Douglas Partners
Geotechnics • Environment • Groundwater

Integrated Practical Solutions

REPORT
on
PHASE 1 CONTAMINATION ASSESSMENT

STAGE 1 - PROPOSED COCHLEAR GLOBAL HEADQUARTERS PROJECT
MACQUARIE UNIVERSITY CAMPUS, SOUTH PRECINCT

Prepared for
LACHLAN PROJECT DEVELOPMENT PTY LTD

Project 45298.01
March 2008

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REPORT ON PHASE 1 CONTAMINATION ASSESSMENT
PROPOSED COCHLEAR GLOBAL HEADQUARTERS
MACQUARIE UNIVERSITY CAMPUS, SOUTH PRECINCT

1. INTRODUCTION

This report details the methodology and results of a Phase 1 Contamination Assessment undertaken by Douglas Partners Pty Ltd (DP), at the proposed global headquarters for Lachlan Project Development Pty Ltd, located on University Avenue, Macquarie University Campus, South Precinct. The investigation was commissioned by CRI Australia Pty Ltd, on behalf of Lachlan Project Development Pty Ltd.

It is understood that the proposed development will include construction of a six to seven-storey building with two levels of basement carparking. The lowest basement level (RL 58.3) may require excavation to depths of 10 m in the north-western corner of the site reducing to 3 m on the south-eastern corner of the site.

The investigation included a review of available site history information and a limited soil and groundwater sampling and analytical programme targeting a range of common contaminants. The report presents the findings of the investigation and provides comments relating to the likely degree and extent of soil and groundwater contamination and the suitability of the site for the proposed development. This report also provides a preliminary *in situ* waste classification of the materials encountered.

A geotechnical assessment of the site was undertaken concurrently by DP and is reported separately in a report entitled *Report on Geotechnical Investigation* (DP reference 45298).

2. SCOPE OF WORKS

The scope of the Phase 1 Contamination Assessment was as follows:-

- Undertake a site history search including a title deeds search, a review of historical aerial photographs, a search of Contaminated Land Register for Notices issued under the *Contaminated Land Management Act 1997*, WorkCover Dangerous Goods records and Council records (including Section 149 (2) Certificates);
- Review of information held by Macquarie University (if available) regarding past site uses and the environmental condition of the site;
- Review available site information with reference to local geology and Department of Natural Resources groundwater bores;
- Conduct a walk-over inspection of the site to identify signs of potential contamination;
- Drill 10 test bores into natural materials, using a solid flight auger to a maximum depth of 5 m or prior refusal, and 2 test bores using hand tools to a maximum depth of 1m or prior refusal. Collect soil/filling samples from the 12 bores at broadly regular intervals, at changes in the strata or upon signs of contamination.
- Installation of one groundwater piezometer within the site to provide a preliminary assessment with respect to potential groundwater contamination (an additional piezometer was installed for geotechnical purposes) ;
- Conduct laboratory analysis on selected soil samples (including 10% QA/QC) at a NATA accredited analytical laboratory for a combination of the following potential contaminants:
  - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Total recoverable hydrocarbons (TRH);
  - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene – BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Phenols

- Polychlorinated biphenyls (PCB);
- Organochlorine pesticides (OCP);
- Asbestos;
- TCLP (heavy metals, PAH) on selected samples for waste classification purposes.

- Groundwater sampling following well development and purging and analysis including the following potential contaminants
  - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Total petroleum hydrocarbons (TPH);
  - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene – BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Phenols;
  - PCB;
  - OCP;
  - pH; and
  - Hardness

- Provision of a Phase 1 Contamination Assessment Report, providing general comments on the recorded level of contamination in the subsoils and groundwater and the likely suitability of the site for the proposed development. This report also includes a review of the potential for acid sulphate soils and provides a provisional waste classification of the materials encountered.

- Store remaining soil samples not analysed for a period of one month pending the need for further analysis.

3. SITE DESCRIPTION

3.1 Site Identification

The site of the proposed development (referred to as 'the site' in this report) covers an area of approximately 19000 m^2 and is located on the eastern side of a large triangular land parcel, which covers an area of approximately 34,000 m^2. The large triangular area is identified as Lots 181-182 in Deposited Plan 1112777 and the site is part of the mentioned lots. A locality map is shown in Drawing 1 in Appendix A.

3.2 Site Description

The site is bounded by University Avenue to the north, the 'Gumnut Cottage' childcare centre to the west, the 'Waratah Occasional Care Centre' to the south and vacant grass covered land further to the south and east. An open water-course runs along the south-eastern boundary.

The site and surrounding area are located on a gentle south-east-facing hill which generally falls towards the water-course. Within the site, the ground surface generally falls to the south-east from approximately RL 69.0 to RL 61.0, relative to Australian Height Datum (AHD), at an average slope of approximately 2 to 3 degrees. Along the south-eastern side of the site the surface falls more steeply towards the water course at an average slope of approximately 10 degrees.

At the time of the investigation the site was generally covered with an asphaltic concrete paved carpark, operated by Macquarie University. Based on the borehole data and topography it appears that the carpark surface has been formed by previous filling on the down-slope (south-eastern) side of the site and possibly some excavation on the upslope (north-western) side of the site. A mound approximately 2 m to 3 m high is located along the northern boundary (adjacent to University Drive) and a mound approximately 2 m high is located along the south-eastern side of the site.

4. GEOLOGY

Reference to the Sydney 1:100 000 Series Geological Sheet indicates the site is underlain by Ashfield Shale and that the site is close to the boundary with Hawkesbury Sandstone to the north and east of site. Ashfield Shale typically comprises black to dark grey shale and laminite (interbedded shale, siltstone and fine grained sandstone) and typically weathers to form clays of medium to high plasticity. Hawkesbury Sandstone typically comprises medium to coarse grained quartz sandstone with some shale bands or lenses. The geological mapping was confirmed by the field work which identified residual soils then laminite overlying sandstone bedrock. The laminite may be part of the Mittagong Formation which is a transitional rock unit between the Ashfield Shale and Hawkesbury Sandstone.

5. ACID SULPHATE SOILS

A review of the Prospect/Parramatta River *Acid Sulphate Soils Risk Map* (Edition 2, DLWC, 1997) indicated that the site is located in an area of 'no known acid sulphate soil'. The potential for Acid Sulphate Soils (ASS) to be present on site is therefore low.

6. SITE HISTORY

6.1 Site History

A site historical information review was conducted, comprising a title deeds search, a review of historical aerial photographs, Contaminated Land Register for Notices issued under the *Contaminated Land Management Act 1997*, WorkCover Dangerous Goods records and Council records (including Section 149 (2) Certificates) as well as a groundwater bore search of the Department of Water and Energy database. The full site history search information is presented in Appendix C.

6.2 Title Deeds

A historical title deeds search is used to obtain ownership or occupancy information on the property, including company names and the occupations of individuals. The title information can assist in the identification of previous land uses and can therefore assist in establishing whether there were potentially contaminating activities occurring at the site. For the purpose of detailed title deeds search the site was divided into six parts A – F, as marked on the attached cadastre (see Appendix C). The title deed search results are summarised in Table 1- 6. In establishing the possible use of the site, information has also been drawn from other sources such as aerial photographs.

Table 1 - Historical Title Deed Record for part A

Date	Owner/Occupier	Possible site use
1905?	John Charles Rogers	Rural (agriculture)
1905 - 1911	Eliza Knight *(Married Woman)*	Rural (agriculture)
1911 - 1919	Charles Alfred Learoyd *(Wool Buyer)*	Rural(agriculture/wool storage)
1919?	Charles Boggio *(Wool Buyer)*	Rural(agriculture/wool storage)
1919 - 1920	John Alfred Thorn *(French Polisher)*	Rural(agriculture)
	John William Robertson *(French Polisher)*	Rural(agriculture)
1920 - 1951	John William Robertson *(French Polisher)*	Rural(agriculture)
1951 - 1952	Rudolph Albert Karl Krix *(Retired)*	Rural(agriculture)
	Ruby Letitia Krix *(Married Woman)*	Rural(agriculture)
1952	Ruby Letitia Krix *(Widow)*	Rural(agriculture)
1958 - 1960	Albert Charles Rudolph Krix *(Horticulturist)*	Rural(agriculture)
	Ernest Alfred Norman Krix *(Horticulturist)*	Rural(agriculture)
1960 - 1963	Sydney George Hope Raymond *(Poultry Farmer)*	Rural (poultry farming)
	John Sydney Raymond *(Poultry Farmer)*	Rural (poultry farming)
1963	John Sydney Raymond *(Poultry Farmer)*	Rural (poultry farming)
1968 - current	# Macquarie University	Educational

Current Registered Proprietor

Table 2 - Historical Title Deed Record for part B

1905?	John Charles Rogers	Rural (agriculture)
1905 - 1911	Eliza Knight *(Married Woman)*	Rural (agriculture)
1911 - 1919	Charles Alfred Learoyd *(Wool Buyer)*	Rural(agriculture/wool storage)
1919?	Charles Boggio *(Wool Buyer)*	Rural(agriculture/wool storage)
1919 - 1920	John Alfred Thorn *(French Polisher)*	Rural(agriculture)
	John William Robertson *(French Polisher)*	Rural(agriculture)
1920 - 1951	John William Robertson *(French Polisher)*	Rural(agriculture)
1951 - 1960	Albert Charles Rudolph Krix *(Horticulturist)* Ernest Alfred Norman Krix *(Horticulturist)*	Rural(agriculture)
1960 - 1963	Sydney George Hope Raymond *(Poultry Farmer)*	Rural (poultry farming)
	John Sydney Raymond *(Poultry Farmer)*	Rural (poultry farming)
1963	John Sydney Raymond *(Poultry Farmer)*	Rural (poultry farming)
1968 - current	# Macquarie University	Educational

Current Registered Proprietor

Table 3 - Historical Title Deed Record for part C

Date	Owner/Occupier	Possible site use
1898 - 1903	Henry Havelock Rogers	Rural/undeveloped
1903 - 1911	Thomas William Wheeler *(Gardener)*	Rural/undeveloped
1911 - 1912	Martin Baring Gardiner *(Orchardist)*	Rural/undeveloped
1912 - 1929	Annie McBeath *(Married Woman)*	Rural/undeveloped
1929	Peter Stewart McBeath *(Builder)*	Rural/undeveloped
1929 - 1966	Giovanni Lizzio *(Orchardist)*	Rural(agriculture/orchards)
1966 - 1967	State Planning Authority of New South Wales	State Government use
1967 - current	# Macquarie University	Educational

Current Registered Proprietor

Table 4 - Historical Title Deed Record for part D

Date	Owner/Occupier	Possible site use
1904 - 1963	Reynold Rainbow *(Store Keeper, now retired)*	Rural(agriculture/orchards)
1963 - 1966	Doris Elizabeth Rainbow *(Spinster)*	Rural(agriculture/orchards)
1966 - 1967	State Planning Authority of New South Wales	State Government use
1967 - current	# Macquarie University	Educational

Current Registered Proprietor

Table 5 - Historical Title Deed Record for part E

Date	Owner/Occupier	Possible site use
1926 - 1934	James Hogarth *(Stores Superintendent)*	Rural
1934 - 1937	Jack Sabine *(Poultry Farmer)*	Rural (poultry farming)
1937 - 1941	Cyril Gerard Gore *(Tea Planter)*	Rural (poultry farming)
1941 - 1944	Arthur Stephenson Tout *(Master Carrier)*	Rural (poultry farming)
	Joseph William Berghouse *(Poultry Farmer)*	Rural (poultry farming)
1944 - 1945	Arthur Stephenson Tout *(Master Carrier)*	Rural (poultry farming)
1945 - 1950	Laurence George Percival Russell *(Accountant)*	Rural (poultry farming)
1950 - 1966	Margaret Ann Davey *(Spinster)*	Rural (poultry farming)
1966 - 1967	State Planning Authority of New South Wales	State Government use
1967 - current	# Macquarie University	Educational

Current Registered Proprietor

Table 6 - Historical Title Deed Record for part F

Date	Owner/Occupier	Possible site use
1926 - 1934	James Hogarth *(Stores Superintendent)*	Rural
1934 - 1937	Jack Sabine *(Poultry Farmer)*	Rural (poultry farming)
1937 - 1941	Cyril Gerard Gore *(Tea Planter)*	Rural (poultry farming)
1941 - 1944	Arthur Stephenson Tout *(Master Carrier)*	Rural (poultry farming)
	Joseph William Berghouse *(Poultry Farmer)*	Rural (poultry farming)
1944 - 1949	Joseph William Berghouse *(Poultry Farmer)*	Rural (poultry farming)
1949 - 1950	Harry Pavell *(Farmer)*	Rural (poultry farming)
	Marion Edna Drew *(Married Woman)*	Rural (poultry farming)
1950 - 1962	Giuseppe De Pietra *(Wool Buyer)*	Rural (poultry farming or wool storage)
	Rosa De Pietra *(Married Woman)*	Rural (poultry farming or wool storage)
1962 - 1966	G & R De Pietra Pty Limited	Rural (poultry farming or wool storage)
1966 - 1967	State Planning Authority of New South Wales	State Government use
1967 - current	# Macquarie University	Educational

Current Registered Proprietor

According to the title deeds, Part A and Part B of the site potentially had the same past uses, based on a common ownership. In particular the uses may have include rural (agricultural) use from 1905 to 1960, possibly with some use for a wool storage from 1911 to 1951 and

poultry farming from 1960 to 1968. Part A and B became the property of Macquarie University in 1968.

