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REPORT ON

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
PITT TOWN, NSW

Submitted to :

Johnson Property Group Pty Ltd

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SYDNEY NSW 2000

DISTRIBUTION:

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June 2005 05623002/12

RECORD OF ISSUE

COMPANY	CLIENT CONTACT	VERSION	Quantity	DATE ISSUED	METHOD OF DELIVERY
JPG Pty Ltd	Paul Hedge	RL1	1	29.06.05	Courier
Brown Consulting Pty Ltd	Don Lucci	RL1	2	29.06.05	Courier
Golder Associates Pty Ltd	Glen Fuller	RL1	1	29.06.05	N/A

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Abrreviations / Glossary

ASS	Acid Sulfate Soils
Brown	Brown Consulting Pty Ltd
Golder	Golder Associates Pty Ltd
HCC-DCP	Hawkesbury City Council – Development Control Plan 2002
JPG	Johnson Property Group Pty Ltd
kL	Kilolitre (1,000 Litres)

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out by Golder Associates Pty Ltd (Golder) at the site of a proposed residential development in Pitt Town, NSW (The 'Site'). The site location is illustrated in Figure 1.

The Site consists of two large parcels of land, either side of Bootles Lane, with the northern property identified as the Bona Vista Site (about 40 Ha) and the southern property identified as the Fernadell Site (about 32 Ha). Both sites were previously used for agricultural purposes.

The Site is located within the jurisdiction of Hawkesbury Council, County of Cumberland and Parish of Pitt Town and is currently zoned as rural land. It is proposed to subdivide the land for development with primarily low-density residential and rural housing, in accordance with draft amendment No. 45 of the Hawkesbury Local Environmental Plan (1989).

Golder previously carried out a Preliminary Geotechnical and Contamination Assessment of the site in 1998 (Reference 1). The objective of the current geotechnical investigation was to obtain information to supplement the previous investigations, specifically:

- Confirmation of the subsurface conditions at the site;
- Lot classification in accordance with AS2870-1996;
- Infiltration tests to assess the feasibility of in ground stormwater disposal; and
- Assessment of subgrade conditions for preliminary pavement design.

The geotechnical investigation was carried out concurrently with a Stage II Detailed Site Contamination Investigation (DSI) (Reference 2) and Acid Sulfate Soils Investigation (Reference 3). Fieldwork for each of the investigations was combined and used the same test holes for sampling. The contamination investigation also included the installation of groundwater monitoring wells and hydrogeological studies.

The geotechnical investigation was performed in accordance with our proposals (P042225.B dated 14th October 2004, P042225C dated 3rd November 2004 and P042225.D dated 29th November 2004). The investigation was carried out following approval to proceed from Mr Paul Hedge of Johnson Property Group Pty Ltd (JPG) dated 18th February 2005.

2.0 SCOPE OF WORK

2.1 Fieldwork

The scope of fieldwork for the geotechnical investigation included:

- Excavation of 20 test pits to up to 4 m depth using a backhoe;
- Collection of bulk samples from the test pits for geotechnical laboratory testing;
- Drilling of 71 hand auger holes to a nominal depth of 1 m below the existing ground surface;
- Drilling of 3 boreholes using a truck mounted drill rig to depths of between 7.6 and 10.5 m and installation of groundwater monitoring wells; and
- Infiltration testing at 16 surface locations.

The fieldwork was carried out between 4th March 2005 and 5th May 2005 in accordance with Golder Standard Quality Procedures.

The drilling and excavation of test pits was attended by a Golder Associates Geotechnical Officer, who located the boreholes and test pits, described the soils encountered, recorded in-situ test results and collected samples for laboratory testing.

A site plan and surrounding properties are illustrated on Figure 2. The borehole and test pit locations are illustrated in Figure 3.

The borehole and test pit reports and explanatory notes in Appendix A present information on the ground conditions encountered. The coordinates shown on the test pit and borehole reports were established using a hand-held GPS and are typically accurate to +/- 5 m.

2.2 Field Permeability Testing

Golder commissioned Sydney Environmental and Soil Laboratory Pty Ltd (SESL) to conduct the field infiltration / field permeability tests. The tests were carried out on 15th April 2005 by Environmental Scientists from SESL.

Infiltration testing was carried using the Talsma Hallam or shallow well permeameter method (Boesma, 1965b, Reference 4). This method was chosen over the double ring infiltration test method as the preferred method for dryland soils such as those encountered on the site. Test locations are illustrated on Figure 3.

A copy of the Infiltration Report prepared by SESL is presented in Appendix B.

2.3 Geotechnical Laboratory Testing

Samples collected from test pits were submitted to Terratest Pty Ltd (Terratest) for laboratory analysis. Terratest is NATA registered for the tests performed which included:

- Moisture Content – AS 1289 2.1.1;
- Standard Compaction – AS 1289 5.1.1; and
- California Bearing Ratio (CBR) – AS 1289 6.1.1.

Laboratory test certificates are presented in Appendix C.

3.0 SITE INFORMATION

3.1 Geology and Hydrogeology

The Penrith Sheet 9031 of the 1:100,000 geological maps (SCS NSW, 1991) indicates that the Site is in an area underlain by the Quaternary Pitt Town Sand Formation comprising quartz sand, clay and minor pebbles. Ashfield Shale of the Wianamatta Group is shown on the geological map close to the western boundary of the Site and comprises claystone-siltstone and fine sandstone-siltstone laminates.

The previous investigations conducted at the Site by Golder (1998) included 59 test pits and indicated:

- In the western part of the site, sand (medium to coarse grained) to depths of 1 to 2.5 m below the ground level, overlaying
- clayey sand (fine to medium grained) to at least 3 m depth, and extending across the northern quarter of the Site; and
- in the eastern half of the Site, silty sand and silt up to 0.4 m depth, overlaying sandy clay, silty clay and clay to depth of at least 3 m.

The results of the geotechnical laboratory test results carried out as part of the previous investigation indicated that the majority of the soils tested were mixtures of sand, silt, and clay. For cohesive soils tested, the Liquid Limits ranged from 26% to 45% and Plastic Limits from 11% to 18% indicating that the cohesive soils are low to medium plasticity. Linear Shrinkage values of the clayey samples range from 6% to 10.5%.

Grading of sand and sandy clay samples indicated that the sand content of the soils is predominantly medium grained and the sands are poorly graded.

3.2 Topography and Soil Landscapes

The Site is located on an elevated "dome" within the Hawkesbury River Flood Plain. Slopes are generally <5% gradient with low to medium density woodland community. The Site slopes gently down from north-west to south-east. The northwestern corner of the Bona Vista Site is at a level of about 25.6m AHD and the southeastern corner of the Fernadell Site at a level of about 12.4 AHD.

The Bona Vista Site consists of open grassed paddocks on the western part of the Site with heavily vegetated bushland occupying the eastern part of the Site. The Fernadell Site is relatively clear of trees with former orchard trees having been stockpiled across various locations on the Site. The Fernadell Site was overgrown with tall grasses and weeds at the time of the investigation with several areas of general waste consisting of steel cables and hail netting previously used in the orchards.

Several drainage depressions / ditches were observed on both Sites, ranging in depth from 0.5 m to about 2.0 m depth. The major depressions / ditches were surveyed by Brown Consulting and are shown in Figure 3.

The closest watercourses to the Site are:

- Bardenerang Creek about 0.25km west of the Site,
- Pitt Town Lagoon about 0.5km south-west of the Site; and
- the Hawkesbury River about 1km north of the Site.

The Penrith 1:100,000 Series Soil Landscapes Sheet 9030 (SCS NSW, 1989) indicates that the Site is primarily on the Agnes Bank soil landscape comprising low parallel alluvial / aeolian sand dunes on a flat terrace surface of Tertiary age.

4.0 RESULTS OF THE INVESTIGATION

4.1 Subsurface Conditions

Boreholes and testpits were logged during drilling / excavation with logs provided in Appendix A. The test pits and boreholes indicate that ground conditions are relatively consistent across both the Sites and with the results of the 1998 investigation. The soils generally comprise sand and clay mixtures. Bedrock was not encountered within the depth of investigation (up to 10.6 m depth).

In the western half of the site, and extending across the northern quarter, the profile is predominantly sand with progressively greater clay content with increasing depth. The profile can be generalised as follows:

- SAND: medium to coarse grained with a trace or some silt and clay, extending to depths ranging from about 0.8m to 4.2m.

- Clayey SAND: fine to medium grained, extending to the termination depth of the test pit. In some test pits the lower material is Sandy CLAY, or contains pockets of sandy clay.

In the eastern part of the Fernadell and Bona Vista Sites (excluding the northern east corner) the profile is predominantly clay with a variable surficial layer of silt and sand. The profile can be generalised as follows:

- Silty SAND, Sandy SILT, and SILT extending to depths of up to 0.4 m (not uniform across the site).

- Sand CLAY, Silty CLAY, and CLAY – generally medium plasticity, but with some high plasticity layers, extending to the termination depth of the test pits.

Fill was encountered at six locations. Three locations on the Bona Vista Site (BH125, BH126 & BH127) to a maximum depth of 0.4m adjacent to existing drainage a depression consisting of Silty SAND. The Fill material was similar to natural soil of the Site and has been attributed to excess soil associated with the exacavtion of the adjacent drainage depression. Three locations on the Fernadell Site (BH172, BH180 & BH181) to a maximum depth of 0.4m and consisting of gravely CLAY were identified within existing driveway and beneath the existing packaging shed.

4.2 Geotechnical Laboratory Test Results

Ten samples were selected for laboratory analysis. The results of geotechnical testing are presented as follows:

Table 1 : Summary of Geotechnical Laboratory Results

Test Location	Depth (m)	Soil Type	Field Moisture (%)	Standard Maximum Dry Density (t/m^3)	Standard Optimum Moisture Content (%)	CBR (%)	Swell (%)
TP21*		Silty Clay		1.85	15.0	-	-
TP33*		Sand		2.02	9.5	-	-
TP108	0.4-0.8	Sand	2.2	1.95	9.2	20	Nil
TP109	0.4-0.8	Sand	5.5	1.89	9.8	12	Nil
TP119	0.4-0.8	Sand	6.9	2.00	8.7	45	Nil
TP132	0.4-0.8	Sand	4.1	1.99	8.4	40	Nil
TP139	0.4-0.8	Silty Clay	14.6	1.76	16.8	2.0	2.0
TP140	0.4-0.8	Sand	5.4	2.09	8.1	35	Nil
TP146	0.4-0.8	Silty Clay	19.1	1.78	19.9	2.5	1.5
TP157	0.4-0.8	Sand	5.5	1.97	8.4	25	Nil
TP160	0.4-0.8	Sandy Clay	14.3	1.80	16.5	25	Nil
TP170	0.4-0.8	Sand	5.3	1.89	9.7	25	Nil

Note: TP21 and TP33 were from the 1998 investigation

The results for field moisture contents and Standard Maximum Dry Densities (SMDD) were similar to those encountered during the previous investigation. The CBR results were typical of the clay and sandy clay soils (2.0 –2.5%), however, the results obtained from the sandy soils were higher than typical ranging from (12 to 45%).

4.3 Groundwater Conditions

Groundwater observed within the test pits was limited to seepages between 1.1 m and 3.2 m depth. This water is likely to be perched water infiltrating through the relatively permeable upper sandy soils.

Groundwater was encountered in the boreholes at depths ranging from 1.9 m below ground level in BH163/MW3 (12.4 m AHD) to 8.6 m below ground level in BH172/MW2 (23.3 m AHD).

Current groundwater information derived from monitoring of the depth to groundwater and a survey of the levels suggest that the general groundwater flow at the Site is in a south to southeasterly direction towards the Pitt Town Lagoon (see Figure 4).

Table 2 : Groundwater Levels

Monitoring Well Location / ID	Date	Depth of Well (m)	Standing Water Level – BSL (m)	Reduced Level (AHD) – Top of Casing (m)	Water Level – AHD (m)
BH101/MW1	23/03/05	9.0	4.5	25.76	21.26
BH172/MW2	23/03/05	10.5	8.6	23.30	14.7
BH172/MW2	23/03/05	10.5	8.8	23.30	14.5
BH162/MW3	05/05/05	7.6	1.9	12.40	10.5

4.4 Field Permeability Test Results

The results of the infiltration testing are summarised in the following table:

Table 3 : Field Permeameter Measurements

Area	Test Location	Material Type	Permeability / Ksat (m/s)
Bona Vista Site	TP104	Sand	1.1×10^{-5}
	TP109	Sand	2.1×10^{-6}
	TP116	Sand	5.1×10^{-6}
	TP132	Sand	4.5×10^{-6}
	TP113	Sand	1.4×10^{-5}
	TP108	Sand	1.5×10^{-5}
	TP123	Sand	1.3×10^{-5}
	TP139	Clay	7.5×10^{-7}

Area	Test Location	Material Type	Permeability / Ksat (m/s)
Fernadell Site	TP140	Sand	4.0×10^{-6}
	TP154	Sand	3.4×10^{-6}
	TP157	Sand	5.9×10^{-6}
	TP143	Sand	3.4×10^{-6}
	TP165	Clay	1.9×10^{-6}
	TP160	Clay	1.5×10^{-6}
	TP146	Clay	1.1×10^{-6}
	TP167	Sand	5.6×10^{-6}

The results indicate that the permeability across both sites is relatively high, consistent with the results generally expected for sand soils. Tests in clay soils gave some what lower results, as expected.

5.0 DISCUSSIONS AND RECOMMENDATIONS

5.1 Site Preparation

The Site is reasonably level and the development of residential lots is expected to involve routine earthworks practice's.

Several drainage ditches observed across the Site may need to be filled. Other surface areas containing deleterious materials such as irrigation pipes, stockpiled vegetation and general waste will need to be removed from the Site.

Low lying boggy areas were encountered during the previous investigation (1998) in the southeastern part of the Fernadell site. However, during the 2005 investigation this area was observed to be relatively dry with some small boggy areas observed. It is important to note that at the time of the investigation the site had experienced extended dry periods, which may have contributed to the area being less boggy than observed in 1998. These areas are likely to collect water draining from other parts of the site and may require grading, provision of drainage or filling to produce suitable building platform.

Topsoil containing significant amounts of organic material is of limited thickness (ranging from 100 mm to 200 mm). The average depth of stripping depth required for roadways and filling areas is likely to be in the order of 150 mm to 200 mm. Stripped topsoil would not be suitable for reuse as structural fill and reuse should be limited to landscaping. Soil containing organic material was also observed in some drainage ditches.

It may be necessary to treat other highly silty soils by:

- Excavating and replacing with less sensitive material or;
- Using good quality material such as ripped rock to form bridging layers over sensitive soils and / or ;
- Using geotextiles to form a bridging layer over sensitive material to improve the compaction of lower layers of fill.

Areas to be filled will need to be inspected by the Certifying Authority prior to placement of fill. The upper 200 mm of the natural subgrade will need to be compacted and tested in accordance with Hawkesbury City Council Development Control Plan 2002 (HCC-DCP) (Reference 4, Part II Construction Specification, Section 4.4). Poor or unsuitable materials would need to be removed and replaced with suitable structural fill as instructed by the Certifying Authority.

5.2 Filling

Filling should be carried out in accordance with AS3798 – 1996 "Guidelines on Earthworks for Commercial and Residential Developments" (Reference 5) and HCC-DCP (2002). The soils at the site, other than deleterious materials discussed above, are suitable for use as structural fill.

Imported fill should be free of deleterious or unsuitable material such as rubbish and organic material and should have a maximum particle size of 100 mm.

Clay fill should be compacted to at least 98% Standard Maximum Dry Density Ratio (SMDD), and moisture conditioned to be within 2% of Standard Optimum Moisture Content (SOMC). The layer thickness should be appropriate for the compaction plant adopted, but should be limited to a maximum of 200 mm when compacted.

Fill comprising sand and silty sand should be compacted to a minimum Density Index of 80%. Highly silty soils may be difficult to compact as their compaction characteristics can be sensitive to moisture content.

Earthworks compliance testing should be in accordance with AS3798 1996, Table 8.1 with testing to be provided by a NATA accredited testing authority.

5.3 Preliminary Pavement Thickness Design

The Preliminary Pavement Thickness Design in Table 4 has been completed to meet the requirements of Hawkesbury City Council Development Control Plan, 2002 (HCC-DCP) and our understanding of the Austroads "Pavement Design Guide 1992" (Reference 6).

Based on the results of CBR testing carried out and for the purpose of this preliminary design a CBR of 2.0% for clay soils and 10% for sandy soils has been adopted.

Design traffic loading's for various road types have been obtained from HCC-DCP (2002), Part I (Design Specifications) Table 6.8. The preliminary pavement design has been based on design traffic loading of 2×10^5 (minor collector) and 5×10^5 (medium collector).

Table 4 : **Preliminary Pavement Thickness**

Design CBR Value (%)	Material Type	Minor Collector	Medium Collector
2.0	Clayey Soils	525-550mm	575-600mm
10	Sandy Soils	325-345mm*	325-345mm*

Note: * denotes minimum pavement based on HCC DCP construction requirements

The pavement composition should be as follows:

- The wearing surface of 25mm (AC10) for local and collector roads increasing to 50mm (AC10) for roundabouts and cul-de-sacs;
- The basecoarse shall meet the requirements of a class "DGB20" material as specified in HCC-DCP, Section 7.3 of the Civil Specifications Part 2 Construction and a minimum compacted thickness of 100mm; and
- The sub-base shall consist of crushed or ripped sandstone, either 75mm or 100mm nominal size. Alternatively, a sub-base material satisfying RTA QA Specification 3051 Unbound and Modified Base and Sub-base Materials for Surfaced Road Pavements and RTA QA Specification 3052 – Material to be Bound for Base and Sub-base Materials for Surface Road Pavements. The Sub-base shall consist of a minimum compacted thickness of 200mm.

The preliminary pavement design has been provided in accordance with HCC-DCP and Austroad design guide, however, once proposed roads have been designed a formal pavement design should be carried out based on samples collected from the proposed road corridors. Subject to prior agreement and discussions with council a reduction in pavement thickness in areas of high CBR values may be possible using sound engineering design principles and pavement design software.

5.4 Excavation and Temporary Batters

Excavation of the soils encountered within the depth of the investigations should be possible using conventional earthworks equipment. It is unlikely that groundwater would be encountered in excavations shallower than about 1.5 m depth, with the exception of small seepages that may occur from perched water tables during and following wet weather, or in boggy areas of the Site..

Temporary unsupported batters may be cut at slopes of 1H:1V but always in accordance with NSW OH&S regulations. It is likely that shallow (<1m deep) utility trenches can be cut with steeper sides (near vertical) but construction equipment should not be allowed closer to the trenches than the equivalent depth of the trench.

5.5 Permanent Batters

Permanent batters may be constructed at slopes of 2H to 1V. The batters should be landscaped to limit the potential for erosion.

If permanent cuts are excavated for the diversion of surface water, the cuts should be formed at slopes no steeper than 3H to 1V. Erosion protection would be required, such as vegetation and/or geofabric pinned to the ground surface.

5.6 Pavement Construction

Flexible Pavements and materials shall be constructed in accordance with HCC-DCP (2002) Part II Construction Specification, Section 7.

Subgrade Preparation

The formation should be finished with boxing for the reception of the pavement. The exposed subgrade should be inspected, proof rolled by the Certifying Authority and compaction testing carried out in accordance with the requirements specified below. Where poor subgrade is encountered it shall be rendered suitable either by moisture conditioning, removed or stabilised as required. Construction of the pavement should not proceed until approval has been obtained from the Certifying Authority.

