



Douglas Partners

Geotechnics • Environment • Groundwater

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**REPORT
ON
TARGETED PHASE 2 CONTAMINATION ASSESSMENT**

**PROPOSED AUSTRALIAN HEARING HUB
CNR OF UNIVERSITY AVENUE & MACQUARIE DRIVE
MACQUARIE PARK**

**Prepared for
MACQUARIE UNIVERSITY**

**Project 71683.01
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Douglas Partners Pty Ltd
ABN 75 053 980 117

96 Hermitage Road
West Ryde NSW 2114
Australia

PO Box 472
West Ryde NSW 1685

Phone (02) 9809 0666
Fax (02) 9809 4095
sydney@douglaspartners.com.au



EXECUTIVE SUMMARY

This report presents the results of a Targeted Phase 2 Contamination Assessment undertaken for the proposed Australian Hearing Hub (AHH) within the Macquarie University campus, located at the corner of University Avenue and Macquarie Drive, Macquarie Park. The investigation was commissioned by Coffey Projects (Australia) Pty Ltd on behalf of Macquarie University, the client.

The objective of the investigation is to assess the suitability of the site for the proposed Australian Hearing Hub development from a contamination perspective which is required for DA purposes. It is understood that a condition requirement for DA is the submission of a Targeted Phase 2 Contamination Assessment, which is not a full Phase 2 that complies with the EPA's minimum sampling density. The objective of a Targeted Phase 2 Assessment is to target the Areas of Environmental Concern (AEC). The scope of work for the current assessment comprised a site walkover inspection, review of site history, to conduct intrusive soil and groundwater sampling with a view to obtaining data pertaining to the contamination status of the site, and to provide a preliminary assessment of the material to be excavated for waste classification purposes. DP also undertook a geotechnical investigation concurrently with this assessment. Results of the investigation are reported separately under Project Number 71683.

It is understood that the AHH development will include the construction of a new six storey research/commercial building with two levels of basement car parks. The basement floor level varies from RL65.5 to RL66.5 m and will require excavation to depths of approximately 6 m to 8 m. The western end of the basement extends into locally elevated ground and will require excavation to depths of approximately 9.5 m. The site covers part of Lot 114 in Deposited Plan 1129623 and has an area of 7,203.7 m².

The main potential of soil contaminants on the subject site are likely to be associated with the former orchard and market garden uses which includes the "surficial application" of pesticides and petroleum hydrocarbons associated with the storage of fuels for the use of plant and equipment. However, the disturbance of the site and the time since market gardens were present is likely to have reduced any potential impact.

The demolition of the former structures (houses, sheds) also has the potential to have impacted the site. As the majority of the site is covered by asphalt-paved car parks, petroleum hydrocarbons from motor vehicles and PAHs from asphalt are also considered to be potential sources of contamination. In addition the use of filling from unknown sources for the low landscaped mounds around car parks W1 and W2 and the grassed section on the opposite side of Western Road from car park W1 may also be potentially contaminated depending on the source of the fill.

Sample locations for the contamination assessment were selected to cover the area that will be subject to the construction works, to target areas most likely to be impacted from contamination (i.e. the filled area at the western point of the site and in the areas of the former structures, as well as addressing the previous land use of market gardens), to provide general site coverage and background information on the subsoil conditions at the site. Soil samples were collected at broadly regular intervals or upon signs of potential contamination. 10% field replicate samples were collected for QA/QC purposes, with the samples considered most likely to be contaminated from each test bore were selected for laboratory analysis. The potential for contamination, with regard to each sample, was assessed based on the sample location within the profile (e.g. surface), source (filling/ natural) and signs of environmental concern (e.g. odours, staining). Three of the bores were converted into groundwater wells, for a preliminary assessment of groundwater conditions, if encountered.

A review of historical information indicated that the site was previously in a rural/agricultural area. Prior to the establishment of Macquarie University in 1965 the site was used for agricultural purposes possibly including orchard, market gardens and poultry farming since at least 1929. Since the establishment of Macquarie University all structures related to the market gardens, farm sheds and orchards have been removed. The majority of the site is currently occupied by two and three-storey car parks, namely, W1 and W2. Landscaped garden beds and lawns are located around the car parks, and there is a landscaped mound with a stand of trees opposite car park W1 on the other side of Western Road, which makes up the western portion of the subject site. The current site and surrounding land uses are not considered to be significant in terms of the potential to adversely impact the site; however, there is the potential of contamination associated to the asphalt paving for the car parks, fuel and oil leaks from motor vehicles, the past land use of market gardens and the placement of fill during site development.

The analytical results for the soil samples submitted to the laboratory for analysis show that the concentrations of BTEX, TPH C₆-C₉, PAH, OCP, PCB and phenols in soil samples analysed were well within the health-based SAC for commercial/ industrial land use and also below the laboratory's detection limits for reporting, with generally low heavy metal concentrations all within their respective HILs and generally within the typical background ranges for soil. Although nickel levels in sample BH3/0.12-0.2 and arsenic levels in sample BH3/0.2-0.5 were above PPIL values, they were well within the HIL criteria. Exceedances in PPIL values may affect the growth of plants and vegetation; however, PPIL have not been included as part of the assessment criteria for this site.

