, M>Wp							
	1			D	1.1				1
				D	1.7				
	2			D	2.3				2
	2.6	Pit discontinued at 2.6m							

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Visual assessment, ** Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 25m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 10
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SILTY SAND - Light brown silty sand with trace rootlets, damp		D	0.1				
	0.15	CLAY - Hard, light brown clay with trace sand, M>Wp		D,pp	0.5		490-550 kPa		
	0.7	SANDY CLAY - Very stiff, light grey mottled red sandy clay		D,pp	1.0		420-450 kPa		
	1			D,pp	1.5		250-350 kPa		
		from 1.8m, mottled red and orange, friable							
	2			D,pp	2.0		100-120 kPa		
	2.3	SANDSTONE - Extremely low to very low strength, extremely weathered, light grey and light brown sandstone		D	2.5				
	2.7	Pit discontinued at 2.7m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 30.5m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 11
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.1	SILTY SAND - Light brown silty sand with trace rootlets							
		SANDY CLAY - Hard, light brown sandy clay, M>Wp		D,pp	0.5		470-500 kPa		
1	1.0	SANDY CLAY - Hard, light grey mottled red sandy clay, M>Wp		D,pp	1.2		450-500 kPa		1
	1.4	SANDSTONE - Extremely low strength, completely to extremely weathered, light grey mottled light brown sandstone		D,pp	1.7				
2				D,pp	2.3				2
	2.6	Pit discontinued at 2.6m							

5 10 15 20

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 23.5m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 12
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.05	SILTY SAND - Light brown silty sand with trace rootlets							
		SANDY CLAY - Very stiff, light brown sandy clay, M>Wp		D,pp	0.3		230-250 kPa		
	0.6	SANDY CLAY - Hard, light grey mottled red and light brown sandy clay, M>Wp		D,pp	0.8		450-550 kPa		
	1								1
				D,pp	1.3		450 kPa		
	1.4	SANDSTONE - Extremely low strength, extremely weathered, light grey mottled red and orange sandstone							
				D	1.7				
	2								2
		from 2.2m, sandy clay		D,pp	2.3		220-350 kPa		
	2.6	Pit discontinued at 2.6m							

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 31.5m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 13
PROJECT No: 39229
DATE: 06 May 05
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 mm)
	0.05	SILTY SAND - Light brown silty sand with trace rootlets							
		SANDY CLAY - Very stiff, light brown sandy clay, M>Wp		D,pp	0.3		200-320 kPa		
		from 0.7m, mottled red		D,pp	0.8		320-400 kPa		
	1.2	CLAY - Hard, light grey mottled red clay, M>Wp		D,pp	1.5		540-550 kPa		
	1.8	SANDY CLAY - Hard, light grey mottled red sandy clay, M>Wp		D,pp	2.0		500->600 kPa		
	2.5	Pit discontinued at 2.5m							

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

RIG: Cat 428 Backhoe
LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 37.2m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 14
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SANDY CLAY - Stiff, light brown sandy clay, M>Wp		D,pp	0.3		150 kPa		
	0.6	SANDY CLAY - Very stiff, light grey mottled red and orange sandy clay, M>Wp		D,pp	0.8		350-370 kPa		
	1.2	CLAY - Very stiff to hard, light grey mottled red clay, M>Wp		D,pp	1.3		390-400 kPa		
				D,pp	1.9		460-510 kPa		
	2.1	SANDSTONE- Very stiff, light grey mottled orange sandstone, moist, extremely to completely weathered sandstone		D,pp	2.3		300-360 kPa		
	2.5	Pit discontinued at 2.5m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 30.2m AHD**
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 15
PROJECT No: 39229
DATE: 06 May 05
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 mm)
		SILTY SAND - Light brown silty sand with trace rootlets							
	0.2	SANDY CLAY - Very stiff to hard, light brown sandy clay, M>Wp		D,pp	0.5		470 kPa		
	0.8	SANDY CLAY - Very stiff, light brown mottled light grey and red sandy clay, M>Wp		D,pp	1.0		370-430 kPa		
	1.2	CLAY - (Very stiff*), light grey mottled red clay, M>Wp							
	1.4	SANDSTONE - Extremely low strength, extremely to completely weathered, light grey mottled light brown-orange sandstone (clayey sand in parts)		D	1.6				
				D	2.3				
	2.5	Pit discontinued at 2.5m							