Compaction Requirements

Density testing shall be carried out by a NATA registered laboratory on the basis of one test every 50 metres of pavement taken 1.0m from the face of kerb on alternate sides of pavement. The pavement compaction requirements shall be as follows:

- All testing to be carried out in accordance with AS1289 testing procedures;
- Subgrade – 100% Standard Maximum Dry Density @ 0 to –3% Standard Optimum Moisture Content;
- Sub-base – 98% Modified Maximum Dry Density (MMDD) @ 0 to –3% Modified Optimum Moisture Content (MOMC); and
- Base course – 98% MMDD @ 0 to –3% MOMC.

Proof rolling to the satisfaction of the Certifying Authority should be conducted prior to placement of each pavement layer.

5.7 Preliminary Lot Classifications and Footing Design

Based on the results of the investigation, the following preliminary lot classification has been prepared in accordance with AS2870 – 1996, Residential Slabs and Footings.

The site generally consists of sands and sandy clays on the western and northern part of the Site with medium to high plasticity soils on the eastern and southeastern part of the Site.

An area within the eastern / southeastern part of the Fernadell Site was previously observed as boggy (Reference 1). Subsequent further investigation of the Site via the construction of three groundwater monitoring wells have identified that shallow groundwater flows in a southerly / south-easterly direction towards this area. Therefore there is potential for water from other parts of the site being directed into this low-lying area. Moderate to high reactive

clays encountered within the area are likely to be relatively susceptible to large surface movements associated with fluctuations in moisture conditions.

A preliminary lot classification is illustrated in Figure 5.

In general residential lots should be able to be developed with footing systems suitable for:

- 'S' Class, where the near surface soils and bearing stratum soil is sand: and
- 'M' Class, where the near surface soils and bearing stratum is clay, subject to good drainage being provided – refer also to our discussion on possible impacts of stormwater infiltration in Section 5.8.

Sites to be filled should be classified on the basis of the nature, thickness and level of compaction of the fill. If the fill compaction is controlled then 'S' and 'M' classification may be adopted. If uncompacted fill or boggy conditions result in weak, compressible foundation material remaining on lots then a 'P' classification would be required.

These recommendations are reasonably consistent with the lot classifications provided in our 1998 report.

5.8 Stormwater Infiltration

We understand that consideration is being given to disposal of stormwater by infiltration into the sandy soils underlying most of the site. Based on the results of the investigation we provide the following comments:

- The permeability of the sand soils is sufficiently high to make the disposal of stormwater by infiltration feasible;
- Infiltration of stormwater to the low reactivity sand soils across the western and northern parts of the Site is not likely to impact on footings and pavements;
- Infiltration of stormwater may result in local raising of the level of the shallow groundwater table beneath the site;
- It is possible that stormwater that infiltrates to the sand soils could migrate down gradient to the low lying areas of the Site. These areas are generally underlain by clays and there is the potential for these soils to react adversely due to moisture changes brought about as a result of the infiltrated stormwater. Adequate drainage would be required to divert and manage this groundwater during wet periods to avoid impacts foundations and pavements in areas of the site underlain by clay. These affects could also be managed by allowing for thicker pavements or a poorer lot classification (Class P).

5.9 Other Geotechnical Considerations

Location of gardens / plantings and the design of adequate drainage across the site will be paramount to the performance of pavements and foundations, specifically within the more reactive soil stratums. A “Guide to Home Owners on Foundation Maintenance and Footing Performance (1996)” prepared by the Commonwealth Science and Industrial Research Organisation (CSIRO) provides a guide for home owners to care for the foundation of their houses and what to expect from a well designed footing system, and is presented as Appendix D.

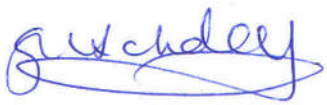
Where Acid Sulfate Soils are encountered precautionary measures such as the use of sulfate resistant cement should be considered for foundations in accordance with AS 2159 1995.

6.0 IMPORTANT INFORMATION

Your attention is drawn to the document - "Important Information about your Geotechnical Engineering Report", which is included in Appendix E of this report. This document has been prepared by the ASFE *(Professional Firms Practicing in the Geosciences)*, of which Golder Associates is a member. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the groundworks for this project. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

We would be pleased to answer any questions about this important information from the reader of this report.

GOLDER ASSOCIATES PTY LTD



Glen Fuller
Senior Technical Officer

Graham Scholey
Associate

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GJF/GKS:CSC/gjf

7.0 REFERENCES

1. Preliminary Geotechnical and Contamination Investigation, Lot 1 DP133026, Lots 13 & 14 DP865977, Pitt Town, NSW – October 1998;

2. Detailed Site Investigation, Proposed Residential Development, Pitt Town, NSW – May 2005;

3. Preliminary Acid Sulfate Soils Investigation, Proposed Residential Development, Pitt Town, NSW – June 2005;

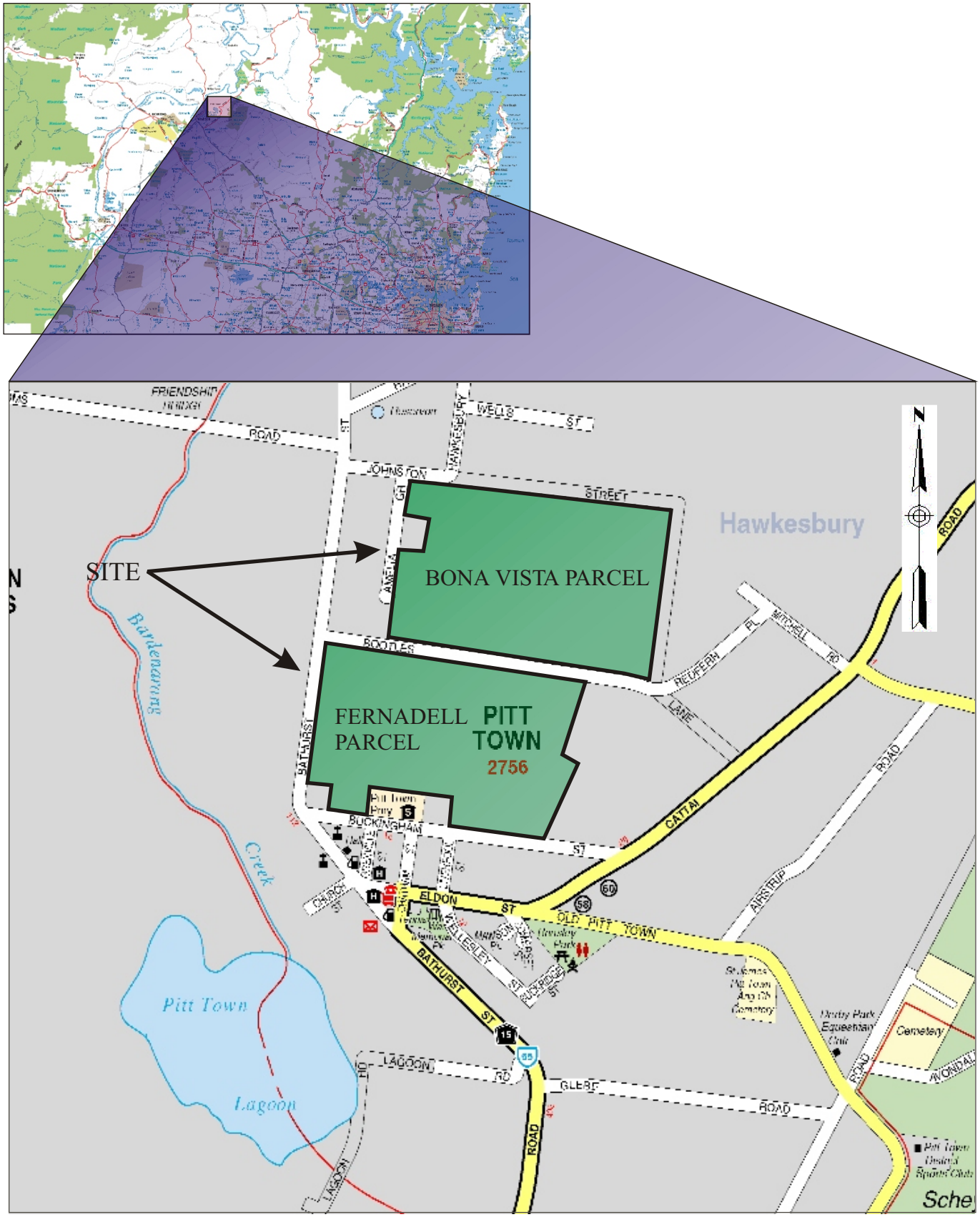
4. Boesma, 1965b – Infiltration Testing

5. Hawkesbury City Council Development Control Plan, 2002;

6. Guidelines on earthworks for commercial and residential developments AS3798, 1996;

7. Austroads "Pavement Design Guide , A Guide to the Structural Design of Road Pavements, 1992";

8. Residential slabs and footings – Construction AS2870, 1996.



SOURCE: BASE MAP 2004 UBD CITY LINK 16TH EDITION

Golder Associates	CLIENT: Johnson Property Group Pty Ltd		PROJECT: Proposed Residential Development, Pitt Town NSW			
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	CHECKED	DATE				
	SCALE: N.T.S		PROJECT No: 05623002 / 012	FIGURE No: 1	REV No: 0	A4

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HAWKSBURY RIVER

HAWKSBURY RIVER

023/PITT TOWN BOTTOMS RD

POUNT RD

HAWKSBURY ST

WELLS ST

JOHNSTON STREET

AMELIA GROVE

BATHURST ST

BONA VISTA

LOT 13 DP865977

LOT 14 DP865977

FUTURE ROAD

WATER HOLE

BOOTLESS LANE

FERNADELL

DP0 133026 LOT 1

SEMI RURAL / RESIDENTIAL

LOW LYING AREA

SEMI RURAL / RESIDENTIAL

BATHURST STREET

SCHOOL

CHURCH

CHURCH

BUCKINGHAM STREET

023/BUCKINGHAM ST

128/BATHURST ST/BUCKINGHAM ST

CHURCH LANE

SEMI RURAL / RESIDENTIAL

SEMI RURAL / RESIDENTIAL

SEMI RURAL / RESIDENTIAL

PITT TOWN LAGOON
(≈ 0.5KM FROM SITE)

N

LEGEND:

- SITE BOUNDARY
- FENCE
- DRAINAGE LINE
- APPROXIMATE LOCATION OF EASEMENT
- RESIDENTIAL AREA

1 SERVICE STATION SITE
2 SHOPPING CENTRE
3 HARDWARE & VEHICLE MAINTENANCE
4 HOTEL / PUB

BASE PLAN SUPPLIED BY BROWN CONSULTING PTY LTD

CLIENT	Johnson Property Group	PROJECT	Proposed Residential Development, Pitt Town NSW
DRAWN SL	DATE 24 May 2005	TITLE	SITE BOUNDARY AND SURROUNDING PROPERTIES
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SCALE 1:7500		PROJECT No 05623002 / 012	FIGURE No 2 · REV No 0 · A3

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JOHNSTON STREET

AMELIA GROVE

BATHURST ST

FUTURE ROAD

BOOTLES LANE

BATHURST STREET

BUCKINGHAM STREET

028 BATHURST S

WATER HOLE

N

LEGEND:

- SITE BOUNDARY
- FENCE
- DRAINAGE LINE
- APPROXIMATE LOCATION OF EASEMENT

TP165, BH162, HA187 — BOREHOLE TESTPIT LOCATIONS, Golder Investigation 2005 (Current)

TP56, SS60 — APPROXIMATE TESTPIT LOCATIONS, Golder Investigation1998

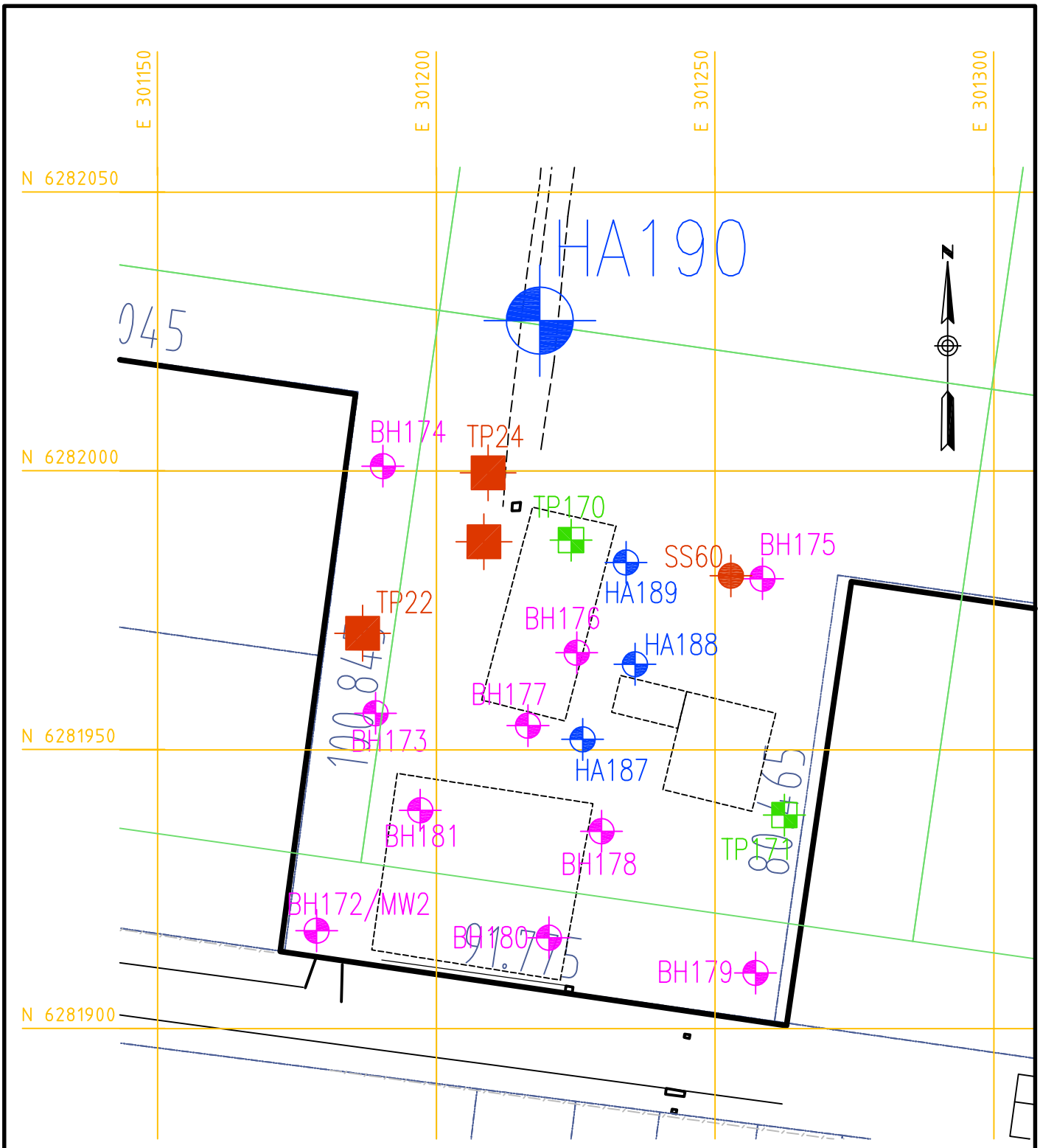
BH163/MW3 — MONITORING WELL LOCATIONS, Golder Investigation 2005 (Current)

BASE PLAN SUPPLIED BY BROWN CONSULTING PTY LTD

CLIENT: Johnson Property Group		PROJECT: Proposed Residential Development, Pitt Town NSW	
DRAWN: SL	DATE: 24 May 2005	TITLE: BOREHOLE TESTPIT LOCATIONS	
CHECKED:	DATE:		
SCALE: 1:5000		PROJECT No: 05623002/012	FIGURE No: 3 / REV No: 0 / A3

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.

J:\05Proj\001-050\Enviro\05623002_Johnson - Pitt Town NSW\Figures\Report12\05623002 Fig 3 r0.dwg Jun 30, 2005 - 10:38am



LEGEND:

- SITE BOUNDARY
- FENCE
- DRAINAGE LINE
- APPROXIMATE LOCATION OF EASEMENT

TP165, BH162, HA187 — BOREHOLE TESTPIT LOCATIONS, Golder Investigation 2005 (Current)

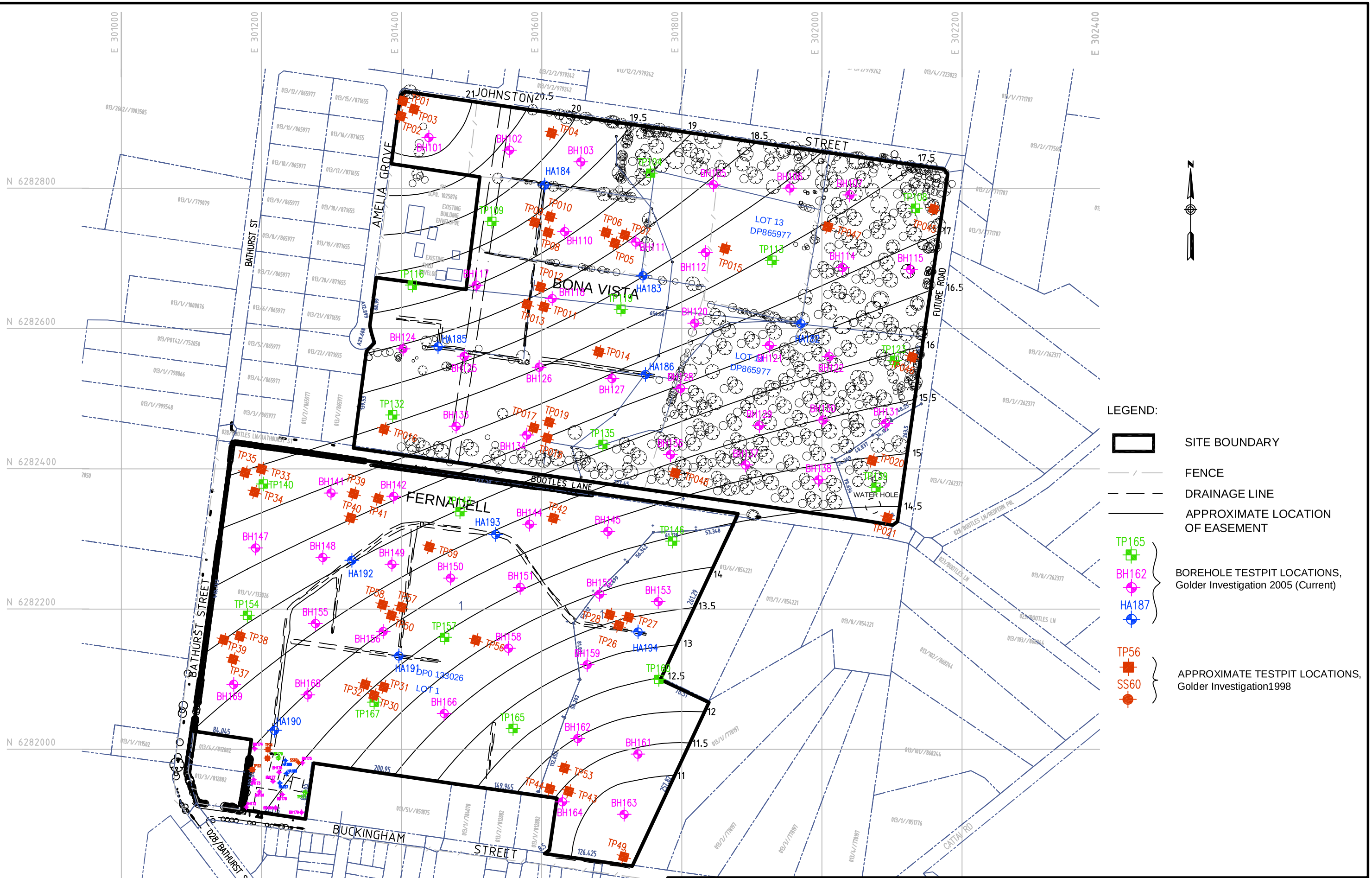
TP56, SS60 — APPROXIMATE TESTPIT LOCATIONS, Golder Investigation1998

BH163/MW3 — MONITORING WELL LOCATIONS, Golder Investigation 2005 (Current)

BASE PLAN SUPPLIED BY BROWN CONSULTING PTY LTD

CLIENT: Johnson Property Group		PROJECT: Proposed Residential Development, Pitt Town NSW	
DRAWN: SL	DATE: 24 May 2005	TITLE: BOREHOLE TESTPIT LOCATIONS SOUTHWEST OF FERNADELL	
CHECKED	DATE		
SCALE: 1:1000		PROJECT No: 05623002 / 012	FIGURE No: 3A / REV No.: 0 / A4

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.