Four samples within the subject site, BH12/0.4-0.5, BH13/0.2-0.3, BH14/0.1-0.2 and BH15/0.3-0.4 recorded TPH C₁₀-C₃₆ concentrations at levels above the adopted SAC. In reviewing the chromatograms for these samples which were provided by Envirolab, they appear to resemble the fingerprint of asphalt (with no coal tar). These samples were taken from locations within the asphalt-paved car parks of W1 and W2. Concentrations detected in sample BH15/0.3-0.4 classify the sample location as a hotspot, which would normally require further delineation of the area affected by the contamination and subsequent remove the hotspot. However, as it is understood that the area in which BH15 is located (within car park W2), is to be excavated to a maximum depth of 6 m, the material classified as a hotspot will be removed as part of the excavations. TPH C₁₅-C₃₆ were also detected in samples BH2/0.1-0.3 (bore hole within subject site) and BH8/0-0.2 (outside of subject site boundary); however, the levels found in these two samples were within the adopted SAC.

Although asbestos was not observed during fieldwork or detected by laboratory analysis, the presence of asbestos in fill material is equivocal, as in the case of any site, therefore, precaution should be taken if asbestos-containing materials are uncovered during excavation and site development. If encountered, management and disposal of asbestos material conducted by an AS A licensed contractor is to be undertaken.

A groundwater assessment was carried out, with samples from BH1 and BH3 (from outside the site boundaries) forwarded to Envirolab, a NATA accredited laboratory, for chemical analysis. Laboratory results for arsenic, chromium, lead, mercury, TPH, toluene, benzene, ethyl benzene, xylene, PAH and OCP were below the adopted GIL, with most concentrations less than the practical quantitation limits (PQL). Toluene, however, was detected in low levels in sample ID

GW3 of 3.6 µg/L and arsenic detected at 2 µg/L in sample ID GW1 were detected above the PQL. Cadmium, copper, nickel and zinc were detected at levels over the GIL values in sample GW1, with copper concentrations above the GIL in sample GW3. The detected levels are not considered to be significant as the copper and cadmium exceedances are only marginal. Zinc, nickel and copper are commonly detected at levels above the ANZECC (2000) Guidelines in groundwater, particularly in urban areas in Sydney, and it is likely that the resulting concentrations represent background concentration levels.

A preliminary waste classification was conducted based on the samples collected for the Phase 2 Contamination Assessment. On the basis of the total and leachable (TCLP) concentrations obtained, the filling material is provisionally classified as General Solid Waste. It should be noted that the waste classification is based on a limited number of samples and is thus preliminary in nature only. It is recommended that a full waste classification assessment be undertaken at the time of stockpiling the excavated material from the subject site. It may be possible to classify the shale bedrock from the excavation as virgin excavated natural material (VENM). The fill soil may be able to be classified as excavated natural material (ENM) under the ENM Exemption, 2008; however, it is to be noted that the ENM criteria are stringent such that the potential for the material not meeting the ENM criteria is possible.

Based on the review of the available site history, site observations and laboratory results, DP considers that the site can be made compatible with the proposed commercial development subject to the removal of the filling material from underneath the asphalt-paved car park that has recorded TPH levels above the SAC values for commercial land use. In light of the understanding that this material will be part of the excavated area from within the subject site, it is considered that the site is compatible with the proposed commercial development once the contaminated material has been appropriately removed.

Glossary of Terms

As	arsenic
Bgl	below ground level
B(a)P	benzo(a)pyrene (a polycyclic aromatic hydrocarbon compound)
BTEX	benzene, toluene, ethyl benzene, total xylenes (monocyclic aromatic hydrocarbons)
Cd	cadmium
Cr	chromium (total)
Cr(III)	chromium with oxidation state III (stable in normal environments)
Cr(VI)	chromium with oxidation state VI (typically not stable in normal environments)
Cu	copper
C ₆ –C ₉	light hydrocarbon chain groups
C ₁₀ –C ₁₄	medium hydrocarbon chain groups
C ₁₅ –C ₂₈	heavy hydrocarbon chain groups
C ₂₉ –C ₃₆	heavy hydrocarbon chain groups
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DIPNR	Department of Infrastructure, Planning and Natural Resources
DNR	Department of Natural Resources
DWE	Department of Water and Energy
DP	Douglas Partners Pty Ltd
EPA	Environment Protection Authority
GW	groundwater
ha	hectares
HIL	NSW EPA Contaminated Sites: <i>Guidelines for the NSW Site Auditors Scheme, 2nd Edition 2006</i> . Health-based investigation levels (Columns 1 to 4)
Hg	mercury
m	metres
mg/kg	milligrams per kilogram (or parts per million)
NATA	National Association of Testing Authorities
Ni	nickel
NSW	New South Wales

OCP	organochlorine pesticides
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyls
PID	photo ionisation detector
TPH	total petroleum hydrocarbons
VOC	Volatile Chlorinated Hydrocarbons
Zn	zinc

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PROPOSED AUSTRALIAN HEARING HUB
CNR UNIVERSITY AVENUE AND MACQUARIE DRIVE, MACQUARIE PARK

1. INTRODUCTION

This report presents the results of a Targeted Phase 2 Contamination Assessment undertaken for the proposed Australian Hearing Hub (AHH) within the Macquarie University campus, located at the corner of University Avenue and Macquarie Drive, Macquarie Park. The investigation was commissioned by Coffey Projects (Australia) Pty Ltd on behalf of Macquarie University, the client.