A major portion of Part C of the site appears to be bushland in 1930. The area was subsequently used for agricultural (orchard) purposes till 1966.

Part D was owned by the Rainbow family from 1904 to 1966, with possible orchard and/or agricultural use.

Parts E and F were owned by James Hogarth from 1926 to 1934 and later probably used for rural purposes, possibly including use as part of a poultry farm from 1934 to 1966. Part E was possibly used as a wool store from 1950 to 1966.

Parts C, D, E and F became the property of State Planing Authority of NSW in 1966 and Macquarie University in 1967.

Based on the title deeds, it appears that the site was used mainly for agricultural purposes (possibly including wool storage, market gardens and poultry farming) from at least 1905 (the year the records start) to 1967/1968. The site was then used for educational purposes by State Planning Authority of NSW and Macquarie University since 1967/1968 till present. The title deed search results for the site are included in Appendix C.

6.3 Aerial Photographs

Aerial photographs from 1930, 1951, 1961, 1970 and 1986 were obtained from the NSW Department of Lands Office and the 1943 and 2006 images were obtained from the NSW Department of Lands website (www.lands.nsw.gov.au) on 8 January 2008. The aerial photographs are presented in Appendix C. These aerial photos were reviewed to assess the likely past uses of the site. The findings are summarised below.

1930 – The site was in an area of agriculture (possibly market gardens) and bushland vegetation, spanned across approximately six properties south of Balaclava Road. Surrounding land was made up of similar bushland vegetation, market gardens, orchards and farms.

1943 – Bushland vegetation at the south-east section of the site had been largely cleared and landuse comprised market gardens, orchards and paddocks. The surrounding area is still predominantly being used for market gardens, farms and orchards.

1951 – No significant change to the landuse or the surrounding area was observed from the 1943 photograph.

1961 – There are possible poultry sheds visible on the site. More bushland vegetation had been cleared for market gardens.

1970 - Macquarie University now encompasses the site, which has had all the market gardens, farm sheds and orchards removed. Most of the site was vegetated and the remaining area was covered with grass and walkways crossing the site. University Avenue is visible on the north boundary of the site. The surrounding area includes buildings which are part of Macquarie University.

1986 – Some of the vegetated area of the site had been cleared possibly for a carpark area and the child-care centre building, which is visible at the western section of the site.

2006 – The buildings of the Long Day Care Centre at the western section of the site and the Occasional Care Centre at the south-east section of the site are clearly visible. The carpark area is formed and the site landscaped.

6.4 Council Records

The subject site is located within City of Ryde Council.

The site is zoned:

- Business Special – mixed activity
- Special uses 'C' – University
- Reserve for proposed county road.

According to the Section 149(2) Planning Certificate, the site is not affected by acid sulphate soils and has not been declared to be an "investigation area" or "remediation site" under Part 3 of the *Contaminated Land Management Act 1997* or subject to Site Audit Statement. The Section 149(2) Planning Certificates are included in Appendix C.

6.5 WorkCover NSW Dangerous Goods Database

A search of the NSW WorkCover dangerous goods database confirmed that there were no dangerous goods registered at the subject site. WorkCover search documentation is attached in Appendix C.

6.6 Regulatory Notices Search

A search of Notices on the DECC website on 9 January 2008 indicated that there are currently no Notices and/or Licences under the Protection of the Environment Operations Act (1997) that pertain directly to the subject site. No Notices or Orders to investigate or remediate the site are reported to have been issued for the site under the *Contaminated Land Management Act, 1997*.

6.7 Relevant Information held by Macquarie University

Discussions were held with Robert Kelly (Director of Facilities Management at Macquarie University). Mr Kelly was not aware of any documents or reports held by the University that were relevant to the current assessment.. No information was thus available for review. It was, however, noted that the site has been mainly used as a carpark.

6.8 Groundwater Bore Search

A groundwater bore search of the Department of Water and Energy website database (previously held by the Department of Natural Resources) was conducted. Three groundwater bores in a 1 km radius were located north of the site. There was no information available for those bores on the website, which suggests that the bores were installed in the past when there was no record and they were used for irrigation of market gardens or orchards present in the area at the time. The groundwater bore search map is attached in Appendix C.

7. POTENTIAL CONTAMINANTS

The potential soil contaminants on the subject site are likely to be associated with the former agricultural uses including market gardens, orchards and poultry farming. “Surficial application” of pesticides may have been conducted in agricultural areas. In addition, due to the likely former use of the site for poultry farming, there is a potential for biohazards associated with microbial impacts. No signs of poultry farm waste (e.g. carcasses) were noted in any of the test pits excavated. The scope of the current assessment does not include the evaluation of biohazards. Petroleum hydrocarbons associated with the storage of fuels for the use of plant and equipment are also potential contaminants (although there were no records of dangerous goods storage). Disturbance of the site associated with the development of Macquarie University and the time lapse since the previous agricultural uses ceased operation is likely to have reduced the overall impact. Another potential source of

contamination is the filling of unknown origin used to form/landscape the site and to form the watercourse and parkland along the eastern boundary.

A broad range of commonly found organic and inorganic compounds were included in the analytical suite for soil, as follows. :

- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH);
- Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene – BTEX);
- Polychlorinated Biphenyls (PCB);
- Phenols;
- Organochlorine Pesticides (OCP);
- Asbestos.

The following suite of chemical contaminants for groundwater was assessed:

- Heavy metals;
- PAH;
- TPH;
- BTEX;
- Phenols;
- PCB;
- OCP;
- pH, hardness

8. FIELD WORK

8.1 Data Quality Objectives

The data quality objectives (DQO) of the Preliminary Contamination Assessment have been developed to define the type and quality of the data to achieve the project objectives and were based broadly in accordance with the seven step data quality objective process, as

defined in Australian Standard (AS) *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds* (AS 4482.1 – 2005). The DQO process is outlined in the AS and defined by:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors;
- Optimising the Design for Obtaining Data.

Data Quality Indicators (DQI) have been established for the project are summarised in Table 7.

Table 7 – Data Quality Indicators

Data Quality Objective	Report section where addressed
State the Problem	S1 Introduction S3 Site Description
Identify the Decision	S8 Site Assessment Criteria S10 Assessment of Laboratory Results S11 Conclusions and Recommendations
Identify Inputs to the Decision	S3 Site Description S4 Geology S6 Potential Contaminants S8 Site Assessment Criteria S9 Results of the Soil Investigation S10 Assessment of Laboratory Results
Define the Boundary of the Assessment	S3 Site Description, Appendix A
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	Appendix E
Optimise the Design for Obtaining Data.	S7 Field Work

8.2 Sampling Rationale

Soil samples were collected from twelve bores over the 1.9 ha site. The *EPA Contaminated Sites Sampling Design Guidelines* 1995 outlines in Table A that the minimum bore density (for a Phase 2 investigation) on 1.9 ha is 30 bores. It is considered that a density of 30-50% of that outlined in the Guideline is appropriate for a Phase 1 contamination assessment,

hence a total of twelve bores was considered appropriate for this investigation. Based on site observations and the site history review, the sampling locations were placed over the accessible portions of the site with a view to providing appropriate site coverage.

Bores drilled adjacent to geotechnical investigation bores have the annotation 'a' added to the sample number.

Soil samples were collected at broadly regular intervals, or based on field observations, including changes in strata and signs of contamination. Sampling locations are indicated on Drawing 1 in Appendix A.

8.3 Sampling Procedures

8.3.1 Soil Sampling

All sample locations were cleared for services and pipes using Dial-before-you-dig information and an electro-magnetic sweep by an accredited service locater.

For the purpose of contamination assessment and waste classification the fieldwork comprised the drilling of 10 bore holes with an auger drilling rig and 2 bore holes with hand auger tools. Eight additional bore holes were drilled for geotechnical purposes.

All sampling data was recorded on DP Test Bore Reports with essential information included in the chain-of-custody sheets. The general sampling procedure is summarised below:-

- collect soil samples directly from the auger using disposable sampling equipment;
- transfer samples into laboratory-prepared glass jars, capping immediately and ensuring that the headspace within the sample jar is minimised;
- collect a split replicate at each location into a zip lock plastic bag;
- collect 10% replicate samples for QA/QC purposes;
- label sample containers with individual and unique identification, including project number, sample location and sample depth; and

- place the glass jars, with teflon lined lid, into a cooled, insulated and sealed container for transport to the laboratory.

A photoionisation detector (PID) was used to screen the headspace gases of the replicate samples placed in the sealed zip-lock bag. The PID provides an indication of the likely presence of volatile organic compounds in the soil. The PID had a 10.6eV lamp and was calibrated with isobutylene gas at 100 ppm prior to commencement of each day's field work.

Envirolab Services, a laboratory accredited by the National Association Testing Authorities (NATA), was employed to conduct the sample analysis. The laboratory is required to carry out routine in-house QC procedures.

8.3.2 Piezometer Installation and Groundwater Sampling Methods

Two groundwater monitoring piezometers were installed one in the geotechnical Bore 1 (for geotechnical purposes) and one in Bore 7 (for contamination purposes). The bores were extended to depths of 14.2 m and 11.55 m respectively.

A bobcat-mounted drill rig using solid flight auger (TC-bit), rotary (water) and NMLC -Coring was used to install the wells. Construction details for each piezometer are presented on the Test Bore Reports, Appendix D.

The piezometers were constructed using 50 mm diameter acid washed class 18 PVC casing and machine slotted well screen. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate the groundwater. The piezometers in Bore 1 was completed with a gravel pack extending to 0.18 m above the well screen and in Bore 7 to 0.3 m, a bentonite plug of at least 0.5 m thickness and backfilled with drill returns to the surface. The piezometers were finished with a gatic cover on the ground surface.

No free groundwater was observed during augering of the boreholes (i.e. within depths of 1.5 m to 5.1 m). The use of water during wash boring and coring within the bedrock prevented the measurement of groundwater below this depth. The water level within the groundwater monitoring wells was measured prior to purging on 14/12/07 and again prior to sampling on 18/12/07. The monitoring well in BH 1 appeared to be filled with silt below a

depth of 8.1 m and therefore observation/measurement of groundwater below this depth was not possible.

After installation, the well in Bore 7 was developed by removing three bore volumes of water using disposable bailer. The well was allowed to recharge and the groundwater sample was collected three days later. Following the development of the well and prior to sampling, the well was micro-purged and field parameters (pH, dissolved oxygen, turbidity, electrical conductivity and temperature) monitored. The sample was collected after the field parameters had stabilised (see Section 10.3). Collection of the groundwater sample was carried out in accordance with the methodology prescribed in the Standard DP field procedures.

The sample was obtained using low flow geopump and disposable tubing. Groundwater samples were field filtered through a 0.45 μm membrane filter prior to laboratory analysis for heavy metals.

Sample handling and transport was as set out below:-

- sample containers were labelled with individual and unique identification, including project number and sample number;
- samples were placed in insulated coolers and maintained at a temperature of approximately 4°C until transported to the analytical laboratory, and
- chain of custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

All samples were dispatched to Envirolab Services, a NATA accredited laboratory, for analysis.

8.4 Analytical Rationale

The analytical scheme (Table 8) was designed to assess the potential for contamination which may have arisen from current and past use of the site. A total of 17 selected soil samples (including 2 QA/QC replicates) were analysed for various combinations of the contaminants of concern. In addition, one groundwater sample was also analysed as shown in Table 9.