N

LEGEND:

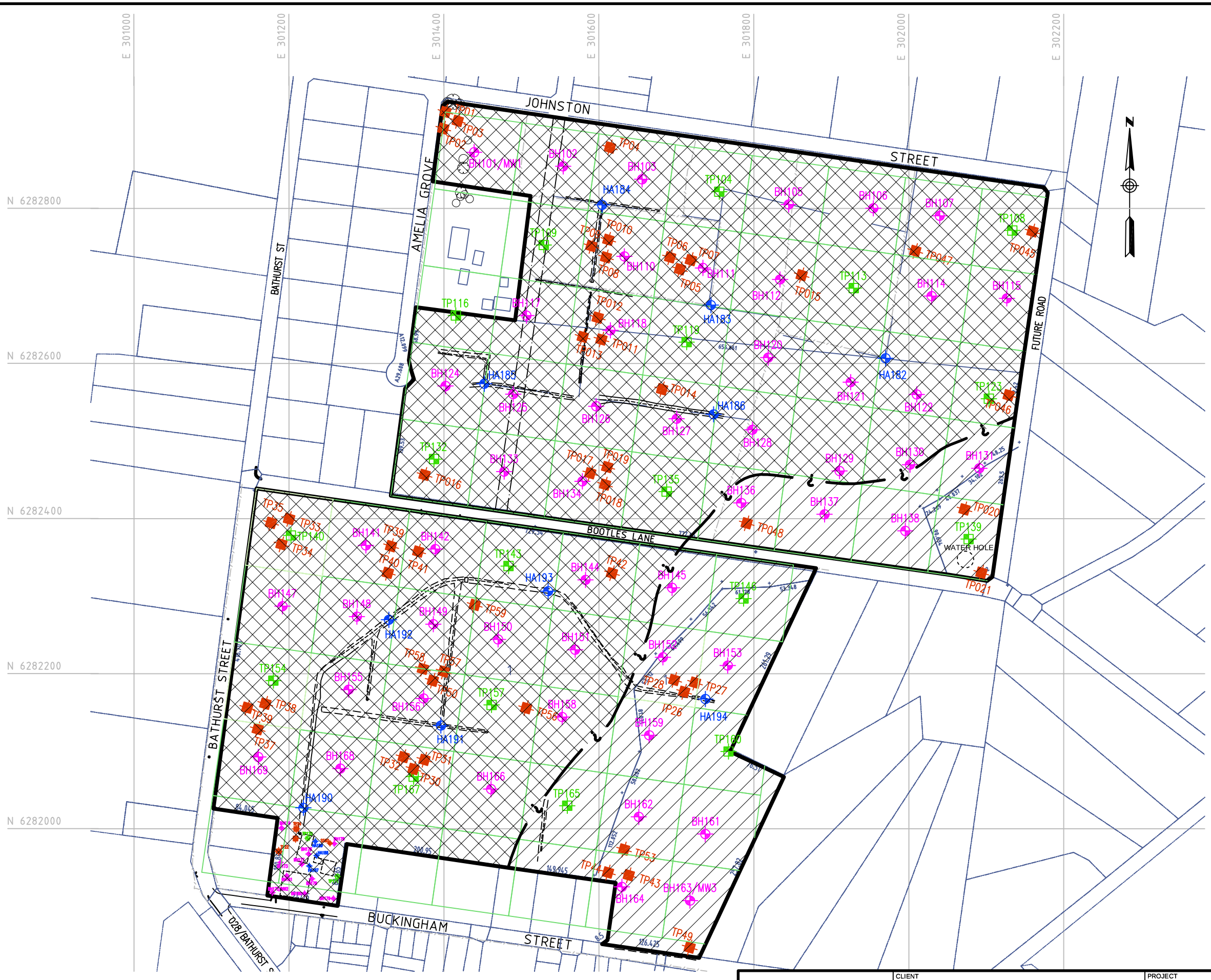
- SITE BOUNDARY
- FENCE
- DRAINAGE LINE
- APPROXIMATE LOCATION OF EASEMENT
- TP165, BH162, HA187 — BOREHOLE TESTPIT LOCATIONS, Golder Investigation 2005 (Current)
- TP56, SS60 — APPROXIMATE TESTPIT LOCATIONS, Golder Investigation1998

BASE PLAN SUPPLIED BY BROWN CONSULTING PTY LTD

CLIENT: Johnson Property Group		PROJECT: Proposed Residential Development, Pitt Town NSW	
DRAWN: SL	DATE: 24 May 2005	TITLE: GROUNDWATER CONTOURS	
CHECKED:	DATE:		
SCALE: 1:5000		PROJECT No: 05623002 / 012	FIGURE No: 4 — REV No: 0 — A3

J:\05Proj\001-050\Enviro\05623002_Johnson - Pitt Town NSW\Figures\Report12\05623002 Fig 4 r0.dwg Jun 30, 2005 - 10:39am

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.



LEGEND:

- SITE BOUNDARY
- FENCE
- DRAINAGE LINE
- APPROXIMATE LOCATION OF EASEMENT
- APPROXIMATE GEOLOGY BOUNDARY
- PRELIMINARY LOT CLASSIFICATION 'M'
- PRELIMINARY LOT CLASSIFICATION 'S'

TP165, BH162, HA187 — BOREHOLE TESTPIT LOCATIONS, Golder Investigation 2005 (Current)

TP56, SS60 — APPROXIMATE TESTPIT LOCATIONS, Golder Investigation1998

BH163/MW3 — MONITORING WELL LOCATIONS, Golder Investigation 2005 (Current)

BASE PLAN SUPPLIED BY BROWN CONSULTING PTY LTD

CLIENT: Johnson Property Group		PROJECT: Proposed Residential Development, Pitt Town NSW	
DRAWN: SL	DATE: 24 May 2005	TITLE: PRELIMINARY LOT CLASSIFICATION	
CHECKED:	DATE:		
SCALE: 1:5000		PROJECT No: 05623002/012	FIGURE No: 5 / REV No: 0 / A3

J:\05Proj\001-050\Enviro\05623002_Johnson - Pitt Town NSW\Figures\Report12\05623002 Fig 5 r0.dwg Jun 30, 2005 - 10:39am

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.

Appendix A
Borehole and Test Pit Reports and Explanatory Notes

REPORT OF BOREHOLE: BH101

CLIENT:	Johnson Property Group	COORDS: 301439 m E 6282873 m N MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: 25.76 m DATUM: AHD	DRILL RIG: Gemco 210B
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Drilltest
JOB NO:	05623002	HOLE DIA: 125 mm HOLE DEPTH: 9.00 m	LOGGED: GJF DATE: 4/3/05
			CHECKED: LBM DATE: 26/6/05

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		0	0.20 25.56	BH1/1 DS 0.00-0.20m R = 0A PID = 3.6 ppm			SAND, fine to medium gravel brown with organic matter.		Gatic Cover 0 - 0.1m Concrete 0.1-0.2m
			0.50 25.26				SAND, fine to medium gravel light brown/grey.		
		1		BH1/2 SPT 0.50-0.95m 7,10,10 N=20			SAND, medium grained white with clay low plasticity.		
			1.20 24.56	R = 0A PID = 4.6 ppm			As above but yellow/brown.		Bentonite 0 .2-2.8m
			1.50 24.26	BH1/3 SPT 1.50-1.95m			Clayey SAND, low plasticity, medium grained, brown/yellow/grey.		
		2		10,15,13 N=28 R = 0A PID = 3.1 ppm					
				BH1/4 SPT 2.50-2.95m					
			2.90 22.86	8,15,16 N=31 R = 0A			As above but brown/yellow with coal particles/organic?		
		3	3.20 22.56	PID = 4.7 ppm			Sandy CLAY, low to medium plasticity, grey/brown.		
			3.50 22.26	BH1/5 SPT 3.50-3.95m			CLAY, high plasticity, grey/brown/yellow.		
			3.90 21.86	5,10,15 N=25			As above with medium ironstone gravel.		
ATC	Standing Water Level 23/3/05	4							
				BH1/6 SPT 4.50-4.95m					
		5							1.5mm Graded Sand 2.8-9.0m
			5.50 20.26	BH1/7 SPT 5.50-5.95m			As above but yellow/grey.		
	Groundwater encountered @ 7.2m	6		5,10,12 N=22 R = 0A PID = 3.8 ppm					
			6.40 19.36				As above but increasing Ironstone banding, yellow/brown.		Class 18 uPVC 0.5mm (3.0-9.0m)
		7							
		8							
		9	9.00 16.76				END OF BOREHOLE @ 9.00 m Reached target depth		
		10							
		11							

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F05
RL2

REPORT OF BOREHOLE: BH102

CLIENT:	Johnson Property Group	COORDS: 301554 m E 6282854 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 10/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH102/1 DS 0.00-0.20m R = 0A PID = 4.6 ppm			SP	SAND, fine to medium grained, brown with clay.	M		TOPSOIL.
				0.30				SP	SAND, medium to coarse grained, brown/grey with clay.			NATURAL.
			0.5		BH102/2 DS 0.40-0.60m R = 0A PID = 5.0 ppm							
				0.70				SP	As above but grey.			
				1.00	BH102/3 DS 0.90-1.00m R = 0A PID = 4.3 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH103

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301656 m E 6282838 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
EX	L	Groundwater not Encountered	0.0	0.20	BH103/1 DS 0.00-0.20m R = 0A PID = 2.7 ppm			SP	SAND, fine to medium grained, brown with silt, trace of clay.	M		TOPSOIL.
			0.5	0.80	BH103/2 DS 0.40-0.60m R = 0A PID = 3.9 ppm			SP	SAND, fine to medium grained, brown/light brown with clay.			NATURAL
			1.0	1.00	BH103/3 DS 0.90-1.00m R = 0A PID = 3.6 ppm			SC	As above but Clayey SAND, grey/white.			
									END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP104

CLIENT:	Johnson Property Group	COORDS: 301755 m E 6282822 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.60 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP104/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm			SP	SAND, fine to medium grained, brown/white with fine gravels, trace of clay.	D		NATURAL.
			0.5		TP104/2 DS 0.40-0.60m R = 0A PID = 4.3 ppm							
				0.80				SP	Silty SAND, fine grained grey/white with fine sansdstone gravels.			
			1.0		TP104/3 DS 1.00-1.20m R = 0A PID = 3.2 ppm							
			1.5									
				1.90				SP	As above but fine to medium grained.			
	M		2.0		TP104/4 DS 2.00-2.20m R = 0A PID = 4.1 ppm					D-M		
			2.5									
			3.0		TP104/5 DS 3.00-3.20m R = 0A PID = 3.6 ppm							
			3.5	*3.60*					TEST PIT DISCONTINUED @ 3.60 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH105

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301845 m E 6282828 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0		BH105/1 DS 0.00-0.20m R = 0A PID = 4.9 ppm			SP	Silty SAND, fine to medium grained, light/brown/grey.	D		NATURAL.
				0.20				SP	SAND, fine grained, grey/white.			
			0.5		BH105/2 DS 0.40-0.60m R = 0A PID = 3.6 ppm			SP	As above but with clay and fine to medium ironstone gravel (extremely weathered).	D-M		Ironstone cementations
				0.60								
				1.00	BH105/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH106

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301954 m E 6282800 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH106/1 DS 0.00-0.20m R = 0A PID = 3.7 ppm			SP	SAND, medium grained, grey/white.	D		NATURAL. - Borehole collapsing.
			0.5		BH106/2 DS 0.40-0.60m R = 0A PID = 3.1 ppm			SP	SAND, fine to medium grained, white.	M		
				0.60								
				1.00	BH106/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH107

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 302040 m E 6282791 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH107/1 DS 0.00-0.20m R = 0A PID = 4.0 ppm			SP	SAND, fine to medium grained, brown/grey.	D		NATURAL.
			0.5		BH107/2 DS 0.40-0.60m R = 0A PID = 3.6 ppm							
				0.70				SP	SAND, fine grained, grey/white trace of fine gravel.	D-M		
			1.0	1.00	BH107/3 DS 0.80-1.00m R = 0A PID = 4.2 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP108

CLIENT:	Johnson Property Group	COORDS: 302133 m E 6282772 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP108/1 DS 0.00-0.20m R = 0A PID = 8.6 ppm			SP	SAND, fine to medium grained, white/brown.	D	L	NATURAL
			0.5		TP108/2 DS 0.40-0.80m R = 0A PID = 6.4 ppm BS 0.4 -0.8							
				0.80				SP	SAND, fine grained, grey mottled yellow/orange.			
			1.0		TP108/3 DS 1.00-1.20m R = 0A PID = 4.9 ppm					D-M		
			1.5									
				1.80				SP	SAND, fine to medium grained, yellow/white/brown with fine ironstone gravels.			
	MH		2.0		TP108/4 DS 1.80-0.20m R = 0A PID = 5.4 ppm					D		
			2.5									
					TP108/5 DS 2.80-3.00m R = 0A PID = 3.6 ppm							
			3.0	*3.00*					TEST PIT DISCONTINUED @ 3.00 m Reached target depth			
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP109

CLIENT:	Johnson Property Group	COORDS: 301529 m E 6282753 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Seepage @1.1m	0.0		TP109/1 DS 0.00-0.20m R = 0A PID = 4.6 ppm			SP	Silty SAND, fine to medium grained, brown.			TOPSOIL
				0.20				SP	SAND, fine to medium grained, brown/grey.			NATURAL
			0.5		TP109/2 DS 0.40-0.80m R = 0A PID = 6.4 ppm BS 0.4 - 0.8							
				0.80				SP	SAND, fine to medium grained, grey mottled orange/yellow with clay and fine to medium ironstained sandstone gravel (extremely weathered, extremely low strength)			
			1.0		TP109/3 DS 1.00-1.20m R = 0A PID = 3.6 ppm							
				1.20				SC	Clayey SAND, fine to medium grained, orange/grey with medium ironstone stained sandstone gravel (extremely weathered)			
			1.5									
				1.90				SC cl	Sandy CLAY/Clayey SAND,low plasticity, fine to medium grained, orange mottled grey.	M		
			2.0		TP109/4 DS 2.00-2.20m R = 0A PID = 5.1 ppm							
			2.5									
			3.0		TP109/5 DS 3.00-3.20m R = 0A PID = 4.4 ppm							
			3.5									
				3.60				CI	CLAY, medium plasticity, brown/yellow trace sand.		St	
				3.80				CH	CLAY, high plasticity, yellow/grey.		St-VSt	
			4.0	4.00					TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH110

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301633 m E 6282738 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	BH110/1 DS 0.00-0.20m R = 0A PID = 2.0 ppm			SP	SAND, fine to medium grained, brown with silt.	M		TOPSOIL
			0.5	0.80	BH110/2 DS 0.40-0.60m R = 0A PID = 2.7 ppm			SP	SAND, fine to medium grained, grey with brown clay.			NATURAL.
			1.0	1.00	100/3 DS 0.90-1.00m R = 0A PID = 3.0 ppm			SP	As above but with ironstone gravel.			
									END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH111

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301734 m E 6282723 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH111/1 DS 0.00-0.20m R = 0A PID = 2.6 ppm			SP	Silty SAND, fine to medium grained, brown/light brown.	M		TOPSOIL
				0.20				SP	SAND, fine to medium grained, brown/grey with clay.			NATURAL.
			0.5		BH111/2 DS 0.40-0.60m R = 0A PID = 2.8 ppm							
				0.70				SP	Aa above but with ironstone gravel.			
				1.00	BH111/3 DS 0.90-1.00m R = 0A PID = 2.7 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH112

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301834 m E 6282708 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.10	BH112/1 DS 0.00-0.10m R = 0A PID = 4.0 ppm			SP	Silty SAND, fine to medium grained brown/light brown	D		TOPSOIL
				0.30				SP	SAND, fine to medium grained, brown/grey.	M		NATURAL.
			0.5		BH112/2 DS 0.40-0.60m R = 0A PID = 3.0 ppm			SP	As above but grey.			
				0.80				SP	As above but trace of fine ironstone gravels.			
			1.0	1.00	BH112/3 DS 0.80-1.00m R = 0A PID = 2.0 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP113

CLIENT:	Johnson Property Group	COORDS: 301929 m E 6282697 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP113/1 DS 0.00-0.20m R = 0A PID = 7.4 ppm			SP	SAND/Silty SAND, fine to medium grained, brown.			NATURAL
				0.30				SP	SAND, fine grained, grey/white with clay.			
			0.5		TP113/2 DS 0.40-0.80m R = 0A PID = 5.4 ppm BS 0.4 - 0.8							
			1.0		TP113/3 DS 1.00-1.20m R = 0A PID = 3.8 ppm							
			1.5	*1.50*				SP	As above but mottled yellow.			
				1.80				SP	SAND, fine to medium grained, grey/yellow/orange with clay.	M		
			2.0		TP113/4 DS 2.00-2.20m R = 0A PID = 5.1 ppm							
			2.5	*2.50*				SC	Clayey SAND, fine to medium grained, orange/grey.			
			3.0		TP113/5 DS 3.00-3.20m R = 0A PID = 6.2 ppm							
				3.40				SC	As above but grey/white.			
			3.5		TP113/6 DS 3.80-4.00m R = 0A							
			4.0	*4.00*	PID = 4.7 ppm				TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH114

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 302029 m E 6282687 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 10/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH114/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			SP	SAND, fine to medium grained, brown/grey.	D		NATURAL.
			0.5		BH114/2 DS 0.40-0.60m R = 0A PID = 3.6 ppm							
				0.80								
	M			1.00	BH114/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm			SP	SAND, fine grained, grey/white.	D-M		- Slow progress.
			1.0						END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH115

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 302126 m E 6282684 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH115/1 DS 0.00-0.20m R = 0A PID = 5.1 ppm			SP	Silty SAND, fine to medium grained, brown.			TOPSOIL.
				0.20				SP	SAND, fine to medium grained, brown/grey.	D		NATURAL
			0.5		BH115/2 DS 0.40-0.60m R = 0A							
				0.60	PID = 5.3 ppm			SP	SAND, fine to medium grained, white.			- Slow progress.
	MH				BH115/3 DS 0.80-1.00m R = 0A					M		
			1.0	1.00	PID = 4.8 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP116

