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SPECIALISTS MANAGING THE EARTH

GEOTECHNICAL INVESTIGATION AND PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

Lismore Base Hospital, Uralba Street, Lismore NSW
Department of Commerce

GEOTALST01618AF-AD
12 December 2007

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
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SPECIALISTS MANAGING THE EARTH

12 December 2007

Department of Commerce
Dalley Street
Lismore NSW 2480

Attention: David Keeler

Dear Sir

RE: Geotechnical Investigation and Preliminary Environmental Site Assessment at Lismore Base Hospital, Uralba Street, Lismore NSW

Coffey Geotechnics Pty Ltd is pleased to present our report on the Geotechnical Investigation and Preliminary Environmental Site Assessment for the proposed Integrated Cancer Care Unit in Lismore Base Hospital, Lismore NSW.

We draw your attention to the attached sheet entitled “Important Information About Your Coffey Environmental Site Assessment” and “Important Information About Your Coffey Report” which should be read in conjunction with this report.

We trust that this report meets with your requirements. If you require further information please contact the undersigned in our Alstonville office.

For and on behalf of Coffey Geotechnics Pty Ltd

Tom Nicholson

Senior Engineering Geologist

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1 INTRODUCTION

1.1 General

Coffey Geotechnics Pty Ltd (Coffey) was requested by David Keeler of Department of Commerce (DoC) to carry out a Geotechnical Investigation and Preliminary Environmental Site Assessment (ESA) for a proposed Integrated Cancer Care Unit to be located on Lot 267 DP755718 of the Lismore Base Hospital, Lismore NSW. The work was commissioned by David Keeler of DoC on 6 November 2007.

The site has been used as a hospital since about the 1930's, when a "country" hospital was built. In the 1960's major works were carried out on the hospital to make it into a base hospital. It is thought that prior to becoming a hospital, the land may have been used for cattle grazing.

We understand that it is proposed to construct an Integrated Cancer Care Unit on the northwest portion of Lot 267 DP755718 (Lot 267). The development will require demolition of the Richmond Clinic currently located on the site, and then construction of a new two storey Cancer Care Unit. No basements are proposed for the structure, however excavations of about 2.5m depth are anticipated below the existing ground level for the construction of 'Bunkers" to accommodate x-ray equipment. The 'Bunkers' are understood to be about 3m by 5m with 1m thick reinforced concrete walls. New car parking facilities are also proposed as part of the development.

For the purposes of this report the site is the approximately 4,600m^2 area on the northwest portion of Lot 267 DP755718. The boundary of the site is shown on Figure 2.

The objective of the Geotechnical Investigation and Preliminary ESA is to provide geotechnical conditions and parameters, and a preliminary assessment for the presence of potential contamination from current or past activities.

1.2 Previous Work

Coffey have carried out numerous assessments for the Lismore Base Hospital in the past. A summary of each assessment is provided below.

Geotechnical and Preliminary Environmental Assessment – NR1618/1-AC, dated 12 May 2006

This report contains information on a geotechnical assessment, and a preliminary environmental site assessment.

The geotechnical assessment provided recommendations and/or comments on: geotechnical model; site classification to AS2870-1996; excavation conditions; suitability of site soils for use as fill and fill construction procedures; alternative footing types and levels; pavement design; retaining wall design parameters; likelihood of the existence of slope stability hazards; earthquake site factor; and stress relief issues.

The acid sulphate soil assessment indicated that some of the soils on the site were potential acid sulphate soils (PASS) and other soils on the site were acidic. Recommendations on the treatment of the PASS and acidic soils were provided.

The preliminary environmental assessment included a site history assessment, sampling and analysis of soils and data interpretation and reporting. The assessment identified two areas of environmental concern (AECs) which were fill materials and a 5,000L diesel underground storage tank (UST) located north and up-gradient of the site. The results of the sampling and analysis showed no contamination in the samples analysed. The UST was assessed to be an ongoing risk to the site, due to the potential for diesel to leak from the UST. It was recommended that the UST be removed or an ongoing monitoring program to detect leaks from the UST be established. It was also recommended that a contamination management plan (CMP) be prepared and implemented, due to the potential for hydrocarbon contamination to be encountered during earthworks.

Contamination Site Management Plan – NR1618/3-AB, dated 21 June 2006

The Contamination Site Management Plan (CSMP) provided guidance on appropriate procedures for assessment, management/remediation and validation of contaminated soils, and assessment, handling and disposal of wastes which may have been encountered during excavation and construction activities at the site.

Facsimile: Short Term Slope Stability of Southern Boundary Batter Slope – GEOTALST01618AD-AA, dated 19 January 2007

This facsimile contained information about a site visit to assess the likelihood of slope stability failure of a batter slope. Recommendations on remediation of the batter slope to reduce the potential risk of failure were provided.

Facsimile: Lismore Hospital Extension – Southern Boundary Retention – GEOTALST01618AE-AB, dated 24 January 2007

This facsimile presented recommendations on bond stress parameters for ground anchors to be designed as part of the retention system for the southern and eastern sides of the excavation for the Lismore Hospital Extension.

Soil Nail Wall Option Design Report, Lismore Hospital Extension – Southern Boundary Retention – GEOTALST01618AE-AC, dated 30 January 2007

This report presented the results of analyses for a proposed soil nail wall option to support excavations along the southern boundary of the site for the Lismore Base Hospital extensions.

Soil Nail Wall Specifications, Lismore Hospital Extension – Southern Boundary Retention – GEOTALST01618AE-AD, dated 31 January 2007

This report presented a specification for the construction of a soil nail wall for the Lismore Hospital Extension.

Facsimile: Variation to Soil Nail Wall Design to Account for Site Conditions, GEOTALST01618AE-AE, dated 14 March 2007

This facsimile presented recommendations on variations to the soil nail wall design due to site conditions and changes to the planned design.

Geotechnical Investigation of Lismore Base Hospital Carpark – GEOTALST01618AG-AB, dated 4 December 2007

This report provided the results of a geotechnical investigation, including pavement design parameters, for Lismore Base Hospital car park.

1.3 Scope of Work

The following scope of work was carried out:

- A site history assessment including a review of aerial photographs, a search of historical titles, a check of NSW EPA notices, a groundwater bore search, a review of a local geological map, a search of Dangerous Goods Licenses held by WorkCover, a site walkover, a review of Lismore City Council records for the site, and interviews with people familiar with the site;
- Drilling three boreholes (BH1 to BH3) to depths of 4.0m to 4.5m using an MD200 4WD mounted drilling rig equipped with continuous spiral flight augers. The boreholes were drilled in accessible areas around the existing Richmond Clinic. Soil samples were collected for subsequent geotechnical and environmental testing, and the subsurface conditions were logged by a Coffey Engineering Geologist;
- Laboratory analysis of environmental soil samples for a suite of chemicals of concern including Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl-benzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury) and Organochlorine and Organophosphorous Pesticides (OCP & OPP) for the environmental assessment;
- Laboratory analysis of geotechnical soil samples, including two shrink/swell tests and two compaction and four-day soaked CBR tests for the geotechnical investigation;
- Reporting of the results and data interpretation to assess the significance of contamination with respect to regulatory guidelines including assessing the potential contamination issues identified within the scope, providing comments and recommendations on the need for further investigation and/or remediation, and;
- Reporting of the results and providing recommendations on site preparation, site classification to AS2870-1996, alternative footings types and founding depths, pavement design parameters and requirements for further geotechnical work for the geotechnical investigation.

Further information on each stage is presented in the sections below.

2 SITE LOCATION AND SURROUNDING LANDUSE

The site is located at 60 Uralba Street, Lismore, NSW. The site is located in the northwest portion of Lot 267 DP755718 and comprises an area of approximately 4,600m^2. The site is located within the Lismore Local Government Area, Parish of Lismore, County of Rous. The site lies to the east of Hunter Street and south of Laurel Avenue, within a residential and commercial area of Lismore. The approximate site location is shown on Figure 1.

3 SITE HISTORY ASSESSMENT

Site history information was obtained from a review of aerial photographs, a search of historical titles, a check of NSW EPA notices, a groundwater bore search, a review of a local geological map, a search of Dangerous Goods Licenses held by WorkCover, a site walkover, a review of Lismore City Council records for the site, and interviews with people familiar with the site. The original documents and/or information are presented in Appendix A.

3.1 Site History Information Summary

Interviews

An interview was carried out with Mr Warren Jones on site during the site walkover on 16 November 2007. The interview identified that the site (northwest portion of Lot 267) had been vacant prior to 1947. A two-storey brick building, the Richmond Clinic, and a pool was built in 1947 to 1948. Later in 1988 the site was redeveloped and a two-storey brick extension built. The extension was built over the top of the pool, was which filled in with rubble. Mr Jones thought that the pump and fittings for the pool were probably removed prior to filling it with rubble. A 5,000L diesel underground storage tank (UST) is located just outside the north-east corner of the site. An old road used to run from the north-east corner of the site along the eastern and southern boundaries of the site.

The site is presently used as a mental health unit, and a staff member said there may be medications discarded by patients in the gardens.

An interview was carried out with Mr Bob Miller in 2006 for a previous assessment (reference NR1618/1-AC) at the hospital, which was considered to be relevant to the current assessment. Mr Bob Miller worked at the Lismore Base Hospital and had been involved with the site for about 29 years. Mr Miller indicated that the site was crown land until sometime in the 1940's, when a 'country' hospital was built. Mr Miller stated that there were major developments works on the 'country' hospital in the 1960's, which transformed it into a base hospital. Mr Miller indicated that the land may have been used for cattle grazing prior to becoming hospital land. Mr Miller did not believe any chemicals were used on the site other than household type pesticides and termite treatments, he also stated that it had been 10 to 15 years since hospitals were allowed to use anything 'nasty' on site. Mr Miller indicated that no wastes were stored on the site, other than 'usual' rubbish. No indication was given if wastes were stored on the site in the past. The surrounding land use was residential and prior to the 1940's was crown land which was owned by the hospital. Mr Miller indicated that there were two diesel generators and one diesel underground storage tank (UST) on the hospital site, near Block B. The UST was approximately 5,000L in capacity and was about 20 to 30 years old. The UST is used to power the backup electricity generator.

Titles Search

A titles search was carried out by Advance Legal Search Pty Limited for Lot 267 DP755718.

The titles search indicates that the lot has been owned by The Lismore District Hospital from 1931 to present.

From 1920 to 1931, the site was owned by William Lockett, Norman Sidney and William Riley who were esquires and trustees for the Lismore Hospital.

From 1885 to 1920 the lot was owned by James Baillie, Archibald Currie and James Barrie who were esquires and trustees for the Lismore Hospital.

Prior to 1885 the land was Crown Land, and from 1881 to 1885 it was "dedicated for site of hospital at Lismore".

NSW EPA Notices

A check of the NSW EPA website on 4 December 2007 revealed that no notices have been issued on the site or adjacent properties under the Environmentally Hazardous Chemicals Act (1985) and the Contaminated Land Management Act (1997).

Aerial Photographs

A selection of aerial photographs dating from 1958 to 2004 were viewed. A brief description of the site in each photograph is summarized in Table 1 below.

Table 1: Summary of Site in Aerial Photographs

Date	Description
1958	One square building is located on the southeast side of the site. The northwest part of the site appears to be grassed, with trees. Hunter Street is located to the west, Laurel Avenue to the north and other hospital buildings are located to the south and east. The surrounding land is generally residential.
1967	Similar to 1958.
1979	Appears to be one to two buildings on site, it is not clear if the buildings are joined together or not. Immediately next to the building(s) appears to be vegetated with trees and grass. Hunter Street is located to the west, Laurel Avenue to the north and other hospital buildings are located to the south and east.
1987	Similar to 1979.
2004	A large triangular shaped building with a courtyard in the centre covers most of the site. Immediately next to the building appears to be vegetated with trees and grass, and a few cars are parked. The surrounding land is similar to 1979.

Dangerous Goods License Records

WorkCover Dangerous Goods Licensing Records were reviewed.

The records indicate that ether, ethanol and acetone were kept in a roofed, brick walled package store from at least 1989 to 1992. No sign of this package store was noted on the portion of the hospital being assessed in this investigation.

Letters dated from August 1992 to September 1992 indicates that two above ground LPG storage tanks were transferred from The Central West Linen Service Orange to Lismore Base Hospital. It is not known if these two tanks are still on the hospital site. No sign on them was seen on the portion of the hospital being assessed in this investigation.

The file for Lismore hospital (60 Uralba Street, Lismore) was closed in 2007, indicating that WorkCover believe there is either minor or no storage of dangerous goods on the hospital site.

Council Records

A review of the records held by Lismore City Council was carried out on 30 November 2007.

The information in the records dates after 1989. Very little information about the site was available. The information that was available related to planning for renovations in the late 1990's and a proposed access ramp.

3.2 Site Observations

The site is located on the eastern side of Hunter Street and the southern side of Laurel Avenue in a mainly residential area of Lismore. The site is bounded by Hunter Street to the west, Laurel Avenue to the north and hospital buildings to the east and south.

The site is located at the base of a basalt ridge, and is approximately 50m to 100m from alluvial floodplains to the north and northwest. The site generally slopes to the north and northwest at about 4^0.

A retaining wall is located on the southern boundary of the site, which is about 1m high on the southwest end and about 3.5m high on the southeast end, which indicates that cut and fill earthworks have occurred on the site in the past.

The existing Richmond Clinic building covered most of the site. The Richmond Clinic is a two storey brick building, triangular in shape with a courtyard in the centre. The courtyard is grassed with a fountain. The building was observed to be in good condition, with no obvious signs of settlement.

Gardens around the perimeter of the building are generally grassed with trees of 6m to 8m in height and shrubs. Surface water on the site would run off onto Hunter Street and Laurel Avenue.

Major construction works were occurring to the north of the site for other new buildings on the hospital.

A 5,000L diesel UST is located adjacent to the northeast corner of the site. The diesel is used to power a backup electricity generator.

3.3 Geology and Hydrogeology

The 1:250,000 Geological Map of the Tweed (which cover the Lismore region) indicates that site locality is underlain by Lismore Basalt.

A search of the NSW Department of Water and Energy groundwater bore data was carried out. One groundwater bore was found within a 1km radius of the site. This bore is used for Recreation (groundwater) purposes. A standing water level of 0.6m was recorded, with water bearing zones at 31m and 93m depth. It is inferred that this bore would be up-gradient of the site. However, it is likely to be in the same geological formation, and groundwater in this bore may be connected to groundwater at the hospital site.

4 POTENTIAL AREAS OF ENVIRONMENTAL CONCERN (AEC) AND CHEMICALS OF CONCERN (COC)

4.1 Potential Areas of Environmental Concern

Based on the site history information and site observations, three main potential Areas of Environmental Concern (AEC) have been identified.

- **AEC 1**: A 5,000L diesel UST adjacent to the northeast corner of the site. There is a potential for the UST to have leaked over time and contaminated the surrounding soils and groundwater.
- **AEC 2**: Buildings on the site. Lead based paints and pesticides may have been used on and around the buildings.

- **AEC 3**: Fill soils on the site. Fill materials have the potential to have been imported from a contaminated property, as well as potentially becoming contaminated on the site.

Samples were collected in AEC 2 and AEC3. Samples were not collected near AEC 1 due site accessibility issues.

4.2 Potential Chemicals of Concern

The likely chemicals of concern associated with the past and current activities, as identified by the site observations and the site history study include:

- TPH - Total Petroleum Hydrocarbons;
- BTEX - Benzene, Toluene, Ethyl-benzene and Xylene;
- PAH - Polycyclic Aromatic Hydrocarbons, and;
- Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury);
- Organochlorine and Organophosphorous Pesticides (OCP & OPP).

5 FIELD INVESTIGATIONS

The site comprises an area of about 4,600m^2 (0.46ha). The NSW EPA (1995) Sampling Design Guidelines specify approximately thirteen sample locations for a 0.5ha area. As this is a Preliminary Environmental Site Assessment, and the site had limited accessible locations, only three locations were sampled.

The fieldwork was carried out on 14 November 2007 in the full time presence of an engineering geologist from our Alstonville Office.

A truck mounted drilling rig equipped with 100mm diameter solid continuous flight augers was used to drill three boreholes (BH1 to BH3) to depths of between 4.0m and 4.5m where refusal on weathered basalt was encountered. Standard penetration tests (SPTs) were carried out at approximately 1.5m intervals in each borehole.

The approximate borehole locations are shown on Figure 2. Engineering logs of the boreholes are presented in Appendix B.

5.1 Sampling

During drilling, soil samples were either collected using a split spoon SPT sampler (for samples greater than 0.5m depth) or directly off the augers (for samples less than 0.5m depth). Each sample was collected using clean disposable latex gloves. Sampling equipment was decontaminated between samples by brush scrubbing with potable water, then with a phosphate free detergent and were finally rinsed with potable water.

Soil samples were generally collected at depths of 0.0m, 0.5m, 1.0m, 2.5m and 4.0m. The samples were placed into laboratory supplied 250mL glass jars, and placed directly into a chilled insulated container. One duplicate sample and one wash blank sample were collected during fieldwork.

Two thin walled (U50) tubes were collected from BH2 and BH3 for the geotechnical investigation.

5.2 Subsurface Soil Conditions

Based on the subsurface conditions on the site, the following geological stratigraphy has been interpreted:

- **Unit 1 – Fill:** Ranging from silty clay to sand to gravel, generally moist, overlying,
- **Unit 2 – Residual Soil:** Silty clay, moist, grey-orange changing to red-brown, stiff to hard, overlying,
- **Unit 3 – Extremely Weathered (XW) Basalt:** remoulding as clayey gravel, moist, grey brown to pale brown-grey, very stiff to hard. SPT refusal encountered.

The depth to the base of these units at each borehole location is summarised in 2.

Table 2.