Table 8 – Analytical Scheme for soil samples

Sample ID (Location – Depth)	Heavy Metals	TPH/ BTEX	PAH	PCB/ OCP	Asbestos	Phenols	TCLP
3a/0.8-1.0	✓	✓	✓	✓	✓	✓	✓
7a/1.0-1.2	✓	✓	✓	✓	✓	✓	✓
7a/2.8-3.0	✓	✓	✓		✓		
11/0.8-1.0	✓	✓	✓	✓	✓	✓	✓
12/0.8-1.0	✓	✓	✓	✓	✓	✓	
13/0.3-0.5	✓	✓	✓	✓	✓	✓	✓
13/2.9-3.0	✓	✓	✓	✓		✓	
14/0.3-0.5	✓	✓	✓				
BD3/141207[11]	✓		✓				
16/0-0.2	✓	✓	✓	✓	✓	✓	✓
16/0.2-0.5	✓	✓	✓	✓	✓	✓	
17/0.2-0.5	✓	✓	✓	✓	✓	✓	
7a/3.6-3.9	✓	✓	✓	✓		✓	
9a/0.3-0.5	✓	✓	✓		✓		
10a/1.0-1.2	✓	✓	✓				
BD2/141207[11]	✓		✓				
15/0.3-0.5	✓	✓	✓				

Table 9 – Analytical Scheme for groundwater sample

Sample ID (Location)	Heavy Metals	TPH/ BTEX	PAH	Phenols	PCB/ OCP	pH	Hardness
GW7/181207	✓	✓	✓	✓	✓	✓	✓

9. SITE ASSESSMENT CRITERIA

9.1 Soils

Notwithstanding the fact that the site is located within the Macquarie University Campus, given the proposed development of the site as a commercial company's headquarters, the exposure scenario for contaminants in soils would be that of a commercial or industrial development. DP therefore considered the health-based investigation levels for a commercial land use should be appropriate for this assessment (HIL Column 4, see Appendix II, from the Guidelines).

Due to the likely landscaped nature of the site and surrounding the proposed building provisional phototoxicity-based investigation levels (PPIL) were also considered for unpaved/unsealed areas. PPIL are sourced from Column 5, Appendix II of the Guidelines.

The adopted site assessment criteria are shown in Table 10, below.

A contaminant concentration in soil/filling material is considered to be significant if:

i) The concentration of the contaminant is more than 2.5 times the site assessment criteria (SAC). Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/ management.

ii) For a data of like material, with respect to the health-based criteria, the calculated 95% Upper Confidence Limit of average concentrations (excluding any 'hotspot' concentrations) exceeds the SAC.

iii) The standard deviation of the results is greater than 50% of the health-based investigation levels (HIL).

Note that the statistical analysis would only apply to HILs.

Table 10 – Site Assessment Criteria for Contamination

Contaminant	Adopted Criteria (SAC)		Source
TPH $C_6 – C_9$ $C_{10} – C_{36}$	 65 mg/kg 1000 mg/kg		NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils. Currently there are no other comprehensive, EPA endorsed investigation levels for petroleum hydrocarbons.
BTEX Benzene Toluene Ethylbenzene Xylene	 1 mg/kg 1.4 mg/kg 3.1 mg/kg 14 mg/kg		
Metals Arsenic (total) Cadmium Chromium Copper Lead Mercury Nickel Zinc	**HIL** 500 mg/kg 100 mg/kg 60,000 mg/kg 5000 mg/Kg 1,500 mg/Kg 75 mg/Kg 3,000 mg/Kg 35,000 mg/kg	**PPIL** 20 mg/Kg 3 mg/Kg 400 mg/Kg 100 mg/Kg 600 mg/Kg 1 mg/Kg 60 mg/Kg 200 mg/Kg	NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels outlined in Column 4 for Commercial/Industrial landuse, and Provisional phytotoxicity investigation levels outlined in Column 5.
Total Phenols	42,500 mg/kg		
PAH Total Benzo(a)Pyrene	 100 mg/kg 5 mg/kg		
PCB	20 mg/kg		
OCP Aldrin + dieldrin chlordane DDT (including DDD, DDE, DDT) Heptachlor	 50 mg/kg 250 mg/kg 1000 mg/kg 50 mg/kg		
Asbestos	No asbestos present in soil at the surface		Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors

Providing that the 95% Upper Confidence Limit (UCL) of average concentrations is within the SAC (health-based), and no concentrations of the contaminants are at hotspot level, minor exceedances of the SAC may be considered to pose an insignificant human health risk under the proposed land-use.

9.2 Groundwater

Groundwater investigation levels (GILs) are sourced from the *Australian Water Quality Guidelines (ANZECC (2000)* (Table 11). Where applicable the 95% protection of freshwater species has been applied. The nearest receptor for groundwater is assessed to be Shrimptons Creek, which flows into Lane Cove River.

[1] NSW EPA is now part of the NSW Department of Environment and Climate Change (DECC).

Table 11 – Groundwater Investigation Levels (GILs)

Contaminant	Adopted Criteria (GIL)	Source
TPH $C_6 – C_9$ $>C_9$	 150 µg/L 600 µg/L	Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination have been adopted as screening thresholds [adopted due to the absence of high reliability NSW EPA or ANZECC guidelines for TPH]*
BTEX Benzene Toluene Ethylbenzene Xylene	 950 µg/L 300 µg/L 140 µg/L 550 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species* NSW EPA[2] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) *Threshold concentrations for sensitive land use, Protection of Aquatic Ecosystem* is adopted in the absence of other comprehensive investigation levels for toluene or ethyl benzene in groundwater.
Metals Arsenic (V) Cadmium Chromium (VI) Copper Lead Mercury Nickel Zinc	 13 µg/L 0.2 µg/L 1 µg/L 1.4 µg/L 3.4 µg/L 0.6 µg/L 11 µg/L 8 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species*
PAH Total Benzo(a)Pyrene Naphthalene	 Not specified Not specified 0.016 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species*
Phenols	 320 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species*
OCP Chlordane DDT Endosulfan Endrin Heptaclor	 0.08 µg/L 0.01 µg/L 0.2 µg/L 0.02 µg/L 0.09 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species*
PCB Total Aroclor 1242 Aroclor 1254	 Not specified 0.6 µg/L 0.03 µg/L	*ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Protection of 95% of freshwater species*

Notes:

* Other than a 'low reliability' final chronic value of 7 µg/L for petroleum hydrocarbon, which is not routinely achievable by NATA laboratories due to inability to meet the required detection limits.

9.3 Waste Classification

For the purpose of waste classification, analytical results have been compared with the threshold concentration guidelines as provided in NSW EPA's *Environmental Guidelines: Assessment Classification and Management of Liquid and Non-Liquid Wastes* (1999).

In view of the absence of guidance by DECC on assessment criteria for Virgin Excavated Natural Material (VENM), the following guidelines were referenced:-

- Environmental Soil Quality Guideline 'Background Ranges', as given in the *Schedule B(1) NEPC Guideline on the Investigation Levels for Soil and Groundwater (1999)* (for heavy metals).

- Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (1992)*, Environmental Soil Quality Guidelines Background A [ANZECC A] (for organic compounds)

10. RESULTS OF SOIL INVESTIGATION

10.1 Field Observations

10.1.1 Soils

Details of the sub-surface conditions encountered during the course of the investigation are included in the Test Bore Report Sheets (Appendix D). The bore locations are shown on Drawing 1, Appendix A.

Surficial topsoil and pavements overlying filling to depths of approximately 0.5 m to 1 m on the north-western part of the site increasing to depths of approximately 2.0 m to 4.0 m along the south-western part of the site. The mound along the northern boundary appears to be

formed by filling over natural clay whilst the mound on the south-eastern side of the site is formed by filling only.

Filling generally comprised silty clay with some ironstone and sandstone fragments and generally exhibited no chemical odours or staining. Slag and ash fragments were encountered in Bores 16 and 17. Filling materials were underlain by silty clays and sandstone bedrock.

Table 12 summarises the subsurface profile encountered during the current investigation.

Table 12 - Observed Depths (m) to Soil/Fill Layers

Sampling Location	Bitumen/ Roadbase	Filling	Silty clay/ Clay	Sandstone	Completion Depth
2A	0-0.3		0.3-1.2		1.2
3A		0-1.0	1.0-1.8	1.8-2.0	2.0
7A		0-3.5	3.5-4.7		4.7
9A	0-0.05		0.05-0.6	0.6-1.4	1.4
10A	0-0.15		0.15-1.5	1.5-2.8	2.8
11		0-1.3	1.3-2.0		2.0
12		0-1.3			1.3
13		0-3.5	3.5-4.0		4.0
14	0-0.15	0.15-2.8	2.8-3.0		3.0
15	0-0.15		0.15-2.0		2.0
16		0-0.5			0.5
17		0-0.5			0.5

10.1.2 Groundwater

Groundwater sampling and analyses were conducted at Bore 7 on 18 December 2007. The groundwater levels measured after the installation of the well and prior to sampling are presented in Table 13. Analytical results are presented in Table15.

Table 13 – Groundwater Levels Bore 7

Date	Depth to Ground Water Table (from top of well)(m)	Groundwater RL (m AHD)
14/12/07	4.8	56.3 (prior to purging)
18/12/07	5.2	55.9 (prior to purging)

10.2 Total Photoionisable Compounds (TOPIC) Results

The replicate soil samples collected in plastic bags were allowed to equilibrate under ambient temperatures before screening for Total Photoionisable Compounds (TOPIC) using a calibrated Photoionisation Detector (PID). Results of sample screening are shown in the Test Bore Reports in Appendix D. The PID readings were below detection limits and are thus typical of background levels in Australian soils and, therefore, do not indicate the presence of significant volatile contaminants.

10.3 Groundwater Field Parameters

On 18 December 2007 the piezometer in Bore 7 was purged and samples were collected using low-flow sampling techniques after stable readings were obtained for pH, electrical conductivity, TDS, dissolved oxygen and temperature presented in Table 14.

Table 14 - Groundwater readings prior to sampling

Time	pH	Electrical Conductivity (µS)	Dissolved Oxygen (ppm)	Turbidity (NTU)	Temperature (°C)
10:29	7.50	0.3	3.70	OVRNTU	6.1
10:31	7.73	0.4	2.15	OVRNTU	5.8
10:35	7.9	0.5	1.74	OVRNTU	5.2
10:38	8.36	0.5	1.56	OVRNTU	5.0

10.4 Laboratory Results

The results of laboratory analysis of the soil and groundwater samples are summarised in Tables 15 and 16, with NATA Reports provided in Appendix E.

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Table 15 – Results of Soil Laboratory Analysis