CLIENT:	Johnson Property Group	COORDS: 301415 m E 6282662 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	F	Groundwater not Encountered	0.0	0.20	TP116/1 DS 0.00-0.20m R = 0A PID = 8.4 ppm			SP	Silty SAND, fine to medium grained, brown.	M		TOPSOIL
								SP	SAND, fine to medium grained, brown/grey.			NATURAL
			0.5	0.80	TP116/2 DS 0.40-0.80m R = 0A PID = 6.3 ppm BS 0.4 - 0.8			SP	SAND, fine to medium grained, grey mottled yellow with clay.			
			1.0	1.20	TP116/3 DS 1.00-1.20m R = 0A PID = 4.9 ppm			SC	Clayey SAND, fine to medium grained.			
			1.5	1.70				CL sc	Sandy CLAY/Clayey SAND, low plasticity, orange/grey/yellow.			
			2.0		TP116/4 DS 2.00-2.20m R = 0A PID = 6.3 ppm							
			2.5	2.60				CL sc	As above with ironstained medium sandstone gravels.			
			3.0	3.20	TP116/5 DS 3.00-3.20m R = 0A PID = 4.1 ppm			CH	CLAY, high plasticity, grey with fine to medium sand.		St	
					TP116/6 DS 3.20-3.40m R = 0A PID = 5.8 ppm							
			3.5	3.80								
			4.0	4.00	TP116/7 DS 3.80-4.00m R = 0A PID = 5.4 ppm			CH	CLAY, mediun to high plasticity, brown/yellow trace of fine ironstone gravels.		St-VSt	
									TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH117

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301506 m E 6282662 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH117/1 DS 0.00-0.20m R = 0A PID = 3.6 ppm			SP	SAND, fine to medium with silt, brown.	D-M		TOPSOIL
				0.20				SP	SAND, fine to medium with clay, brown/brown grey			NATURAL.
	L-M		0.5		BH117/2 DS 0.40-0.60m R = 0A PID = 4.0 ppm					M		
				0.60					As above but grey with fine to medium ironstone gravels.			
	M				BH117/3 DS 0.80-1.00m R = 0A PID = 2.1 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH118

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301415 m E 6282643 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	BH118/1 DS 0.00-0.10m R = 0A PID = 3.4 ppm			SP	SAND, fine to medium with silt, brown.	D		TOPSOIL
	L-M		0.5	0.60	BH118/2 DS 0.40-0.60m R = 0A PID = 3.8 ppm			SP	SAND, fine to medium with clay, brown/brown grey.	D-M		NATURAL.
				0.80				SP	As above but grey.			
				1.00	BH118/3 DS 0.80-1.00m R = 0A PID = 2.9 ppm			SP	As above trace of fine ironstone gravels			
			1.0						END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP119

CLIENT:	Johnson Property Group	COORDS: 301713 m E 6282628 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	F	Minorwater seepage @3.2m	0.0	0.20	TP119/1 DS 0.00-0.20m R = 0A PID = 6.4 ppm			SP	Silty SAND,	D		TOPSOIL
								SP	SAND, fine to medium grained, brown/brown-yellow			NATURAL
			0.5		TP119/2 DS 0.40-0.80m R = 0A PID = 5.3 ppm BS 0.4 - 0.8							
			1.0	1.00	TP119/3 DS 1.00-1.20m R = 0A PID = 2.6 ppm			SP	As above but yellow mottled orange with medium iron stained sandstone gravel (extremely weathered, extremely low strength)trace of clay.			
			1.5	1.50				SC	Clayey SAND, fine to medium grained, orange/yellow trace of fine to medium iron stained sandstone.			
			2.0	2.00	TP119/4 DS 2.00-2.20m R = 0A PID = 4.9 ppm			SC	As above but mottled grey.	M		
			2.5	2.80				SC cl	Clayey SAND/Sandy CLAY, orange/grey, trace of fine to medium iron stained sandstone gravel.		F-St	
			3.0		TP119/5 DS 3.00-3.20m R = 0A PID = 5.8 ppm							
			3.5									
			4.0	4.00	TP119/6 DS 3.80-4.00m R = 0A PID = 4.6 ppm				TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH120

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301818 m E 6282608 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0		BH120/1 DS 0.00-0.20m R = 0A PID = 1.6 ppm			SP	Silty SAND, fine to medium grained, light brown/grey.	D		NATURAL.
				0.30				SP	SAND, fine grained, grey/white.			
			0.5	0.60	BH120/2 DS 0.40-0.60m R = 0A PID = 2.8 ppm			SP	As above but with clay and fine ironstone gravel.	D-M		- Ironstone cementations
				1.00	BH120/3 DS 0.80-1.00m R = 0A PID = 2.4 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH121

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301925 m E 6282576 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 10/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH121/1 DS 0.00-0.20m R = 0A PID = 2.9 ppm			SP	SAND, fine to medium grained, grey/brown.	D		NATURAL.
				0.40								
	L-M		0.5		BH121/2 DS 0.40-0.60m R = 0A PID = 2.9 ppm			SP	SAND, fine to medium grained, grey.			
				0.60								
	M				BH121/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm			SP	SAND, medium grained, grey/white.	M		
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH122

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301020 m E 6282560 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	BH122/1 DS 0.00-0.20m R = 0A PID = 2.7 ppm			SP	Silty SAND, fine to medium grained, brown/brown grey.	D		TOPSOIL.
								SP	SAND, fine to medium grained, brown/grey.	M		NATURAL.
			0.5	0.60	BH122/2 DS 0.40-0.60m R = 0A PID = 2.9 ppm			SP	SAND, medium grained, grey/white.			
	M			1.00	BH122/3 DS 0.80-1.00m R = 0A PID = 1.6 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP123

CLIENT:	Johnson Property Group	COORDS: 302103 m E 6282555 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L-M	Groundwater not Encountered	0.0		TP123/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			SP	SAND, fine to medium grained grey/white.	D		NATURAL
			0.5		TP123/2 DS 0.40-0.80m R = 0A PID = 6.4 ppm BS 0.4 - 0.8							
				0.80				SC	Clayey SAND, low plasticity, fine to medium grained, yellow with fine iron stained sandstone.			
			1.0		TP123/3 DS 1.00-1.20m R = 0A PID = 4.2 ppm							
				1.30				SP SC	Clayey SAND, fine to medium grained grey mottled orange/red with medium iron stained sandstone.	M	MD	
	MH		1.5									
					TP123/4 DS 1.80-2.00m R = 0A PID = 5.6 ppm							
			2.0									
			2.5									
					TP123/5 DS 2.80-3.00m R = 0A PID = 5.3 ppm							
			3.0	*3.00*					TEST PIT DISCONTINUED @ 3.00 m Reached target depth			
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH124

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301402 m E 6282571 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH124/1 DS 0.00-0.15m R = 0A PID = 5.3 ppm DUP04			ML	Sandy SILT, low plasticity, brown.	D		TOPSOIL
	M			0.20				SP	Silty SAND, fine grained, light brown.			NATURAL.
			0.5	0.40	BH124/2 DS 0.40-0.60m R = 0A PID = 4.0 ppm			SP	SAND, fine to medium grained, brown/grey with fine to medium ironstone gravel.	M		Cemented? slow progress
	MH			0.60				Gl	Sandy CLAY, low plasticity, brown/yellow with ironstone gravel.		St	
			1.0	1.00	BH124/3 DS 0.80-1.00m R = 0A PID = 4.3 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH125

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301489 m E 6282561 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.30	BH125/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm				FILL:Sandy SILT, low plasticity, brown.	D		FILL
				0.40				ML	Sandy SILT, low plasticity, dark brown with organic matter.	D-M		TOPSOIL
			0.5	0.60	BH125/2 DS 0.40-0.60m R = 0A PID = 3.1 ppm			SC	SAND, fine to medium grained, brown/grey.	M		NATURAL.
	M			0.80				SC	As above but with clay and fine to medium ironstone gravel.			
			1.0	1.00	BH125/3 DS 0.80-1.00m R = 0A PID = 4.3 ppm			SC	Clayey SAND, fine to medium grained, with fine to medium ironstone gravel.			
									END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH126

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301596 m E 6282545 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 10/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	M	Groundwater not Encountered	0.0		BH126/1 DS 0.00-0.20m R = 0A PID = 2.6 ppm				FILL:Silty SAND, fine to medium grained, brown/light brown.	D		FILL
				0.40								
HA	L		0.5		BH126/2 DS 0.40-0.60m R = 0A PID = 3.0 ppm			SP	SAND, fine grained, brown/yellow/grey trace of clay and silt.	M		NATURAL.
					BH126/3 DS 0.80-1.00m R = 0A PID = 2.9 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH127

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301700 m E 6282529 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0	0.20	BH127/1 DS 0.00-0.20m R = 0A PID = 4.0 ppm				FILL:Silty SAND, fine grained, brown/light brown.	D-M		FILL
								SP	SAND, fine to medium grained, with silt, brown, trace of organic matter.	M		NATURAL.
			0.5	0.60	BH127/2 DS 0.40-0.60m R = 0A PID = 3.1 ppm							- Organic odour
				0.80				SP	SAND, fine to medium grained, with silt, light brown.			
				1.00	BH127/3 DS 0.80-1.00m R = 0A PID = 2.7 ppm			SP	SAND, fine grained, brown/grey.			
			1.0						END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH128

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301798 m E 6282515 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0		BH128/1 DS 0.00-0.20m R = 0A PID = 2.6 ppm			SP	Silty SAND, fine grained, light brown/grey.	D-M		NATURAL.
	L		0.5		BH128/2 DS 0.40-0.60m R = 0A PID = 2.8 ppm			SP	SAND, fine grained with fine to medium gravel., light brown/grey			
	M			0.60 0.80	BH128/3 DS 0.80-1.00m R = 0A PID = 2.0 ppm			SP	As above but trace of ironstone gravels.	M		
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH129

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301910 m E 6282461 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 11/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
		Groundwater not Encountered	0.0		BH129/1 DS 0.00-0.20m R = 0A PID = 3.4 ppm			SP	Silty SAND, fine to medium grained, brown/white.	D		TOPSOIL.
	L		0.5	*0.20*	BH129/2 DS 0.40-0.60m R = 0A PID = 4.1 ppm			SP	Silty SAND, fine to medium grained, white.	D-M		NATURAL.
	M		1.0	*0.70* *1.00*	BH129/3 DS 0.80-1.00m R = 0A PID = 2.8 ppm			SP	SAND, fine grained, light brown/white trace of fine gravels. END OF BOREHOLE @ 1.00 m Reached target depth	M		
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH130

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 302001 m E 6282469 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 11/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	BH130/1 DS 0.00-0.20m R = 0A PID = 2.9 ppm			SP	Silty SAND, fine to medium grained, brown/light brown.	D-M		TOPSOIL.
								SP	Silty SAND, fine to medium grained, white.			NATURAL
			0.5	0.60	BH130/2 DS 0.40-0.60m R = 0A PID = 2.3 ppm			SP	SAND, fine grained, brown/white.	M	0	
	M			1.00	BH130/3 DS 0.80-1.00m R = 0A PID = 1.8 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH131

CLIENT:	Johnson Property Group	COORDS: 302091 m E 6282465 m N MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: HA
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: DD DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	HA131/1 DS 0.00-0.20m R = 0A PID = 1.6 ppm			ML	SILT, low plasticity, grey/brown, with clay	D	L	TOPSOIL
	M		0.5	0.60	HA131/2 DS 0.40-0.60m R = 0A PID = 2.1 ppm			CH	CLAY, high plasticity, brown - red/brown	D-M	St-VSt	NATURAL.
				1.00	HA131/3 DS 0.80-1.00m R = 0A PID = 2.2 ppm			CH	As above but yellow/brown	M		
			1.0						END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF TEST PIT: TP132

CLIENT:	Johnson Property Group	COORDS: 301387 m E 6282477 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP132/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			SP	Silty SAND, fine to medium grained, brown.	M		NATURAL
				0.30				SP	SAND, medium grained grey/white with medium to coarse ironstone gravels.			
	L-M		0.5		TP132/2 DS 0.40-0.80m R = 0A PID = 5.4 ppm BS 0.4 - 0.8 m							
				0.80				Cl	Sandy CLAY, medium plasticity.		St	
			1.0		TP132/3 DS 1.00-1.20m R = 0A PID = 4.9 ppm							
				1.30				SC	Clayey SAND, fine to medium grained grained/yellow/red with iron stained sandstone gravel.			
			1.5									
			2.0		TP132/4 DS 2.00-2.20m R = 0A PID = 6.4 ppm							
	M			*2.60*				CH	CLAY, high plasticity, grey trace of fine sand.		St	
				3.00								
			3.0		TP132/5 DS 3.00-3.20m R = 0A PID = 4.2 ppm			SC	Clayey SAND, fine to medium grained grey/orange with iron stained fine to medium sandstone gravels.			
				3.40				Cl CH	CLAY, medium to high plasticity, yellow- brown mottled grey, trace of fine to medium sandstone gravels.		St	
			3.5									
				4.00	TP132/6 DS 3.80-4.00m R = 0A PID = 5.2 ppm				TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH133

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301478 m E 6282461 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH133/1 DS 0.00-0.20m R = 0A PID = 1.9 ppm			SP	Silty SAND, fine to meidum grained, brown/light brown.	D-M		NATURAL.
				0.25				SP	SAND, fine to medium grained, brown.			
			0.5		BH133/2 DS 0.40-0.60m R = 0A PID = 2.9 ppm			SP	As above but grey/light brown.	M		
				0.60								
				0.80	BH133/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm			SP	As above but yellow mottles and fine ironstone gravels.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH134

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301579 m E 6282448 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	BH134/1 DS 0.00-0.20m R = 0A PID = 1.6 ppm			SP	Silty SAND, fine to medium grained, brown.	D-M		NATURAL.
			0.5	0.60	BH134/2 DS 0.40-0.60m R = 0A PID = 2.4 ppm			SP	SAND, medium grained, brown/grey.	M		
	L-M			0.80				SP	As above but grey.			
			1.0	1.00	BH134/3 DS 0.80-1.00m R = 0A PID = 1.8 ppm			SP	As above but trace of ironstone gravels.			
									END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP135

CLIENT:	Johnson Property Group	COORDS: 301687 m E 6282435 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.20 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP135/1 DS 0.00-0.20m R = 0A PID = 6.4 ppm			SP	Silty SAND, fine to medium grained brown/grey.	D		NATURAL
				0.30				SP	SAND, fine grained grey/white with silt.			
			0.5		TP135/2 DS 0.40-0.80m R = 0A PID = 5.8 ppm BS 0.4 - 0.8 m							
			1.0		TP135/3 DS 1.00-1.20m R = 0A							
				1.20	PID = 2.8 ppm			SC	Clayey SAND, fine grained, grey/red/orange, (extremely weathered sandstone).			
	MH		1.5									
				1.90				CH	CLAY, high plasticity, grey/brown/yellow with fine to medium iron stained sandstone gravel.	M	St-VSt	
	M		2.0		TP135/4 DS 2.00-2.20m R = 0A PID = 5.6 ppm							
			2.5									
			3.0		TP135/5 DS 3.00-3.20m R = 0A							
				3.20	PID = 4.7 ppm				TEST PIT DISCONTINUED @ 3.20 m Reached target depth			
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH136

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301784 m E 6282420 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.90 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 10/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH136/1 DS 0.00-0.20m R = 0A PID = 2.8 ppm			ML	Sandy SILT, low plasticity, brown/grey.	D	L	NATURAL.
				0.30								
				0.40				SP	Silty SAND, fine grained, brown/grey.	D-M		
			0.5		BH136/2 DS 0.40-0.60m R = 0A PID = 3.4 ppm			CI	CLAY, medium plasticity, brown/yellow, traces of sand.	M	St	
				0.80								
				0.90	BH136/3 DS 0.80-0.90m R = 0A PID = 3.0 ppm			CI	As above with fine ironstone gravels.			
			1.0						END OF BOREHOLE @ 0.90 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH137

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301891 m E 6282406 m N MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: HA
DRILLER: Golder
LOGGED: DD DATE: 14/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.15	HA137/1 DS 0.00-0.15m R = 0A PID = 2.9 ppm			SP	Silty SAND, fine to medium grained, brown	D		TOPSOIL
	M		0.5		HA137/2 DS 0.40-0.60m R = 0A PID = 2.6 ppm			Cl	Silty CLAY, medium plasticity, brown/yellow	D-M	St	NATURAL.
			1.0	1.00	HA137/3 DS 0.80-1.00m R = 0A PID = 3.4 ppm				END OF BOREHOLE @ 1.00 m Reached target depth	D		- @ 0.5m root (living)
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF BOREHOLE: BH138

CLIENT:	Johnson Property Group	COORDS: 301995 m E 6282384 m N MGA94	SHEET: 1 OF 1		
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: HA		
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder		
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: DD	DATE: 14/3/05	
			CHECKED: GKS	DATE: 26/6/05	

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA138/1 DS 0.00-0.15m R = 0A PID = 3.4 ppm			SP	Silty SAND, fine to medium grained, brown	D		TOPSOIL
				0.25								
	M		0.5		HA138/2 DS 0.40-0.60m R = 0A PID = 3.2 ppm			CI	Silty CLAY, medium plasticity, brown to red/brown	D-M	St	NATURAL.
					HA138/3 DS 0.80-1.00m R = 0A PID = 1.6 ppm					M		
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF TEST PIT: TP139

CLIENT:	Johnson Property Group	COORDS: 302077 m E 6282374 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.20 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L-M	Groundwater not Encountered	0.0		TP139/1 DS 0.00-0.20m R = 0A PID = 8.1 ppm			ML	Silty CLAY, low pasticity, brown.	D	L	TOPSOIL
				0.20								
								Cl	CLAY, medium plasticity, brown/yellow mottled grey, trace of fine ironstone gravels.			RESIDUAL
	L-M		0.5		TP139/2 DS 0.40-0.80m R = 0A PID = 2.6 ppm BS 0.4 - 0.8					D-M	St	
			1.0		TP139/3 DS 1.00-1.20m R = 0A PID = 4.9 ppm							
			1.5	*1.50*				CH	CLAY, high plasticity, grey/brown mottled yellow.			
				1.80				CH	As above with fine to medium ironstone gravels (extremely weathered)			
	M		2.0		TP139/4 DS 2.00-2.20m R = 0A PID = 6.3 ppm					M	St-VSt	
			2.5									RELIC ROCK STRUCTURE
			3.0		TP139/5 DS 3.00-3.20m R = 0A PID = 4.3 ppm							
				3.20					TEST PIT DISCONTINUED @ 3.20 m Reached target depth			
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP140

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301203 m E 6282378 m N 56 MGA94	MACHINE: CAT
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	CONTRACTOR: Onecall
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	LOGGED: GJF DATE: 14/3/05
JOB NO:	05623002	BUCKET TYPE: 450mm	CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP140/1 DS 0.00-0.20m R = 0A PID = 5.4 ppm			SP	SAND/Silty SAND, fine to medium grained.	D		NATURAL
				0.30				SC	Clayey SAND/SAND, fine to medium grained, red/brown with clay.	M		
			0.5		TP140/2 DS 0.40-0.60m R = 0A PID = 3.4 ppm BS 0.4 - 0.8m							
			1.0		TP140/3 DS 1.00-1.20m R = 0A PID = 5.7 ppm							
			1.5									
			2.0		TP140/4 DS 2.00-2.20m R = 0A PID = 2.8 ppm							
				2.50				SC	As above but red with brown mottling.			
			3.0		TP140/5 DS 3.00-3.20m R = 0A PID = 4.7 ppm							
				3.20				SC	Clayey SAND, fine to medium grained, yellow/light brown /red with medium to coarse iron stained sandstone.			
			3.5									
					TP140/3 DS 3.80-4.00m R = 0A PID = 5.3 ppm							
			4.0	4.00					TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH141