Table 2: Depth to Base of Units for Assessed Geological Model

Unit	Depth to Base of Unit (m)		
	BH1	BH2	BH3
Unit 1 – Fill	0.5	0.4	0.9
Unit 2 – Residual Soil	2.0	2.2	2.0
Unit 3 – XW Basalt	>4.5	>4.1	>4.0

5.3 Groundwater

No groundwater inflows were encountered in the boreholes. It should be noted that groundwater levels and inflows may change depending on a number of factors including rainfall, climate and other factors.

6 ENVIRONMENTAL ASSESSMENT

6.1 Sampling & Analysis Schedule

Samples were sent to MGT, a contract NATA accredited laboratory, under chain of custody conditions.

Nine primary soil samples, and three quality control/quality assurance samples were selected for laboratory analysis. Table 3 below summarises the samples selected and the contaminants analysed.

Table 3: Sampling & Analysis Schedule

Location & Depth (m)	Geological Origin of Material	Laboratory Analysis
	Primary Samples	
BH1 0.05-0.2	Fill: Gravel, fine to medium grained, grey	TPH, BTEX, PAH, Metals, OCP & OPP
BH1 0.5-0.8	Residual Soil: Silty Clay, high plasticity, grey-orange	TPH, BTEX, PAH, Metals, OCP & OPP
BH1 2.5-2.95	XW Basalt: Gravelly Clay, medium plasticity, grey-brown, gravel is medium to coarse grained.	TPH, BTEX, PAH, Metals, OCP & OPP
BH2 0.0-0.15	Fill: Sand, medium to coarse grained, pale brown.	TPH, BTEX, PAH, Metals, OCP & OPP
BH2 0.4-0.7	Residual Soil: Silty Clay, high plasticity, orange-grey.	TPH, BTEX, PAH, Metals, OCP & OPP
BH2 2.5-2.95	XW Basalt: Silty Clay, medium plasticity, pale brown.	TPH, BTEX, PAH, Metals, OCP & OPP
BH3 0.05-0.2	Fill: Gravel and Silty Clay. Gravel is coarse grained, grey. Silty Clay is high plasticity, brown.	TPH, BTEX, PAH, Metals, OCP & OPP
BH3 0.4-0.7	Fill: Silty Clay, high plasticity, brown.	TPH, BTEX, PAH, Metals, OCP & OPP
BH3 1.6-2.0	Residual Soil: Silty Clay, high plasticity, orange-grey.	TPH, BTEX, PAH, Metals, OCP & OPP
	Quality Assurance/Quality Control Samples	
Duplicate A	Duplicate of sample BH1 0.05-0.2	TPH, BTEX, PAH, Metals, OCP & OPP
Wash Rinsate	Water	TPH, BTEX, PAH, Metals, OCP & OPP
Trip Spike	Laboratory Supplied	BTEX

6.2 Soil Investigation Levels (SILs)

In order to assess the degree of contamination in soils on the site, the results of soil analyses were compared with guidelines in the following references:

- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd edition), and;
- NSW EPA (1994) Guidelines for Assessing Service Station Sites.

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme summarises the National Environmental Health Forum (NEHF) investigation levels[1] for protection of human health for different land uses and also provide guidelines for provisional phytotoxicity investigation levels for a range of contaminants in soils.

The site is intended to be redeveloped for ongoing commercial/industrial use. The NSW EPA (1994) guidelines provide acceptable cleanup levels at service station sites which are to be redeveloped for a sensitive use such as residential. The NSW EPA also recommends the use of these guidelines for assessing hydrocarbon contaminants for sites with less sensitive land uses. Thus, these criteria have been used to compare the results of soil testing.

Where appropriate the results have been compared to NEHF F criteria (Column 4) for commercial/industrial use provided in the NSW DEC (2006) guidelines, and to the sensitive land use criteria in Table 3 of the NSW EPA (1994) guidelines.

6.3 Quality Assurance/Quality Control

Samples were transported under chain of custody conditions and in chilled insulated containers to mgt Environmental Consulting Pty Ltd (mgt) Melbourne laboratory which is NATA accredited for the analysis performed. A copy of the chain of custody is included with the laboratory test results in Appendix C.

The laboratory conducted internal quality control using laboratory duplicates, spikes and method blanks. The results are shown with laboratory report sheets in Appendix C and a Data Validation Report is presented with the laboratory report. Analytical methods used for the laboratory testing are also indicated on the laboratory report sheets. The results of laboratory quality control testing are considered to be within acceptable limits.

For QA/QC purposes one duplicate sample required analysis. The duplicate soil sample collected during field work was analysed for TPH, BTEX, PAH, Metals, and OCP & OPP. The relative percentage difference (RPD) between the primary and duplicate sample is summarised in Table 4 below. A wash blank sample, and a trip spike sample were also tested.

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[1] In Imray and Langley (1994). Health Based Soil Investigation Levels. (IN: The Health Risk Assessment and Management of Contaminated Sites – Proceedings of the Third National Workshop on the Health Risk Assessment and Management of Contaminated Sites. Contaminated Sites Monograph Series No.5, 1996. South Australian Department of Health and Family Services/Commonwealth [1]

Table 4: Relative Percentage Difference (RPD) Between Primary and Duplicate Sample

Analyte	Primary Sample	Duplicate Sample	RPD%
	BH1 0.05-0.2	Duplicate A	
Arsenic <	2 <	2	NA
Cadmium <	0.5 <	0.5	NA
Chromium <	5 <	5	NA
Copper	16	14	13
Lead <	5 <	5	NA
Nickel	14	11	24
Zinc	59	51	14
Mercury <	0.1 <	0.1	NA
TPH C6-C9 <	20 <	20	NA
TPH C10-C14 <	50 <	50	NA
TPH C15-C28 <	100 <	100	NA
TPH C29-C36 <	100 <	100	NA
Benzene <	0.05 <	0.05	NA
Toluene <	0.05 <	0.05	NA
Ethyl-benzene <	0.05 <	0.05	NA
Xylene <	0.05 <	0.05	NA
Total PAH <	0.1 <	0.1	NA
Total OCP <	1.2 <	1.2	NA
Total OPP <	4.4 <	4.4	NA

The comparison of the test results for the primary and field duplicate sample indicates that the RPDs were either below the control limit of 50% or the analyte was below the laboratory limit of reporting (LOR). Where the analyte is below the LOR it is impractical to calculate the RPD. The wash blank sample was tested for TPH, BTEX, PAH, Metals and OCP & OPP and the results show analytes below the LOR. The trip spike was analysed for BTEX, and the spike recoveries were within control limits.

Based on the above assessment it is considered that the field and laboratory methods are appropriate and that the data obtained is usable and considered to reasonably represent the concentrations at the sampling points at the time of sampling.

6.1 Comparison of Results to Soil Investigation Levels

The laboratory test results for soil are summarised in Table 5

Comparison of soil concentrations to the SILs discussed in Section 6.2 is as follows:

- Concentrations of Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury) were below adopted criteria in each sample tested;
- Concentrations of TPH C_6-C_9 were below adopted criteria and LOR in each sample tested;
- Concentrations of TPH C_{10}-C_{36} were below adopted criteria and LOR in each sample tested;
- Concentrations of BTEX were below adopted criteria and LOR in each sample tested;
- Concentrations of PAH and benzo(a)pyrene were below adopted criteria in each sample tested;
- Concentrations of OCP & OPP were below adopted criteria in each sample tested.

Table 5: Summary of Laboratory Test Results

Sample ID	**Threshold Concentrations**	BH1	BH1	BH1	BH2	BH2	BH2	BH3	BH3	BH3
Matrix		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Depth (m)	Commercial Use	0.05-0.2	0.5-0.8	2.5-2.95	0.0-0.15	0.4-0.7	2.5-2.95	0.05-0.2	0.4-0.7	1.6-2.0
Date Sampled		15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07	15-Nov-07
Heavy Metals										
Arsenic	500 [1]	<2 <	2 <	2 <	2 <	2 <	2 <	2 <	2 <	2
Cadmium	100 [1]	<0.5 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5
Chromium	500 [1]	<5 <	5 <	5	12 <	5 <	5	6.9	24 <	5
Copper	5000 [1]	16	23	18	22	16	40	39	29	12
Lead	1500 [1]	<5	11	5.6	6.3	8.6 <	5	6.3	140 <	5
Nickel	3000 [1]	14	21	25	29	12	20	8.3	11	14
Zinc	35000 [1]	59	92	52	72	64	120	63	170	71
Mercury	75 [1]	<0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1
Total Recoverable Hydrocarbons										
TRH C6-C9	65 [2]	<20 <	20 <	20 <	20 <	20 <	20 <	20 <	20 <	20
TRH C10-C14	<	50 <	50 <	50 <	50 <	50 <	50 <	50 <	50 <	50
TRH C15-C28	<	100 <	100 <	100 <	100 <	100 <	100 <	100 <	100 <	100
TRH C29-C36	<	100 <	100 <	100 <	100 <	100 <	100 <	100 <	100 <	100
Total TRH C10-C36	1000 [2]	<250 <	250 <	250 <	250 <	250 <	250 <	250 <	250 <	250
BTEX										
Benzene	1 [2]	<0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05
Toluene	1.4 [2]	<0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05
Ethyl-benzene	3.1 [2]	<0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05
Xylene	14 [2]	<0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05	0.07 <	0.05
Polycyclic Aromatic Hydrocarbons										
Acenapthene	<	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1	0.3 <	0.1
Acenapthlyene	<	0.1 <	0.1 <	0.1<	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1
Anthracene	<	0.1 <	0.1 <	0.1	0.3 <	0.1 <	0.1 <	0.1	0.8 <	0.1
Benz(a)anthracene	<	0.1 <	0.1 <	0.1	1.2 <	0.1 <	0.1 <	0.1	3.5 <	0.1
Benzo(a)pyrene	5 [1]	<0.1 <	0.1 <	0.1	1.1 <	0.1 <	0.1 <	0.1	3.2 <	0.1
Benzo(b)fluoranthene	<	0.1 <	0.1 <	0.1	1.1 <	0.1 <	0.1	0.1	3.8 <	0.1
Benzo(g.h.i.)prylene	<	0.1 <	0.1 <	0.1	1 <	0.1 <	0.1 <	0.1	2.7 <	0.1
Benzo(k)fluoranthene	<	0.1 <	0.1 <	0.1	0.8 <	0.1 <	0.1	0.1	1.4 <	0.1
Chrysene	<	0.1 <	0.1 <	0.1	1.1 <	0.1 <	0.1 <	0.1	2.8 <	0.1
Dibenz(a.h)anthracene	<	0.1 <	0.1 <	0.1	0.2 <	0.1 <	0.1 <	0.1	0.5 <	0.1
Fluoranthene	<	0.1 <	0.1 <	0.1	1.9 <	0.1 <	0.1	0.1	7.1 <	0.1
Fluorene	<	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1	0.2 <	0.1
Indeno(1.2.30cd)pyrene	<	0.1 <	0.1 <	0.1	0.8 <	0.1 <	0.1 <	0.1	2.3 <	0.1
Napthalene	<	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1
Phenanthrene	<	0.1 <	0.1 <	0.1	0.8 <	0.1 <	0.1 <	0.1	4.6 <	0.1
Pyrene	<	0.1 <	0.1 <	0.1	2.1 <	0.1 <	0.1	0.2	7.1 <	0.1
Total PAH	100 [1]	<1.6 <	1.6 <	1.6	12.4 <	1.6 <	1.6	0.5	40.3 <	1.6
Organochlorine Pesticides										
Aldrin + Dieldrin	50 [1]	<0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1
Chlordane	250 [1]	<0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1
Heptachlor	50 [1]	<0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05
DDT + DDE + DDD	1000 [1]	<0.15 <	0.15 <	0.15 <	0.15 <	0.15 <	0.15 <	0.15	0.35 <	0.15
Total OCP	<	1.2 <	1.2 <	1.2 <	1.2 <	1.2 <	1.2 <	1.2 <	1.2 <	1.2
Organophosphorous Pesticides										
Total OPP	<	4.4 <	4.4 <	4.4 <	4.4 <	4.4 <	4.4 <	4.4 <	4.4 <	4.4

Notes:

	LOR exceeds adopted critieria
Value	exceeds Commercial/Industrial Criteria

[1] Based on NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd ed) - NEHF F (Column 4) Commercial/Industrial Use criteria.

[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites - Table 3: Threshold concentrations for sensitive land use - soils

6.1 Discussion

Each sample tested showed concentrations of contaminants below the adopted criteria. It is noted that elevated levels of PAH were detected for samples BH2 0.05-0.2m and BH3 0.4-0.7m, although these concentrations were below the adopted criteria.

The samples with elevated concentrations of PAH were collected within fill materials, and these levels may indicate that the fill materials contain PAH contamination. Further assessment of the fill materials would be required to conclude this.

6.2 Conclusions and Recommendations

The site history and observations identified three AECs for the site. Samples were collected within AEC 2, near existing buildings, and AEC 3, fill materials. Samples were not collected near AEC 1 due to site accessibility issues. No obvious stains, spills, odours or leaks were observed on the site.

The concentrations of the contaminants tested for were below the adopted criteria for each sample analysed. It is noted that elevated levels of PAH were detected for two samples, BH2 0.05-0.2m and BH3 0.4-0.7m, although the concentrations of PAH were still below the adopted criteria. These two samples were collected within fill materials that had been imported to the site during previous developments. The elevated concentrations indicate that the fill materials on the site may be contaminated with PAH.

Given the limited number of sample locations, and the results of the laboratory testing, it is recommended that further assessment (sampling and analysis) be carried out in the fill materials, including fill in the former pool, on the site prior to construction of the Integrated Cancer Care Unit.

The management plan for the construction works should include information on how to identify, manage and dispose of contaminated soils should they be encountered. A contamination management plan may be required for the construction works, depending on the results of the additional contamination assessment of the fill materials.

It is also desirable that a contamination assessment be carried out for the diesel UST adjacent to the northeast corner of the site. As a minimum an integrity test of the UST should be carried.

7 GEOTECHNICAL ASSESSMENT

7.1 Geotechnical Model

Based on the subsurface conditions on the site, the following geological stratigraphy has been interpreted:

- **Unit 1 – Fill:** Ranging from silty clay to sand to gravel, generally moist, overlying,
- **Unit 2 – Residual Soil:** Silty clay, moist, grey-orange changing to red-brown, stiff to hard, overlying,
- **Unit 3 – Extremely Weathered Basalt:** remoulding as clayey gravel, moist, grey brown to pale brown-grey, very stiff to hard. SPT refusal encountered.

The depth to the base of these units at each borehole location is summarised in Table 6.

Table 6: Depth to Base of Units for Assessed Geological Model

Unit	Depth to Base of Unit (m)		
	BH1	BH2	BH3
Unit 1 – Fill	0.5	0.4	0.9
Unit 2 – Residual Soil	2.0	2.2	2.0
Unit 3 – XW Basalt	>4.5	>4.1	>4.0

The locations of the boreholes are indicated on Figure 2.

7.2 Groundwater

Groundwater was not encountered during the site investigations. Groundwater conditions at the proposed structures may change as a result of climatic effects or other factors such as services leaks or the planting or removal of large trees near buildings.

7.3 Laboratory Testing

The results of the geotechnical laboratory testing are summarised in Table 7 (Atterberg Limits and Linear Shrinkage) and Table 8. Laboratory test result sheets are presented in Appendix C. It was initially proposed to carry out two shrink/swell tests on samples obtained during the investigation. Upon investigation, it became evident that some samples taken were unable to be tested. In place of a shrink/swell test on the sample from BH1, an Atterberg Limits test including linear shrinkage was carried out.

Table 7: Results from Atterberg Limits and Linear Shrinkage Testing

Location	Depth (m)	Material	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Field Moisture Content (%)
BH2	0.8-1.1	CH, Residual	76	33	43	17.5	36.6
BH3	1.0-1.3	CH, Residual	96	33	63	21.0	34.5

The results from the Atterberg Limits and Linear Shrinkage testing indicate that that the clay encountered on site has a high plasticity. Published correlations (Cameron, 1989) indicate that a shrink-swell index of 5% and 8% would result from the in-situ clays. Based on the observed soil profile this would lead to characteristic soil surface movements (y_s) of at least 70mm but possibly as much as 100mm.

Table 8: Results from CBR Testing

Location	Depth (m)	Material	Optimum MC (%)	Field MC (%)	Max. Dry Density (kg/m^3)	CBR (%)
BH2	0.4-0.9	CH, Residual	41.2	34.1	1.2	3.5

7.4 Site Classification

Fill materials were observed in all boreholes at the site, however cohesive fill in excess of 0.4m was observed in BH3 only. We are not aware of any records which indicate the fill was placed as 'controlled fill', and therefore we have assumed that the fill is 'uncontrolled'. If documentation is provided which indicates that the fill is 'controlled', the classification may change and further advice should be sought.

Based on the limited amount of investigation carried out, it is considered that at this stage the entire site is classified as Class P in accordance with AS2870-1996, under the current conditions. Fill materials observed in boreholes are assessed to be unsuitable to act as founding materials for shallow footings, and the uncontrolled fill should not be relied upon for bearing beneath slabs.

The results of the shrink/swell and Atterberg limits testing indicated that the natural soils at the site have a shrink/swell index (I_{ss}) of between about 5% and 8% based on published correlations. Such values would lead to characteristic surface movements of at least 70mm but up to 100mm for structures founded on the residual soils from which the test samples were taken.

Should the fill materials be stripped and removed from site or re-used as landscaping fill only, the site classification will be affected.

Should footings be proposed to be founded at depth lower values for characteristic surface movement could be assessed. This is also the case for footings below 2m of the surface (e.g. piled footings) or for basement excavations, which are planned for the radiation bunkers to a depth of about 2.5m to 3m.

Where less reactive fill is placed over the residual soils, the design near surface movement due to seasonal moisture changes may vary. Further advice will be required should be sought if filling in this manner as proposed. The final y_s will depend on the type of fill used, and the method of placement and compaction.