Sample ID	Fill/Natural	Heavy Metals																PAH				TRH		Benzene	Toluene	Ethyl-Benzene	Total Xylene	Total Phenols	PCB[4]	OCP[4]	asbestos
		As		Cd		Cr[3]		Cu		Pb		Hg		Ni		Zn		Total PAH[4]		B(a)P[5]		C6-C9	C10-C36								
		total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	TCLP[2]	total[1]	total[1]	total[1]	total[1]	total[1]	total[1]	total[1]	total[1]	total[1]	-
3a/0.8-1.0	F	8.9	-	<1	-	60	<0.01	64	-	28	-	0.23	-	3.2	-	31	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	0.7	Nil
7a/1.0-1.2	F	<4	-	<1	-	9.1	-	18	-	42	<0.03	<0.1	-	5.5	<0.02	20	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	<0.1	Nil
7a/2.8-3.0	F	7.4	-	<1	-	15	-	12	-	38	-	<0.1	-	2	-	11	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	-	-	-	Nil
11/0.8-1.0	F	5.9	-	<1	-	40	<0.01	8.1	-	25	<0.03	<0.1	-	2.6	-	15	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	<0.1	Nil
12/0.8-1.0	F	4.9	-	<1	-	9	-	3	-	10	-	<0.1	-	<1	-	3.6	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	<0.1	Nil
13/0.3-0.5	F	5	-	<1	-	13	-	6.7	-	24	-	<0.1	-	3.8	-	9.5	-	2.7	<0.002	0.3	<0.001	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	<0.1	Nil
13/2.9-3.0	F	8.3	-	<1	-	36	-	54	-	43	-	0.26	-	2.2	-	38	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	0.1	-
14/0.3-0.5	F	5.3	-	<1	-	19	-	1.7	-	22	-	<0.1	-	1.2	-	2.9	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	-	-	-	-
BD3/141207[11]	F	6.4	-	<1	-	19	-	3.4	-	19	-	<0.1	-	4.9	-	5.4	-	<0.2	-	<0.05	-	-	-	-	-	-	-	-	-	-	-
16/0-0.2	F	<4	-	<1	-	19	<0.01	36	-	15	<0.03	<0.1	-	53	0.06	40	-	1.3	<0.002	0.1	<0.001	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	-	Nil
16/0.2-0.5	F	<4	-	<1	-	15	-	37	-	15	-	<0.1	-	49	-	38	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	-	Nil
17/0.2-0.5	F	5.2	-	<1	-	14	-	19	-	16	-	<0.1	-	27	-	19	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	-	Nil
7a/3.6-3.9	N	8.2	-	<1	-	21	-	12	-	23	-	<0.1	-	2.5	-	13	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	<5	<0.1	<0.1	-
9a/0.3-0.5	N	6.8	-	<1	-	16	-	5.5	-	23	-	<0.1	-	9.3	-	5.4	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	-	-	-	Nil
10a/1.0-1.2	N	8.4	-	<1	-	20	-	20	-	25	-	<0.1	-	2.1	-	4.7	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	-	-	-	-
BD2/141207[11]	N	7	-	<1	-	19	-	17	-	24	-	<0.1	-	2.1	-	4.6	-	<0.2	-	<0.05	-	-	-	-	-	-	-	-	-	-	-
15/0.3-0.5	N	5.5	-	<1	-	16	-	20	-	71	-	<0.1	-	3	-	8.5	-	<0.2	-	<0.05	-	<25	<250	<0.5	<0.5	<1	<3	-	-	-	-
Site Assessment Criteria[12]																															
SAC		500		100		60000		5000		1500		75		3000		35000		100		5		65	1000	1	1.4	3.1	14	42500	50	50/250/ 1000/50[13]	Nil[14]
Provisional Phytotoxicity Investigation Levels[12]																															
PPIL		20		3		400		100		600		1		60		200															
Waste Classification Criteria for Filling[7]																															
Criteria for Inert Waste																															
CT1		10	-	2	-	10	-	1000[8]	-	10	-	0.4	-	4	-	7000[8]	-	-	-	0.08	-	-	-	1	28.8	60	100	28.8	-	-	Nil
SCC1		500	0.5	100	0.1	1900	0.5	-	-	1500	0.5	50	0.02	1050	0.2	-	-	200	-	1	0.004	650	5000	18	518	1080	1800	518	2	1	Nil
Background Criteria for Natural Material[9]																															
Published background		1-50	-	1	-	5-1000	-	2-100	-	2-200	-	0.03	-	5-500	-	10-300	-	0.95-5	-	-	-	-	-	0.05-1	0.1-1	-	-	0.03-0.5	0.02-0.1	<0.001-<0.05[10]	-

Notes:

1 total values in mg/kg
2 TCLP values in mg/L
3 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment.
4 Results less than general Practical Quantitation Limit (PQL) quoted for individual compounds
5 benzo(a)pyrene
7 NSW EPA's Environmental Guidelines: Assessment Classification and Management of Liquid and Non-Liquid Wastes (1999): Table A3: Contaminant Threshold Values for Waste Classification of Non-Liquid wastes without doing the Leaching Test (CT); and Table A4: Leachable Concentration (TCLP) and Total Concentration Values for Non-Liquid Waste Classification (SCC) (as applicable)
8 As Waste Classification Criteria for Cu and Zn is not available, NSW DEC [4] Contaminated Sites *Guidelines for the NSW Site Auditor Scheme 2nd edition* (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for residential with gardens and accessible soil (HIL Column 1) were applied.
9 Published background levels sourced from NEPC (1999). National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1) Guidelines on the Investigation Levels for Soil and Groundwater, Background Ranges (for heavy metals) and Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (1992), Environmental Soil Quality Guidelines Background A [ANZECC A] (for organic compounds)
10 lowest threshold available, for aldrin
11 denotes replicate of the sample listed directly above
12 as per Table 10
13 SAC for OCP given in order aldrin+dieldrin/ chlordane/ DDT+DDD+DDE/ heptachlor
14 No asbestos present on the ground surface (Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors).
Bold result exceed Waste Classification Criteria
- not analysed/ not defined/ not applicable

Table 16 - Laboratory Results of Groundwater Samples

Sample ID	hardness	Heavy Metals								PAH		TRH		Benzene	Toluene	Ethyl-Benzene	Xylene	pH	Phenols	PCB	OCP[2]
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total[2]	B(a)P	C6-C9	C10-C36								
units	$mgCaCO_3/L$	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pH Units	mg/L	mg/L	mg/L
GW7/181207	56	2.3	**0.4**	**1.7**	**3**	1.4	<0.5	8.7	**140**	<1	<1	<10	<250	<1	<1	<1	<3	4.5	<0.05	<2	<0.2
Groundwater Investigation Levels[4]																					
GIL	-	13.0	0.2	1.0	1.4	3.4	0.6	11.0	8.0	16, 5[6]	-	150	600	950	300	140	550	-	320	0.6/0.03[7]	0.08/0.01/0.2/0.02/0.09[8]

Notes:

2 where results are above practical quantitation limit (PQL) sum of all results given, when below PQL results quoted as <PQL of majority of individual analytes

4 GIL refer to Table 11

6 trigger value for naphthalene, phenanthrene other PAH's not defined

7 trigger values for clordane/DDT/endosulfan/endrin/heptaclor

8 trigger values for aroclor 1242/arochlor 1254

Bold indicates exceedance of GIL

11. ASSESSMENT OF LABORATORY RESULTS

11.1 Chemical Contaminants in Soil

Soil samples were assessed for a suite of potential contaminants of concern including heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TPH, BTEX, PAH, PCB, OCP and phenols.

The laboratory results (Table 15) indicated that contaminant concentrations in the soil samples analysed were within the health-based SAC for commercial/ industrial land use and the Provisional Phytotoxicity-based Investigation Levels (PPIL), which are relevant for landscaped areas.

11.2 Asbestos

Eleven samples of filling and one sample of shallow natural material (0.3 - 0.5 m) were analysed for asbestos. Asbestos was not detected in these samples.

11.3 Groundwater Results

The main purpose of the current Phase 1 Assessment was to provide an indication of the likely contamination status of the site, the scope of the investigation did not include a detailed assessment of surface and/or groundwater.

In this regard, no discernible signs or sources of ground and/or surface water contamination were noted at the site. It is further noted that major sections of the water course running broadly along the south eastern site boundary were not located within the area of the Phase 1 Contamination Assessment (refer to Drawing 1, Appendix A). Surface water sampling was, therefore, not included in the scope of the current assessment and was not undertaken.

As part of the Phase 1 Contamination Assessment one groundwater well was constructed at Bore 7 and a groundwater sample was collected and analysed for a suite of common

contaminants. Laboratory results (Table 15) for arsenic, lead, mercury, nickel, TPH, toluene, benzene, ethyl benzene, xylene, PAH, PCB, Phenols and OCP were below the adopted GIL with all organic concentrations less than practical quantitation limits. Laboratory results for cadmium (detected concentration of 0.4 µg/L compared to GIL value of 0.2 µg/L), chromium (1.7 µg/L over the GIL of 1.0 µg/L), copper (3 µg/L over the GIL of 1.4 µg/L) and zinc (140 µg/L over the GIL of 8.0 µg/L) exceeded the GIL. However, the detected levels were not considered to be significant as the chromium, copper and cadmium exceedances are only marginal. Furthermore, with respect to chromium (Cr) it is noted that the threshold for Cr (VI) was adopted in the absence of a GIL for Cr (III) in freshwater. Cr (VI) is highly unstable in normal environmental conditions and is therefore considered unlikely to be present. The total Cr level was well within the Cr (III) level for marine waters. Zinc is commonly detected at levels above the ANZECC (2000) Guidelines in groundwater, particularly in urban areas, and it is likely that this concentration (140 µg/L) represents a residual background concentration. Additionally all metal concentrations detected in soil samples were low and are unlikely to contribute to the groundwater. All results were within the *Australian Drinking Water Guideline (2004)*.

11.4 Preliminary Waste Classification

11.4.1 Filling Material

Laboratory results were compared to NSW EPA's *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Waste* (1999) for Inert Waste Screening Threshold Values (NSW EPA 2004).

On the basis of the total and leachable (TCLP) concentrations of the filling material is provisionally classified as Inert Waste (Table 14). It should be noted that the waste classification is based on a limited number of samples and is thus preliminary in nature only.

11.4.2 Natural Material

The levels of potential contaminants detected in the natural material samples analysed (Samples 7a/3.6-3.9, 9a/0.3-0.5, 10a/1.0-1.2, 15/0.3-0.5) were low and within expected background levels (Table 15).

On this basis, natural materials with no signs of contaminant impact, such as hydrocarbon odours or elevated levels of potential contaminants, are classifiable as Virgin Excavated Natural Materials (VENM).

12. CONCLUSIONS AND RECOMMENDATIONS

The scope of work for the current assessment comprised a site walkover inspection, review of site history, a limited soil and groundwater sampling regime and preliminary assessment of the material to be excavated for the purpose of potential reuse or disposal.

A review of historical information indicated that the site was previously in a rural/agricultural area. Prior to the establishment of Macquarie University in 1967 the site was used for agricultural purposes possibly including orchard, market gardens and poultry farming since at least 1930. Since the establishment of Macquarie University all structures related to the market gardens, farm sheds and orchards have been removed. The site is currently occupied by Long Day Care Centre at the western section of the site and the Occasional Care Centre at the south-east section together with a carpark and landscaping. The current site and surrounding land uses are not considered to be significant in terms of the potential to adversely impact the site. The potential for contamination is generally considered to be low which was confirmed by the low level of contaminants in the samples analysed. There were no exceedances of the SAC and PPIL used for the fill material and the published background levels for the underlying natural clay material.

Groundwater laboratory results for cadmium, chromium, copper and zinc exceeded the GIL. However, the detected levels were not considered to be significant as the chromium, copper and cadmium exceedances are only marginal. Zinc is commonly detected at levels above

the ANZECC (2000) Guidelines in groundwater, particularly in urban areas, and it is likely that the elevated zinc concentration represents a residual background concentration.

Soil samples assessed against the Waste Classification Guidelines indicate that the fill material is provisionally classified as Inert Waste for the purposes of off-site disposal. Sample analysis in conjunction with on-site observations and bore records indicates that the material below the filling is natural and would be classifiable as VENM.

It is recommended that the waste classification of the material should be verified/checked prior to and/or during site excavation.

On the basis of the investigation findings, DP considers the potential for contamination associated with the site is very low and the site is suitable for the proposed development from a chemical contamination perspective.

Having said this, it is noted that the current assessment only comprised a Phase 1 Assessment with limited sampling. The adopted sampling regime does not meet the sampling density recommended by DECC to “characterise” the contamination status of the site. To meet the sampling density specified by DECC for site characterisation, additional soil and ground/surface water sampling and analysis would have to be undertaken.

This Phase 2 assessment should be conducted at the time of the additional waste classification assessment (as recommended). As part of the more extensive Phase 2 Contamination Assessment, DP suggests that additional soil and groundwater assessment should be conducted. This should include:

- soil sampling from the additional test bores;
- groundwater sampling from existing piezometer in Bore 7, as well as from other (newly constructed) groundwater piezometers At least four groundwater wells should be constructed; and
- In addition, surface water and sediment should be collected from up-, mid- and down-stream sections of the water course at the site.

In addition, due to the likely former use of the site for poultry farming, there is a potential for biohazards associated with microbial impacts. Having said this, no signs of poultry farm waste (e.g. carcasses) were noted in any part. The scope of the current assessment does not include the evaluation of biohazards.

13. LIMITATIONS OF THIS REPORT

The scope of the site assessment activities and consulting services undertaken by DP were limited to those detailed in the proposal dated 19 November 2007 and accepted by Mr Andrew Harb (CRI Australia Pty Ltd) on behalf of Lachlan Project Development Pty Ltd.

DP's assessment is necessarily based upon the result of a limited site investigation and the restricted programme of surface and subsurface sampling, screening and chemical testing which was set out in the proposal. DP cannot provide unqualified warranties with regards to site contamination nor does DP assume any liability for site conditions not observed or accessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change over time due to activities such as spillages of contaminating substances. These changes may occur subsequent to DP's investigations and assessment.

This report, its associated documentation and the information herein have been prepared solely for the use of Lachlan Project Development Pty Ltd. Any reliance assumed by third parties on this report shall be at such parties' own risk.