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301300 m E 628265 m N MGA94	DRILL RIG: HA
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: DD DATE: 14/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH141/1 DS 0.00-0.20m R = 0A PID = 2.4 ppm			SP	Silty SAND, fine to medium grained, brown/grey	D		NATURAL.
				0.40								
			0.5		BH141/2 DS 0.40-0.60m R = 0A PID = 3.0 ppm			SP	As above but yellow/brown	D-M		
				0.65				SP	As above but with fine to medium ironstone gravels.			
	L-M				BH141/3 DS 0.80-1.00m R = 0A PID = 2.1 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF BOREHOLE: BH142

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301389 m E 6282361 m N MGA94	DRILL RIG: HA
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: DD DATE: 14/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		BH142/1 DS 0.00-0.20m R = 0A PID = 0.8 ppm			SP	Silty SAND, fine to medium grained, grey/brown	D		NATURAL.
			0.5		BH142/2 DS 0.40-0.60m R = 0A PID = 1.8 ppm					M-W		
				0.80								
					BH142/3 DS 0.80-1.00m R = 0A PID = 3.1 ppm			SP	As above but with fine to medium ironstone gravels.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF TEST PIT: TP143

CLIENT:	Johnson Property Group	COORDS: 30183 m E 6282339 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.60 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP143/1 DS 0.00-0.20m R = 0A PID = 6.2 ppm			SP	Silty SAND, fine to medium grained brown.	D		TOPSOIL
				0.20				CI	CLAY, medium plasticity, brown/yellow/grey trace of fine ironstone.	M	F-St	NATURAL
			0.5		TP143/2 DS 0.40-0.80m R = 0A PID = 4.3 ppm BS 0.4 - 0.8m							
				0.90				CI	As above but yellow/grey.		St	
	M		1.0		TP143/3 DS 1.00-1.20m R = 0A PID = 3.8 ppm							
			1.5									
			2.0		TP143/4 DS 2.00-2.20m R = 0A PID = 4.9 ppm							
				2.10				CI	As above but with fine to medium iron stained sandstone.		St-VSt	
				2.50				SC	Clayey SAND, fine to medium grained, orange/grey with medium to coarse iron stained sandstone gravels.			WEATHERED BEDROCK
			2.5									
	MH		3.0		TP143/5 DS 3.00-3.20m R = 0A PID = 4.4 ppm					M-W		
			3.5	3.60					TEST PIT DISCONTINUED @ 3.60 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH144

CLIENT:	Johnson Property Group	COORDS: 301583 m E 6282321 m N MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: HA
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: DD DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0	0.25	BH144/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			CI	Silty CLAY, medium plasticity, brown	D-M	F-St	NATURAL.
	M-H		0.5		BH144/2 DS 0.40-0.60m R = 0A PID = 2.6 ppm			CI	CLAY, medium plasticity, brown	M	St-VSt	
			1.0	1.00	BH144/3 DS 0.80-1.00m R = 0A PID = 2.9 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF BOREHOLE: BH145

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301694 m E 6282311 m N MGA94	DRILL RIG: HA
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: DD DATE: 14/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0		BH145/1 DS 0.00-0.20m R = 0A PID = 4.1 ppm			ML	Clayey SILT, low plasticity, brown	D-M		TOPSOIL
				0.30								
	M		0.5		BH145/2 DS 0.40-0.60m R = 0A PID = 3.8 ppm			CI	CLAY, medium plasticity, brown/red	M	St	NATURAL.
				0.75								
					BH145/3 DS 0.80-1.00m R = 0A PID = 4.4 ppm			CI	As above but brown mottled grey			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF TEST PIT: TP146

CLIENT:	Johnson Property Group	COORDS: 301867 m E 6282297 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.60 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0	0.20	TP146/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm			ML	Sandy SILT, low plasticity, brown.	D	L	TOPSOIL
	M		0.5	0.80	TP146/2 DS 0.40-0.60m R = 0A PID = 4.4 ppm			CL CI	CLAY, low to medium plasticity, brown/grey mottled yellow.	M	F-St	RESIDUAL
			1.0	1.60	TP146/3 DS 1.00-1.20m R = 0A PID = 4.0 ppm			CI	CLAY, medium plasticity, red/grey trace of fine to medium ironstone gravels.		St	
			2.0	2.30	TP146/4 DS 2.00-2.20m R = 0A PID = 5.3 ppm			CI	As above with fine to medium iron stained Siltstone/Sandstone and trace of sand.			
			2.5					CH	CLAY, high plasticity, grey with red mottlings and medium iron stained Siltstone/Sandstone gravels.			
			3.0		TP146/5 DS 3.00-3.20m R = 0A PID = 4.9 ppm							
			3.5	3.60					TEST PIT DISCONTINUED @ 3.60 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH147

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301192 m E 6282287 m N MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: HA
DRILLER: Golder
LOGGED: DD DATE: 14/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA147/1 DS 0.00-0.20m R = 0A PID = 4.3 ppm			SP	Silty SAND, fine grained, red/brown with traces of clay	D		NATURAL.
			0.5		HA147/2 DS 0.40-0.60m R = 0A PID = 3.8 ppm					D-M		
					HA147/3 DS 0.80-1.00m R = 0A PID = 4.1 ppm					M		
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF BOREHOLE: BH148

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301288 m E 6282274 m N MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: HA
DRILLER: Golder
LOGGED: DD DATE: 14/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA148/1 DS 0.00-0.20m R = 0A PID = 3.1 ppm			SP	Silty SAND, fine to medium grained, grey/brown	D		NATURAL.
			0.5		HA148/2 DS 0.40-0.60m R = 0A PID = 3.3 ppm					D-M		
				0.60				SP	As above but with fine to medium ironstone gravels.			
	M				HA148/3 DS 0.80-1.00m R = 0A PID = 3.0 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F01a
RL2

REPORT OF BOREHOLE: BH149

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301386 m E 6282263 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA149/1 DS 0.00-0.20m R = 0A PID = 5.7 ppm			SP	SAND, fine to medium grained, grey/brown.	D		NATURAL.
				0.30				SP	SAND, fine to medium grained, grey.	M		
			0.5		HA149/2 DS 0.40-0.60m R = 0A PID = 4.8 ppm							
				0.70				GP	Gravelly SAND, fine to medium grained, white/grey, with medium ironstone gravel.			
	M			1.00	HA149/3 DS 0.80-1.00m R = 0A PID = 3.7 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH150

CLIENT:	Johnson Property Group	COORDS: 301470 m E 6282244 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA150/1 DS 0.00-0.20m R = 0A PID = 4.2 ppm			SP	SAND/Silty SAND, fine to medium grained, brown.	D-M		NATURAL.
				0.40								
			0.5		HA150/2 DS 0.40-0.60m R = 0A PID = 4.4 ppm			SP	SAND, fine to medium grained, grey/brown.	M		
				0.80								
					HA150/3 DS 0.80-1.00m R = 0A PID = 3.6 ppm			SP	As above but with yellow mottlings.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH151

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301569 m E 6282231 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	HA151/1 DS 0.00-0.20m R = 0A PID = 3.9 ppm			SP	Silty SAND, fine to medium grained, brown.	D-M		NATURAL.
								SP	SAND, fine to medium grained, grey/brown.			
			0.5	0.60	HA151/2 DS 0.40-0.60m R = 0A PID = 4.5 ppm			SP	Silty SAND, fine to medium grained, grey/yellow.	M		
				0.90	HA151/3 DS 0.80-1.00m R = 0A PID = 4.2 ppm			CL	Sandy CLAY, low plasticity, grey/yellow with fine to medium iron stained sandstone gravel.		S	
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH152

CLIENT:	Johnson Property Group	COORDS: 301683 m E 6282221 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA152/1 DS 0.00-0.20m R = 0A PID = 5.4 ppm			ML	Clayey SILT, low plasticity, brown trace of sand.	M	S	TOPSOIL
				0.20								
	L-M		0.5		HA152/2 DS 0.40-0.60m R = 0A PID = 4.3 ppm			CL CI	Silty CLAY, low to medium plasticity, brown/yellow trace of fine sand.		St	NATURAL.
				0.80								
					HA152/3 DS 0.80-1.00m R = 0A PID = 4.4 ppm			CL CI	As above but yellow/brown mottled grey.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH153

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301766 m E 6282210 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 21/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA153/1 DS 0.00-0.20m R = 0A PID = 3.6 ppm			ML	Clayey SILT, low plasticity, brown trace of fine sand.	M	S	TOPSOIL.
				0.25				CL CI	Silty CLAY, low to medium plasticity, brown/yellow.			NATURAL.
	L-M		0.5		HA153/2 DS 0.40-0.60m R = 0A PID = 2.4 ppm						St	
				0.70				CI	As above but medium plasticity.			
				1.00	HA153/3 DS 0.80-1.00m R = 0A PID = 3.7 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP154

CLIENT:	Johnson Property Group	COORDS: 301180 m E 6282191 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L-M	Groundwater not Encountered	0.0		TP154/1 DS 0.00-0.20m R = 0A PID = 5.4 ppm			SP	Silty SAND, fine to medium grained, brown with fine to medium gravel.	D		TOPSOIL
				0.20				SP	SAND, fine to medium grained, red/brown with medium iron stained sandstone gravel.			NATURAL
			0.5		TP154/2 DS 0.40-0.80m R = 0A PID = 4.8 ppm BS 0.4 - 0.8					D-M		
				0.90				SP	SAND, fine to medium grained, light brown/grey with medium to coarse sandstone gravels.			
			1.0		TP154/3 DS 1.00-1.20m R = 0A PID = 4.9 ppm							
			1.5	1.60				SP	As above but brown/yellow mottled grey.	M		
			2.0		TP154/4 DS 2.00-2.20m R = 0A PID = 5.4 ppm							
			2.5	2.60				CI	Sandy CLAY, medium plasticity, grey mottled yellow with medium to coarse iron stained sandstone gravel.		F-St	
			3.0		TP154/5 DS 3.00-3.20m R = 0A PID = 5.1 ppm							
				3.30				CH	CLAY, high plasticity, yellow/grey trace of fine to medium sandstone gravel.		St	
			3.5									
				4.00	TP154/6 DS 3.80-4.00m R = 0A PID = 4.1 ppm				TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH155

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301277 m E 6282179 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA155/1 DS 0.00-0.20m R = 0A PID = 6.1 ppm			SP	Silty SAND, fine to medium grained, brown/brown yellow.	D-M		NATURAL.
				0.35								
			0.5		HA155/2 DS 0.40-0.60m R = 0A PID = 3.8 ppm			SP	Gravelly SAND, fine grained, brown/grey mottled yellow with iron stained sandstone gravels.	M		
				0.70				SP	SAND, fine to medium grained, grey/white with gravel.			
	M				HA155/3 DS 0.80-1.00m R = 0A PID = 4.4 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH156

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301374 m E 6282168 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA156/1 DS 0.00-0.20m R = 0A PID = 3.2 ppm			SP	Silty SAND, fine to medium grained, brown.	D-M		NATURAL.
				0.30				SP	As above with clay.			
				0.40	HA156/2 DS 0.40-0.60m R = 0A PID = 3.6 ppm			SP	SAND, fine grained, brown/white.			
			0.5	0.70				SP	Gravelly SAND, fine to medium grained, grey/white with medium iron stained gravel.	M		
				1.00	HA156/3 DS 0.80-1.00m R = 0A PID = 5.1 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP157

CLIENT:	Johnson Property Group	COORDS: 301461 m E 6282160 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP157/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			SP	Silty SAND, fine grained, brown.	D		NATURAL
				0.20				SP	Gravelly SAND, fine to medium grained light brown with medium to coarse crushed gravel.	D-M		
			0.5		TP157/2 DS 0.40-0.80m R = 0A PID = 5.2 ppm BS 0.4 - 0.8							
				0.90				GP	Sandy GRAVEL, medium to coarse grained, brown/grey, gravel is iron stained Sandstone/Ironstone.		VD	
	M		1.0		TP157/3 DS 1.00-1.20m R = 0A PID = 3.2 ppm							
			1.5	*1.60*				CI	CLAY, medium plasticity, brown/yellow.	M	MD	
	L-M		2.0		TP157/4 DS 2.00-2.20m R = 0A PID = 3.9 ppm							
			2.5								St	
			3.0		TP157/5 DS 3.00-3.20m R = 0A PID = 4.1 ppm							
			3.5	*3.50*				CI	As above but mottled grey with medium iron stained sandstone.			
			4.0	*4.00*					TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.5									
			5.0									

REPORT OF BOREHOLE: BH158

CLIENT:	Johnson Property Group	COORDS: 301553 m E 6282144 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA158/1 DS 0.00-0.20m R = 0A PID = 3.6 ppm			SP	SAND, fine grained, brown.	D-M		TOPSOIL
				0.40								
			0.5		HA158/2 DS 0.40-0.60m R = 0A PID = 4.7 ppm			SP	SAND, fine to medium grained, grey/brown/white.	M		NATURAL.
				0.90	HA158/3 DS 0.80-1.00m R = 0A PID = 2.6 ppm			SP	SAND, fine to medium grained, yellow/brown.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH159

CLIENT:	Johnson Property Group	COORDS: 301665 m E 6282121 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA159/1 DS 0.00-0.20m R = 0A PID = 3.9 ppm			SP	Silty SAND, fine to medium grained, brown.	M		TOPSOIL.
				0.20				SC	Clayey SAND, fine to medium grained, brown/grey.			NATURAL.
				0.40	HA159/2 DS 0.40-0.60m R = 0A PID = 4.3 ppm			CL	Sandy CLAY, low plasticity, brown/yellow.		F	
			0.5	0.70				CL CI	As above but low to medium plasticity, less sand.		St	
				1.00	HA159/3 DS 0.80-1.00m R = 0A PID = 2.5 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP160

CLIENT:	Johnson Property Group	COORDS: 301767 m E 6282100 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.50 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L-M	Groundwater not Encountered	0.0		TP160/1 DS 0.00-0.20m R = 0A PID = 4.3 ppm			ML	Clayey SILT, low plasticity, brown.	D	L-MD	TOPSOIL.
				0.25				CI	CLAY, medium plasticity, brown/yellow.	M	St	NATURAL.
			0.5		TP160/2 DS 0.40-0.80m R = 0A PID = 5.1 ppm BS 0.4 - 0.8							
				0.80				CI	As above but yellow mottled grey.			
			1.0		TP160/3 DS 1.00-1.20m R = 0A PID = 2.9 ppm							
			1.5									
				1.90				CH	CLAY, high plasticity, yellow/grey trace of fine to medium siltstone.			
			2.0		TP160/4 DS 2.00-2.20m R = 0A PID = 3.1 ppm							
			2.5									
				2.70				CH	As above but grey mottled yellow.			
			3.0		TP160/5 DS 3.00-3.20m R = 0A PID = 4.7 ppm							
				3.50					TEST PIT DISCONTINUED @ 3.50 m Reached target depth			
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH161

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301737 m E 6281993 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA161/1 DS 0.00-0.20m R = 0A PID = 3.4 ppm			ML	Clayey SILT, low plasticity, brown/dark brown.	D-M	L	TOPSOIL.
				0.20				CI	CLAY, medium plasticity, brown/yellow.	M	St	NATURAL.
			0.5		HA161/2 DS 0.40-0.60m R = 0A PID = 4.1 ppm							
				0.80				CH	CLAY, high plasticity, yellow/brown mottled grey.		St-VSt	
			1.0	1.00	HA161/3 DS 0.80-1.00m R = 0A PID = 3.0 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH162

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301651 m E 6282015 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.20	HA162/1 DS 0.00-0.20m R = 0A PID = 4.6 ppm			ML CL	Silty CLAY, Clayey SILT, low plasticity, brown.	M	S	TOPSOIL.
			0.5	0.60	HA162/2 DS 0.40-0.60m R = 0A PID = 3.8 ppm			CL	Sandy CLAY, low plasticity, brown/yellow.		S-F	NATURAL.
			1.0	1.00	HA162/3 DS 0.80-1.00m R = 0A PID = 5.1 ppm			CI	CLAY, medium plasticity, yellow mottled grey with fine to medium SAND.		F	
									END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH163

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301718 m E 6281907 m N MGA94	DRILL RIG: Gemco 210B
PROJECT:	Proposed Residential Development	SURFACE RL: 12.4 m DATUM: AHD	DRILLER: Drilltest
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 4/3/05
JOB NO:	05623002	HOLE DIA: 125 mm HOLE DEPTH: 7.60 m	CHECKED: LBM DATE: 26/6/05

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
ATC	Standing Water Level 23/3/05 Groundwater encountered @ 5.6m during drilling	0	12.40 0.25	BH63/1 SPT 0.00-0.20m R = 0A PID = 4.1 ppm			Clayey SILT, low plasticity, brown.		Gatic Cover 0 - 0.1m Concrete 0.1-0.2m
			12.15				CLAY, medium plasticity, brown/yellow tace of fine ironstone gravel.		
		1		BH63/2 SPT 0.50-0.95m 2,4,7 N=11 R = 0A PID = 3.4 ppm					Bentonite 0 .2-1.4m
				BH63/3 SPT 1.50-1.95m 3,4,6 N=10 R = 0A					
		2	2.20	PID = 2.0 ppm					
			10.20				CLAY, high plasticity, grey/brown.		
				BH63/4 SPT 2.50-2.95m 4,5,8 N=13 R = 0A PID = 3.6 ppm					
		3							1.5mm Graded Sand 1.4-9.0m
			3.80	BH63/5 SPT 3.50-3.95m					
			8.60	4,7,8 N=15 R = 0A PID = 2.1 ppm			As above but grey/brown/yellow with ironstone gravels.		
		4							
				BH63/6 SPT 4.50-4.95m 5,8,15 N=23 R = 0A PID = 1.6 ppm					
		5							
				BH63/7 SPT 5.50-5.95m 4,7,15 N=22					
			6.00	R = 0A					
		6	6.40	PID = 3.6 ppm			As above but gravels with increasing ironstone banding.		Class 18 uPVC 0.5mm (1.6-7.6m)
		7	7.60						
			4.80				END OF BOREHOLE @ 7.60 m Reached target depth		
		8							
		9							
		10							
		11							

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F05
RL2

REPORT OF BOREHOLE: BH164

CLIENT:	Johnson Property Group	COORDS: 301629 m E 6281925 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA164/1 DS 0.00-0.20m R = 0A PID = 3.4 ppm			SC CL	Clayey SAND/Sandy CLAY,low plasticity, fine grained, brown.	D-M	MD-D	TOPSOIL.
				0.30								
	L-M		0.5		HA164/2 DS 0.40-0.60m R = 0A PID = 4.3 ppm			CI	CLAY, medium plasticity, brown/yellow.		St	NATURAL.
				0.65						M		
					HA164/3 DS 0.80-1.00m R = 0A PID = 4.1 ppm			CH	As above but high plasticity, yellow mottled grey.		St-VSt	
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP165

CLIENT:	Johnson Property Group	COORDS: 301559 m E 6282029 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.70 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	MH	Groundwater not Encountered	0.0		TP165/1 DS 0.00-0.20m R = 0A PID = 4.6 ppm			GP	Gravelly SILT/Silty GRAVEL, medium grained, brown.	M		NATURAL
				0.25				GP	Sandy GRAVEL, fine to medium grained, brown/grey.			
			0.5		TP165/2 DS 0.40-0.80m R = 0A PID = 3.8 ppm BS 0.4 - 0.8							
				0.70				SP	SAND, medium grained, brown/grey/yellow trace of clay.			
			1.0		TP165/3 DS 1.00-1.20m R = 0A PID = 4.2 ppm							
				1.30				SC	Clayey SAND, fine to medium grained, grey/brown mottled yeloow with coarse cemented sand.			
	M		1.5									
			2.0		TP165/4 DS 2.00-2.20m R = 0A PID = 4.1 ppm							
				2.20				CI	CLAY, medium plasticity, brown/yellow/grey		St	
			2.5		TP165/5 DS 2.30-2.50m R = 0A PID = 5.0 ppm							
				2.70				CH	CLAY, high plasticity, grey mottled yellow, trace of fine to medium sitlstone gravvel.			
			3.0		TP165/6 DS 3.00-3.20m R = 0A PID = 3.4 ppm							
			3.5									
				3.70					TEST PIT DISCONTINUED @ 3.70 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH166