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

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Visual assessment ** Interpolated from site plan

☐ 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: Johnson Property Group
PROJECT: Preliminary Site Assessment
LOCATION: Lot 219, DP 755218, Cooranbong

SURFACE LEVEL: 34m AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 16
PROJECT No: 39229
DATE: 06 May 05
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 mm) 5 10 15 20
		SANDY CLAY - Very stiff, light brown mottled red sandy clay, M>Wp		D,pp	0.4		370-420 kPa		
	0.7	SANDSTONE - Extremely low strength, extremely to completely weathered, light grey mottled light brown sandstone							
	1			D	1.0				1
				D	1.8				
	2								2
		from 2.2m, very low strength							
	2.3	Pit discontinued at 2.3m, refusal		D	2.3				

RIG: Cat 428 Backhoe

LOGGED: Taylor

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Interpolated from site plan

☐ 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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APPENDIX C

LABORATORY REPORT SHEETS

Douglas Partners
Geotechnics · Environment · Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117

Box 324
Hunter Region Mail Centre NSW 2310
Australia

15 Callistemon Close
Warabrook NSW 2304

Phone (02) 4960 9600
Fax: (02) 4960 9601
newcastle@douglaspartners.com.au

DETERMINATION OF EMERSON CLASS NUMBER OF SOIL

Client:	**Johnson Property Group Pty Ltd**	**Project No:**	39229
		Report No:	N05-084
Project:	Preliminary Site Asessment	**Report Date:**	19/5/2005
Location:	Cooranbong	**Date of Test:**	16/5/2005
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	WATER TYPE	WATER TEMP	CLASS NO.
Pit 1	0.5	CLAY - Light grey mottled light brown and orange	Distilled	18.9^{0}C	6
Pit 2	0.7	Sandy CLAY - Light grey mottled orange	Distilled	18.9^{0}C	2
Pit 4	0.2	Clayey SAND - Light grey	Distilled	18.9^{0}C	6
Pit 9	0.3	Sandy CLAY - Light brown	Distilled	18.9^{0}C	6
Pit 10	0.5	CLAY - Light brown	Distilled	18.9^{0}C	6
Pit 16	0.4	Sandy CLAY – Light brown mottled red	Distilled	18.9^{0}C	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:

NATA Accredited Laboratory
Number: 1670
NATA endorsed test report. This document shall not be reproduced, except in full.

Approved Signatory:

Tested: DR
Checked: DM

D Millard
Laboratory Manager

SGS

17 May 2005

TEST REPORT

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

Your Reference: 39229, Cooranbong
Report Number: 37324

Attention: Greg Taylor

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

Samples:	Qty.	1 Material
Date of Receipt of Samples:		11/05/05
Date of Receipt of Instructions:		11/05/05
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 Botany Industrial Park Gate 3, Denison Street, Matraville 2036 NSW Australia
t +61 (0)2 9666 1426 f +61 (0)2 9666 1364 url www.sgs.com

SGS Ref ---	Sample ID ---	Depth	Date Sampled	Sample Description	Asbestos ID in materials
37324-1	AC1			60x50x30mm Rock	No asbestos detected

Method ID	Methodology Summary
SASB-002	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques. Accreditation does not cover the identification of Synthetic Mineral Fibre.

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

ASBESTOS NB. Even after disintegration of certain bulk samples (vinyl tiles and bituminous type materials), the detection, of fibres may be difficult when using Polarised Light Microscopy and Dispersion Staining Techniques. This may be due to the matrix of the sample (uneven distribution), or fine fibres that are difficult to detect and positively identify.

NATA Accreditation No. 2562

Quality Control Protocol

Duplicate: A separale portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicale is prepared at least every 20 samples.