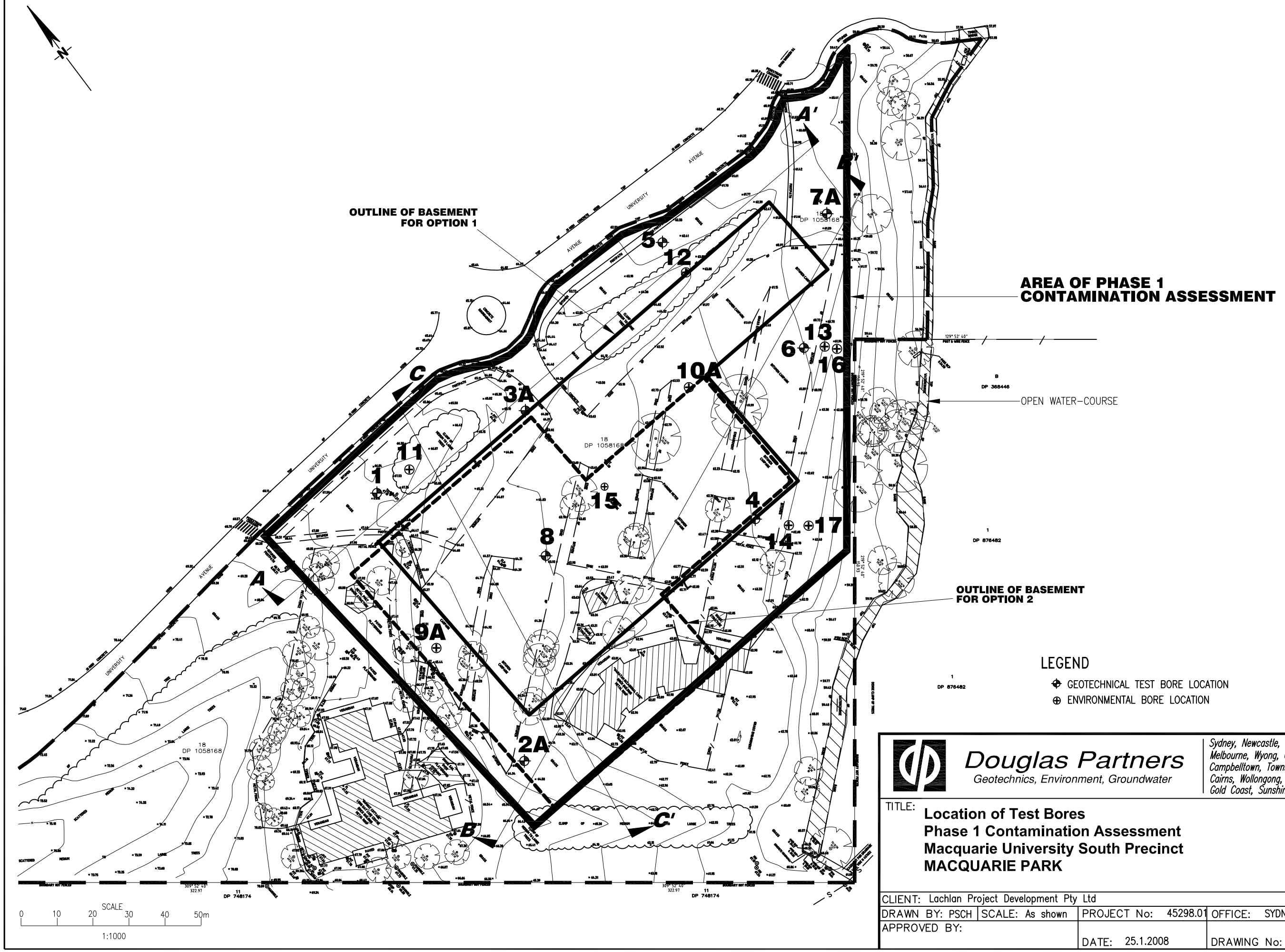
DOUGLAS PARTNERS PTY LTD

Reviewed by

Galia Nikolaeva
Environmental Scientist

Ronnie Tong
Principal

APPENDIX A
Site Drawing



LEGEND

- ⊕ GEOTECHNICAL TEST BORE LOCATION
- ⊕ ENVIRONMENTAL BORE LOCATION

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Geotechnics, Environment, Groundwater

Sydney, Newcastle, Brisbane, Melbourne, Wyong, Canberra, Campbelltown, Townsville, Perth, Cairns, Wollongong, Darwin, Gold Coast, Sunshine Coast

TITLE: **Location of Test Bores**
Phase 1 Contamination Assessment
Macquarie University South Precinct
MACQUARIE PARK

CLIENT: Lachlan Project Development Pty Ltd			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 45298.01	OFFICE: SYDNEY
APPROVED BY:		DATE: 25.1.2008	DRAWING No: 1

P:\45298.01 MACQUARIE PARK, Macquarie University South Precinct Phase 1 Contamination LR\Drawings\45298.01-1.dwg, 1/25/2008 2:57:00 PM

APPENDIX B
Site Photographs

Photo 1: General view of the north section of the site adjacent to University Avenue

Photo 2: General view of the eastern section of the site adjacent to the artificial watercourse

Phase 1 Contamination Assessment University Avenue, Macquarie University, South Precinct	**Project 45298.01**	**January 2008**	**Plate 1**

Douglas Partners
Geotechnics · Environment · Groundwater

Photo 3: General view of the southern section of the site

Phase 1 Contamination Assessment University Avenue, Macquarie University, South Precinct	**Project 45298.01**	**January 2008**	**Plate 2**

Douglas Partners
Geotechnics · Environment · Groundwater

APPENDIX C
Site History Information
Results of DNR Search

ACN: 093 412 474
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

SUMMARY AS TO OWNERS.

Property: Macquarie University, Macquarie Park

Description: - Part of Lot 182 D.P. 1112777

As to that part marked A on the attached cadastre

16.12.1905?	John Charles Rogers	Vol 1182 Fol 107
20.04.1905	Eliza Knight *(Married Woman)*	Vol 1182 Fol 107
19.01.1911	Charles Alfred Learoyd *(Wool Buyer)*	Vol 1182 Fol 107
01.12.1919?	Charles Boggio *(Wool Buyer)* *(We have not investigated the Transmission Application)*	Vol 1182 Fol 107
02.10.1919	John Alfred Thorn *(French Polisher)* John William Robertson *(French Polisher)*	Vol 1182 Fol 107
19.08.1920	John William Robertson *(French Polisher)*	Vol 6377 Fol 181
16.08.1951	Rudolph Albert Karl Krix *(Retired)* Ruby Letitia Krix *(Married Woman)*	Vol 6470 Fol 132
10.12.1952	Ruby Letitia Krix *(Widow)*	Vol 6470 Fol 132
04.03.1958	Albert Charles Rudolph Krix *(Horticulturist)* Ernest Alfred Norman Krix *(Horticulturist)*	Vol 7539 Fol's 238 & 239
20.10.1960	Sydney George Hope Raymond *(Poultry Farmer)* John Sydney Raymond *(Poultry Farmer)*	Vol 7898 Fol 125

email: grolly1@bigpond.net.au

ACN: 093 412 474
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

18.06.1963	John Sydney Raymond *(Poultry Farmer)*	Vol 7898 Fol 125
31.03.1968	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

As to that part marked B on the attached cadastre

16.12.1905?	John Charles Rogers	Vol 1182 Fol 107
20.04.1905	Eliza Knight *(Married Woman)*	Vol 1182 Fol 107
19.01.1911	Charles Alfred Learoyd *(Wool Buyer)*	Vol 1182 Fol 107
01.12.1919?	Charles Boggio *(Wool Buyer)* *(We have not investigated the Transmission Application)*	Vol 1182 Fol 107
02.10.1919	John Alfred Thorn *(French Polisher)* John William Robertson *(French Polisher)*	Vol 1182 Fol 107
19.08.1920	John William Robertson *(French Polisher)*	Vol 6377 Fol 181
16.08.1951	Albert Charles Rudolph Krix *(Horticulturist)* Ernest Alfred Norman Krix *(Horticulturist)*	Vol 6470 Fol's 130 & 131
20.01.1960	Sydney George Hope Raymond *(Poultry Farmer)* John Sydney Raymond *(Poultry Farmer)*	Vol 7898 Fol 124
18.06.1963	John Sydney Raymond *(Poultry Farmer)*	Vol 7898 Fol 124
31.03.1968	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

email: grolly1@bigpond.net.au

ACN: 093 412 474
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

As to that part marked C on the attached cadastre

04.01.1898	Henry Havelock Rogers	Vol 1240 Fol 45
15.01.1903	Thomas William Wheeler *(Gardener)*	Vol 1240 Fol 45
02.03.1911	Martin Baring Gardiner *(Orchardist)*	Vol 1240 Fol 45
23.11.1912	Annie McBeath *(Married Woman)*	Vol 1240 Fol 45
08.05.1929	Peter Stewart McBeath *(Builder)* *(We have not investigated the Transmission Application)*	Vol 1240 Fol 45
17.06.1929	Giovanni Lizzio *(Orchardist)*	Vol 1240 Fol 45
04.05.1966	State Planning Authority of New South Wales	Vol 1240 Fol 45
09.05.1967	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

As to that part marked D on the attached cadastre

16.05.1904	Reynold Rainbow *(Store Keeper, now retired)*	Vol 1987 Fol 72
16.08.1963	Doris Elizabeth Rainbow *(Spinster)*	Vol 8371 Fol 237
04.05.1966	State Planning Authority of New South Wales	Vol 8371 Fol 237
09.05.1967	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

email: grolly1@bigpond.net.au

ACN: 093 412 474
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

As to that part marked E on the attached cadastre

29.12.1926	James Hogarth *(Stores Superintendent)*	Vol 2304 Fol 34
24.08.1934	Jack Sabine *(Poultry Farmer)*	Vol 2304 Fol 34
20.05.1937	Cyril Gerard Gore *(Tea Planter)*	Vol 2304 Fol 34
26.11.1941	Arthur Stephenson Tout *(Master Carrier)* Joseph William Berghouse *(Poultry Farmer)*	Vol 5298 Fol's 150 & 151
19.10.1944	Arthur Stephenson Tout *(Master Carrier)*	Vol 5467 Fol 240
03.04.1945	Laurence George Percival Russell *(Accountant)*	Vol 5467 Fol 240
20.03.1950	Margaret Ann Davey *(Spinster)*	Vol 6236 Fol 61
04.05.1966	State Planning Authority of New South Wales	Vol 6236 Fol 61
09.05.1967	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

As to that part marked F on the attached cadastre

29.12.1926	James Hogarth *(Stores Superintendent)*	Vol 2304 Fol 34
24.08.1934	Jack Sabine *(Poultry Farmer)*	Vol 2304 Fol 34
20.05.1937	Cyril Gerard Gore *(Tea Planter)*	Vol 2304 Fol 34
26.11.1941	Arthur Stephenson Tout *(Master Carrier)* Joseph William Berghouse *(Poultry Farmer)*	Vol 5298 Fol's 150 & 151