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301461 m E 6282051 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 21/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA166/1 DS 0.00-0.20m R = 0A PID = 2.6 ppm			SP	Silty SAND, fine grained, brown.	M		TOPSOIL.
				0.20				SP	SAND, fine to medium grained, brown/grey with clay.			NATURAL.
			0.5		HA166/2 DS 0.40-0.60m R = 0A PID = 3.0 ppm							
				0.70				SC	Clayey SAND, fine to medium grained, grey/yellow with iron stained sandstone gravels.			
				1.00	HA166/3 DS 0.80-1.00m R = 0A PID = 3.1 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP167

CLIENT:	Johnson Property Group	COORDS: 301361 m E 6282067 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	F	Groundwater not Encountered	0.0		TP167/1 DS 0.00-0.20m R = 0A PID = 5.3 ppm			SP	Silty SAND	M		TOPSOIL
				0.20				SP	SAND, fine to medium grained yellow/brown with fine to medium iron stained sandstone gravels.			NATURAL
			0.5		TP167/2 DS 0.40-0.80m R = 0A PID = 3.6 ppm BS 0.4 - 0.8							
			1.0		TP167/3 DS 1.00-1.20m R = 0A PID = 4.8 ppm							
				1.30				SC	Clayey SAND, fine to medium grained brown/yellow /grey with fine to medium iron stained sandstone.			
			1.5									
			2.0		TP167/4 DS 2.00-2.20m R = 0A PID = 3.4 ppm							
				2.20				SC	As above but grey/yellow.			
			2.5									
			3.0		TP167/5 DS 3.00-3.20m R = 0A PID = 4.1 ppm							
				3.30				SC	Increasing coarse sandstone			
				3.50				CH	CLAY, high plasticity, grey/yellow trace of fine to medium gravel.		St	
			3.5		TP167/5 DS 3.80-4.00m R = 0A PID = 4.2 ppm							
				4.00					TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH168

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301266 m E 6282078 m N 56 MGA94	DRILL RIG: Hand Auger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 21/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA168/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm			SP	Silty SAND, fine grained, brown.	D		TOPSOIL
				0.20				SP	Silty SAND, fine grained, grey/white.	D-M		NATURAL.
			0.5		HA168/2 DS 0.40-0.60m R = 0A PID = 3.5 ppm							
				0.70				SP	Gravelly SAND, fine to medium grained, white mottled yellow/red with fine to medium iron stained gravel.	M		
	M				HA168/3 DS 0.80-1.00m R = 0A PID = 4.1 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH169

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301160 m E 6282093 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA169/1 DS 0.00-0.20m R = 0A PID = 3.6 ppm			SP	Silty CLAY, fine to medium grained, brown.	D-M	L	TOPSOIL.
				0.25				SP	SAND, fine to medium grained, brown/yellow/red.	M		NATURAL.
			0.5		HA169/2 DS 0.40-0.60m R = 0A PID = 3.0 ppm							
	M			0.80	HA169/3 DS 0.80-1.00m R = 0A PID = 3.7 ppm			SP	As above but with iron stained fine to medium gravels sandstone.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP170

CLIENT:	Johnson Property Group	COORDS: 301224 m E 6281988 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 4.00 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Minor water seepage @ 1.9m	0.0		TP170/1 DS 0.00-0.20m R = 0A			MC	Gravelly SILT, low plasticity, brown with sand.	D	MD-D	Asbestos fragments on surface. Ash Metal fragments
				0.30				SP	Silty SAND, fine grained, white/grey with fine to medium gravels.			
			0.5		TP170/2 DS 0.40-0.80m R = 0A BS 0.4 - 0.8							
				0.80				SC	Clayey SAND, fine to medium grained white mottled orange/red with iron stained sandstone.			
			1.0		TP170/3 DS 1.00-1.20m R = 0A							
			1.5									
			2.0		TP170/4 DS 2.00-2.20m R = 0A							
				2.10				SC cl	Sandy CLAY/Clayey SAND, fine to medium grained, brown/yellow/grey.			
			2.5								MD-D	
			3.0		TP170/5 DS 3.00-3.20m R = 0A					M		
				3.30				SC	Clayey SAND, fine to medium grained, grey/dark grey mottled yellow/orange.			
			3.5									
				4.00					TEST PIT DISCONTINUED @ 4.00 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF TEST PIT: TP171

CLIENT:	Johnson Property Group	COORDS: 301262 m E 6281938 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	MACHINE: CAT
LOCATION:	Pitt Town	PIT DEPTH: 3.50 m	CONTRACTOR: Onecall
JOB NO:	05623002	BUCKET TYPE: 450mm	LOGGED: GJF DATE: 14/3/05
			CHECKED: GKS DATE: 26/6/05

Excavation					Sampling		Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	L	Groundwater not Encountered	0.0		TP171/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm			SP	Silty SAND, fine grained, brown.	D		TOPSOIL.
				0.20				SP	Silty SAND, fine grained, white/brown with fine to medium gravels.	D-M		NATURAL
			0.5		TP171/2 DS 0.40-0.60m R = 0A PID = 5.1 ppm							
				0.90				SC	Clayey SAND, fine to medium grained white mottled orange/red with ironstone gravels.			
			1.0		TP171/3 DS 1.00-1.20m R = 0A PID = 4.2 ppm							
			1.5									
			2.0	2.00	TP171/4 DS 2.00-2.20m R = 0A PID = 3.6 ppm			SC cl	Sandy CLAY/CLAYEY SAND, fine to medium grained low plasticity, brown/yellow/grey.	M		
			2.5									
			3.0		TP171/5 DS 3.00-3.20m R = 0A PID = 3.0 ppm							
				3.20				SC	Clayey SAND, fine to medium grained grey/dark grey mottled yellow/orange.			
			3.5	3.50					TEST PIT DISCONTINUED @ 3.50 m Reached target depth			
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH172

CLIENT:	Johnson Property Group	COORDS: 301179 m E 6281918 m N MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: 23.3 m DATUM: AHD	DRILL RIG: Gemco 210B
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Drilltest
JOB NO:	05623002	HOLE DIA: 125 mm HOLE DEPTH: 10.50 m	LOGGED: GJF DATE: 4/3/05
			CHECKED: LBM DATE: 26/6/05

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
ATC	Groundwater encountered @8.3m Standing Water Level 23/3/05	0	23.30	BH72/1 SPT 0.00-0.20m R = 0A PID = 3.8 ppm			Gravely SAND, fine gravel brown with river cobbles.		Gatic Cover 0 - 0.1m Concrete 0.1-0.2m
			0.40						
			22.90	BH72/2 SPT 0.50-0.95m R = 0A PID = 6.1 ppm			Cemented SAND, fine to medium gravel white/brown/yellow with ironstone cementations		
		1		BH72/3 SPT 1.50-1.95m R = 0A PID = 4.2 ppm					
		2							Bentonite (0 .2-4.3m)
				BH72/4 SPT 2.50-2.95m R = 0A					
		3							
				BH72/5 SPT 3.50-3.95m R = 0A PID = 3.1 ppm					
		4	*4.20*						
			19.10				CLAY, high plasticity, grey/brown		
			4.80	BH72/6 SPT 4.50-4.95m					
			18.50	5,10,14 N=24 PP = 80,100,140 kPa R = 0A PID = 2.6 ppm			Gravelly CLAY, high plasticity, yellow/brown/red with ironstone banding.		
		5							
				BH72/7 SPT 5.50-5.95m 6,11,16 N=27 PP = 100,90,70 kPa R = 0A PID = 1.9 ppm					1.5mm Graded Sand (4.3-10.5m)
		6	*6.50*						
			16.80	BH72/2 SPT 6.50-6.95m 4,10,18 N=28 PP = 100,150,90 kPa R = 0A PID = 3.4 ppm			As above but yellow/brown.		
		7							Class 18 uPVC 0.5mm (4.5-10.5m)
		8	*8.40*						
			14.90				As above but with increasing ironstone/gravel banding.		
		9							
		10	*10.50*						
			12.80				END OF BOREHOLE @ 10.50 m Reached target depth		
		11							

This report of borehole must be read in conjunction with accompanying notes and abbreviations.

GAP gINT FN. F05
RL2

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REPORT OF BOREHOLE: BH173

CLIENT:	Johnson Property Group	COORDS: 301187 m E 6281964 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA173/1 DS 0.00-0.20m R = 0A PID = 3.8 ppm			SP	SAND, fine to medium grained, brown.	D-M		TOPSOIL.
				0.30				SP	SAND, fine to medium grained, brown/grey.			NATURAL.
			0.5	0.60	HA173/2 DS 0.40-0.60m R = 0A PID = 4.8 ppm			SP	SAND, fine to medium grained,grey mottled yellow trace of fine iron stained gravel.	M		
				0.90	HA173/3 DS 0.80-1.00m R = 0A PID = 4.6 ppm			SP	As above but with CLAY & medium gravel.			
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH174

CLIENT:	Johnson Property Group	COORDS: 301190 m E 6282001 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA		Groundwater not Encountered	0.0		HA DS 0.00-0.20m R = 0A PID = 5.2 ppm			SP	SAND, fine to medium grained, brown.	D-M		TOPSOIL.
				0.30				SP	SAND, fine to medium grained, brown/grey.			NATURAL.
			0.5	0.60	HA DS 0.40-0.60m R = 0A PID = 3.6 ppm			SP	Gravelly SAND, fine to medium grained, grey mottled yellow.	M		
				1.00	HA DS 0.80-1.00m R = 0A PID = 4.1 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH175

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301258 m E 6281981 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA175/1 DS 0.00-0.20m R = 0A PID = 4.7 ppm			SP	Silty SAND, fine grained, brown.			TOPSOIL.
				0.40								
			0.5		HA175/2 DS 0.40-0.60m R = 0A PID = 3.4 ppm			SP	SAND, fine to medium grained, white/grey.	M		NATURAL.
					HA175/3 DS 0.80-1.00m R = 0A PID = 2.1 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH176

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301225 m E 6281967 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA176/1 DS 0.00-0.20m R = 0A PID = 2.6 ppm			SP	SAND, fine to medium grained, brown.	M		TOPSOIL/LANDSCAPE GARDEN
				0.40								
			0.5		HA176/2 DS 0.40-0.60m R = 0A PID = 2.9 ppm			SP	SAND, fine to medium grained, brown/grey.			NATURAL.
				0.70				SP	SAND, fine to medium grained, grey/white trace of gravels.			
					HA176/3 DS 0.80-1.00m R = 0A PID = 1.8 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH177

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301216 m E 6281954 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 21/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	*0.20*	HA177/1 DS 0.00-0.20m R = 0A PID = 5.1 ppm			SP	SAND, fine grained, brown/black with clay.	M		TOPSOIL.
								SP	Silty SAND, fine grained, brown.			NATURAL.
			0.5	*0.50*	HA177/2 DS 0.40-0.60m R = 0A PID = 4.3 ppm			SP	SAND, fine to medium grained, white/grey.			
				1.00	HA177/3 DS 0.80-1.00m R = 0A PID = 2.8 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH178

CLIENT:	Johnson Property Group	COORDS: 301230 m E 6281935 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Minor water seepage observed @ 0.8m	0.0		HA178/1 DS 0.00-0.20m R = 0A PID = 1.6 ppm			SP	SAND, fine to medium grained, brown/dark brown.	M		TOPSOIL.
				0.30				SP	SAND, fine to medium grained, grey/brown.			NATURAL.
			0.5	0.60	HA178/2 DS 0.40-0.60m R = 0A PID = 2.9 ppm			SP	SAND, fine to medium grained, grey/white/yellow trace of fine to medium sandstone gravel.	M-W		
				1.00	HA178/3 DS 0.80-1.00m R = 0A PID = 2.4 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH179

CLIENT:	Johnson Property Group	COORDS: 301257 m E 6281910 m N 56 MGA94	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	LOGGED: GJF DATE: 21/3/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA179/1 DS 0.00-0.20m R = 0A PID = 4.8 ppm			SP	Silty SAND, fine grained, brown.	D-M		TOPSOIL.
				0.30				SP	SAND, fine to medium grained, grey/white.	M		NATURAL.
			0.5		HA179/2 DS 0.40-0.60m R = 0A PID = 3.9 ppm							
				0.90	HA179/3 DS 0.80-1.00m R = 0A PID = 3.7 ppm							
	M			1.00				SP	As above with medium to coarse sandstone gravel.			
			1.0						END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH180

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

COORDS: 301220 m E 6281916 m N 56 MGA94
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: GJF DATE: 23/3/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.0	0.10					CONCRETE, fine to medium sub angular gravels.			CONCRETE.
HA	L	Groundwater not Encountered			HA180/1 DS 0.10-0.30m R = 0A PID = 4.1 ppm				Gravelly Silty CLAY, low plasticity, brown trace of fine sand.	M		FILL.
				0.40								
	L-M		0.5		HA180/2 DS 0.40-0.60m R = 0A PID = 5.3 ppm			SP	Silty SAND, fine grained, brown/light brown, trace of fine to medium gravels.			NATURAL.
					HA180/3 DS 0.80-1.00m R = 0A PID = 4.9 ppm							
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH181

SHEET: 1 OF 1

CLIENT:	Johnson Property Group	COORDS: 301197 m E 6281939 m N 56 MGA94	DRILL RIG: Hand AUger
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILLER: Golder
LOCATION:	Pitt Town	INCLINATION: -90°	LOGGED: GJF DATE: 23/3/05
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 1.00 m	CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.0	0.10					CONCRETE, fine to medium sub angular gravel.			CONCRETE.
HA	L	Groundwater not Encountered			HA181/1 DS 0.10-0.30m R = 0A PID = 5.1 ppm				Silty/Gravelly CLAY, low plasticity, brown.	M		FILL.
	L-M		0.5	0.40	HA181/2 DS 0.40-0.60m R = 0A PID = 4.2 ppm			SP	Silty SAND, fine grained, brown/light brown.			NATURAL.
				1.00	HA181/3 DS 0.80-1.00m R = 0A PID = 4.9 ppm				END OF BOREHOLE @ 1.00 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH182

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L-M	Groundwater not Encountered	0.0		HA182/1 DS 0.00-0.10m R = 0A PID = 6.2 ppm			SP	SAND, fine grained, white.	M		NATURAL. Camphor odour.
				0.20								
	L				HA182/2 DS 0.20-0.50m R = 0A PID = 3.9 ppm			SP	As above, yellow/brown.			
			0.5	*0.60*						D		
	M				HA182/3 DS 0.70-0.90m R = 0A PID = 4.8 ppm			SP	As above but some cementation.			
			1.0	*1.00*					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH183

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.80 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	M	Groundwater not Encountered	0.0		HA183/1 DS 0.00-0.10m R = 0A PID = 4.9 ppm DUP183/1 HA183/2 DS 0.20-0.40m R = 0A PID = 5.0 ppm			SP	SAND, fine grained, yellow/brown, with medium cemented gravels.	D-M		NATURAL Mild camphor odour.
	H		0.5	*0.50*				SP	SAND, orange mottled yellow, medium grained trace clay with medium cemented gravel.			
				0.80	HA183/3 DS 0.70-0.80m R = 0A PID = 4.3 ppm				END OF BOREHOLE @ 0.80 m Reached target depth			Refusal on cemented sand.
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH184

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.40 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	GWNE	0.0		HA184/1 DS 0.00-0.10m R = 0A PID = 5.8 ppm			SP	Sandy SILT, low plasticity, brown/light brown	D	L	NATURAL.
	MH			0.20				SP	SAND, fine grained, white/brown, cemented.			
				0.40	HA184/2 DS 0.20-0.40m R = 0A PID = 4.3 ppm				END OF BOREHOLE @ 0.40 m Reached target depth			Refusal on cemented sand.
			0.5									
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH185

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 1.00 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Ponded Water ▽	0.0	0.20	HA185/1 DS 0.00-0.10m R = 0A PID = 4.3 ppm			CL	Sandy CLayey SILT, low plasticity, black/brown.	W	VS	NATURAL. High concetration rotting organic matter.
					HA185/2 DS 0.20-0.50m R = 0A PID = 3.8 ppm			SC	Clayey SAND, fine to medium grained, grey/brown mottled orange.			
			0.5	0.50					As above, medium grained with meidum sandstone gravels.			
				0.60	HA185/3 DS 0.60-0.80m R = 0A PID = 4.1 ppm			CL CI	Sandy CLAY, low to medium plasticity, grey, trace fine gravels.	M	S	
			1.0	1.00					END OF BOREHOLE @ 1.00 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH186

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.40 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	GWNE	0.0	0.10	HA186/1 DS 0.00-0.10m R = 0A PID = 6.0 ppm			ML	Sandy SILT, low plasticity, brown with organic matter.	D-M	L	NATURAL.
				0.40	HA186/2 DS 0.20-0.40m R = 0A PID = 5.2 ppm			SP	SAND, medium grained, yellow/brown with medim cemented gravevl, trace clay.			
			0.5						END OF BOREHOLE @ 0.40 m Reached target depth			Refusal.
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH187

CLIENT:	Johnson Property Group	POSITION: Refer to figure 4A	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 0.80 m	LOGGED: DM DATE: 5/5/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	M	Groundwater not Encountered	0.0		HA187/1 DS 0.00-0.10m R = 0A PID = 3.9 ppm			ML	Sandy SILT, low plasticity, brown/light brown.	D	L	NATURAL
				0.40	HA187/2 DS 0.20-0.40m R = 0A PID = 4.1 ppm			SP	Silty SAND, medium grained, yellow/brown, with fine to medium gravels.	M		
	L-M		0.5		HA187/3 DS 0.60-0.80m R = 0A							
				0.80	PID = 4.7 ppm				END OF BOREHOLE @ 0.80 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH188

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4A
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.80 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.10	HA188/1 DS 0.00-0.10m R = 0A PID = 3.9 ppm			ML	Sandy SILT, low plasticity, brown/light brown.	D	VL	NATURAL
					HA188/2 DS 0.20-0.40m R = 0A PID = 4.7 ppm			SP	Silty SAND, fine grained, brown/yellow.			
	M		0.5	0.50	HA188/3 DS 0.60-0.80m R = 0A PID = 4.1 ppm			SP	As above but fine to medium grained.	D-M		
				0.80					END OF BOREHOLE @ 0.80 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH189

CLIENT:	Johnson Property Group	POSITION: Refer to figure 4A	SHEET: 1 OF 1
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 0.80 m	LOGGED: DM DATE: 5/5/05
			CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
H	L	Groundwater not Encountered	0.0		HA189/1 DS 0.00-0.10m R = 0A PID = 5.3 ppm			ML	Sandy SILT, low plasticity, brown/light brown.	D	L	NATURAL
				0.40	HA189/2 DS 0.20-0.40m R = 0A PID = 4.9 ppm			SP	SAND, fine to medium grained, white/grey, trace fine gravels.	M		
	L-M		0.5		HA189/3 DS 0.60-0.80m R = 0A PID = 4.3 ppm							
				0.80					END OF BOREHOLE @ 0.80 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH190