Our recommendations for foundation design and construction in terms of the site classification effects of construction are therefore as follows:

- Shallow footings should be founded below any fill materials and should be designed as per the recommendations for a Class E site classification as per AS2870-1996.
- Deep footings piled through the residual clays to extremely weathered basalt or better should be designed to accommodate shrink-swell movements of the residual clays, either by allowing for structural capacity in the piles to allow for the shrink-swell movements or by sleeving the piles and designing the piles as end-bearing piles alone.
- Footings for the radiation bunkers are expected to be founded at levels of 2.5m to 3m below existing ground on Unit 3 materials. This is below the anticipated depth of seasonal influence in Lismore. As such footings may be designed as per the recommendations for a Class S site classification and the walls of the bunkers should be designed to accommodate additional tension and uplift forces due to shrink-swell movements of the residual clays from 0 to 2m depth.
- All fill should be placed as controlled fill under Level 1 construction testing and monitoring as per AS3879-2007. Should the placement of fill be considered, additional advice should be sought in order to re-classify the filled site.

Reference should be made to Section 7.7 for geotechnical design parameters for foundation design.

7.5 Excavation Conditions

Excavation using hydraulic excavation equipment should proceed readily to the depths of Unit 3 materials. Heavier equipment may be required to rip Unit 3 materials to the required geometry for the deep radiation bunkers, and heavy ripping using D10 dozers (or heavier) with tynes may be required to disintegrate the extremely weathered rock.

Groundwater was not encountered in the boreholes during the site investigation, and it is unlikely that groundwater effects will impact on the excavatability of the site.

It is recommended that prospective contractors be given access to the engineering logs in order to allow assessment of the required construction equipment.

7.6 Retaining Wall Design Parameters

7.6.1 Temporary & Permanent Batter Slopes

Should it be required that batter slopes be established on the site, we recommend that such slopes be made at angles no steeper than those recommended in Table 9, for each of the specific geological

units. Temporary slopes refer to slopes established for periods of less than 1 month, for example during construction. The values in the table assume that no surcharge loads are applied at the top of the slope.

Table 9: Temporary and Permanent Batter Slopes

Geological Unit	Recommended Temporary Maximum Batter Slope	Recommended Permanent Maximum Batter Slope
Unit 1: In-situ Uncontrolled Fill	3H:1V	3H:1V
Unit 2: In-situ Residual Silty Clays	2H:1V	2.5H:1V
Unit 3: In-situ Extremely weathered Basalt	1H:1V	2H:1V

It is recommended that the slope faces and flat areas at the top of temporary slopes be protected from water ingress by the placement adequate measures such as plastic sheeting and perimeter drains.

Permanent batter slopes should be protected by rapidly establishing vegetation cover. Suitable drainage measures should be provided for all batter slopes. As a minimum, surface drains should be installed at the top of temporary slopes to divert water away from the face of the slope, while bare slopes (e.g. prior to the establishment of vegetation) should also be protected during rainfall.

7.6.2 Retaining Walls

The foundation of any retaining walls must be located below all colluvial soils and founded fully within residual soils or better.

Gravity type retaining walls may be designed on the basis of a triangular lateral stress distribution. Design parameters for the geotechnical units are shown in Table 10. Design of the walls must take into account any surcharge from sloping ground or other loadings behind the wall which will increase the lateral earth pressure loads from the horizontal ground case. Global failure of the structure should also be checked for acceptable factors of safety. In general, the recommendations of AS4678:2002 are to be followed when designing and constructing retaining walls on the site.

Any backfill behind retaining walls should comprise free-draining granular materials placed as controlled fill to Level 1 observation and testing (as defined by AS3798:2007). The controlled fill should be placed in layers not exceeding 300mm prior to compaction and should be compacted to a minimum Density Index of 75%.

Adequate drainage should be provided for all retaining walls. It is recommended that granular, free-draining material be placed in a wedge behind the wall sloping upwards above the horizontal at an angle of no more than 45°.

Vertical drains should be connected to a geofabric wrapped perimeter drain provided at the toe of the final excavation, which should discharge to the site stormwater system to provide long term drainage behind excavation walls. Flushing points should be incorporated into the design of the perimeter drain and periodic maintenance should be incorporated into the management plan of the proposed development.

Drainage measures as described above, if properly maintained, should reduce the risk of elevated pore water pressures at the back of the wall, however pore pressures may still be generated at other points behind the wall. The design should incorporate an allowance for such pressures. A typical allowance of potential water pressure build-up equivalent to one-third the wall height is considered to be reasonable with such drainage measures installed.

It is recommended that a suitably qualified geotechnical professional inspect any excavations during construction to confirm the design assumptions.

Table 10: Retaining Wall Design Parameters

UNIT	MOIST BULK UNIT WEIGHT[2] (kN/m^3)	EFFECTIVE COHESION c' (kPa)	EFFECTIVE FRICTION ANGLE ⌀' (degrees)	ALLOWABLE BEARING PRESSURE (kPa)[3]
Granular free draining Controlled Fill[1.]	20	0	32	100
Unit 1: In-situ Uncontrolled Fill	20	0	25	-
Unit 2: In-situ Residual Silty Clays	20	2	28	100
Unit 3: In-situ Extremely weathered Basalt	22	10	32	500

Notes: **1**. Assumes a well-graded cohesion-less and granular free draining fill placed and compacted in accordance with AS4678-2002 Earth Retaining Structures. **2**. Allowance should be made for saturated conditions where appropriate. **3**. Applies to minimum 1.0m overburden and minimum 1.5m footing width.

7.7 Footing Design Parameters

Footings on the site may be constructed as either shallow (pad, strip or raft footings, etc.) or deep footings (e.g. piles) depending on the method of site preparation and the structure to be supported. An assessment of geotechnical design parameters has been made for the materials encountered on-site and these are summarised in Sections 7.7.1 and 7.7.2.

It is likely that for the deep basement excavation for the radiation bunkers, high-level (shallow) footings in the extremely weathered basalt materials (Unit 3) will suffice. For any other structures or footings, which do not have deep excavations beyond the level of depth of the Unit 3 materials, it is likely that the

extremely reactive soils will render shallow footings in residual clays uneconomical and piled footings for these structures or footings may be considered, end-bearing onto the extremely weathered basalt layers or better.

7.7.1 Shallow Footings

High level footings may comprise pad or strip footings supporting column and wall loads or a raft slab. Allowable bearing pressures have been assessed for these types of footings for each of the units encountered in the field investigations. These are summarised in Table 11.

The assessment of serviceability beneath shallow footings founded as described above may be undertaken assuming stiffness values from Table 11. Cognisance should be given to the effects of shrink-swell movements at footing level as discussed in Section 7.4.

Should pad footings not be feasible due to bearing capacity or serviceability concerns, a stiffened raft could be adopted. The raft should be designed to accommodate shear forces and bending moments from columns, walls and other applied loads. The assessment of serviceability should consider the effects of uniform, point and line loads from the structure.

High level footings are to be founded outside or below all zones of existing or future services trenches.

Table 11: Geotechnical Design Parameters for Shallow Footings

Unit	Allowable Bearing Pressure * Pad or Strip footing, q_{all} (kPa)	Allowable Bearing Pressure ** Raft footing, q_{all} (kPa)	Young's Modulus E, (MPa)
Unit 1: In-situ Uncontrolled Fill	DO NOT FOUND	DO NOT FOUND	DO NOT FOUND
Unit 2: In-situ Residual Silty Clays	100	150	15
Unit 3: In-situ Extremely weathered Basalt	500	750	50

7.7.2 Deep Footings

Piled footings may be considered for the footings of the proposed structures to minimise the effect of shrink-swell ground movements, or where shallow footings are impracticable. A number of pile types could be utilised for the proposed structure.

Pile foundations typically fall into two categories, namely displacement piles and non-displacement piles. Displacement piles are those pile types that displace the soil surrounding the pile during installation, thus effectively improving the ground conditions. Non-displacement piles are those that are bored into the ground without effectively displacing soil materials, and therefore no improvement is

obtained from the in situ ground conditions. Examples of non-displacement piles are open bored piles or continuous-flight auger CFA piles.

Of the pile types indicated above, the displacement piles or CFA piles have an advantage of not requiring pile hole support during construction. Open bored piles would require temporary or casing to reduce the risk of collapse within sand and gravel materials. Groundwater inflows should be expected during construction. An allowance should be made in the case of bored piles to pump out water from the pile holes prior to pouring concrete, or for concrete to be placed below water from the base of the hole using a tremmie.

Alternate piling types and their assessed advantages and disadvantages are shown in Table 12 below.

Table 12: Pile Types and Assessed Advantages and Disadvantages

Pile Type	Advantages	Disadvantages
Bored Piles. *Non-displacement type*	Likely least expensive option. Relatively widely available and understood construction technology.	Additional cost of spoil removal. Typically lower values of end bearing and shaft adhesion compared to displacement piles, due to mode of installation and lower confidence in pile performance. Water inflows and consequent wall stability may complicate construction. May not have sufficient capacity for expected loads.
Driven Pre-Cast Concrete Piles. *Displacement type*	High level of performance confidence. Increased design strength parameters due to displacement type. No spoil removal issues.	Relatively high noise and vibration during installation may affect nearby developments. Would require dilapidation studies for adjacent structures and vibration monitoring during construction. Splice joints may be required depending on depth, increasing cost.

Geotechnical design parameters have been assessed for the units encountered in the augered holes. These are summarised in Table 13.

The design of piled foundations should include assessment of both strength and serviceability limit states. A geotechnical strength reduction factor of $\phi_g = 0.6$ should be applied to the ultimate values indicated in Table 13 when considering the ultimate strength limit state. Where driven piles are adopted, should a suitable proportion be dynamically tested, a higher geotechnical strength reduction factor of $\phi_g = 0.75$ may be adopted.

The uncontrolled fill materials should not be relied upon for pile design parameters in terms of shaft friction or lateral capacity. The potential for damage to the corrosion protection on steel piles should be considered.

Cognisance should be taken of the effect of ground movement due to shrink-swell movements as discussed in Section 7.4. Pile sleeving may be required to minimise transfer of stresses due to ground heave onto the piles.

It is unlikely that driven piles would penetrate into Unit 3 extremely weathered basalts, and end-bearing piles may be required to be bored and socketed into these materials.

Foundation design should take into account the minimum embedment required to resist the effects of lateral loading and moment transfer to the foundations. Limiting lateral bearing capacities of the soil units are summarised in Table 13.

Table 13: Geotechnical Design Parameters for Deep Footings

Unit	Pile Type	Ultimate End Bearing F_b (kPa)	Ultimate Shaft Adhesion F_s (kPa)	Limit Lateral Pressure P_y (kPa)	Young's Modulus E_v (MPa)
Unit 2: In-situ Residual Silty Clays	Driven	1,000	40	800	35
	Bored	800	30		25
Unit 3: In-situ Extremely weathered Basalt	Bored	3,000	100	2,000	50

The values in Table 13, apply to depths of greater than 4 pile diameters embedment below the ground surface.

A reduction in the ultimate lateral bearing capacity should be made for pile zones closer than 4 pile diameters from abutments or slope crests. The lateral limiting bearing capacities should be linearly reduced from the recommended values in Table 13 for locations equal to or greater than 4 pile diameters from the edge of the slope, to zero at 1 pile diameter from the edge of the slope.

Lateral soil stiffnesses (E_H) may be taken as 75% of the vertical stiffnesses (E_V) recommended in Table 13. Spring stiffnesses structural models should be checked for sensitivity to the estimated soil modulus, and if that proves to be the case, further advice should be sought.

Should end-bearing piles in the Unit 3 extremely weathered basalts prove to be inadequate in terms of the required load carrying capacity for the development, we recommend that additional site investigations such as deep boring be undertaken to ascertain the level of increased strength basalt.

7.8 Pavement Design and Site Preparation beneath Pavements and Footings

On the basis of the CBR test results, a design CBR of 3.5% may be adopted for the design of flexible pavements **on near-surface in-situ residual clays (NOT fill materials)**. We note that immediately north of the site alluvium has been encountered. This alluvial material is grey to dark grey and high plasticity, and typically has a design CBR of less then 1.5%. Should alluvium be encountered during construction, further advice should be sought.

Imported fill may be considered to improve the design CBR of any roads or pavements on the site. The CBR of imported granular and well graded fill may be significantly higher than the CBR of the in-situ

residual subgrade. The pavement design CBR value should be reviewed once the CBR and thickness of fill is known.

The following scope of work is required to improve the subgrade to allow pavements to be constructed.

Site preparation and earthworks on the subgrade suitable for pavement and structure support should comprise:

- Prior to construction of pavements and placement of any fill, the proposed areas should be stripped to remove all of the following materials:
    - Fill not confirmed as controlled fill under Level 1 inspection and testing as defined by AS3798-2007,
    - vegetation,
    - Topsoil,
    - Root affected soils, or
    - Other potentially deleterious material.
- Following stripping, the exposed subgrade materials should be proof rolled in the presence of a suitably qualified and experienced geotechnical practitioner to identify any wet or excessively deflecting material. Any such areas should be over excavated and backfilled with an approved select material;
- Approved fill beneath pavements should be placed in layers not exceeding 300mm loose thickness and cohesive materials should be compacted to at least 98% Standard Compaction in accordance with AS1289 5.1.1 or equivalent. Clay subgrade fill should be placed and maintained at ±2% of Optimum Moisture Content. Granular non-cohesive materials should be placed at a density index (I_D) of no less than 75%;
- The top 300mm of natural subgrade below pavements or the final 300mm of road subgrade replaced should be compacted to at least 100% Standard Compaction or equivalent within the above stated moisture range.

8 LIMITATIONS

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

9 REFERENCES

1. NEPC (1999), *National Environment Protection (Assessment of Site Contamination) Measure*
2. NSW EPA (1994), *Guidelines for Assessing Service Station Sites*
3. NSW EPA (1995), *Sampling Design Guidelines*
4. NSW EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites*
5. NSW DEC (2006), *Guidelines for the NSW Auditor Scheme (2nd edition)*

6. Kingsland I.R. and Barnet I.C., *Assignment of AS2870 Soil Suction Change Profile Parameters to TMI Derived Climatic Zones for NSW*.

For and on behalf of Coffey Geotechnics Pty Ltd,

Tom Nicholson

Senior Engineering Geologist

Andrew Ballard

Associate Environmental Engineer

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Important information about your **Coffey** Report

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

Your report is based on project specific criteria

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

Subsurface conditions can change

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

Interpretation of factual data

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

Your report will only give preliminary recommendations

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

Your report is prepared for specific purposes and persons

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

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Important information about your **Coffey** Report

Interpretation by other design professionals

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

Data should not be separated from the report*

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

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

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

Rely on Coffey for additional assistance

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

Responsibility

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

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

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

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

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Environmental Report

Your report will only give preliminary recommendations

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

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

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

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

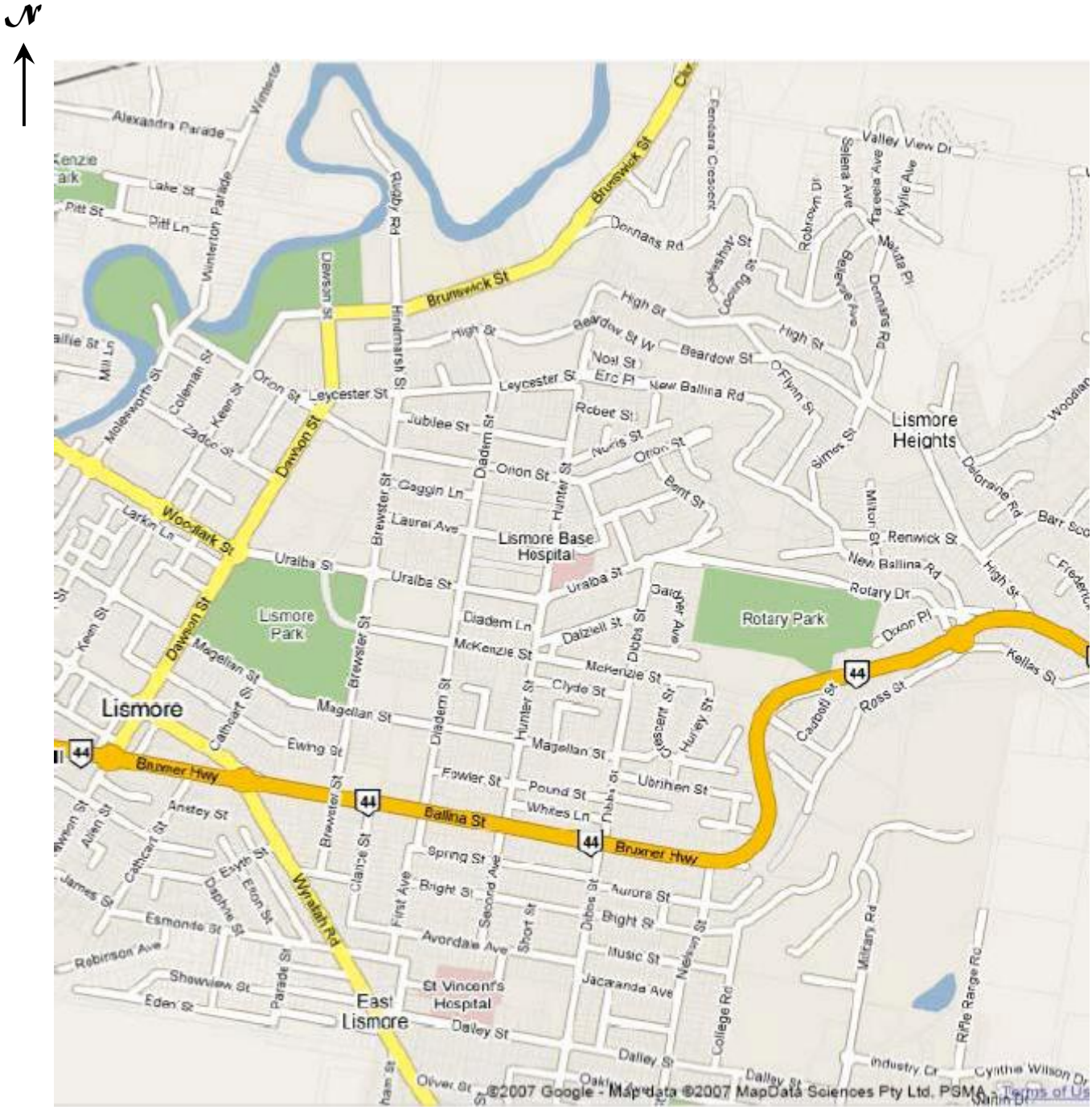
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time.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