email: grolly1@bigpond.net.au

ACN: 093 412 474
ABN: 61 093 412 474

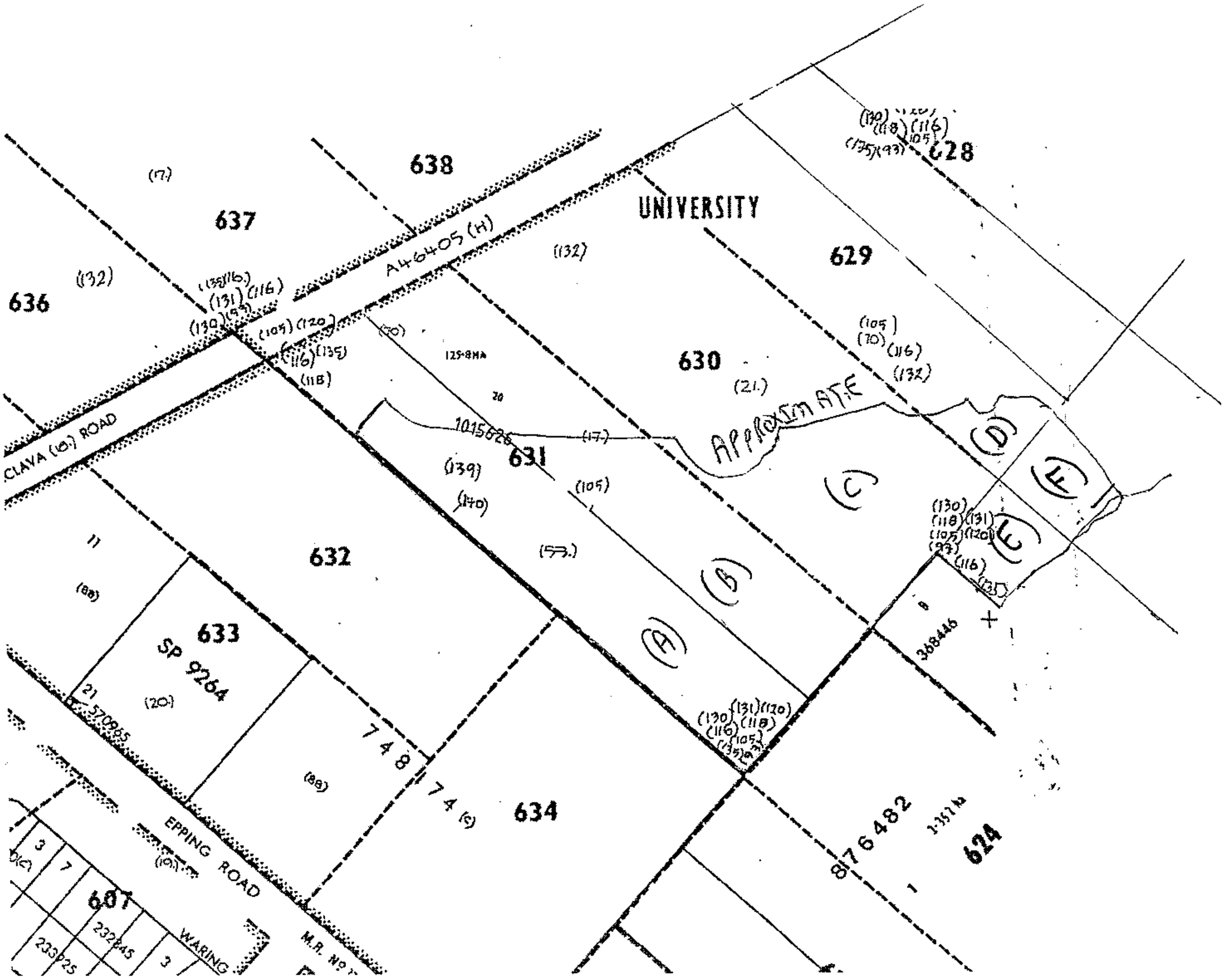
Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

19.10.1944	Joseph William Berghouse *(Poultry Farmer)*	Vol 5467 Fol 239
18.08.1949	Harry Pavell *(Farmer)* Marion Edna Drew *(Married Woman)*	Vol 5467 Fol 239
23.11.1950	Giuseppe De Pietra *(Wool Buyer)* Rosa De Pietra *(Married Woman)*	Vol 5467 Fol 239
19.01.1962	G & R De Pietra Pty Limited	Vol 5467 Fol 239
04.05.1966	State Planning Authority of New South Wales	Vol 6236 Fol 61
09.05.1967	# Macquarie University	A/C 8665-1

 # Current Registered Proprietor

email: grolly1@bigpond.net.au



638
637
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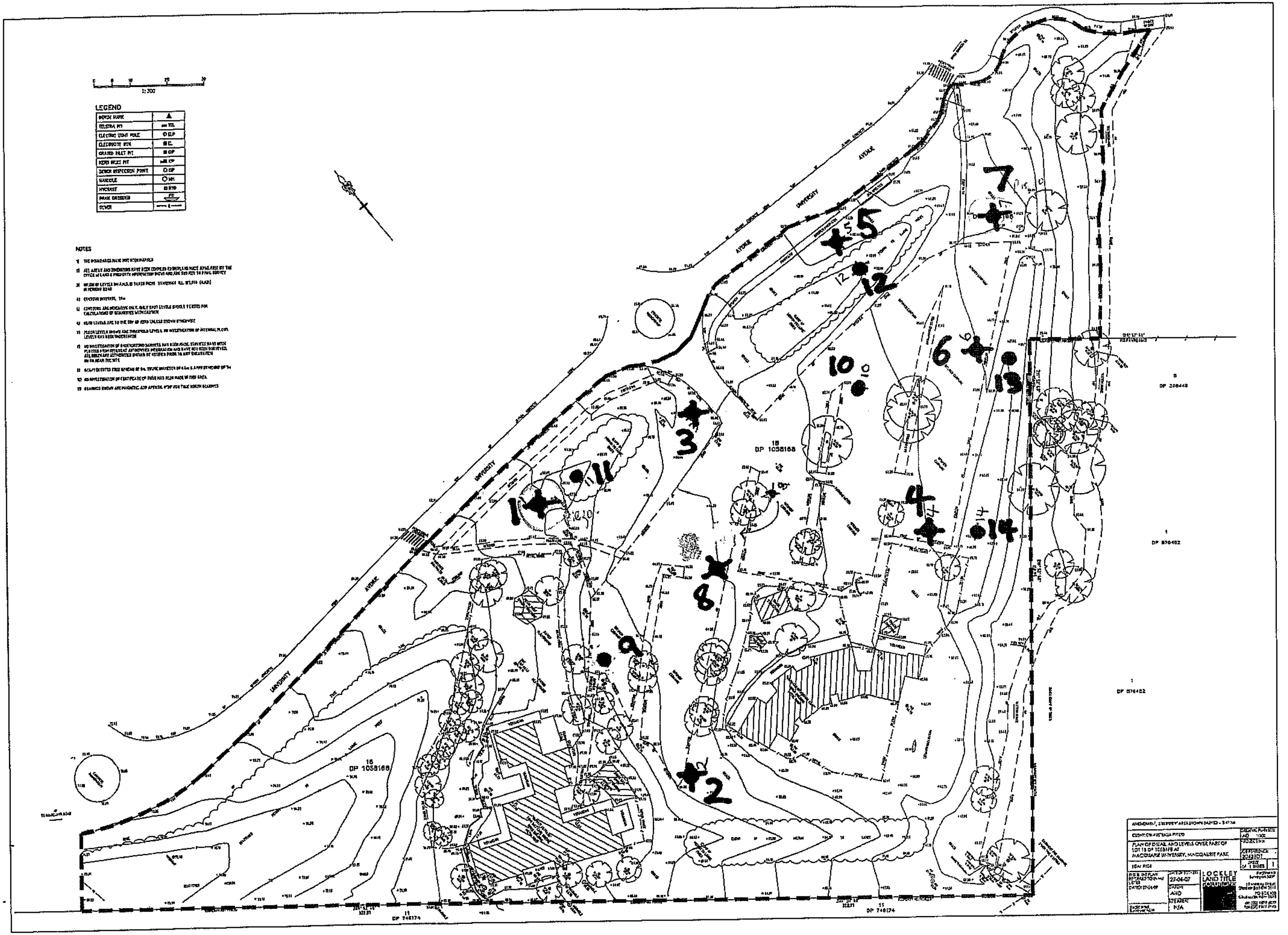
UNIVERSITY
APPROXIMATE
A46405 (H)
CLAVA (O) ROAD
EPPING ROAD
WARING
SP 9264
1015626
125·8HA
748
876482
368446
570965
(A)
(B)
(C)
(D)
(E)
(F)


LEGEND
NOTES
1:300
UNIVERSITY AVENUE
18
DP 1058168
DP 748174
DP 870482
DP 208448
1
2
3
4
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10
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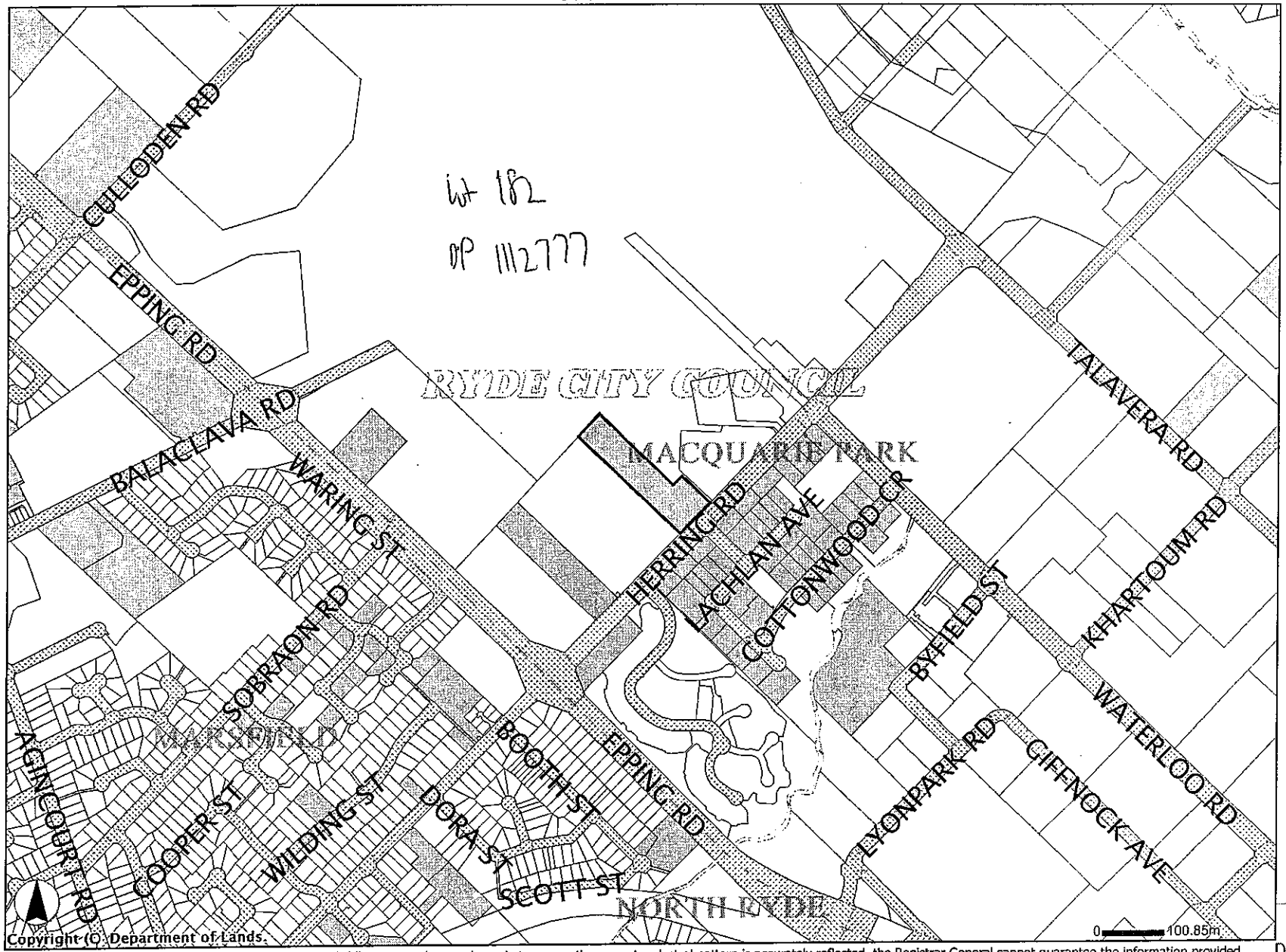
12
13
14
PLAN OF DETAIL AND LEVELS OVER PART OF
MACQUARIE UNIVERSITY, MACQUARIE PARK
27-06-07
AHD
N/A
LOCKLEY
LAND TITLE

Printed : Tuesday, 18 December 2007 12:23:51 PM by planroom3

Cadastral Records Viewer Print



Current Feature
Lot B DP368446
Locality: MACQUARIE PARK
LGA: RYDE
Parish: HUNTERS HILL
County: CUMBERLAND

LEGEND

Parcels [Selected Features]

- Current Feature
- Other Selected Features
- Localities
- LGAs
- Rail Corridor
- Waterway Corridor

Waterways

- Unidentified Parcels

Parcels

- Standard Lot
- Standard Part Lot
- Strata
- Stratum

Road Corridor

Roads

Department of Lands

PLAN FORM 2

Plan Drawing only to appear in this space

* OFFICE USE ONLY

SIGNATURES, AND SEALS ONLY

EXECUTED FOR AND ON BEHALF OF MACQUARIE UNIVERSITY UNDER POWER OF ATTORNEY DATED 3 MAY 2001 (REGISTERED BOOK 4309 No. 693) AS AMENDED BY A POWER OF ATTORNEY DATED 4 JULY 2005 (REGISTERED BOOK 4464 NO. 361) BY:

STEVEN SCHWARTZ + BRIAN SPENCER

WHO CERTIFIES THAT HE/SHE HAS NOT RECEIVED NOTICE OF REVOCATION OF THAT POWER IN THE PRESENCE OF:

[signature]
SIGNATURE OF ATTORNEY

Steven Schwartz Vice Chancellor
NAME OF ATTORNEY

[signature]
SIGNATURE OF ATTORNEY

BRIAN SPENCER Registrar and Vice-Principal
NAME OF ATTORNEY

[signature]
SIGNATURE OF WITNESS

HEATHER KING
NAME OF WITNESS

Department of Land and Water Conservation Approval

I .... in approving this plan certify (Authorised Officer) that all necessary approvals in regard to the allocation of the landshown hereon have been given.