CLIENT:	Johnson Property Group	POSITION: Refer to figure 4	SHEET: 1 OF 1		
PROJECT:	Proposed Residential Development	SURFACE RL: m DATUM: AHD	DRILL RIG: Hand Auger		
LOCATION:	Pitt Town	INCLINATION: -90°	DRILLER: Golder		
JOB NO:	05623002	HOLE DIA: 75 mm HOLE DEPTH: 0.80 m	LOGGED: DM	DATE: 5/5/05	
			CHECKED: GKS	DATE: 26/6/05	

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	*0.20*	HA190/1 DS 0.00-0.10m R = 0A PID = 2.8 ppm				SAND, fine grained, brown/yellow.	M	F	NATURAL - Organic matter.
			0.5	*0.60*	HA190/2 DS 0.20-0.40m R = 0A PID = 4.3 ppm			CL	Sandy CLAY/CLayey SAND, low plasticity, orange/brown with medium to coarse sandstone gravels.			
				0.80	HA190/3 DS 0.60-0.80m R = 0A PID = 3.9 ppm			SC	Clayey SAND, fine grained, brown/yellow.			
			1.0						END OF BOREHOLE @ 0.80 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH191

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.80 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0		HA191/1 DS 0.00-0.10m R = 0A PID = 5.3 ppm			SP	Silty SAND, fine grained, brown.	D		NATURAL
				0.20	HA191/2 DS 0.20-0.40m R = 0A PID = 4.6 ppm			SC	Clayey SAND, fine to medium grained, orange/grey.	M		
			0.5		HA191/3 DS 0.60-0.80m R = 0A PID = 5.1 ppm							
				0.80					END OF BOREHOLE @ 0.80 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH192

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.80 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.10	HA192/1 DS 0.00-0.10m R = 0A PID = 2.8 ppm			ML	Clayey SILT, low plasticity, brown.	M	S	Organic layer. Base of channel
			0.5	0.50	HA192/2 DS 0.20-0.40m R = 0A PID = 4.1 ppm			SC	Clayey SAND, fine to medium grained, yellow/orange mottled grey.			NATURAL.
				0.80	HA192/3 DS 0.60-0.80m R = 0A PID = 5.3 ppm			CI	CLAY, medium plasticity, grey mottled yellow trace of gravel.		L-MD	
			1.0						END OF BOREHOLE @ 0.80 m Reached target depth			
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH193

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.80 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.10	HA194/1 DS 0.00-0.10m R = 0A PID = 4.9 ppm			ML	Clayey SILT, low plasticity, brown.	M	S	TOPSOIL
					HA194/2 DS 0.20-0.40m R = 0A PID = 3.7 ppm			CI	CLAY, medium plasticity, brown/yellow.		St	NATURAL.
			0.5	0.60	HA194/3 DS 0.60-0.80m R = 0A PID = 4.6 ppm			CI	As above mottled grey.			
				0.80					END OF BOREHOLE @ 0.80 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

REPORT OF BOREHOLE: BH194

SHEET: 1 OF 1

CLIENT: Johnson Property Group
PROJECT: Proposed Residential Development
LOCATION: Pitt Town
JOB NO: 05623002

POSITION: Refer to figure 4
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 75 mm HOLE DEPTH: 0.90 m

DRILL RIG: Hand Auger
DRILLER: Golder
LOGGED: DM DATE: 5/5/05
CHECKED: GKS DATE: 26/6/05

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	Groundwater not Encountered	0.0	0.10	HA193/1 DS 0.00-0.10m R = 0A PID = 5.0 ppm			ML	Sandy/Clayey SILT, low plasticity, brown.	M	S	Organic layer. Base of drainage channel.
					HA193/2 DS 0.20-0.40m R = 0A PID = 4.1 ppm			ML	Sandy/Clayey SILT, low plasticity,orange/ brown.	M-W	VS	NATURAL.
			0.5	0.50	HA193/3 DS 0.60-0.80m R = 0A PID = 3.9 ppm			ML	As above but Clayey SILT	D	S	
				0.90					END OF BOREHOLE @ 0.90 m Reached target depth			
			1.0									
			1.5									
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT REPORTS

DRILLING/EXCAVATION METHOD

AS*	Auger Screwing	RD	Rotary blade or drag bit	HQ	Diamond Core - 63 mm
AD*	Auger Drilling	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
*V	V-Bit	RAB	Rotary Air Blast	NQ	Diamond Core - 47 mm
*T	TC-Bit, e.g. ADT	RC	Reverse Circulation	BH	Tractor Mounted Backhoe
HA	Hand Auger	PT	Push Tube	EX	Tracked Hydraulic Excavator
DTC	Diatube Coring	CT	Cable Tool Rig	EE	Existing Excavation
WB	Washbore or Bailer	JET	Jetting	HAND	Excavated by Hand Methods

PENETRATION/EXCAVATION RESISTANCE

L **Low resistance.** Rapid penetration possible with little effort from the equipment used.

M **Medium resistance.** Excavation/possible at an acceptable rate with moderate effort from the equipment used.

H **High resistance** to penetration/excavation. Further penetration is possible at a slow rate and requires significant effort from the equipment.

R **Refusal or Practical Refusal.** No further progress possible without the risk of damage or unacceptable wear to the digging implement or machine.

These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.

WATER

▽	Water level at date shown	◁	Partial water loss
▷	Water inflow	◀	Complete water loss

GROUNDWATER NOT OBSERVED	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.
GROUNDWATER NOT ENCOUNTERED	The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-1993
4,7,11 N=18	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm seating
30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
DS	Disturbed sample
BDS	Bulk disturbed sample
G	Gas Sample
W	Water Sample
FP	Field permeability test over section noted
FV	Field vane shear test expressed as uncorrected shear strength s_v
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket penetrometer test expressed as instrument reading in kPa
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres

Ranking of Visually Observable Contamination and Odour (for specific soil contamination assessment projects)

R = 0	No visible evidence of contamination	R = A	No non-natural odours identified
R = 1	Slight evidence of visible contamination	R = B	Slight non-natural odours identified
R = 2	Visible contamination	R = C	Moderate non-natural odours identified
R = 3	Significant visible contamination	R = D	Strong non-natural odours identified

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

$$= \frac{\textit{Length of core recovered}}{\textit{Length of core run}} \times 100$$

SCR = Solid Core Recovery (%)

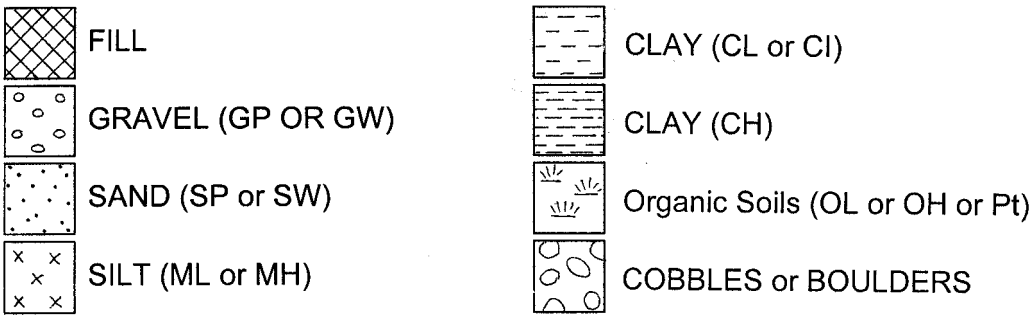
$$= \frac{\sum \textit{Length of cylindrical core recovered}}{\textit{Length of core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\sum \textit{Axial lengths of core} > 100\,\textit{mm}}{\textit{Length of core run}} \times 100$$

METHOD OF SOIL DESCRIPTION
USED ON BOREHOLE AND TEST PIT REPORTS

GRAPHIC LOG - TYPICAL SYMBOLS FOR SOILS



Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay.

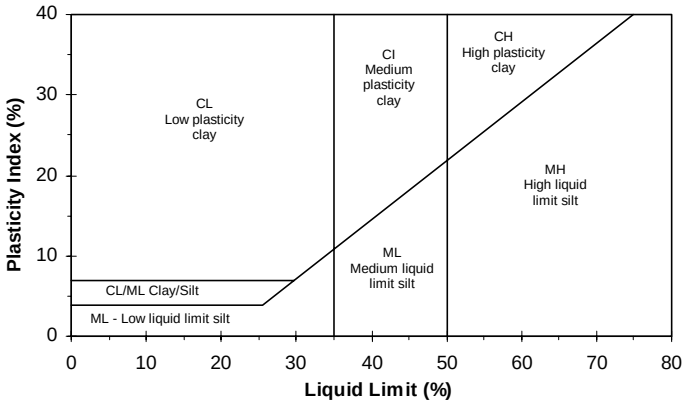
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil and Rock is classified and described in Reports of Boreholes and Test Pits using the preferred method given in AS1726 - 1993, Appendix A. The material properties are assessed in the field by visual/tactile methods.

Particle Size

Major Division	Sub Division	Particle Size
BOULDERS		> 200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	20 to 63 mm
	Medium	6.0 to 20 mm
	Fine	2.0 to 6.0 mm
SAND	Coarse	0.6 to 2.0 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2 mm
SILT		0.002 to 0.075 mm
CLAY		< 0.002 mm

Plasticity Properties



MOISTURE CONDITION

AS1726 - 1993

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

CONSISTENCY AND DENSITY

AS1726 - 1993

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0 to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	above 200 kPa

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	Less than 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Dense	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	above 85	Above 50

SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.
In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.

TERMS FOR ROCK MATERIAL STRENGTH & WEATHERING AND ABBREVIATIONS FOR DEFECT DESCRIPTIONS

STRENGTH

Symbol	Term	Point Load Index, $Is_{(50)}$ (MPa)	Field Guide
EL	Extremely Low	< 0.03	Easily remoulded by hand to a material with soil properties.
VL	Very Low	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm can be broken by finger pressure.
L	Low	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
M	Medium	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
H	High	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer.
VH	Very High	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
EH	Extremely High	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

ROCK STRENGTH TEST RESULTS

▼ Point Load Strength Index, $Is_{(50)}$, Axial test (MPa)

◀ Point Load Strength Index, $Is_{(50)}$, Diametral test (MPa)

ROCK MATERIAL WEATHERING

Symbol		Term	Field Guide
RS		Residual Soil	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
EW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
	MW		
SW		Slightly Weathered	Rock is slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

ABBREVIATIONS FOR DEFECT TYPES AND DESCRIPTIONS

Defect Type

B	Bedding parting
X	Foliation
L	Cleavage
J	Joint
SZ	Sheared zone (Fault)
CS	Crushed seam (Fault)
DS	Decomposed seam
IS	Infilled seam
S	Schistocity
V	Vein

Coating or Infilling

Cn	Clean
Sn	Stain
Vr	Veneer
Ct	Coating

Planarity

Pl	Planar
Un	Undulating
St	Stepped

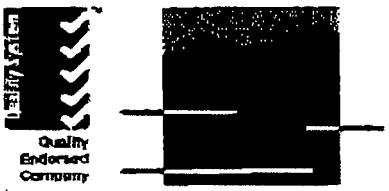
Roughness

Sl	Slickensided
Sm	Smooth
Ro	Rough

Vertical Boreholes – The dip (inclination from horizontal) of the defect is given.
Inclined Boreholes – The inclination is measured as the acute angle to the core axis.

Appendix B
Infiltration Report prepared by SESL Report

19th April 2005



Sydney Environmental
and Soil Laboratory Pty Ltd
ABN 70 106 810 708
16 Chilvers Road
Thornleigh NSW 2120
Australia
Address Mail to
PO Box 357
Pennant Hills NSW 1715
Telephone:(02) 9980 6554
Facsimile:(02) 9484 2427
Web: www.sesl.com.au
Email: sesl@sesl.com.au

Attention: Glen Fuller
Golder Associates Pty Ltd
PO Box 1302
Crows Nest
NSW 1585

Re: Infiltration - Bathurst, Pitt Town NSW

Sydney Environmental and Soil Laboratory (SESL) conducted on site infiltration testing on 15th April 2005 at Bathurst Street, Pitt Town NSW. The purpose of this work was to assess the permeability of the soil across the site, to gain information for use as part of the engineering sensitive urban design and possible filtration of stormwater.

Method

A total of 16 infiltration measurements were conducted (8 locations at Northern Site and 8 locations at Southern Site) across the site. Test locations were selected by Glen Fuller of Golder Associates and are identified on the following site plan. Infiltration measurements were conducted on level areas prepared by a backhoe and located adjacent to previously excavated test pits.
Infiltration measurements were conducted using the *Talsma Hallam* or shallow well permeameter method (Boesma, 1965b). This is our preferred method for dryland soils as it gives reliable results across a wide range of soil types.

Results

Table 1. Field Permeameter measurements at test locations across Northern Site

Test pit	Ksat (m/s)
TP 104	1.069×10^{-5}
TP 109	2.100×10^{-6}
TP 116	5.126×10^{-6}
TP 132	4.501×10^{-6}
TP 113	1.350×10^{-5}
TP 108	1.501×10^{-5}
TP 123	1.318×10^{-5}
TP 139	7.503×10^{-7}

Table 2. Field Permeameter measurements at test locations across Southern Site.

Test pit	Ksat (m/s)
TP 140	4.024×10^{-6}
TP 154	3.376×10^{-6}
TP 157	5.908×10^{-6}
TP 143	3.376×10^{-6}
TP 165	1.877×10^{-6}
TP 160	1.501×10^{-6}
TP 146	1.125×10^{-6}
TP 167	5.626×10^{-6}

Soils across the site were predominately deep sandy loams of alluvial origin. These soils are commonly found throughout the Hawkesbury basin and typically have low fertility and high permeability. Soils in the South Western corner of the site showed slightly different physical properties, as they contained a high level of clay.

Table 1 and 2 above, show permeability across both sites is relatively high. These results are expected in sandy soils. We note infiltration at test pit 139 was significantly lower than all other sites. This result is due to the presence of clay through this South Western corner. The clay band also influenced infiltration at test pits 165, 160 and 146 on the Southern Site.

We trust this data set is of assistance in understanding infiltration across this site and will give guidance in developing appropriate hydraulic models.

If you require any further information please do not hesitate to contact either Daniel Saunders or myself of 9980 6554.

Regards,

Charlotte Moore
Soil Scientist

Attachment: Site Plan

Appendix C
Laboratory Test Certificates

Our Job: 25131
Batch No: 2
Your Ref: 05623002
Page: 1 of 3

TERRATEST "the best down under" Drilling and Testing Service

Laboratory Report

CLIENT: Golder Asociates Pty. Ltd

Address: PO Box 1302 Crows Nest NSW 1585

PROJECT: Material Analysis - Johnson Property Group- Pitt Town

Sample supplied by Client/ Analysed as Received

california bearing ratio

TEST DATE: 18/04/2005

TEST PROCEDURE **AS1289 6.1.1**

Condition **4 Day Soak**

Compaction **Standard**

Drop of Rammer **300 mm**

Mass of Rammer **2.7 kg**

Surcharge **4.5 kg**

SAMPLE No.		TP 108 0.4 - 0.8m	TP 109 0.4 - 0.8m	TP 119 0.4 - 0.8m	TP 132 0.4 - 0.8m
OVERSIZE					
% greater than 19.0 mm		nk	nk	nk	nk
% oversize used in test		nil	nil	nil	nil
DENSITY					
maximum dry density	(t/m^3)	1.95	1.89	2.00	1.99
before soak	(t/m^3)	1.94	1.89	2.00	1.97
density ratio	(%)	**99.5**	**100.0**	**100.0**	**99.0**
after soak	(t/m^3)	1.94	1.89	2.00	1.97
MOISTURE					
field moisture	(%)	2.2	5.5	6.9	4.1
optimum moisture	(%)	9.2	9.8	8.7	8.4
at compaction	(%)	8.9	9.5	8.4	8.6
moisture ratio	(%)	**96.5**	**97.0**	**96.5**	**102.5**
after soak-top 30mm	(%)	10.7	9.8	9.2	10.1
after soak-overall	(%)	9.7	10.2	8.8	9.4
CBR VALUE					
(top) - 2.5mm	**(%)**	**20**	**12**	**45**	**40**
(top) - 5.0mm	**(%)**	**25**	**16**	**45**	**35**
swell after soak	(%)	nil	nil	nil	nil

Approved Signatory: P.We. (Peter Weir) Date: 22 April, 2005.
General Manager

TERRATEST Pty. Ltd. **(ABN 52 082 867 945)**
117 Magowar Road, Girraween NSW 2145 Ph: (02) 9636 7377 Fax: (02) 9688 4757

NATA Accredited Laboratory No 541
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RTR-CBR8-02

Laboratory Report

TERRATEST "the best down under" Drilling and Testing Service

CLIENT: Golder Asociates Pty. Ltd

Address: PO Box 1302 Crows Nest NSW 1585

PROJECT: Material Analysis - Johnson Property Group- Pitt Town

Sample supplied by Client/ Analysed as Received

california bearing ratio

TEST DATE: 18/04/2005

TEST PROCEDURE **AS1289 6.1.1**
Condition **4 Day Soak**
Compaction **Standard**
Drop of Rammer **300 mm**
Mass of Rammer **2.7 kg**
Surcharge **4.5 kg**

SAMPLE No.		TP 139 0.4 - 0.8m	TP 140 0.4 - 0.8m	TP 146 0.4 - 0.8m	TP 157 0.4 - 0.8m
OVERSIZE					
% greater than 19.0 mm		nk	nk	nk	nk
% oversize used in test		nil	nil	nil	nil
DENSITY					
maximum dry density	(t/m^3)	1.76	2.09	1.78	1.97
before soak	(t/m^3)	1.76	2.08	1.77	1.97
density ratio	(%)	**100.0**	**100.0**	**99.5**	**100.0**
after soak	(t/m^3)	1.73	2.08	1.75	1.96
MOISTURE					
field moisture	(%)	14.6	5.4	19.1	5.5
optimum moisture	(%)	16.8	8.1	19.9	8.4
at compaction	(%)	16.7	7.8	19.7	8.2
moisture ratio	(%)	**99.5**	**96.5**	**99.0**	**97.5**
after soak-top 30mm	(%)	23.9	9.2	23.6	10.0
after soak-overall	(%)	18.7	8.4	20.6	8.7
CBR VALUE					
(top) - 2.5mm	**(%)**	**2.0**	**35**	**2.5**	**25**
(top) - 5.0mm	**(%)**	**2.0**	**40**	**2.5**	**30**
swell after soak	(%)	2.0	nil	1.5	nil

Approved Signatory: P.Wei (Peter Weir) Date: 22 April, 2005.
General Manager

TERRATEST Pty. Ltd. **(ABN 52 082 867 945)**
117 Magowar Road, Girraween NSW 2145 Ph: (02) 9636 7377 Fax: (02) 9688 4757

RTR-CBR8-02

Our Job: 25131
Batch No: 2
Your Ref: 05623002
Page: 3 of 3

TERRATEST "the best down under" Drilling and Testing Service

Laboratory Report

CLIENT: Golder Asociates Pty. Ltd

Address: PO Box 1302 Crows Nest NSW 1585

PROJECT: Material Analysis - Johnson Property Group- Pitt Town

Sample supplied by Client/ Analysed as Received

california bearing ratio

TEST DATE: 18/04/2005

TEST PROCEDURE **AS1289 6.1.1**
Condition **4 Day Soak**
Compaction **Standard**
Drop of Rammer **300 mm**
Mass of Rammer **2.7 kg**
Surcharge **4.5 kg**