Responsibility

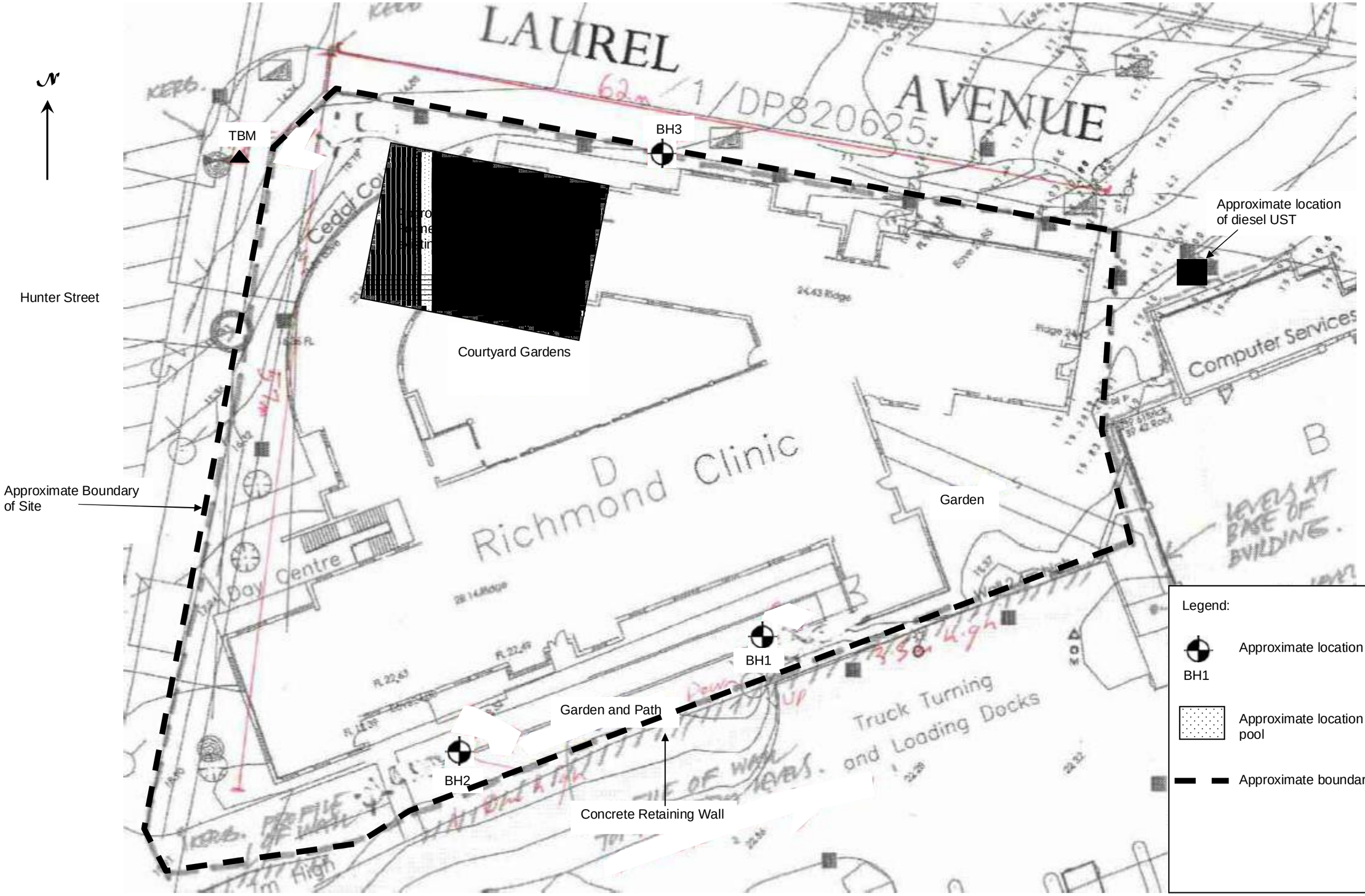
Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help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

72510/07-06

Figures



drawn	**ELC**	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	**Department of Commerce**
approved			project:	**Proposed Integrated Cancer Care Unit Lismore Base Hospital Uralba Street, Lismore NSW**
date	**10-12-2007**			
scale	**NTS**		title:	**Site Locality Plan**
original size	**A4**		project no: **GEOTALST01618AF-AD**	figure no: **FIGURE 1**



revision	description	drawn	approved	date

0 3 6 12 18
Horizontal Scale (metres)

drawn	**ELC**
approved	
date	**10-12-2007**
scale	**~1:300**
original size	**A3**

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: **Department of Commerce**

project: **Proposed Integrated Cancer Care Unit**
Lismore Base Hospital
Uralba Street, Lismore NSW

title: **Site Layout Plan Showing Investigation Locations**

project no: **GEOTALST01618AF-AD** figure no: **FIGURE 2**

Appendix A

Site History Information

ADVANCE LEGAL SEARCH PTY LIMITED

(ACN 077 067 068)
ABN 49 077 067 068

PO Box 149
Yagoona NSW 2199

Telephone: +612 9754 1590
Mobile: 0412 169 809
Facsimile: +612 9754 1364
Email: alsearch@optusnet.com.au

16 November 2007

COFFEY GEOTECHNICS Pty Ltd
PO Box 704
COFFS HARBOUR NSW 2450

Attention Emma Coleman

RE: **60 Uralba Street,**
Lismore
GEOTALST01618AF
Job No. ALSTO1618AF

Current Search

Folio Identifier 267/755718 (title attached)
Crown Plan 2108 – 1759 (plan available)
Dated 13 November 2007
THE LISMORE DISTRICT HOSPITAL

Title Tree
Lot 267 DP 755718

Folio Identifier 267/755718

Certificate of Title Volume 583 Folio 216

Crown Land

****

Summary of Proprietor(s)
Lot 267 DP 755718

Year	Proprietor
	(Lot 267 DP 755718)
1989 – todate	The Lismore District Hospital
(1993 – todate)	*(lease to Peter Charles Meyer, Warick William Herbert, Roman Wayne Lun & Ian Phillip Cappe odf Rooms 4070 & 4071 4th Level "Mahaffey Wing")*
	(Portion 267 Parish Lismore – Area 3 Acres – CTVol 583 Fol 216)
1931 – 1989	The Lismore District Hospital
1920 – 1931	William Lockett, esquire Norman William Sidney, esquire William Riley, esquire *(Trustees for Lismore Hospital)*
1885 – 1920	James Baillie, esquire Archibald Currie, esquire James Barrie, esquire *(Trustees for Lismore Hospital)*
	(Portion 267 Parish Lismore – Area 3 Acres
Prior – 1885	Crown Land
(1881 – 1885)	*(Dedicated for site of Hospital at Lismore)*

*****

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Ref : Lismore

Requested Parcel : Lot 22 DP 589890

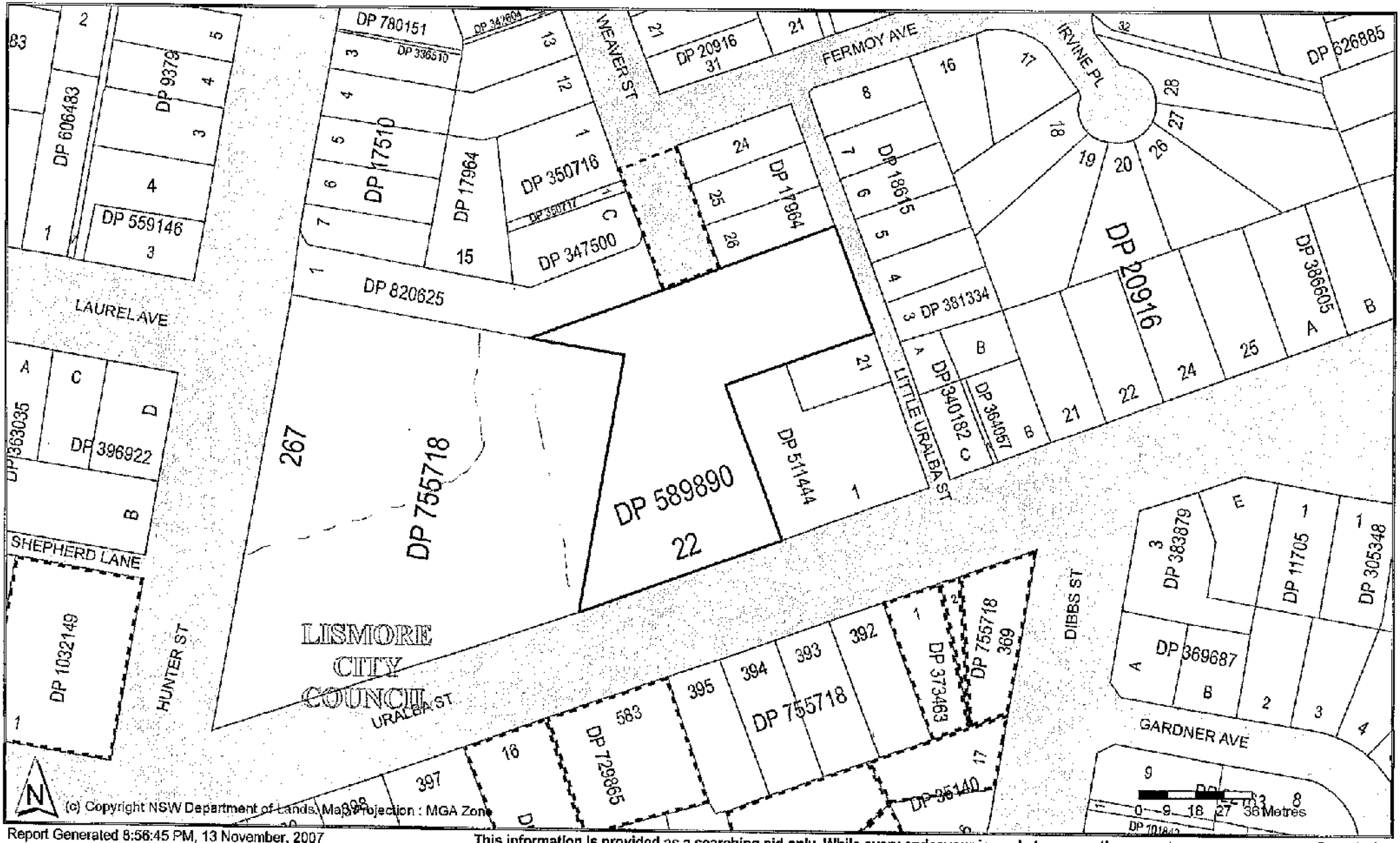
Identified Parcel : Lot 22 DP 589890

Locality : LISMORE

LGA : LISMORE

Parish : LISMORE

County : ROUS



Report Generated 8:56:45 PM, 13 November, 2007

Information Provided Through
Advance Legal Search Pty Ltd
Ph. 0297541590 *Fax.* 0297541364

Title Search

EziSearch
An Approved LPI *NSW*
Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 267/755718

SEARCH DATE	TIME	EDITION NO	DATE
13/11/2007	8:48 PM	1	13/7/1993

LAND

LOT 267 IN DEPOSITED PLAN 755718
LOCAL GOVERNMENT AREA LISMORE
PARISH OF LISMORE COUNTY OF ROUS
(FORMERLY KNOWN AS PORTION 267)
TITLE DIAGRAM CROWN PLAN 2108.1759

FIRST SCHEDULE

THE LISMORE DISTRICT HOSPITAL (T C55977)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 LAND DEDICATED AS SITE FOR PUBLIC HOSPITAL. SEE CROWN GRANT
3 I480110 LEASE TO PETER CHARLES MEYER, WARWICK WILLIAM HERBERT, RAMON WAYNE LUN & IAN PHILLIP CAPPE OF ROOMS 4070 & 4071, 4TH LEVEL, "MAHAFFEY WING" EXPIRES 8-3-1997. OPTION OF RENEWAL 5 YRS

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Coffey - Lismore ALSP PRINTED ON 13/11/2007

PLAN

of one portion Nº 267

Parish of Lismore

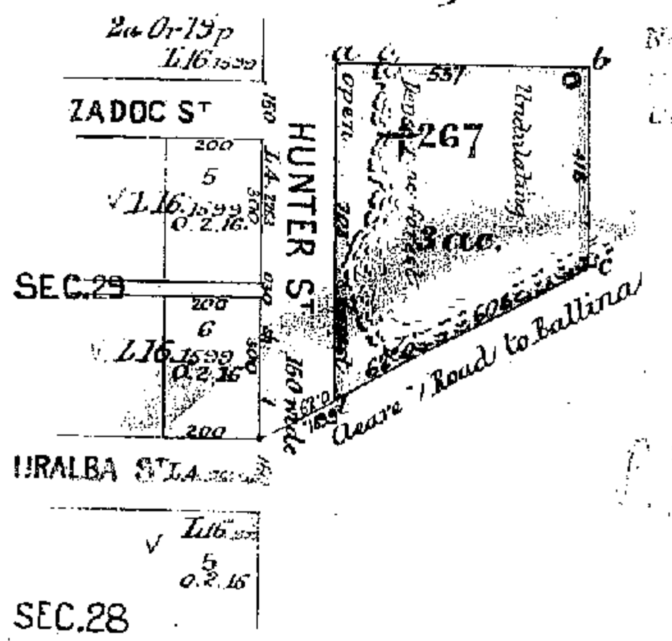
COUNTY OF ROUS

Measured as a site for Hospital

Under the 5th clause of the Crown Lands Alienation Act of 1867
Situated within Lismore Temporary Common Notified 7th February 1868
Within Suburban boundaries Notified 24th August 1866
Approved 28th February 1881 Vide Misc. 80.18271

Withdrawn from Temporary Common 16th May 1881
Dedicated 23rd Sept 1881
Vide Misc. 81-20769, appointing Messrs James Baillie, Archibald Currie, & James Barrie Trustees of site for Hospital at Lismore.

Note 16.2.1.82
MW 25-1-82



CORNERS

Cor.	Bearing	From	Links	Nº on tree
a	104°45'	gum	59	267
b	174°0'	brush	23½	.
c	195°48'	-	15	.
d	190°38	Bloodwood stump	36	.

Scale 4 chains to an inch
Marked in accordance with regulations
Theodolite used in Survey
No improvements
Situated in the Richmond River Police Dist.
Date of Survey 5th October 1880

Plan accepted
MC
17 Feb 1881

R 2108
1759

F. Verdon Hunter LS

Voucher 80.4?? One Sep. 16.2.81

Transmitted to the Surveyor General with my letter of the ...

2108-1759

PLAN

of one portion № 267

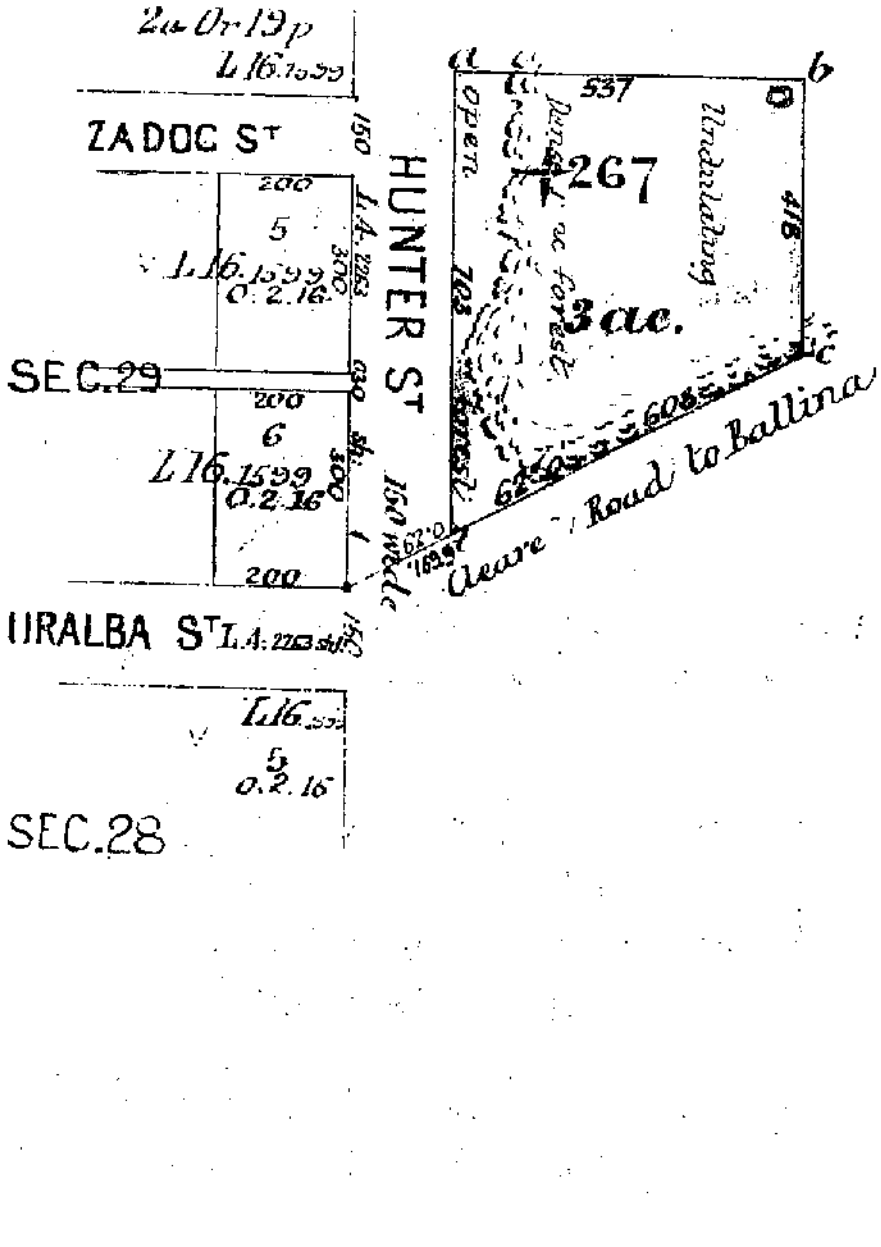
Parish of Lismore

COUNTY OF ROUS

Measured as a site for Hospital

Under the 5th clause of the Crown Lands Alienation Act of 1867
Situated within Lismore Temporary Common Notified 7th February 1868
Within Suburban boundaries. Notified 24th August 1866
Approved 28th February 1881 Vide Misc. 80.1827

Withdrawn from Temporary Common 16th May 1881
Dedicated 23rd Sept 1881
Vide Misc 81-2079, appointing Messrs James Baillie, Archibald Currie, & James Barrie Trustees of site for Hospital at Lismore.