Signature: ....

Date: ....

File Number: ....

Office: ....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed Subdivision .... set out herein
*(insert 'subdivision' or 'new road')

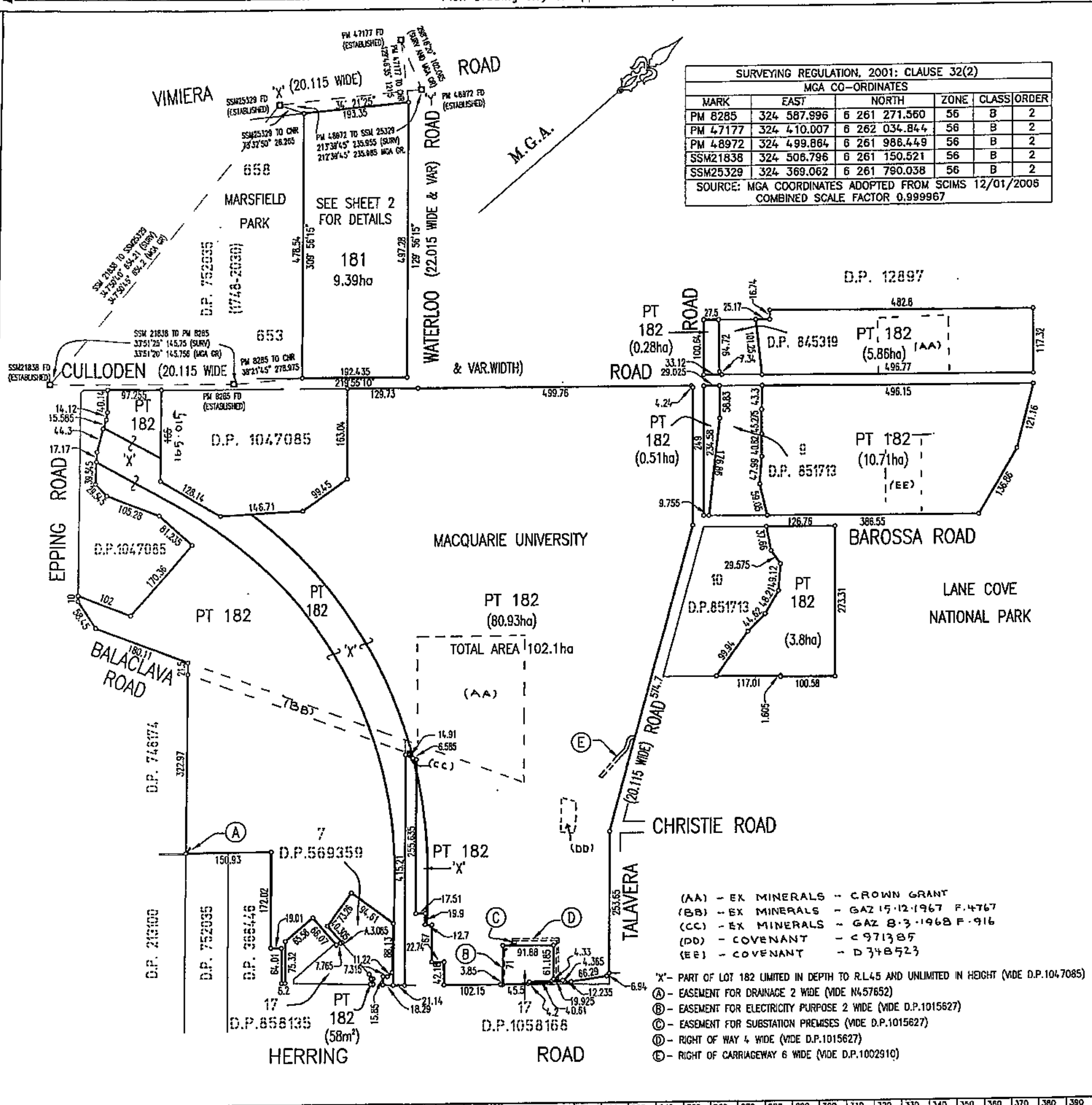
*the subdivision is for lease purposes in accordance with s.23H of the Conveyancing Act 1919

[signature] K. Meale
* Authorised Person/~~General Manager/Accredited Certifier~~
Consent Authority: Ryde City Council
Date of endorsement: 20.11.2006
Accreditation no: ....
Subdivision Certificate no: 5142
File no: LDA 05/850

Note:
When the plan is to be lodged electronically in the Land Titles Office, it should include a signature in an electronic or digital format approved by the Registrar-General.

* Delete whichever is inapplicable.

SURVEYOR'S REFERENCE: 050616 SUB



SURVEYING REGULATION, 2001: CLAUSE 32(2)					
	MGA CO-ORDINATES				
MARK	EAST	NORTH	ZONE	CLASS	ORDER
PM 8285	324 587.996	6 261 271.560	56	B	2
PM 47177	324 410.007	6 262 034.844	56	B	2
PM 48972	324 499.864	6 261 986.449	56	B	2
SSM21838	324 506.796	6 261 150.521	56	B	2
SSM25329	324 369.062	6 261 790.038	56	B	2
SOURCE: MGA COORDINATES ADOPTED FROM SCIMS 12/01/2005 COMBINED SCALE FACTOR 0.999967					

(AA) - EX MINERALS - CROWN GRANT
(BB) - EX MINERALS - GAZ 15·12·1967 F.4767
(CC) - EX MINERALS - GAZ 8·3·1968 F·916
(DD) - COVENANT - C971385
(EE) - COVENANT - D348523

'X' - PART OF LOT 182 LIMITED IN DEPTH TO R.L.45 AND UNLIMITED IN HEIGHT (VIDE D.P.1047085)
(A) - EASEMENT FOR DRAINAGE 2 WIDE (VIDE N457652)
(B) - EASEMENT FOR ELECTRICITY PURPOSE 2 WIDE (VIDE D.P.1015627)
(C) - EASEMENT FOR SUBSTATION PREMISES (VIDE D.P.1015627)
(D) - RIGHT OF WAY 4 WIDE (VIDE D.P.1015627)
(E) - RIGHT OF CARRIAGEWAY 6 WIDE (VIDE D.P.1002910)

Table of mm

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

X:\05JOBS\050616-MACQUARIE-PARK\050616_SHEET_01.dwg

DP1112777

Registered: [seal] UW 7·8·2007

C.A: SEE CERTIFICATE

Title System: TORRENS

Purpose: SUBDIVISION

Ref.Map: U0960-44,71,72,73,74

Last Plan:

PLAN OF SUBDIVISION OF LOT 18 D.P.1058168 ~~FOR LEASE PURPOSES.~~

Lengths are in metres. Reduction Ratio 1:6000

LGA: RYDE CITY

Locality: MACQUARIE PARK

Parish: HUNTERS HILL

County: CUMBERLAND

This is sheet 1 of my plan in 2 sheets
(Delete if inapplicable).

SURVEYING REGULATION, 2001
I, IVAN STERLIGOV of DENNY LINKER & Co of Level 5, 17 RANDLE ST, SURRY HILLS 2010 a surveyor registered under the Surveying Act, 2002, certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying Regulation, 2001 and was completed on 12/01/06.
The survey relates to: LOT 181 ONLY

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature: [signature] Dated: 20/11/6
Surveyor registered under the Surveying Act, 2002
Datum Line: 'X' - 'Y'
Type: Urban/~~Rural~~

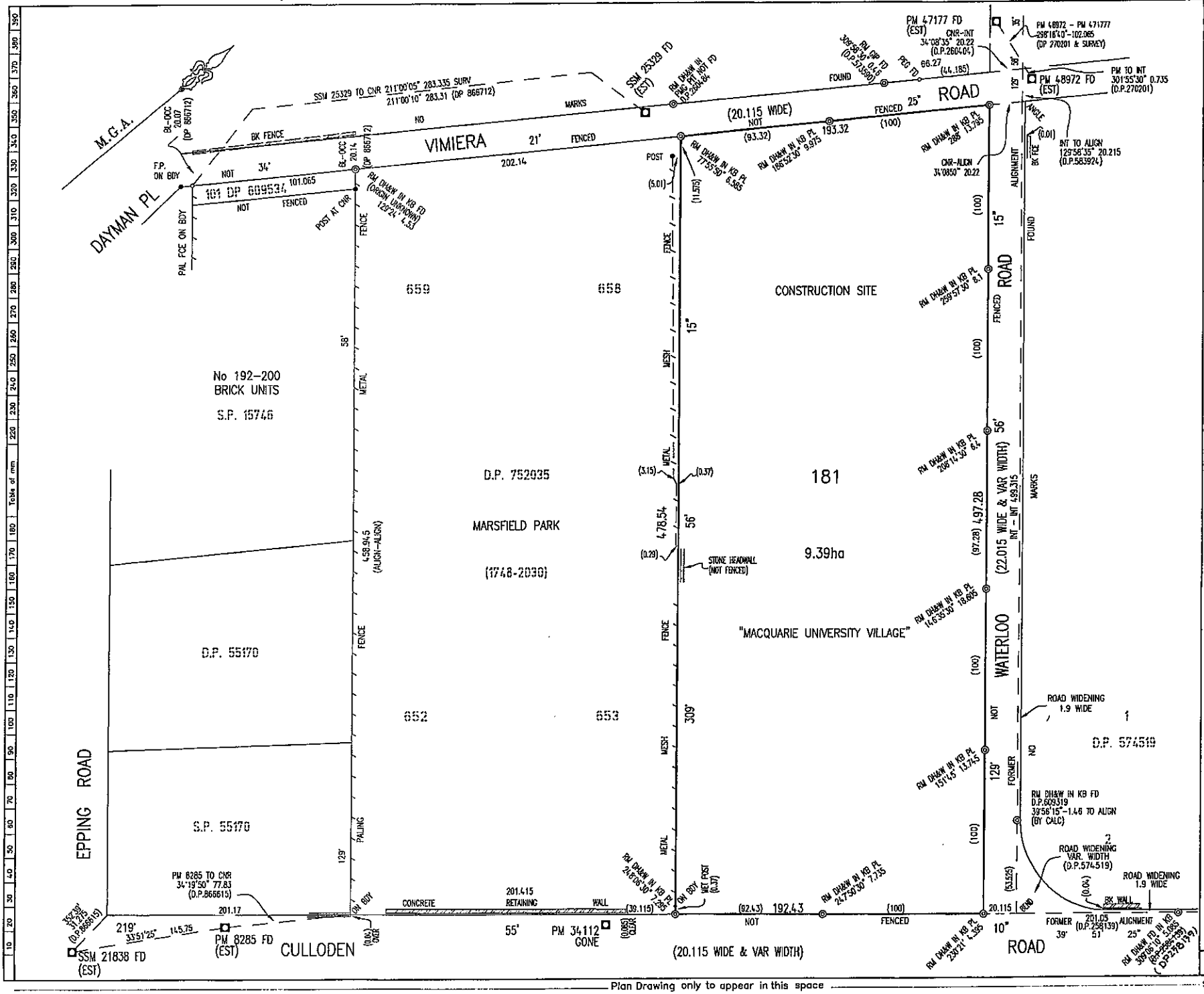
Plans used in preparation of survey/~~compilation~~
D.P. 12897 D.P. 261192 D.P. 382948
D.P. 14226 D.P. 269228 D.P. 501709
D.P. 167360 D.P. 269297 D.P. 530984
D.P. 258139 D.P. 269858 D.P. 573590
D.P. 260404 D.P. 270201 D.P. 574518

CONTINUED ON SHEET 2

PANEL FOR USE ONLY for statements of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants

DISTANCE AMENDED IN LPI AT SURVEYOR'S REQUEST

PLAN FORM 3 | To be used in conjunction with Plan Form 2 | WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION | x:\05JOBS\050616-MACQUARIE-PARK\050616_SHEET_02.dwg | * OFFICE USE ONLY



DP1112777

Registered: 7.8.2007

This is sheet 2 of my plan in 2 sheets dated 20/11/06

Surveyor registered under Surveying Act 2002

This is sheet 2 of the plan of 2 sheets covered by subdivision certificate No. 5642 of 22/12/2006

Authorised Person/~~General Manager~~/~~Accredited Certifier~~

For use where space is insufficient in any panel on Plan Form 2.