SAMPLE No.		TP 160 0.4 - 0.8m	TP 170 0.4 - 0.6m		
OVERSIZE					
% greater than 19.0 mm		nk	nk		
% oversize used in test		nil	nil		
DENSITY					
maximum dry density	(t/m^3)	1.80	1.89		
before soak	(t/m^3)	1.78	1.87		
density ratio	(%)	**99.0**	**99.0**		
after soak	(t/m^3)	1.77	1.87		
MOISTURE					
field moisture	(%)	14.3	5.3		
optimum moisture	(%)	16.5	9.7		
at compaction	(%)	16.7	9.6		
moisture ratio	(%)	**101.0**	**99.0**		
after soak-top 30mm	(%)	18.3	10.2		
after soak-overall	(%)	17.4	10.0		
CBR VALUE					
(top) - 2.5mm	**(%)**	**25**	**25**		
(top) - 5.0mm	**(%)**	**25**	**20**		
swell after soak	(%)	nil	nil		

Approved Signatory: P.We. (Peter Weir) Date: 22 April, 2005.
General Manager

TERRATEST Pty. Ltd. **(ABN 52 082 867 945)**
117 Magowar Road, Girraween NSW 2145 Ph: (02) 9636 7377 Fax: (02) 9688 4757

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RTR-CBR8-02

Golder Associates

Sydney office

Geotechnical Laboratory Test Request

Project No.	05623002
Sheet	1 of 2

Client: Johnson Property Group
Project: Residential Development.
Location: Pitt Town

Date Requested: 22/03/05
Requested by: COF
Reviewed by Project Manager: CAM/KA
Date Required by:

Laboratory Reference No.	Sample Identification	Sample type	Test Method Requested - Test Required (/) Test completed (X): 4 Day Soak CBR.	Std Comp	4.5kg Surcharge	100% Smdd	@ SOMC										Additional Test Details	Store Location
	e.g. BH / TP No., Depth , & sample No. client reference No. sample location.	i.e. U50, U75, U63 or D for disturbed samples.															i.e. degree of compaction for CBR, confining pressures for triaxial, etc.	Requester to indicate. Laboratory to show final location or indicate if no sample remains after testing.
	TP104 0.4 – 0.8																	
	TP108 0.4 – 0.8		/															
	TP109 0.4 – 0.8		/															
	TP113 0.4 – 0.8																	
	TP116 0.4 – 0.8																	
	TP119 0.4 – 0.8		/															
	TP123 0.4 – 0.8																	
	TP132 0.4 – 0.8		/															
	TP135 0.4 – 0.8																	
	TP139 0.4 – 0.8		/															
	TP140 0.4 – 0.8		/															
	TP143 0.4 – 0.8																	
	TP146 0.4 – 0.8		/															
	TP154 0.4 – 0.8																	

Golder Associates

Sydney office

Geotechnical Laboratory Test Request

Project No. 05623002

Sheet 2 of

Client: JOHNSON PROPERTY GROUP

Project: RESIDENTIAL DEVELOPMENT

Location: PITT TOWN

Date Requested: 22/03/05

Requested by: CDF

Reviewed by Project Manager: CPM/KA

Date Required by:

Laboratory Reference No.	Sample Identification	Sample type	Test Method Requested - Test Required (/) Test completed (X)														Additional Test Details	Store Location
	e.g. BH / TP No., Depth , & sample No. client reference No. sample location.	i.e. U50, U75, U63 or D for disturbed samples.	4 DAY Soak CBR														i.e. degree of compaction for CBR, confining pressures for triaxial, etc.	Requester to indicate. Laboratory to show final location or indicate if no sample remains after testing.
	TP157 0.4 - 0.8		/															
	TP160 0.4 - 0.8		/															
	TP167 0.4 - 0.8																	
	TP170 0.4 - 0.8		/															
	TP171 0.4 - 0.8																	
	TP165 0.4 - 0.8																	

Appendix D
CSIRO “Guide to home owners on foundation maintenance and footing performance (1996)”

CSIRO

Improving the Built Environment
information sheet

Sheet No. 10–91 Revised August 1996

Guide to home owners on foundation maintenance and footing performance (updated for AS 2870–1996)

Introduction

This guide was prepared by Dr P.F. Walsh, formerly of CSIRO and now with the University of Newcastle, with advice from the Standards Australia Committee on Residential Slabs and Footings, to provide guidance to home owners on their responsibilities for the care of clay foundations, and to discuss the performance that can be expected from a footing system. (The ground that supports a house is called a foundation, and the concrete structure that transfers the load to this foundation is the footing system.)

The best information about the design and construction of footing systems is contained in the Australian Standard AS 2870 'Residential Slabs and Footings'. The Standard gives a system of site classification, prescribed footing and slab designs, and construction methods that provide an excellent footing system for Australian houses. However, a warning is given that the chance of a footing failure is higher if extreme site conditions are permitted to occur, viz.:

- growth of trees too close to a footing;
- excessive or irregular watering of gardens adjacent to the house;
- lack of maintenance of site drainage; and
- failure to repair plumbing leaks.

The Standard further states that compliance with this guide is a way to avoid extreme site conditions.

Clay foundations are the cause of major problems for houses. Clays are very fine-grained soils that are plastic and sticky when wet, and hard and strong when dry. All clays swell or shrink to some degree as they become wet or dry out. 'Reactive' clays swell or shrink to such an extent that foundation movements can damage houses.

All house sites are classified. Reactive-clay sites are classified as S, M, H or E, in order of increasing reactivity. Proper maintenance of such clay sites requires that the moisture content of the clay should be kept reasonably constant.

Some minor cracking of masonry walls on reactive clay sites is almost inevitable despite proper design, construction and maintenance. Very slight cracks (up to 1 mm wide) could be expected in most houses. Larger cracks (up to 5 mm) may occur in some houses with properly designed and constructed footings if reactive clay sites have been subject to large changes of moisture. Cracks larger than 5 mm are regarded as significant damage.

Non-reactive sites – sands, silts and certain clays of class A or S – need only be protected from becoming extremely wet. This requires adequate attention to site drainage and prompt repair of plumbing leaks.

Further information on these topics is given in the following sections. The guide has been updated to be consistent with the revised edition of AS 2870 (1996).

Site classification

AS 2870 requires all sites to be classified. The emphasis has been placed on reactive clays that swell and shrink with changes of moisture content, because these are the most common cause of problems. The classification system is fairly complicated but, as a general guide, the following may be helpful in understanding the system for clay sites.

S Clays that have not given trouble in the past.

M Moderately reactive clays that may cause minor damage to brick houses on old-style light strip footings. Moderately reactive clays are common.

H Highly reactive clays that often damage houses, paths and fences.

E Extremely reactive clays that frequently damage houses even with strong footings. Generally rare in major cities except Adelaide. Other occurrences include outback NSW, Darling Downs, Geelong and Horsham.

Since the precautions necessary depend on the reactivity of the site, the owner should check the classification that is shown on the house plans.

The maintenance of the building and the site is the responsibility of the owner, and so the owner should be familiar with the requirements of this guide.

Care of clay foundations

All clays move with changes of moisture content, so the aim is to minimise such changes in the clay by:

- draining the site;
- keeping gardens and trees away from the house;
- adequate but moderate garden watering; and
- repairing plumbing leaks.

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CSIRO PUBLISHING, PO Box 1139, Collingwood, Vic 3066, Australia

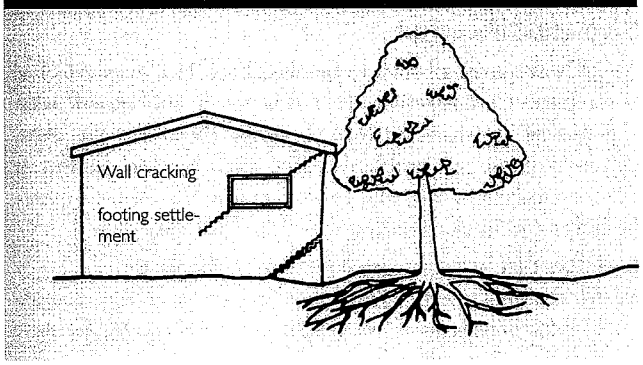
 ISSN 0314-5956

On a reactive-clay site there are some restrictions on the way the owner can safely develop the garden around the house. These restrictions apply mainly to brick houses. In most cases, only minimal precautions are justified for framed houses clad with timber or sheeting.

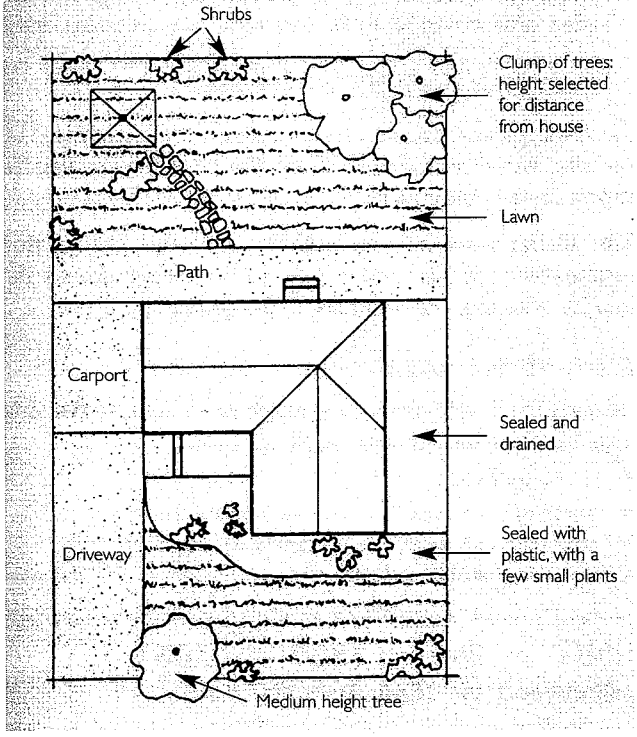
The site must be well drained. Under no circumstances should water be allowed to lie against the house or even near the house. The ground immediately next to the house should be graded away with a slope of about 50 mm over the first metre. Suitable surface drains should be provided to take the surface water away from the house. Where topsoil is brought in, it should not interfere with the site drainage, nor should it raise the ground level enough to block the weepholes in the brick walls or any subfloor vents. Even the subfloor of houses with timber floors should be drained so that water does not collect under the house.

Large garden beds are best not located near the house. This will avoid the possibility of introducing too much moisture to the foundation clay by overwatering. The zone near the house should be planned for paths or covered with gravel and plastic sheeting. Small shrubs may be planted at reasonable spacings.

Trees cause shrinkage and damage



Gardens for reactive site



Gardens and lawns should be watered adequately but not excessively. Uniform, consistent watering can be important to prevent damage to the foundation during dry spells such as droughts or dry summers.

Trees and large shrubs require substantial amounts of water, and if the soil near the tree dries out, the roots will extend in search of soil moisture. Tree watering is important in late summer and in drought. The use of slow-drip watering systems may be appropriate. It has also been found useful to drill holes near trees and fill them with gravel to allow water better access to the tree roots. Otherwise, clays will shrink as they dry, and a house may settle as shown below.

Removal of large trees creates the opposite problem. As soil moisture is gradually restored, clays swell and may lift shallow footings.

Many factors determine the extent of clay drying by trees. The more important include soil type, and the size, number and species of trees. Trees obtain moisture from roots that spread sideways, and the drying zone is influenced by the extent of these roots. For single trees, the drying zone is usually half to twice the tree height, but the zone may be larger for groups or rows of trees. Although it is known that the species can influence the extent and severity of the drying zone, little definite information is available. Some Australian trees are particularly efficient in extracting water from very dry soils and can be more dangerous than non-Australian species that use large amounts of water in normal conditions. The effect of tree drying on the amount of movement is also related to the reactivity of the clay. To minimise the risk of damage, trees (especially groups of trees) should not be planted near the house on a reactive clay site, and the following limits are recommended:

$d = 1.5\,h$ for Class E sites
$d = 1\,h$ for Class H sites
$d = 0.75\,h$ for Class M sites

where d is the distance of the tree from the house, and h is the eventual mature height of the tree. These values should be increased by 50% if the trees are in a dense group. These rules mean that on the average suburban block, trees that grow higher than 8–9 m are often impractical unless the owner accepts the risk of some damage to the house. If large trees are desired, it may be practical to adopt a specially designed footing system, e.g. a piled footing system.

A leak in the plumbing can cause the footings of a house on a reactive clay to move. The water seeps into the clay causing it to swell and push the footing system upwards. Any obvious leaks in stormwater, drainage or sewerage pipes should be investigated. Leaking water pipes can be detected by turning off all the taps and checking if the water meter records any flow.

The above restrictions may seem onerous for new home owners, but lack of site maintenance on a reactive clay can cause damage to the house. The whole issue should be kept in some perspective. The damage to houses caused by reactive clays is mostly unsightly cracks in the brickwork. In the typical Australian brick-veneer house, the brickwork does not support the structure. It is the timber frame that

carries the walls and roof loads, so brick cracks do not affect the structural safety of the house.

If owners choose to disregard some of the above restrictions and, say, plant large trees all around the house, they should not blame the builder, the engineer or the Council if the house suffers some cracking.

Performance of footing systems

All building materials move. Concrete and timber shrink, bricks grow, and so on. Many building practices have been evolved to reduce the damage that such movements cause, and the minor difficulties that arise are usually repaired without significant problems.

Where footings are designed by an engineer, the basis of the design is the limitation of any vertical movement that might occur between the centre of the wall and a line joining the ends of the wall. This is termed the differential movement and limits are given in AS 2870 for various forms of house construction. For example, a masonry veneer house with articulation joints is designed for a movement limit of 30 mm. The amount of this movement at a house can be checked using a level or even a string line along a brick course in the wall. If the vertical differential movement is less than the prescribed limit then the footing system has performed up to standard.

Masonry wall cracking can have many causes other than footing movement, including bricks growing as they absorb moisture, the structural or shrinkage movements of the frame within the veneer skin or even accidental damage during construction. If the cracking is less than a few millimetres it is virtually impossible to determine the cause. Certainly if there is no evidence of excessive differential movement then footings should not be regarded as the cause of the cracking.

However, it must be accepted that on reactive clay sites, particularly Class H and E, some movement is likely and for some sensitive houses cracking may occur even for footings performing within expectations. In order to set realistic expectations, AS 2870 contains Appendix C which is included in this report.

The performance requirement of AS 2870 suggests that Category 0 to 1 damage may be expected for houses on a reactive-clay site, but that the damage is of little consequence. Category 2 damage (isolated cracks up to 5 mm wide) is clearly not satisfactory, but it still does not constitute significant failure and could be expected to occur under adverse environmental conditions.

For these categories of damage, it is the intention of AS 2870 that consequent repairs are part of the normal house maintenance, although during the warranty period this may be the responsibility of the builder.

Nonetheless, to ensure that the damage does not proceed to a more serious state, the owner should take some action.

- Check that the recommendations on site treatment, drainage, garden arrangement, trees etc., have been observed.
- Keep a record of the crack width against the time of the year. If the damage is as high as Category 2 and seems to be increasing, the owner should consult the builder who may be able to offer more specific advice. If this does not prove satisfactory, the owner should engage a consulting engineer who specialises in house footings.
- Engage a plumber to check for leaks if this is suspected to be the cause.
- Replace soil moisture in dry spells by watering. Such watering can be more effective if holes or trenches are dug into the clay. The holes or trenches should be filled with compacted crushed rock or gravel and moderately watered. Some trees may need to be removed or kept pruned.

Complete stability is difficult to achieve, so repairs to damaged walls should include methods that will disguise further movements. Extra joints should be included in external masonry walls and further cracking in internal walls can be concealed by flexible paints, wall paper or panelling. Repairing of cracks with brittle fillers should be avoided unless the cracks have stabilised.

For the more serious categories of damage, the steps to be taken are similar, but there should be little delay in seeking advice. Remedial action for significant failure may still only include attention to stabilising moisture conditions as described above, but could also involve constructing a concrete path or a wall in the ground to stop drying of the foundation clay. Walls may even be designed to span over sagging footings or to cantilever beyond sagging footings. Underpinning is usually not satisfactory in reactive clays.

Experience indicates that lack of maintenance is responsible for many failures. Even with proper design and site maintenance the occasional failure may still occur because footing behaviour is so complex.

Shrinkage of concrete floors

Concrete needs water. Firstly to allow the fresh concrete to flow, and secondly to develop strength during its first few weeks. As a slab starts to dry, it shrinks and tries to contract. Some of this movement is restrained or resisted by friction on the bottom of the slab and by the beams in the ground. This restraint causes tension or stretching forces in the slab and these forces are often large enough to crack the slab.

Shrinkage cracking is almost inevitable and does not represent failure. Most owners never notice the cracks because they often do not occur until after the carpets are laid. Cracks under brittle or sensitive floor coverings are of concern, but the risk of damage can be reduced by using flexible mortars and glues for fixing slate and tiles etc. Also it helps to delay installing the floor covering until after the shrinkage has occurred. The length of delay should be at least three months after the slab has started to dry (i.e. from the time the slab is last wet from rain or during construction).

Adhesive-fixed floor coverings

A concrete slab takes a long time to dry. For example, under temperate condidons a slab will take about three months to dry. Moisture in the concrete can interfere with the bond or break down the adhesive used to attach floor coverings. However, a range of adhesives is available for various floor coverings and these should perform quite well on slabs that have been allowed to dry sufficiently. If there is any doubt, the moisture condition of the slab should be assessed before coverings are placed.

Conclusion

This guide has been prepared to advise owners on how to care for the foundation of their houses and what to expect from a well-designed footing system. The main concern with foundation maintenance is to prevent the foundation soil becoming too wet or too dry, and a variety of recommendations are given to achieve this.

Further information

Cameron, D. A. & Earl, I. 1982, *Trees and Houses: A Question of Function*, Cement & Concrete Association, Melbourne.

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Martin, K. G., Lewis, R. K., Palmer, R. E. & Walsh, P. F. 1983, *Floor Coverings on Concrete Slab-on-ground*, CSIRO Australia, Division of Building Research Report, Melbourne.

Disclaimer

Appendix C of As 2870

Table C1 Classification of damage with reference to walls

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted	15–25 mm but also depends on number of cracks	4

Table C2 Classification of damage with reference to concrete floors

Description of typical damage	Approximate crack width limit in floor	Change in offset from a 3 m straight edge centred over defect (see Note 5)	Damage category
Hairline cracks, insignificant movement of slab from level	<0.3 mm	<8 mm	0
Fine but noticeable cracks. Slab reasonably level	<1.0 mm	<10 mm	1
Distinct cracks. Slab noticeably curved or changed in level	<2.0 mm	<15 mm	2
Wide cracks. Obvious curvature or change in level	2–4 mm	15–25 mm	3
Gaps in slab. Disturbing curvature or change in level	4–10 mm	>25 mm	4

Notes:

1 Crack width is the main factor by which damage to walls is categorised. The width may be supplemented by other factors, including serviceability, in assessing category of damage.

2 In assessing the degree of damage, account shall be taken of the location in the building or structure where it occurs, and also of the function of the building or structure.

3 Where the cracking occurs in easily repaired plasterboard or similar clad-framed partitions, the crack width limits may be increased by 50% for each damage category.

4 Local deviation of slope, from the horizontal or vertical, of more than 1/100 will normally be clearly visible. Overall deviations in excess of 1/150 are undesirable.

5 Account should be taken of the past history of damage in order to assess whether it is stable or likely to increase.

6 The straight edge is centred over the defect, usually, and supported at its ends by equal height spacers. The change in offset is then measured relative to this straight edge.

Appendix E
Important Information about your Geotechnical Engineering Report

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfil the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you* – should apply the report for any purpose or project except the one originally contemplated.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include : the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was :

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical change that can erode the reliability of an existing geotechnical engineering report include those that affect :

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *Geotechnical Engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by : the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalise their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for*

the report's recommendations if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognise that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognise that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labelled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognise their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE member geotechnical engineer for more information.

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