CORNERS

Cor.	Bearing	From	Links	No on tree
a	104°45'	gum	39	267
b	174° 0'	brush	23½	"
c	195°45'	"	15	"
d	190°38'	blackwood stump	18	"

Scale 4 chains to an inch
Marked in accordance with regulations
Theodolite used in Survey
No improvements
Situated in the Richmond River Police Dist
Date of Survey 5th October 1880

J. Linton Hunter L.S.

Voucher 80.4.5 & Tracing
Orig Sur. 81
16.2.81

R 2108 1759
Transmitted to the Surveyor General with my letter

CONVERSION TABLE ADDED IN DEPARTMENT OF LANDS

CL 2107-1759

LINKS	METRES
7	1.408
12	2.414
15	3.018
17	3.420
34	6.840
100	20.117
1904	383.024
2550	512.978
19350	3892.601

AC	RD	P	HA
20	-	-	8.094
40	-	-	16.19
49	1	-	19.93
50	-	-	20.23
65	-	-	26.3

CONVERSION TABLE ADDED IN DEPARTMENT OF LANDS

CL 2108-1759

LINKS	METRES
15	3.018
23.5	4.727
30	6.035
38	7.644
59	11.869
150	30.175
169.9	34.178
200	40.234
300	60.350
537	108.027
608	122.310
703	141.421
814	163.751

AC	RD	P	SQ M
-	2	16	2428

AC	RD	P	HA
3	-	-	1.214

CONVERSION TABLE ADDED IN DEPARTMENT OF LANDS

CL 2109-1759

LINKS	METRES
15	3.018
19	3.822
22	4.426
24	4.828
26	5.230
51	10.260
55	11.064
59	11.869
233	46.872
250	50.292
268	53.913
276	55.522
300	60.350
314	63.167
318	63.971
320	64.374
338	67.995
345	69.403
346	69.604
350	70.409
355	71.415
362	72.823
380	76.444
381	76.645
387	77.852
391	78.657
400	80.467
418	84.088
426	85.698
430	86.502
436	87.709
463	93.141
481	96.762
528	106.217
550	110.642
610	122.712
617	124.121
628	126.334
665	133.777
685	137.800
734	147.657
764	153.692
786	158.118
788	158.520
831	167.171
840	168.981
918	184.672
920	185.075
1007	202.576
1200	241.402
1383	278.215
1594	320.662
3000	603.504
5087	1023.342
5911	1189.104
6030	1213.043
51600	10380.269
73410	14767.743

AC	RD	P	HA
50	-	-	20.23
58	-	-	23.47
180	-	-	72.84
181	2	-	73.45

Information Provided Through
Advance Legal Search Pty Ltd
Ph. 0297541590 *Fax.* 0297541364

Title Search

EziSearch
An Approved LPI *NSW*
Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 21/589890

SEARCH DATE	TIME	EDITION NO	DATE
13/11/2007	8:51 PM	-	-

VOL 13467 FOL 167 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 21 IN DEPOSITED PLAN 589890
LOCAL GOVERNMENT AREA LISMORE
PARISH OF LISMORE COUNTY OF ROUS
TITLE DIAGRAM DP589890

FIRST SCHEDULE

THE LISMORE BASE HOSPITAL

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 Q460926 LEASE TO THE COMMONWEALTH OF AUSTRALIA. EXPIRY DATE 31-12-1987

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Coffey - Lismore ALSP PRINTED ON 13/11/2007

Information Provided Through
Advance Legal Search Pty Ltd
Ph. 0297541590 *Fax.* 0297541364

Historical Search

EziSearch
An Approved LPI *NSW*
Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
13/11/2007 8:49PM

FOLIO: 267/755718

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 583 FOL 216

Recorded	Number	Type of Instrument	C.T. Issue
15/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
11/2/1991		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
15/4/1991		AMENDMENT: TITLE DIAGRAM	
13/7/1993	I480110	LEASE	EDITION 1

*** END OF SEARCH ***

Coffey - Lismore ALSP

PRINTED ON 13/11/2007

PLAN FORM 2

Plan Drawing only to appear in this space

Signatures and seals only.

The common seal of the Lismore Base Hospital was affixed hereto in pursuance of a resolution of the Board of Directors Dated 25/10/1977

BOARD MEMBER

BOARD MEMBER

CHIEF EXECUTIVE OFFICER

SIGNED for and on behalf of THE COMMONWEALTH OF AUSTRALIA by a person holding or performing the duties of the office of Assistant Deputy Crown Solicitor, ~~Deputy Crown Solicitor's Office~~, New South Wales, in the presence of —

an officer of the Attorney-General's Department.

Council Clerk's Certificate

I hereby certify that

(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and

*(b) the requirements of section 39B of the (Metropolitan Water, Sewerage and Drainage Act, 1924, as amended) (Hunter District Water, Sewerage, and Drainage Act, 1938, as amended)

have been complied with by the applicant in relation to the proposed subdivision (insert "new road", "subdivision" or "consolidated lot") set out herein

Subdivision No. 2037

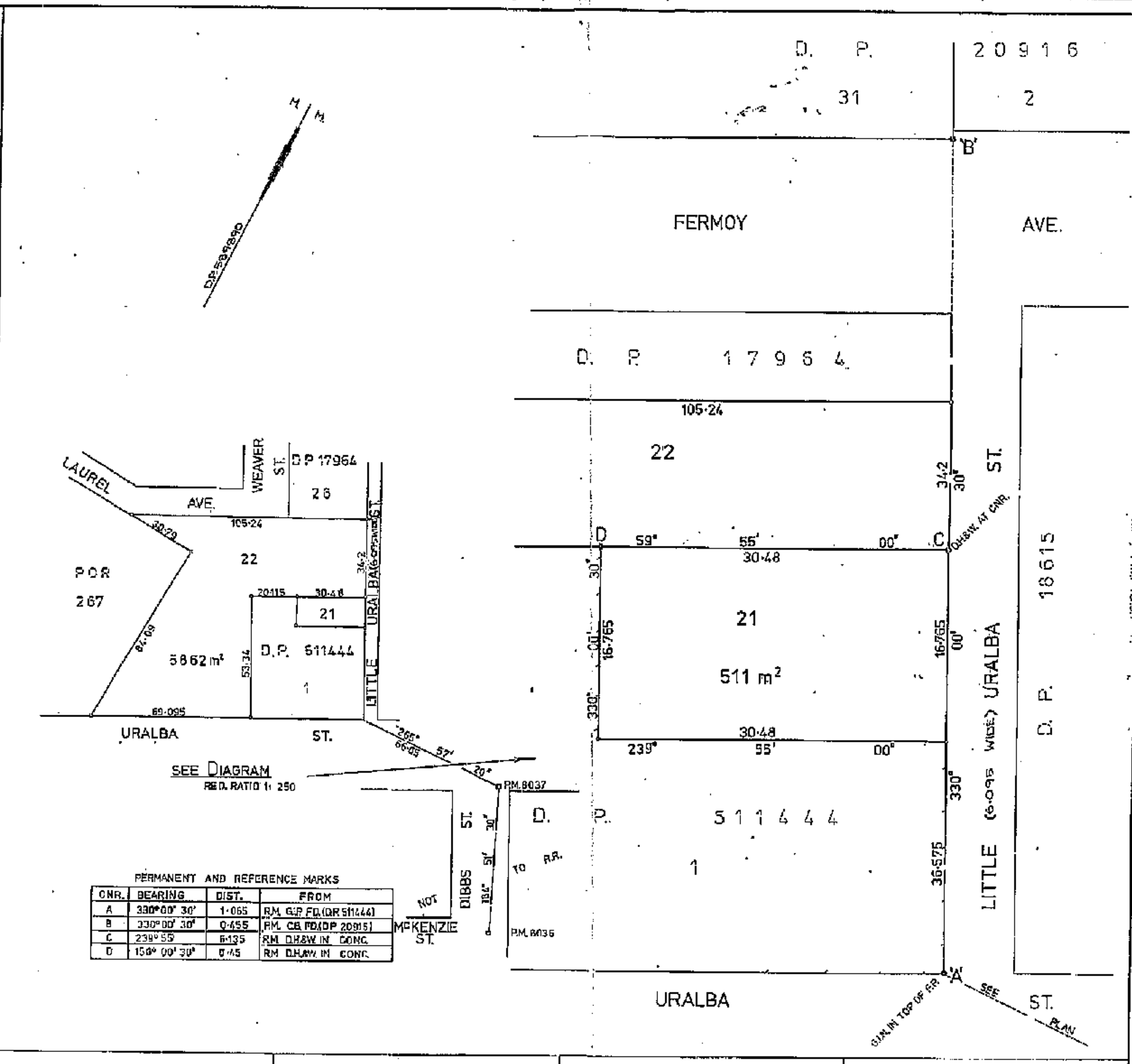
Date 25 March 1976

(Signature) Council Clerk

*This part of certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operation of the Metropolitan Water Sewerage and Drainage Board and the Hunter District Water Board.

(Delete if inapplicable).

M.P.D.



PERMANENT AND REFERENCE MARKS

CNR.	BEARING	DIST.	FROM
A	330°00' 30"	1·065	RM. GIP. FD.(DP 511444)
B	330°00' 30"	0·455	RM. CB. FD.(DP 20916)
C	239° 55'	6·135	RM. DH&W IN CONC.
D	150° 00' 30"	0·45	RM. DH&W IN CONC.

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

OFFICE USE ONLY

D.P. 589890

A | A2 | 00N

Registered: 4.10.1977

C.A.: Nº 2037 OF 25-3-1976

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: LISMORE SH6#

Last Plan: D.P. 511444

PLAN OF SUBDIVISION OF LOT 2 OF D.P. 511444 BEING THE LAND COMPRISED IN C.T. VOL. 8864 FOL. 230.

Reduction Ratio 1:1250
Lengths are in metres.

25/67

~~Mun./Shire~~ City: LISMORE

Locality: LISMORE

Parish: LISMORE

County: ROUS

~~This is sheet 1 of my plan in ... sheets.~~ (Delete if inapplicable).

I, *John Hadley Dawson* of *Australian Survey Office, Sydney* a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan ~~as regard Lot 21/Lot 22~~ ... and was completed on *5th December, 1975*

Signature ....

Surveyor registered under Surveyors Act, 1929, as amended.
Datum Line of Azimuth ...
*Strike out either (1) or (2). Insert date of survey.

Panel for use only for statements of intention to dedicate public roads or to create public reserves, drainage reserves, easements or restrictions as to user.

The Australian Government intends to lease Lot 21

SURVEYOR'S REFERENCE: Neg. Nº 17853

I, Bruce Richard Davies, Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this 5th day of October, 1977

No. 82/27

B97
/Req: B376296
/Doc: CT 00583-216
/Prt: 15-Nov-2007

New South Wales.

00583216

REGISTERED BOOK, VOL. 583 FOLIO 216

CANCELLED [W]
ON ISSUE OF NEW FOLIO 267/255718

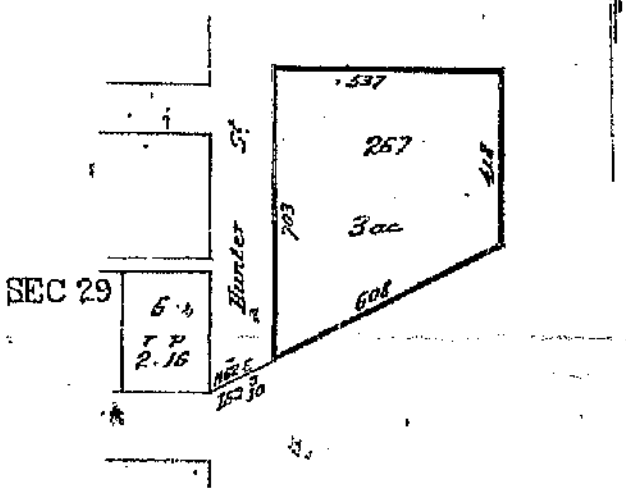
GRANT FOR PUBLIC HOSPITAL.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, and so forth:—
TO ALL to whom these presents shall come, Greeting:—

KNOW YE, That in order to provide a site for a Public Hospital at Lismore in Our Colony of New South Wales, WE, of Our Special Grace, with the advice of Our Executive Council of New South Wales, HAVE GRANTED, and for Us, Our Heirs and Successors, DO HEREBY GRANT unto James Baillie, Archibald Barrie and James Barrie — all of Lismore aforesaid Esquires

~~in the said Colony~~, and to their Heirs and Assigns, as Trustees for the purposes hereinafter mentioned, subject to the Trusts, Conditions, Reservations, and Provisos hereinafter contained: ALL THAT Piece or Parcel of Land in Our said Colony, containing by Admeasurement three acres be the same more or less, situated in the County of Rous — Parish of Lismore — Portion Two Hundred and eighteen

COMMENCING at the Eastern side of Hunter Street at a point bearing N. 11½ sixty five degrees Eastward distant one chain sixty nine links and nine tenths of a link from the South Eastern corner of allotment six of Section twenty nine and bounded thence on the West by that Street bearing North seven chains three tenths on the North by a line bearing East five chains thirty seven links on the East by a line bearing South four chains eighteen links and on the South East by a line bearing South sixty five degrees West six chains eight links to the point of commencement.



Scale 4 chains to an inch

As per plan in the margin hereof: With all the Rights and Appurtenances whatsoever thereto belonging: To Hold unto and to the use of the said James Baillie, Archibald Barrie and James Barrie

their Heirs and Assigns for ever, as Trustees for the purposes hereinafter mentioned, yielding and paying therefor yearly unto Us, Our Heirs and Successors, the Quit-Rent or sum of one farthing, if demanded, upon Trust that the said Piece or Parcel of Land shall be at all times hereafter set apart, maintained, and used by the said Grantees, their Heirs and Assigns, as and for a site for the erection thereon of a Public Hospital, to be called the for the use of the inhabitants of the Town of Lismore aforesaid, and to be governed according to such Rules and Regulations as shall be approved of by the Governor and Executive Council for the time-being of Our said Colony, and for no other purpose whatsoever, on Condition that the said Grantees, their Heirs and Assigns, do and shall, in every respect and at all times, hereafter conform to the Government Regulations for the time-being relating to Hospitals in the said Colony, and to the Laws and Regulations now or hereafter to be in force for better regulating the Alignment of Streets in Our said Colony, so far as the same may be applicable, and upon Trust that they, the said Grantees, their Heirs and Assigns, do and shall, when thereunto required by Our Governor for the time-being of Our said Colony, convey and assure the said Piece or Parcel of Land unto and to the use of such other person or persons as shall from time to time have been appointed by Our said Governor, with the advice of Our Executive Council, Trustees in their place and stead; and upon further Trust that such persons, to whom the said Piece or Parcel of Land shall have been so aforesaid conveyed or assured, shall hold the same subject to all Trusts hereby created, and so on, *toties quoties*, to the intent that the said land shall be for ever vested in the Trustees for the time-being, upon the Trusts thereof: PROVIDED ALWAYS, that if the Trusts, Conditions, Reservations, and Provisos herein contained, or any part thereof, be not duly observed and performed by the said Grantees, their Heirs and Assigns, the said Land shall be forfeited, and revert unto Us, Our Heirs and Successors, and these presents and every matter and thing herein contained, shall cease, determine, and become absolutely void to all intents and purposes; and in any or either of the cases aforesaid, it shall be lawful for Us, Our Heirs and Successors, by Our Governor for the time-being of Our said Colony, or some person by them or him authorized in that behalf, to re-enter upon the said Land, or any part thereof, and the said Grantees, their Heirs and Assigns, and all occupiers, therefrom wholly to remove: In Testimony Whereof, We have caused this Our Grant to be Sealed with the Seal of Our said Colony.

WITNESS Our Right Trusty and Well-beloved Councillor SIR AUGUSTUS WILLIAM FREDERICK SPENCER LOFTUS (*commonly called* LORD AUGUSTUS LOFTUS), *Knight Grand Cross of Our Most Honorable Order of the Bath, Governor and Commander-in-Chief of Our Colony of* NEW SOUTH WALES *and its Dependencies, at Government House, Sydney, in* NEW SOUTH WALES *aforesaid, this* twelfth *day of* February *in the forty-third year of Our Reign, and in the year of Our Lord One thousand eight hundred and* eighty-five

Augustus Loftus

RECORDED and ENROLLED in the Registrar General's Office, at Sydney, in New South Wales, this 3rd day of March 1931.