Plans used in preparation of survey/compilation

CONTINUED FROM SHEET 1

D.P. 574519	D.P. 1002910
D.P. 575331	D.P. 1015627
D.P. 583924	D.P. 1022219
D.P. 605993	D.P. 1027394
D.P. 608939	D.P. 1047085
D.P. 609319	D.P. 1045836
D.P. 609534	D.P. 1058168
D.P. 611720	S.P. 15746
D.P. 845319	S.P. 16200
D.P. 851713	S.P. 16405
D.P. 858135	S.P. 16433
D.P. 866615	S.P. 16723
D.P. 866712	S.P. 55292
D.P. 879423	1748-2030
D.P. 983631	

Reduction Ratio 1: 1500

Plan Drawing only to appear in this space

SURVEYOR'S REFERENCE: 050616 SUB

Req:R679012 /Doc:DP 1112777 P /Rev:08-Aug-2007 /Sts:SC.OK /Prt:18-Dec-2007 14:55 /Pgs:ALL /Seq:2 of 2
Ref:DOUBLEDAY /Src:B

202

New South Wales

[CERTIFICATE OF TITLE]

Primary Appn No.
Reference to Last Title
Vol. 1187 Fol. 72
Charting Map - Ryde Sheet 45.

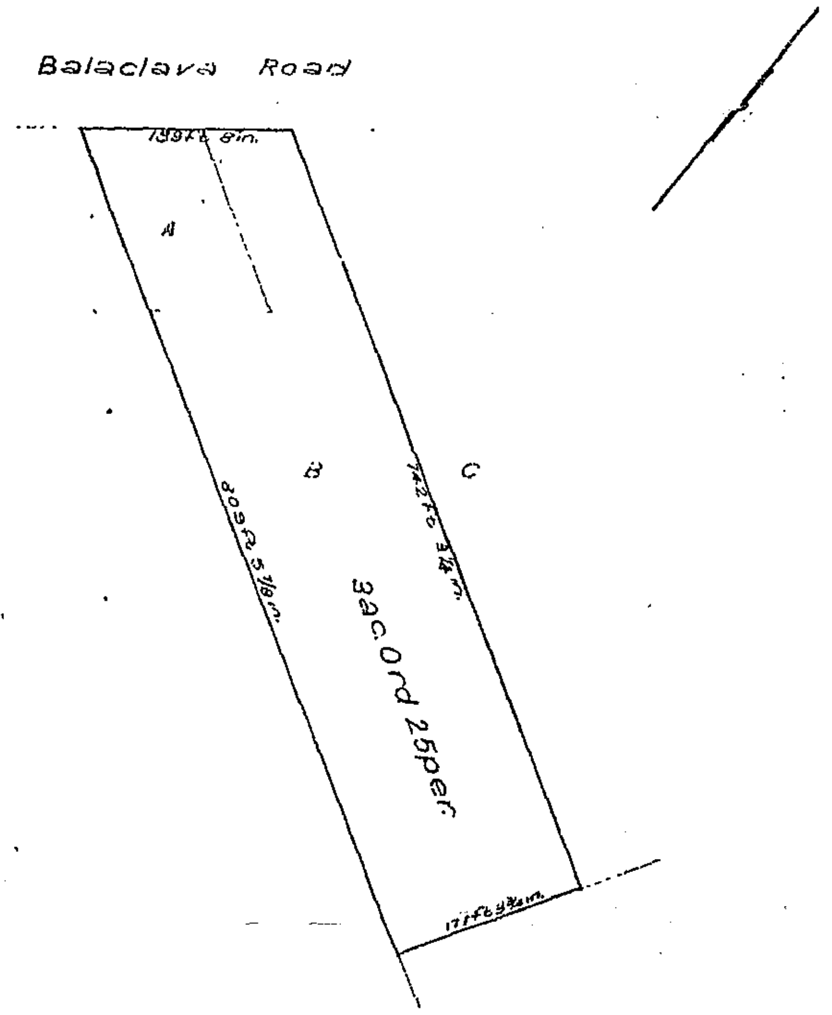
REGISTER BOOK
VOL. 8371 FOL. 237
CANCELLED W
EH Issued on Order No. J33660

REYNOLD RAINBOW, of Eastwood, Retired, is now the proprietor of an Estate in Fee Simple, subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances liens, and interests as are notified hereon, in That piece of land in the Municipality of Ryde Parish of Hunters Hill and County of Cumberland shown in the plan hereon being Lots A and B in plan lodged with Transfer No. F290810 and being part of Portion 629 granted on 7th February 1896 by Crown Grant Volume 1187 Folio 72.

In witness whereof I have hereunto signed my name and affixed my Seal, this Eighteenth day of June, 19 62.

Signed in the presence of S. Davenport

Registrar-General.



Scale: 150 feet to one inch

CAVEAT No J33159 has been withdrawn.
See J411461 Entered 16th August 1963.

REGISTRAR GENERAL

Joris Elizabeth Rainbow of Eastwood, Spinster is
now the registered proprietor of the land within described.
See Section 94 Application No. J367498
Entered 11th August 1963

REGISTRAR GENERAL.

No. K29865 NOTICE OF RESUMPTION. The State Planning Authority of New South Wales is the proprietor of the land within described (including mines and deposits as provided by section 141 of the Public Works Act, 1912) freed from all other interests.
Entered 4th May, 1966

Registrar General

J33660

NOTIFICATION REFERRED TO.
No J33654 Caveat Prohibited 11th April 1962
Entered 17th July 1962

Registrar General

Persons are cautioned against altering or adding to this Certificate or any notification thereon.

K62311

THE MACQUARIE UNIVERSITY is now the registered proprietor of the land within described ~~(excluding the land in Resumption No. ...)~~
See TRANSFER No. K 660742 dated 26th July 1965
Entered 9th May 1967.

[signature]
REGISTRAR GENERAL

This deed is cancelled as to *whole*
New Certificates of Title have issued on *6-8-1969*
for lot in *Deposited* Plan No. *530984* as follows:
Lot *1* Vol. *11110* Fol. *123* ~~respectively.~~

[signature]
REGISTRAR GENERAL

DP530984

CERTIFICATE OF TITLE

NEW SOUTH WALES

PROPERTY ACT, 1900

Appln. No.46405 (part)

Vol. 11110 Fol. 123

For Crown Grants and Prior Titles see Schedules.

EDITION ISSUED

6 7 1978

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Registrar General

CANCELLED

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 1 in Deposited Plan 530984 at North Ryde in the Municipality of Ryde Parish of Hunters Hill and County of Cumberland being land for which no Crown Grant has issued and also the lands granted by Crown Grants set out in the Schedule hereunder. EXCEPTING THEREOUT the minerals reserved by the Crown Grants of Portions 656, 670, 671, 752 and 753 and the minerals excepted by notifications in Government Gazettes dated 15-12-1967 Folio 4767 and 8-3-1968 Folio 916 as regards parts.

SCHEDULE OF PRIOR TITLES

Vol.1187 Fol.246	Vol.3774 Fol.226	Vol.5212 Fol.201	Vol.5881 Fol. 31	Vol.6511 Fol.190	Vol.8305 Fol. 69
Vol.1222 Fol. 42	Vol.3881 Fol. 43	Vol.5311 Fol. 49	Vol.5881 Fol. 32	Vol.6583 Fol.158	Vol.8305 Fol. 70
Vol.1231 Fol. 2	Vol.3967 Fol.250	Vol.5360 Fol. 60	Vol.5906 Fol.197	Vol.6771 Fol.215	Vol.8371 Fol.237
Vol.1234 Fol. 65	Vol.3994 Fol.141	Vol.5467 Fol.239	Vol.5938 Fol. 12	Vol.7298 Fol.189	Vol.8410 Fol.124
Vol.1240 Fol.136	Vol.4004 Fol.109	Vol.5469 Fol. 99	Vol.5938 Fol. 13	Vol.7298 Fol.190	Vol.8443 Fol.237
Vol.1240 Fol.213	Vol.4031 Fol.220	Vol.5486 Fol.250	Vol.6139 Fol. 12	Vol.7298 Fol.191	Vol.9040 Fol. 34
Vol.1342 Fol.166	Vol.4079 Fol.218	Vol.5494 Fol. 32	Vol.6154 Fol.184	Vol.7326 Fol.233	Vol.9040 Fol. 35
Vol.1375 Fol. 14	Vol.4108 Fol. 97	Vol.5562 Fol.231	Vol.6154 Fol.185	Vol.7326 Fol.234	Vol.9635 Fol. 83
Vol.2339 Fol. 79	Vol.4121 Fol.113	Vol.5582 Fol. 22	Vol.6187 Fol.242	Vol.7351 Fol.226	Vol.9983 Fol. 40 (part)
Vol.2339 Fol.153	Vol.4255 Fol. 41	Vol.5582 Fol. 23	Vol.6236 Fol. 61	Vol.7351 Fol.227	Vol.10586 Fol.249
Vol.2585 Fol.166	Vol.4396 Fol.132	Vol.5607 Fol. 54	Vol.6260 Fol.161	Vol.7801 Fol.192	Vol.10586 Fol.250
Vol.3172 Fol. 31	Vol.4426 Fol. 52	Vol.5632 Fol.208	Vol.6331 Fol. 63	Vol.7801 Fol.193	Vol.10609 Fol.104
Vol.3562 Fol.187	Vol.4580 Fol.248	Vol.5632 Fol.209	Vol.6331 Fol. 84	Vol.7898 Fol.124	Vol.10621 Fol. 45
Vol.3583 Fol. 79	Vol.4707 Fol.198	Vol.5710 Fol. 33	Vol.6400 Fol.163	Vol.7898 Fol.125	
Vol.3712 Fol.129	Vol.4788 Fol. 15	Vol.5710 Fol. 34	Vol.6472 Fol. 34	Vol.8269 Fol. 99	
Vol.3712 Fol.130	Vol.4812 Fol.167	Vol.5809 Fol.198	Vol.6480 Fol.232	Vol.8269 Fol.100	
Vol.3774 Fol.225	Vol.5184 Fol.122	Vol.5869 Fol.156	Vol.6480 Fol.233	Vol.8298 Fol. 32	

SCHEDULE OF GRANTS

Number of Portion	Grant Reference Volume	Folio	Number of Portion	Grant Reference Volume	Folio
662	1085	25	638	1234	65
643	1095	67	630	1240	45
636	1099	8	668	1240	136
642	1119	234	673	1240	213
646	1143	207	707 ,708 & 711	1243	234
665	1149	107	628	1248	8
637	1157	245	667	1248	11
663	1182	6	672 & 675 to 680 incl.	1248	12
Pt 635	1182	53	626,627 & Pt 625	1248	153
631	1182	107	681 & 682	1251	145
629	1187	72	655	1260	214
683	1187	246	Pt 666	1263	57
664	1191	41	657	1290	39
645	1195	249	656	1342	166
641	1202	31	714,715 & Pt 716,717	1363	132
669	1222	42	719 to 724 incl. & 726		
674	1228	30	Pt 706	1365	214
644	1231	2	654	1375	14
640	1231	89	670,671,752 & 753	9983	40
639	1234	58			

FIRST SCHEDULE

THE MACQUARIE UNIVERSITY.

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to, as regards parts.
2. Covenants created by Transfers Nos.C971385 and D348523 as regards parts.
3. M688527 Lease being Lot 1 in Deposited Plan 551195 to The Presbyterian Church (New South Wales) Property Trust. Date of expiry 18-3-2069.
4. Easement for Drainage created by Transfer No.N457652 (as more fully set out in the said instrument) affecting that part of the land within described shown as "Proposed Drainage Easement 2 Metres Wide" in plan annexed to Transfer No.N457652.
5. The interest of the Council of the Municipality of Ryde in the addition to existing road shown on Deposited Plan 576295.
6. P573153 Lease of Lot 7 in Deposited Plan 569359 to Church of England Property Trust Diocese of Sydney. Date of expiry 30-6-2073.
7. Q473372 Lease of part being Lots 1 and 2 in Deposited Plan 20189 to Mobil Oil Australia Limited. Date of Expiry 31-3-1982.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.