Registrar General

No. C55976 Pursuant to Section 14 of the Real Property (Amendment) Act 1921 William Lockett Norman William Sidney and William Riley are now registered proprietors as joint tenants of an estate in fee simple in the land within described.
Produced 22nd October 1930 and entered 17th March 1931 at 12 o'clock noon.

Acting Registrar General

No. C55977 TRANSFER dated 16th October 1931 from the said William Lockett Norman William Sidney and William Riley to The Lismore District Hospital

22nd October 1930 of the land within described
Produced and entered 17th March 1931
at 12 o'clock in the noon

Acting REGISTRAR GENERAL

No. C208694 MORTGAGE dated 21st September 1933 from the said The Lismore District Hospital To Commonwealth Bank of Australia

Produced 11th October 1933 and entered 23rd November 1933 at 3 o'clock in the afternoon.

REGISTRAR GENERAL

MORTGAGE No. C208694 has been discharged.
Ent. No. H998734 Entered 16th March 1962

REGISTRAR GENERAL

COMPUTER FOLIO NO FURTHER DEALINGS TO BE REGISTERED.

C22950
C22951
C208694

Print Close page

Search results

Your search for: LGA: Lismore City Council

Matched 10 notices relating to 6 sites.

Suburb	Address	Site Name	Notices related to this site
Goonellabah	Invercauld Road	Dip 4679 Invercauld	1 current and 1 former
Goonellabah	Bruxner Highway	Dip 4885 McDermott's	1 current
Lismore	John Street	Lismore Gasworks	1 current and 1 former
South Lismore	Caniaba Street	Lismore Airport	3 former
The Channon	Wallace	Dip 4687 Izzards	1 current
Tuncester	13 Rifle Range Road	Asbestos Waste Burial Site	1 current

Page 1 of 1

4 December 2007

Our Ref: D07/117266
Your Ref: Emma Coleman

4 December 2007

Attention: Emma Coleman
Coffey Geotechnics
PO Box 704
COFFS HARBOUR NSW 2450

Dear Emma,

RE SITE: 60 Uralba St, Lismore

I refer to your search request of 26th November 2007 requesting information on a Licence to Keep Dangerous Goods on the above site.

Enclosed are copies of the documents, which WorkCover holds on Dangerous Goods Licence **35/026871** relating to the storage of dangerous goods at the above-mentioned premises as listed on the Stored Chemical Information Database (SCID).

If you have any further queries, please contact WorkCover's Dangerous Goods Licensing staff on (02) 4321 5500.

Naomi James
A/Senior Licensing Officer
Dangerous Goods

ICATION FOR LICENCE (or AMENDMENT or TRANSFER of LICENCE) FOR THE KEEPING OF DANGEROUS GOODS

87/0547

Application is hereby made for—*a licence (or amendment of the licence) *~~the transfer of the licence~~ for the keeping of dangerous goods in or on the premises described below.

(*delete whichever is not required)

FEE: $10.00 per Depot

DG 8902 0001 90

Name of Applicant in full (see over)	Surname NF MAHAFFEY Given Names BRIAN HAMILTON (CHIEF EXECUTIVE OFFICER)
Trading name or occupier's name (if any)	TF LISMORE BASE HOSPITAL
Postal address	PFP.O. BOX 419 PP LISMORE Postcode 2480
Telephone number of applicant	STD Code 066 Number 21 8000
Address of the premises in or on which the depot or depots are situated (including street number, if any)	LF "URALBA STREET" 350268718 284255 MORE 2/02/89 CHQ $10.00 Postcode 2480
Nature of premises (see over)	HOSPITAL PHARMACY.

PLEASE ATTACH SITE PLAN

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (see over)	Storage capacity	Dangerous goods: Product being stored	C & C Office use only
1	ROOFED BRICK-WALLED PACKAGE STORE	600 LITRES	ETHER, ETHANOL, ACETONE	DD 001.100.0 6.100.62
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

DATA ENTERED
23 FEB 1989
OPERATOR ONE

Name of company supplying flammable liquid (if any) GOVERNMENT STORES, OR CLIFFORD HALLAM PHARMACEUTICALS

Have premises previously been licensed? NO

If known, state name of previous occupier Licence No.

Signature of applicant [signature] CHIEF EXECUTIVE OFFICER LISMORE BASE HOSPITAL Date 3/2/1989

For external explosives magazine(s), please fill in side 2.

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, being an Inspector under the Dangerous Goods Act,

THE CENTRAL WEST LINEN SERVICE ORANGE

(A Division of the Orange Base Hospital)
Forest Road, Orange

P.O. Box 257
Orange 2800

Phone: (063) 62 4488
Fax: (063) 62 5692

OUR REFERENCE :File 313 ERL/JS
YOUR REFERENCE :LC 216

4th September, 1991.

Chief Inspector of Dangerous Goods,
Work Cover Authority,
Locked Mail Bag 2 P.O.,
ROSEBERY. 2018.

Dear Ms. Sarkissian,

Re Keeping of Dangerous Goods

We refer to your letter 27th August, 1991 to the Orange Base Hospital (Forwarded to us for action) and advise the two L.P. Gas Tanks previously on the Central West Linen Service Licence No: 35018043 were transferred to Lismore Hospital as arranged by the Department of Health.

Any further enquires should be directed to the Regional Office (N.S.W. Department of Health) Bathurst P.O. Box 143 , Bathurst, N.S.W. 2795.

Yours faithfully,

J. J. HEALEY,
GENERAL MANAGER.

THE LISMORE BASE HOSPITAL
P.O. BOX 419, LISMORE. N.S.W. 2480.
TELEPHONE: (066) 21 8000
FAX: (066) 21 9121

Contact Phone No. (066) 202406

14 August 1992

Chief Inspector of Dangerous Goods
Workcover Authority
Locked Bag 10 P O
CLARENCE STREET NSW 2000

Dear Sir,

Licence No: 35/026871

On 16 July 1992 we received the attached Application for a licence to keep Dangerous Goods for your Authority for the storing in a "Roofed Store" of Class 2.1 Flammable Gases.

However, we have no such store within the hospital complex. Of Class 2.1 gases, we have no more than 6 x "E" size acetylene cylinders in various workshops throughout the hospital and only 2 LPG gas cylinders at barbecues.

Unless you can provide us with more information, I suggest the attached application is not relevant to this hospital.

Yours sincerely,

John Lambert.

J M LAMBERT
ENGINEERING SERVICES MANAGER

3501804 3

Reference

WORKCOVER AUTHORITY

Chemical Safety Unit
Locked Bag 10, P O CLARENCE STREET NSW 2000
Ph. (02) 370 5191 OR (02) 370 5192
Fax (02) 370 6105

Licensee

~~MAHAFFEY~~ B H DYER, P J.
LISMORE BASE HOSPITAL
BOX 419 P O
LISMORE 2480

24 JAN 1992

DANGEROUS GOODS BRANCH
17 FEB 1992

Dear Sir/Madam,

RE **APPLICATION FOR RENEWAL OF LICENCE FOR THE KEEPING OF DANGEROUS GOODS**

Our records indicate you hold licence number 35/026871 for keeping dangerous goods at URALBA ST LISMORE 2480.

Details of depots at site.

Depot No.	Depot type	Goods stored in depot	Quantity kg/litres/no.
1	ROOFED STORE	FLAMMABLE GASES	600

Data Entered
04 Mar 92

This licence is now due for renewal. **TO RENEW YOUR LICENCE.** Please carefully check the details shown in this letter and make any required corrections. Then, **SIGN** and **DATE** the declaration below and return this letter to the WorkCover Authority, Chemical Safety Unit. **Fees for these licences have been abolished. DO NOT SEND ANY MONIES.**

Declaration: I wish to renew this licence to 15/02/93. I certify that the licence details shown in this letter are correct.

..... Nyel .... 11/2/92 .....
(Signature) *(Date)*

CHIEF EXECUTIVE OFFICER
LISMORE BASE HOSPITAL

If you do not wish to renew the licence. Please provide the Chemical Safety Unit with a signed statement giving the reason why it is not to be renewed. If you have sold/vacated the site please provide the name and address of the new owner/occupier so we may contact them.

Yours faithfully

Chief Inspector of Dangerous Goods.

Reference 3S018043
3S026871

WORKCOVER AUTHORITY

CHEMICAL SAFETY
Locked Bag 10, P O CLARENCE
SYDNEY 2000
Ph. (02) 370 5191 OR 370 5
Fax (02) 370 6105

MR J M LAMBERT
Engineering Services Manager
THE LISMORE BASE HOSPITAL
BOX 419 P O
LISMORE 2480

2 September 1992

Dear Mr Lambert

RE : LICENCE FOR THE KEEPING OF DANGEROUS GOODS 35/026871

In reply to your letter dated 14 August 1992, I enclose copy of the letter dated 4 September 1991 of THE CENTRAL WEST LINEN SERVICE ORANGE which confirms that the two aboveground tanks of LPG (10,000 litres each) were transferred to THE LISMORE HOSPITAL.

I am returning the relevant documents in order to amend your licence.

Should you have any further queries, please do not hesitate to contact me at the following # (02) 370 51 91.

Yours faithfully

Lucy SARKISSIAN
For Chief Inspector of Dangerous Goods

Putting people first by managing better

PART A

WorkCover Authority

LICENCE TO KEEP DANGEROUS GOODS

(Dangerous Goods Act 1975)

Application for new licence, amendment or transfer

21.2.97.

1. Name of applicant: DEPARTMENT OF PHARMACY, RICHMOND HEALTH SERVICE — ACN:

2. Site to be licensed — No: 60 — Street: Uralba St — Suburb/Town: Lismore — Postcode: 2480

DATA 12 JUL 1995

RECEIVED 12 JUL 1995 SOUTHERN REGION

3. Previous licence number (if known): 35/026871

4. Nature of site: Hospital

5. Emergency contact on site — Phone: X202 463 / A.H. 221909 — Name: Ron Chalmers

6. Site staffing — Hours per day: TWENTY-FOUR — Days per week: SEVEN

7. Major supplier of dangerous goods: GLENDALE CHEMICALS P/L / Q. STORES (NSW) / CLIFFORD HALLAM P/L (NSW)

8. If new site or significant modification — Plan stamped by: Accredited consultant's name: N/A — Date stamped:

9. Number of dangerous goods depots at site: ONE

10. Trading name or occupier's name: RICHMOND HEALTH SERVICE, DEPARTMENT OF PHARMACY

11. Postal address of applicant: P.O. Box 449 — Suburb/Town: LISMORE — Postcode: 2480

12. Contact for licence enquiries — Phone: X066 202 477 — Fax: 066 202 488 — Name: F.M. RUDWICK (Ms)

I certify that the details contained in this application (or the accompanying computer disk) are true and correct.

13. Signature of applicant: F.M. Rudwick — Date: 10/3/95

Please complete attached site sketch, depot listing and check sheet (if required) and return to WorkCover Authority in envelope provided.

12 JUL 1995

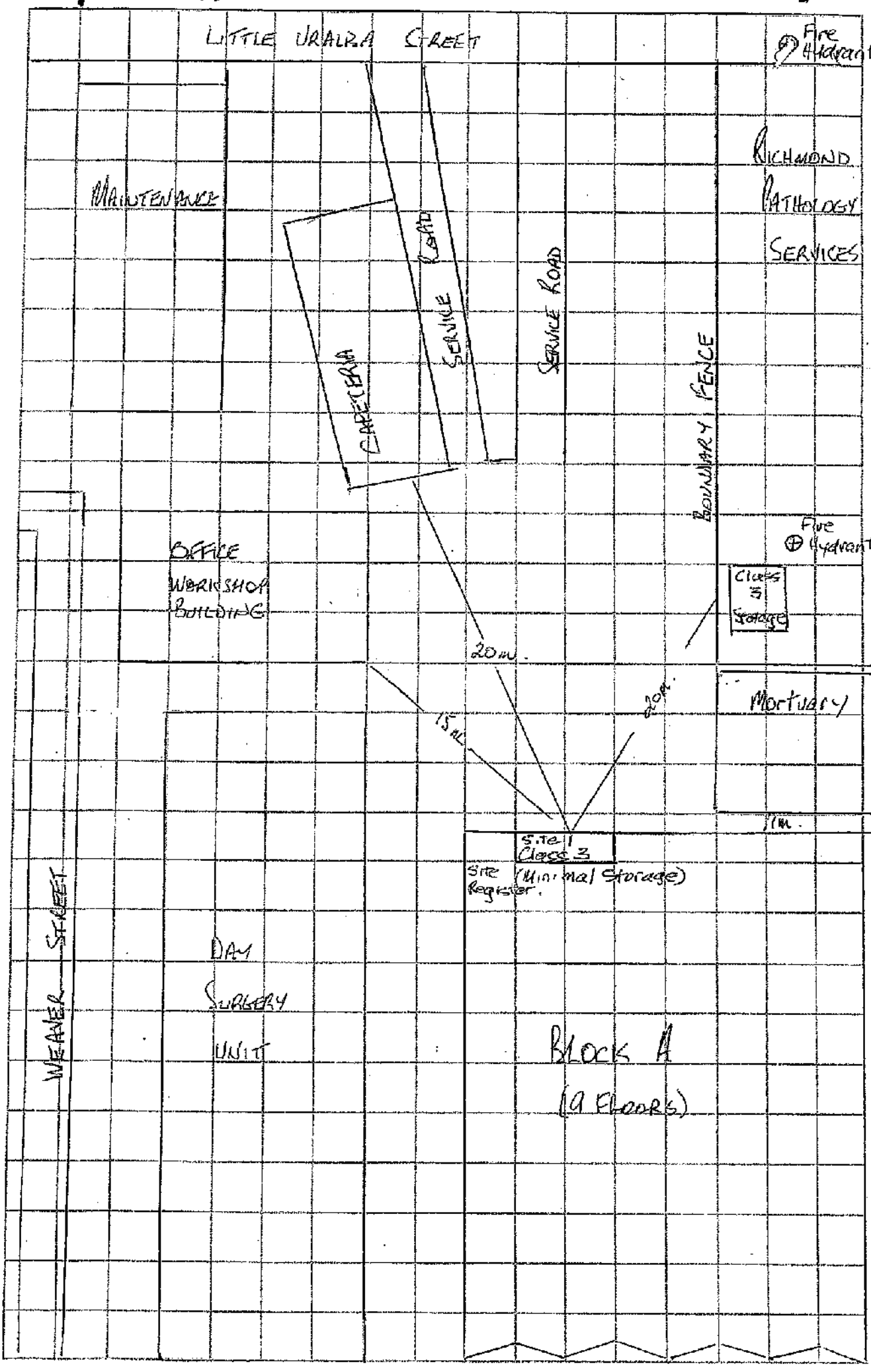
Form DGN

35/026871

PART B

Site Sketch

Please carefully read the instructions in Part B of the guide before sketching the site.



ATF 026871

WorkCover New South Wales, 400 Kent Street, Sydney 2000. Telephone 9370 5000 ALL MAIL TO LOCKED BAG 10, CLARENCE STREET SYDNEY 2000

WORKCOVER NEW SOUTH WALES

027248/026871/030969

Wednesday, 20 May 1998

Mr Ron Hambly
Engineering Section
Lismore Base Hospital
PO Box 419
Lismore NSW 2480

Dear Mr Hambly,

RE: DANGEROUS GOODS LICENCES FOR LISMORE BASE HOSPITAL

I have attached details for three licences that I understand to be all part of the Northern Rivers Health Service, Lismore Base Hospital.

If they are all part of the Base Hospital then they should be licensed as one site. The pathology service has never been licensed as plans, that have been stamped by an accredited consultant were requested, but not provided for the amount of flammable liquids that were reported to be held on site. Flammable liquids must be stored in compliance with *AS1940 - 1993 The storage and handling of flammable and combustible liquids* irrespective of whether or not the site needs to be licensed.

To licence the site accurately you need to:

1. Check that the three separate licences are the responsibility of the hospital;

2. Re-asses the quantity of dangerous goods held at the hospital;

3. Either reduce the quantity of flammable liquids to minor storage amount as described by *AS1940 - 1993 The storage and handling of flammable and combustible liquids* or provide plans stamped by an accredited consultant showing how compliance with this standard has been achieved.

4. Provide a new application for the site. As the area is large the Part B site sketch may be on multiple A4 size paper, some sites do a key map and then divide the site into two or three sections. A new stamped plan is not needed for the existing 5499m3 liquid oxygen tank although you should confirm that this is the amoun of gas kept in the vessel, rather than the water capacity of the vessel.

I can be contacted on 02 9370 5936 or Ken Martin from our Lismore Office may be able to assist you, his number is 6622 0088.

Yours sincerly

Joanna Fielding

Joanna Fielding
Assistant Principal Inspector
Chemical Hazards Section

Licence Number 35/026871

CLOSED FILE
2007

Occupier: NORTH COAST AREA HEALTH SERVICE
PHARMACY DEPT

Site:

60 URALBA ST,
LISMORE 2480

Appendix B

Engineering Logs

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH1**

Sheet 1 of 1

Project No: **GEOTALST01618AF**

Client: **DEPARTMENT OF COMMERCE**

Date started: **14.11.2007**

Principal:

Date completed: **14.11.2007**

Project: **RICHMOND CLINIC**

Logged by: **ALB**

Borehole Location: **REFER TO FIGURE 1**

Checked by:

drill model and mounting: MD 200 TOYOTA 4WD | Easting: 528393 | slope: -90° | R.L. Surface: 104.6

hole diameter: 100 mm | Northing 6813148 | bearing: | datum: TBM=100.0

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
VBAD		N	None Observed	D E				GP	**FILL:** Gravel, fine to medium grained, grey	M	L		FILL
								CH	**FILL:** Silty Clay, medium to high plasticity, pale brown, with a trace of fiine to medium grained gravel pp=80kPa.		F	x	
				D E	104	1		CH	**Silty CLAY:** high plasticity, grey-orange		St		RESIDUAL SOIL
				SPT 4,6,6 N*=12	103	2		GC	**Gravelly CLAY:** medium plasticity, grey-brown, gravel is medium to coarse grained		H		EXTREMELY WEATHERED BASALT
TCAD				SPT 8,20,26 N*=46	102	3							Approaching V bit refusal at 2.5m.
					101	4			Colour change to pale brown at 3.5m.				SPT bouncing.
				SPT 8,25/140 N*=R	100	5			BH1 terminated at 4.5m due to TC refusal (lifting rig). Borehole BH1 terminated at 4.5m				TC bit refusal at 4.5m.
					99	6							Materials encountered looked and smelt free from contamination.
					98	7							
					97	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, C casing, N nil

penetration: 1 2 3 4 — no resistance ranging to refusal

water: 10/1/98 water level on date shown; water inflow; water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

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

BOREHOLE GEOTALST01618AF.GPJ COFFEY.GDT 10.12.07

Form GEO 5.3 Issue 3 Rev 2

coffey geotechnics

Engineering Log - Borehole

Borehole No.	***BH2***
Sheet	1 of 1
Project No:	***GEOTALST01618AF***
Client:	***DEPARTMENT OF COMMERCE***
Date started:	***14.11.2007***
Principal:	
Date completed:	***14.11.2007***
Project:	***RICHMOND CLINIC***
Logged by:	***ALB***
Borehole Location:	***REFER TO FIGURE 1***
Checked by:	

drill model and mounting:	MD 200 TOYOTA 4WD	Easting:	528377	slope:	-90°	R.L. Surface:	104.6
hole diameter:	100 mm	Northing	6813136	bearing:		datum:	TBM=100.0

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
VEAD		N	None Observed	D E				GP	**FILL:** Sand, medium to coarse grained, pale brown	M	L		FILL
								GW	**FILL:** Gravel, fine to medium grained, brown				
				D E Bs	104			CH	**Silty CLAY:** high plasticity, orange-grey		VSt		RESIDUAL SOIL
				U_{50}		1							
									pp=420kPa at 1.1m.		H	×	
					103				Colour change to red-brown at 1.6m.				
						2							
TCAD				SPT 8,22,25 N*=47	102			GC	**Silty CLAY:** medium plasticity, pale brown				EXTREMELY WEATHERED BASALT Rock structure visible. Approaching V-Bit refusal at 2.5m.
					101	3							
				SPT 25/100 N*=R		4							TC Bit refusal at 4.0m, SPT bouncing.
					100	5			BH2 terminated at 4.1m due to refusal. Borehole BH2 terminated at 4.1m				
					99	6							
					98	7							
					97	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*bit shown by suffix e.g.	ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

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

BOREHOLE GEOTALST01618AF.GPJ COFFEY.GDT 10.12.07

Form GEO 5.3 Issue 3 Rev 2

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH3**

Sheet 1 of 1

Project No: **GEOTALST01618AF**

Client: **DEPARTMENT OF COMMERCE**

Date started: **14.11.2007**

Principal:

Date completed: **14.11.2007**

Project: **RICHMOND CLINIC**

Logged by: **ALB**

Borehole Location: **REFER TO FIGURE 1**

Checked by:

drill model and mounting: MD 200 TOYOTA 4WD | Easting: 528388 | slope: -90° | R.L. Surface: 101

hole diameter: 100 mm | Northing 6813179 | bearing: | datum: TBM=100.0

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
VEAD		N	None Observed	D E				GP	**FILL:** Gravel, coarse grained, grey	M	L		FILL
								CH	**FILL:** Silty Clay, high plasticity, brown, with some medium to coarse grained gravel and a trace of organics pp=40kPa.		S	×	Very moist at 0.5m, Odorous.
				D E									
					100	1		CH	**Silty CLAY:** high plasticity, orange-grey		St		RESIDUAL SOIL
				U_{50}					pp=150kPa.			×	
				D E	99	2							
								GC	**Gravelly CLAY:** medium plasticity, pale brown-grey, gravel is fine to coarse grained		VSt		EXTREMELY WEATHERED BASALT
				SPT 4,9,18 N*=27									Rock structure evident.
TCAD					98	3					H		V-Bit refusal at 3.1m.
					97	4							
				SPT 25/30 N*=R					BH3 terminated at 4.0m due to refusal. Borehole BH3 terminated at 4m				Highly weathered at 4.0m. TC refusal at 4.0m.
					96	5							
					95	6							
					94	7							
					93	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
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Wp	plastic limit
W_L	liquid limit

consistency/density index

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

coffey

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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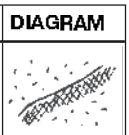
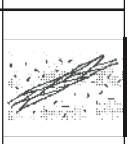
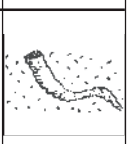
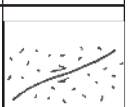
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)						USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.		GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)		GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)		GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing		SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).		SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.				
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**		
			None to Low	Quick to slow	None	ML	SILT
			Medium to High	None	Medium	CL	CLAY
			Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium	MH	SILT
			High	None	High	CH	CLAY
			Medium to High	None	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT

♦Low plasticity – Liquid Limit W_L less than 35%. ♦Modium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM	TERM	DEFINITION	DIAGRAM
PARTING	A surface or cr[redacted] soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.		TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.		TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.		INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of 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.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, I_S50 (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (Is50). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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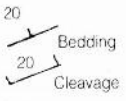
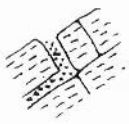
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES

Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

DEFECT SHAPE TERMS

Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS

Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS

Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS

Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

Appendix C

Laboratory Test Result Sheets

mgt Environmental Consulting Pty. Ltd.

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CERTIFICATE OF ANALYSIS

Coffey Geotechnics Pty Ltd ALS
4/6 Russelton Dve
Alstonville
NSW
Site: ALST01618AF

Report Number: 217536 Page 1 of 19
Order Number:
Date Received: Nov 15, 2007
Date Sampled: Nov 15, 2007
Date Reported: Nov 22, 2007
Contact: Tom Nicholson

Methods

- USEPA 6010B Heavy Metals & USEPA7470/71 Mercury
- USEPA 6020 Heavy Metals
- USEPA 8141A Organophosphorus Pesticides
- USEPA 8081A Organochlorine Pesticides
- USEPA 8270C Polycyclic Aromatic Hydrocarbons
- USEPA 8260B - MGT 350A Monocyclic Aromatic Hydrocarbons
- MGT100A-GC Total Recoverable Hydrocarbons
- USEPA 6010B Heavy Metals & USEPA 7470/71 Mercury
- Method 102 - ANZECC - % Moisture

Comments

Notes

1. The results in this report supersede any previously corresponded results.
2. All Soil Results are reported on a dry basis.
3. Samples are analysed on an as received basis.

ABBREVIATIONS
mg/kg : milligrams per kilograms, mg/L : milligrams per litre, ppm : parts per million,
LOR : Limit of Reporting
RPD : Relative Percent Difference
CRM : Certified Reference Material
LCS : Laboratory Control Sample

Authorised

Report Number: 217536

Michael Wright	Onur Mehmet	Orlando Scalzo	Tammy Lakeland
Laboratory Manager	**Client Manager**	**Chief Organic Chemist**	**Chief Inorganic Chemist**
NATA Signatory	**NATA Signatory**	**NATA Signatory**	

NATA
World Recognised Accreditation

NATA Accredited
Laboratory Number 1261
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Environmental Laboratory Industry Group
Member

mgt Environmental Consulting Pty. Ltd.

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Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH1 0.05-0.2	BH1 0.5-0.8	BH1 2.5-2.95	DUPLICATE A
	Lab Number		07-No04142	07-No04143	07-No04144	07-No04145
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	< 50	< 50
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes(ortho,meta and para)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fluorobenzene (surr.)	1	%	82	84	88	104
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benz(a)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total PAH	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene-d12 (surr.)	1	%	111	116	104	101
2-Fluorobiphenyl (surr.)	1	%	75	131	113	93

COMMENTS:

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH1 0.05-0.2	BH1 0.5-0.8	BH1 2.5-2.95	DUPLICATE A
	Lab Number		07-No04142	07-No04143	07-No04144	07-No04145
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	82	103	120	89
Tetrachloro-m-xylene (surr.)	1	%	81	89	103	84
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

COMMENTS:

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH1 0.05-0.2	BH1 0.5-0.8	BH1 2.5-2.95	DUPLICATE A
	Lab Number		07-No04142	07-No04143	07-No04144	07-No04145
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	83	82	88	80
% Moisture	0.1	%	5.4	29	21	7.5
Heavy Metals (7)						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	5	mg/kg	< 5	< 5	< 5	< 5
Copper	5	mg/kg	16	23	18	14
Lead	5	mg/kg	< 5	11	5.6	< 5
Nickel	5	mg/kg	14	21	25	11
Zinc	5	mg/kg	59	92	52	51
Heavy Metals						

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH1 0.05-0.2	BH1 0.5-0.8	BH1 2.5-2.95	DUPLICATE A
	Lab Number		07-No04142	07-No04143	07-No04144	07-No04145
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

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Coffey Geotechnics Pty Ltd ALS	Client Sample ID		BH2 0.0-0.15	BH2 0.4-0.7	BH2 2.5-2.95	BH3 0.05-0.2
4/6 Russelton Dve	Lab Number		07-No04146	07-No04147	07-No04148	07-No04149
Alstonville	Matrix		Soil	Soil	Soil	Soil
NSW	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	< 50	< 50
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes(ortho,meta and para)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fluorobenzene (surr.)	1	%	113	95	115	99
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	0.1	mg/kg	0.3	< 0.1	< 0.1	< 0.1
Benz(a)anthracene	0.1	mg/kg	1.2	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	mg/kg	1.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	1.1	< 0.1	< 0.1	0.1
Benzo(g,h,i)perylene	0.1	mg/kg	1.0	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	0.8	< 0.1	< 0.1	0.1
Chrysene	0.1	mg/kg	1.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1
Fluoranthene	0.1	mg/kg	1.9	< 0.1	< 0.1	0.1
Fluorene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	0.1	mg/kg	0.8	< 0.1	< 0.1	< 0.1
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	0.8	< 0.1	< 0.1	< 0.1
Pyrene	0.1	mg/kg	2.1	< 0.1	< 0.1	0.2
Total PAH	0.1	mg/kg	12	< 0.1	< 0.1	0.5
Chrysene-d12 (surr.)	1	%	95	118	112	130
2-Fluorobiphenyl (surr.)	1	%	90	87	90	97

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH2 0.0-0.15	BH2 0.4-0.7	BH2 2.5-2.95	BH3 0.05-0.2
	Lab Number		07-No04146	07-No04147	07-No04148	07-No04149
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Organochlorine Pesticides						
4,4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	76	131	103	72
Tetrachloro-m-xylene (surr.)	1	%	78	127	99	78
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

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Coffey Geotechnics Pty Ltd ALS	Client Sample ID		BH2 0.0-0.15	BH2 0.4-0.7	BH2 2.5-2.95	BH3 0.05-0.2
4/6 Russelton Dve	Lab Number		07-No04146	07-No04147	07-No04148	07-No04149
Alstonville	Matrix		Soil	Soil	Soil	Soil
NSW	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	**LOR**	**Units**				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	77	79	63	84
% Moisture	0.1	%	9.2	27	25	11
Heavy Metals (7)						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	5	mg/kg	12	< 5	< 5	6.9
Copper	5	mg/kg	22	16	40	39
Lead	5	mg/kg	6.3	8.6	< 5	6.3
Nickel	5	mg/kg	29	12	20	8.3
Zinc	5	mg/kg	72	64	120	63
Heavy Metals						

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH2 0.0-0.15	BH2 0.4-0.7	BH2 2.5-2.95	BH3 0.05-0.2
	Lab Number		07-No04146	07-No04147	07-No04148	07-No04149
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH3 0.4-0.7	BH3 1.6-2.0	WASH RINSATE	SPK 099121107
	Lab Number		07-No04150	07-No04151	07-No04152	07-No04153
	Matrix		Soil	Soil	Water	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	**LOR**	**Units**				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	< 0.02	120%
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	< 0.05	-
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	< 100	< 0.1	-
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	< 0.1	-
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	< 0.001	120%
Toluene	0.05	mg/kg	< 0.05	< 0.05	< 0.001	120%
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.001	120%
Xylenes(ortho,meta and para)	0.05	mg/kg	0.07	< 0.05	< 0.001	110%
Fluorobenzene (surr.)	1	%	88	80	89	82%
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	0.3	< 0.1	< 0.001	-
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	< 0.001	-
Anthracene	0.1	mg/kg	0.8	< 0.1	< 0.001	-
Benz(a)anthracene	0.1	mg/kg	3.5	< 0.1	< 0.001	-
Benzo(a)pyrene	0.1	mg/kg	3.2	< 0.1	< 0.001	-
Benzo(b)fluoranthene	0.1	mg/kg	3.8	< 0.1	< 0.001	-
Benzo(g,h,i)perylene	0.1	mg/kg	2.7	< 0.1	< 0.001	-
Benzo(k)fluoranthene	0.1	mg/kg	1.4	< 0.1	< 0.001	-
Chrysene	0.1	mg/kg	2.8	< 0.1	< 0.001	-
Dibenz(a,h)anthracene	0.1	mg/kg	0.5	< 0.1	< 0.001	-
Fluoranthene	0.1	mg/kg	7.1	< 0.1	< 0.001	-
Fluorene	0.1	mg/kg	0.2	< 0.1	< 0.001	-
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	2.3	< 0.1	< 0.001	-
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.001	-
Phenanthrene	0.1	mg/kg	4.6	< 0.1	< 0.001	-
Pyrene	0.1	mg/kg	7.1	< 0.1	< 0.001	-
Total PAH	0.1	mg/kg	40	< 0.1	< 0.001	-
Chrysene-d12 (surr.)	1	%	116	100	72	-
2-Fluorobiphenyl (surr.)	1	%	98	82	90	-

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH3 0.4-0.7	BH3 1.6-2.0	WASH RINSATE	SPK 099121107
	Lab Number		07-No04150	07-No04151	07-No04152	07-No04153
	Matrix		Soil	Soil	Water	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	**LOR**	**Units**				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
4.4'-DDE	0.05	mg/kg	0.11	< 0.05	< 0.0001	-
4.4'-DDT	0.05	mg/kg	0.22	< 0.05	< 0.0001	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Chlordane	0.1	mg/kg	< 0.1	< 0.1	< 0.0005	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.0001	-
Toxophene	0.1	mg/kg	< 0.1	< 0.1	< 0.0005	-
Dibutylchlorendate (surr.)	1	%	115	146	128	-
Tetrachloro-m-xylene (surr.)	1	%	98	124	118	-
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH3 0.4-0.7	BH3 1.6-2.0	WASH RINSATE	SPK 099121107
	Lab Number		07-No04150	07-No04151	07-No04152	07-No04153
	Matrix		Soil	Soil	Water	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.002	-
Triphenylphosphate (surr.)	1	%	136	79	79	-
% Moisture	0.1	%	22	28		
Heavy Metals (7)						
Arsenic	2	mg/kg	< 2	< 2	< 0.001	-
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.0002	-
Chromium	5	mg/kg	24	< 5	< 0.001	-
Copper	5	mg/kg	29	12	< 0.001	-
Lead	5	mg/kg	140	< 5	< 0.001	-
Nickel	5	mg/kg	11	14	< 0.001	-
Zinc	5	mg/kg	170	71	< 0.001	-
Heavy Metals						

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID		BH3 0.4-0.7	BH3 1.6-2.0	WASH RINSATE	SPK 099121107
	Lab Number		07-No04150	07-No04151	07-No04152	07-No04153
	Matrix		Soil	Soil	Water	Soil
	Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	LOR	Units				
Mercury	0.1	mg/kg	0.4	< 0.1	< 0.0001	

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Coffey Geotechnics Pty Ltd ALS	Client Sample ID		BLANK 073121107
4/6 Russelton Dve	Lab Number		07-No04154
Alstonville	Matrix		Soil
NSW	Sample Date		Nov 15, 2007
Analysis Type	**LOR**	**Units**	
Total Recoverable Hydrocarbons			
TRH C6-C9 Fraction by GC	20	mg/kg	< 20
Monocyclic Aromatic Hydrocarbons			
Benzene	0.05	mg/kg	< 0.05
Toluene	0.05	mg/kg	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05
Xylenes(ortho,meta and para)	0.05	mg/kg	< 0.05
Fluorobenzene (surr.)	1	%	78

COMMENTS:

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Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	Method Blank
	Lab Number	07-No04142	07-No04142	07-No04142	07-No04142	Batch
	QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
	Matrix	Soil	Soil	Soil	Soil	Soil
	Sample Date	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	Units			% RPD	% Recovery	mg/L
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC		-	-	< 1	86	< 0.02
TRH C10-C14 Fraction by GC		< 50	< 50	< 1	112	< 0.05
TRH C15-C28 Fraction by GC		< 100	< 100	< 1	-	< 0.1
TRH C29-C36 Fraction by GC		< 100	< 100	< 1	-	< 0.1
Monocyclic Aromatic Hydrocarbons						
Benzene		< 0.05	< 0.05	< 1	93	< 0.005
Toluene		< 0.05	< 0.05	< 1	86	< 0.005
Ethylbenzene		< 0.05	< 0.05	< 1	91	< 0.005
Xylenes(ortho,meta and para)		< 0.05	< 0.05	< 1	94	< 0.005
Fluorobenzene (surr.)		82	97	-	83	107
Polycyclic Aromatic Hydrocarbons						
Acenaphthene		< 0.1	< 0.1	< 1	92	< 0.02
Acenaphthylene		< 0.1	< 0.1	< 1	86	< 0.02
Anthracene		< 0.1	< 0.1	< 1	104	< 0.02
Benz(a)anthracene		< 0.1	< 0.1	< 1	110	< 0.02
Benzo(a)pyrene		< 0.1	< 0.1	< 1	96	< 0.02
Benzo(b)fluoranthene		< 0.1	< 0.1	< 1	94	< 0.02
Benzo(g,h,i)perylene		< 0.1	< 0.1	< 1	107	< 0.02
Benzo(k)fluoranthene		< 0.1	< 0.1	< 1	100	< 0.02
Chrysene		< 0.1	< 0.1	< 1	113	< 0.02
Dibenz(a,h)anthracene		< 0.1	< 0.1	< 1	105	< 0.02
Fluoranthene		< 0.1	< 0.1	< 1	110	< 0.02
Fluorene		< 0.1	< 0.1	< 1	100	< 0.02
Indeno(1,2,3-cd)pyrene		< 0.1	< 0.1	< 1	102	< 0.02
Naphthalene		< 0.1	< 0.1	< 1	95	< 0.02
Phenanthrene		< 0.1	< 0.1	< 1	116	< 0.02
Pyrene		< 0.1	< 0.1	< 1	108	< 0.02
Total PAH		< 0.1	< 0.1	-	-	< 0.02

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Coffey Geotechnics Pty Ltd ALS
4/6 Russelton Dve
Alstonville
NSW

Client Sample		BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	Method blank
Lab Number		07-No04142	07-No04142	07-No04142	07-No04142	Batch
QA Description			Duplicate	Duplicate % RPD	Spike % Recovery	
Matrix		Soil	Soil	Soil	Soil	Soil
Sample Date		Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	Units			% RPD	% Recovery	mg/L
Polycyclic Aromatic Hydrocarbons						
Chrysene-d12 (surr.)		111	128	-	-	122
2-Fluorobiphenyl (surr.)		75	101	-	-	85
Organochlorine Pesticides						
4.4'-DDD		< 0.05	< 0.05	< 1	92	< 0.005
4.4'-DDE		< 0.05	< 0.05	< 1	81	< 0.005
4.4'-DDT		< 0.05	< 0.05	< 1	88	< 0.005
a-BHC		< 0.05	< 0.05	< 1	85	< 0.005
Aldrin		< 0.05	< 0.05	< 1	81	< 0.005
b-BHC		< 0.05	< 0.05	< 1	100	< 0.005
Chlordane		< 0.1	< 0.1	< 1	81	< 0.01
d-BHC		< 0.05	< 0.05	< 1	101	< 0.005
Dieldrin		< 0.05	< 0.05	< 1	99	< 0.005
Endosulfan I		< 0.05	< 0.05	< 1	91	< 0.005
Endosulfan II		< 0.05	< 0.05	< 1	92	< 0.005
Endosulfan sulphate		< 0.05	< 0.05	< 1	95	< 0.005
Endrin		< 0.05	< 0.05	< 1	90	< 0.005
Endrin aldehyde		< 0.05	< 0.05	< 1	88	< 0.005
Endrin ketone		< 0.05	< 0.05	< 1	88	< 0.005
g-BHC (Lindane)		< 0.05	< 0.05	< 1	88	< 0.005
Heptachlor		< 0.05	< 0.05	< 1	87	< 0.005
Heptachlor epoxide		< 0.05	< 0.05	< 1	92	< 0.005
Hexachlorobenzene		< 0.05	< 0.05	< 1	80	< 0.005
Methoxychlor		< 0.05	< 0.05	< 1	91	< 0.005
Toxophene		< 0.1	< 0.1	< 1	79	< 0.01
Dibutylchlorendate (surr.)		82	83	-	87	88
Tetrachloro-m-xylene (surr.)		81	81	-	85	86
Organophosphorous Pesticides						
Bolstar		< 0.2	< 0.2	< 1	-	< 0.002

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Coffey Geotechnics Pty Ltd ALS
4/6 Russelton Dve
Alstonville
NSW

Client Sample	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	Method blank
Lab Number	07-No04142	07-No04142	07-No04142	07-No04142	Batch
QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	Units		% RPD	% Recovery	mg/L
Organophosphorous Pesticides					
Chlorpyrifos	< 0.2	< 0.2	< 1	-	< 0.002
Coumaphos	< 0.2	< 0.2	< 1	110	< 0.002
Demeton-O	< 0.2	< 0.2	< 1	-	< 0.002
Diazinon	< 0.2	< 0.2	< 1	106	< 0.002
Dichlorvos	< 0.2	< 0.2	< 1	-	< 0.002
Disulfoton	< 0.2	< 0.2	< 1	-	< 0.002
Ethion	< 0.2	< 0.2	< 1	99	< 0.002
Ethoprop	< 0.2	< 0.2	< 1	-	< 0.002
Fenitrothion	< 0.2	< 0.2	< 1	98	< 0.002
Fensulfothion	< 0.2	< 0.2	< 1	100	< 0.002
Fenthion	< 0.2	< 0.2	< 1	-	< 0.002
Merphos	< 0.2	< 0.2	< 1	-	< 0.002
Methyl azinphos	< 0.2	< 0.2	< 1	-	< 0.002
Methyl parathion	< 0.2	< 0.2	< 1	105	< 0.002
Mevinphos	< 0.2	< 0.2	< 1	93	< 0.002
Naled	< 0.2	< 0.2	< 1	-	< 0.002
Phorate	< 0.2	< 0.2	< 1	-	< 0.002
Ronnel	< 0.2	< 0.2	< 1	-	< 0.002
Tokuthion	< 0.2	< 0.2	< 1	-	< 0.002
Trichloronate	< 0.2	< 0.2	< 1	-	< 0.002
Triphenylphosphate (surr.)	83	79	-	81	87
Heavy Metals (7)					
Arsenic	< 2	< 2	< 1	-	-
Cadmium	< 0.5	< 0.5	< 1	80	-
Chromium	< 5	< 5	< 1	83	-
Copper	16	16	2.9	86	-
Lead	< 5	< 5	< 1	75	-
Nickel	14	14	0.20	77	-

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Coffey Geotechnics Pty Ltd ALS
4/6 Russelton Dve
Alstonville
NSW

Client Sample	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	BH1 0.05-0.2	Method blank
Lab Number	07-No04142	07-No04142	07-No04142	07-No04142	Batch
QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	Units		% RPD	% Recovery	mg/L
Heavy Metals (7)					
Zinc	59	58	2.3	82	-
Heavy Metals					
Mercury	< 0.1	< 0.1	< 1	89	< 0.005

COMMENTS:

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Coffey Geotechnics Pty Ltd ALS 4/6 Russelton Dve Alstonville NSW	Client Sample ID	WASH RINSATE	WASH RINSATE	WASH RINSATE	WASH RINSATE	Method Blank
	Lab Number	07-No04152	07-No04152	07-No04152	07-No04152	Batch
	QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
	Matrix	Water	Water	Water	Water	Water
	Sample Date	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007	Nov 15, 2007
Analysis Type	Units			% RPD	% Recovery	mg/L
Heavy Metals (7)						
Arsenic		< 0.001	< 0.001	< 1	85	< 0.001
Cadmium		< 0.0002	< 0.0002	< 1	82	< 0.0002
Chromium		< 0.001	< 0.001	< 1	80	< 0.001
Copper		< 0.001	< 0.001	< 1	81	< 0.001
Lead		< 0.001	< 0.001	3.4	82	< 0.001
Nickel		< 0.001	< 0.001	< 1	84	< 0.001
Zinc		< 0.001	< 0.001	< 1	83	< 0.001

COMMENTS:

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

QA/QC DATA VALIDATION REPORT

Job No: GEOTALST01618AF-AD Batch: 217536

I. SAMPLE HANDLING

	Yes	No
1. Were the sample **holding times** met?	☒	☐
2. Were the samples in **proper custody** between the field and reaching the laboratory?	☒	☐
3. Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

Sample Handling was: ☒ Satisfactory ☐ Unsatisfactory ☐ Partially Satisfactory

II PRECISION / ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☒	☐
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

Precision/Accuracy of the Laboratory Report	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

III. FIELD QA/QC

1. Number of Samples Analysed

Soil:	9
Duplicates (Soil):	1
Wash Blanks	1

2. Number of Days of Sampling Soil: 1

3. Number and Type of QA/QC Samples Collected:

	SOIL	WATER
Field Duplicates	1	NA
Trip Spikes	1	NA
Wash Blanks	1	NA
Other (Field Blanks, Trip Blanks, etc.)	0	NA

4. Field Duplicates

	Yes	No
A. Were an Adequate Number of field duplicates collected?	☒	☐
B. Were RPDs within Control Limits?		
a. Organics (< 50 %)	☒	☐
b. Metals/Inorganics (< 50 %)	☒	☐

5. TRIP BLANKS

	Yes	No
A. Were an Adequate Number of trip blanks collected?	☒	☐
B. Were the Trip Blanks free of contaminants?	☒	☐

6. WASH BLANKS

	Yes	No
A. Were an adequate number of Wash Blanks collected?	☒	☐

B. Were the Wash Blanks free of contaminants?	☒	☐

Comments:

A trip spike was also collected. The trip spike recoveries were within the control limits.

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory	
	☐ Partially Satisfactory		

IV LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1. Types and Number of QA/QC Samples

	SOIL	WATER
Method Blanks	6	1
Matrix Spikes	6	1
Laboratory Duplicates	6	1
Surrogates	58	6

	Yes	No
2 Were the laboratory blanks/reagents blanks free of contamination?	☒	☐
3. Were the spike recoveries within laboratory control limits?		
a. Organics (60% to 130%)	☒	☐
b. Metals/Inorganic (70% to 130%)	☒	☐
4. Were the RPDs of the laboratory duplicates within control limits?	☒	☐
5. Were the surrogate recoveries within control limits?	☒	☐

The laboratory internal QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

V. DATA USABILITY

1. Data Directly Usable ☒
2. Data Usable with the following corrections/modifications ☐
3. Data Not Usable. ☐

QA/QC Report Prepared by Emma Coleman

Environmental Consulting Pty. Ltd.

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Sample Receipt Advice

Company name:	Coffey Geotechnics Pty Ltd ALB
Contact name:	Tom Nicholson
Client job number:	ALST01318AF
COC number:	19851
Turn around time:	Five day
Date received:	Nov 15, 2007
MGT lab reference:	217536

Sample information

- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ All samples were provided chilled.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

Contact notes

If you have any questions with respect to these samples please contact:

Onur Mehmet on the above number or by e.mail: mehmeto@mgtenv.com.au

Results will be delivered electronically via e.mail to Tom Nicholson - Tom_Nicholson@coffey.com.

mgt Sample Receipt

coffey

Chain of Custody

No. 1[illegible]

Laboratory Quotation / Order No:

Job No: A1S101618AF Sheet 1 of 1

Dispatch to: (Address & Phone No.) MGT Environmental	Sampled by: ALB	Consigning Officer: ALB Date Dispatched: 15/11/07
Attention: Lab Manager	Project Manager (report results to): Tom_Nicholson@coffey.com	Courier Service: TNT Consignment Note No: B96525818

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
[signature]	15/11/07	4.30pm	TNT dave		
			WC RCD ESKY 16/11/07 4:22PM #217536	15/11	10:20

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	PAHs	TPHs	MAHs = BTEX	Metals: Cu, Pb, Zn, Cd, Ni, As, Hg	OC, OP pest	Sample Condition on Receipt
	Soil	Glass Jar	BH1 0.05-0.2	15/11/07	\	\	\	\	\	
	"	"	BH1 0.5-0.8	"	\	\	\	\	\	
	"	"	BH1 2.5-2.95	"	\	\	\	\	\	
	"	"	Duplicate A	"	\	\	\	\	\	
	"	"	BH2 0.0-0.15	"	\	\	\	\	\	
	"	"	BH2 0.4-0.7	"	\	\	\	\	\	
	"	"	BH2 2.5-2.95	"	\	\	\	\	\	
	"	"	BH3 0.05-0.2	"	\	\	\	\	\	
	"	"	BH3 0.4-0.7	"	\	\	\	\	\	
	"	"	BH3 1.8-2.0	"	\	\	\	\	\	
3 x bottles	Water	1L Glass (Preserved)	Wash Rinsate	15/11/07	\	\	\	\	\	
	Soil	Glass Jar	BH3 2.5-2.95	"	Do not test (Spare)					
		Vial	SPK 09112107	"	\	\	\	\	\	
		Vial	Blank 09121107	"	\	\	\	\	\	

Special Laboratory Instructions:

Detection Limits:

Turnaround Required:

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

Copies: WHITE: Sign on release. **YELLOW:** If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey. **BLUE:** To be returned with results.

Alstonville Laboratory

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Aggregate/Soil Test Report

Report No: MAT:ALST07S-02749
Issue No: 1
This report replaces all previous issues of report no 'MAT:ALST07S-02749'.

Client: Coffey Geotechnics Pty Ltd
4/6 Russelton Drive
Alstonville NSW 2477

Principal:

Job No: LABTALST0001BH

Project: GEOTALST01618AF

Lot No: **TRN:**

Approved Signatory: Richard Rutter

NATA Accredited Laboratory Number: 431
Date of Issue: 4/12/2007

Sample Details

Sample ID: ALST07S-02749
Field Sample: 0002
Date Sampled: 14/11/2007
Source: BH 3
Material: 1.0 to 1.3
Specification:
Sampling Method: AS1289.1.2.1 Clause 6.5
Location: Richmond Clinic.,,,,

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	21.0	
Mould Length (mm)		249.9	
Crumbling		No	
Curling		No	
Liquid Limit (%)	AS 1289.3.1.2	96	
Method		One Point	
Plastic Limit (%)	AS 1289.3.2.1	33	
Plasticity Index (%)	AS 1289.3.3.1	63	
Moisture Content (%)	AS 1289.2.1.1	34.5	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Alstonville Laboratory

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Aggregate/Soil Test Report

Report No: MAT:ALST07S-02748
Issue No: 1
This report replaces all previous issues of report no 'MAT:ALST07S-02748'.

Client: Coffey Geotechnics Pty Ltd
4/6 Russelton Drive
Alstonville NSW 2477

Principal:

Job No: LABTALST0001BH

Project: GEOTALST01618AF

Lot No: **TRN:**

Approved Signatory: Richard Rutter

NATA Accredited Laboratory Number: 431
Date of Issue: 4/12/2007

Sample Details

Sample ID: ALST07S-02748
Field Sample: 0001
Date Sampled: 14/11/2007
Source: BH 2
Material: 0.8 to 1.1
Specification: No Specification
Sampling Method: AS1289.1.2.1 Clause 6.5
Location: Richmond Clinic,,,,

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	17.5	
Mould Length (mm)		250.3	
Crumbling		No	
Curling		No	
Liquid Limit (%)	AS 1289.3.1.2	76	
Method		One Point	
Plastic Limit (%)	AS 1289.3.2.1	33	
Plasticity Index (%)	AS 1289.3.3.1	43	
Moisture Content (%)	AS 1289.2.1.1	36.6	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

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California Bearing Ratio

Report No: CBR:ALST07S-02782
Issue No: 1
This report replaces all previous issues of report no 'CBR:ALST07S-02782'.

Client: Coffey Geotechnics Pty Ltd
4/6 Russelton Drive
Alstonville NSW 2477

Principal:
Job No: LABTALST0001BH
Project: GEOTALST01618AF
Lot No: **TRN:**

Approved Signatory: Richard Rutter

NATA Accredited Laboratory Number: 431
Date of Issue: 11/12/2007

Sample Details

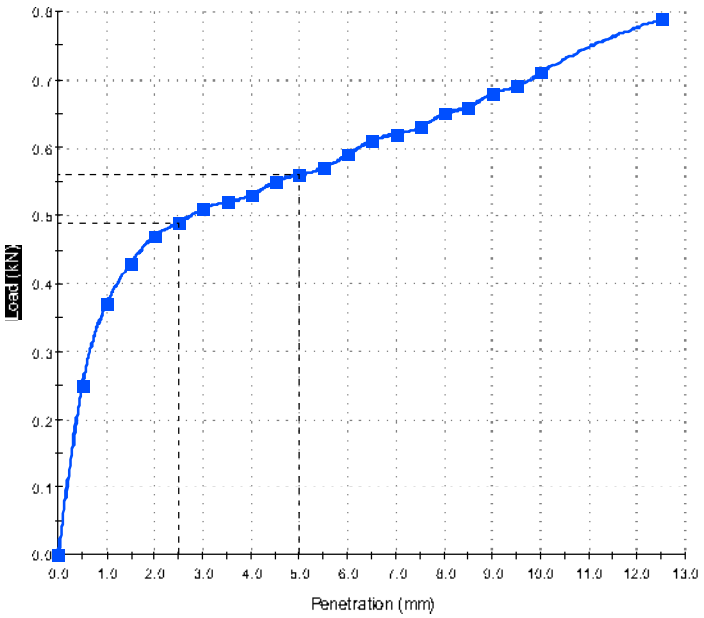
Product: 0.4m to 0.9
Source: BH 2
Location: Richmond Clinic
Client Ref: 0003

Date Sampled: 5/12/2007
Sampling Method: AS1289.1.3.1 Clause 5.5(a)
Sample ID: ALST07S-02782

Test Results

Description	Result
Test Method	AS 1289.6.1.1
Maximum Dry Density (t/m³)	1.200
Optimum Moisture Content (%)	41.2
CBR 2.5mm (%)	**3.5**
CBR 5.0mm (%)	3.0
Preparation	Soaked
Initial Moisture Content (%)	34.1
Achieved Dry Density (t/m³)	1.217
Achieved Moisture Content (%)	36.9
Swell (%)	2.0
Moisture After Penetration (%)	41.0
Period of Soaking (days)	4
Moisture Content of Top 30mm (%)	46.8
Moisture of Penetrated End (%)	41.0
Compaction Type	standard
Surcharge Mass (kg)	4.50
Laboratory Moisture Ratio After Compaction (%)	83
Laboratory Density Ratio After Compaction (%)	101
Oversize Material Excluded	YES
Percent Oversize Excluded	0.0
Rate of Penetration	1.0

Chart



CBR (%): 3.5

Comments

N/A