The objective of the investigation is to assess the suitability of the site for the proposed Australian Hearing Hub development from a contamination perspective which is required for DA purposes. It is understood that a condition requirement for DA is the submission of a Targeted Phase 2 Contamination Assessment, which is not a full Phase 2 that complies with the EPA's minimum sampling density. The objective of a Targeted Phase 2 Assessment is to target the Areas of Environmental Concern (AEC).

It is understood that the AHH development will include the construction of a new six storey research/commercial building with two levels of basement car parks. The basement floor level varies from RL65.5 to RL66.5 m and will require excavation to depths of approximately 6 m to 8 m. The western end of the basement extends into locally elevated ground and will require excavation to depths of approximately 9.5 m.

The site covers part of Lot 114 in Deposited Plan 1129623 and has an area of 7,203.7 m². The objective of this assessment was to review the site history to identify past land uses that may

indicate contaminating activities with the potential to impact the site. This was supplemented with intrusive sampling and an analytical programme in order to support the conclusions drawn in respect to the site's contamination status and its suitability for the proposed development.

DP also undertook a geotechnical investigation concurrently with this assessment. Results of the investigation are reported separately under Project Number 71683.

2. SCOPE OF WORK

Douglas Partners undertook the following principal tasks as part of this assessment:

- Identification of the properties - street address and real property description(s);
- Search of the current and historic titles and Deposited Plans to identify previous owners that may indicate potentially contaminating activities;
- Search of the historical aerial photos to identify land uses and changes in the land that may indicate a potential for contamination;
- Review of Section 149(2) planning certificates;
- Review of geology, soil types, topography and hydrogeology;
- A site reconnaissance to identify areas of environmental concern (e.g. identification of present and past land uses, likely locations of filling material, storage of chemicals, discoloured soils, affected vegetation, proximity to surface waters/groundwater, etc.);
- Clearing of bore hole locations for services and pipes based on a site inspection, dial-before-you-dig information and an electro-magnetic sweep by an accredited services locator;
- Collect samples from 16 test bore locations to depths of at least 0.5 m into natural soils with the assistance of a bobcat mounted drill rig. The locations of the test bores were pre-determined by the client. Collect samples for analysis at regular intervals and from horizons where signs of contamination were observed;
- Install three groundwater wells to at least 3 m below the rock surface and collect samples from the three wells for analysis for a range of common contaminants;

- Screen all collected soil samples with a photoionisation detector (PID) to assess the presence of volatile organic compounds (VOC);
- Conduct laboratory analysis on fifteen selected soil samples (plus one QA/QC sample) at a NATA accredited analytical laboratory for a combination of the following potential contaminants:
 - 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);
 - Organochlorine Pesticides (OCP);
 - Phenols; and
 - Asbestos.

Analyse the following additional samples for QA/QC purposes:

- 1 intra-laboratory soil replicates (heavy metals and PAH).
- Conduct Toxicity Characteristic Leaching Procedure (TCLP) tests on four selected samples for heavy metals and PAH for preliminary waste classification purposes;
- Store remaining soil samples not analysed for a period of one month pending the need for further analysis; and
- Preparation of this Targeted Phase 2 Contamination Assessment Report detailing the methodology and results of the assessment, comment on the suitability of the site for the proposed development and provide recommendations for further actions, as required. This report also provides a preliminary waste classification of the materials encountered.

3. REVIEW OF SITE INFORMATION

3.1 Proposed Development

It is understood that the proposed development will include the construction of a six storey building with two levels of basement carpark for approximately 300 vehicles. It is anticipated that the maximum depth of excavation will be approximately 6 – 8 m below ground level. The building will be used as an educational facility (medical research and development facility) with additional commercial and retail uses.

3.2 Real Property Details

At the time of this assessment the site was identified as part of Lot 114 in Deposited Plan 1129623 in the Parish of Hunters Hill, County of Cumberland and the local government area of Ryde City Council.

The site is located on the corner of University Avenue and Macquarie Drive within Macquarie University, Macquarie Park. It is bound by University Avenue to the south and west, Macquarie Drive to the north and by an adjoining car park to the east (refer to Drawing 1, Appendix A). It covers an area of approximately 7,200 m².

3.3 Section 149 (2) Certificate

Section 149 (2) Planning Certificate was original obtained from the City of Ryde for DP's investigation on a nearby site within Macquarie University (*Report on Phase 1 Contamination Assessment with Limited Sampling, Proposed Student Housing, Cnr of Culloden and Gymnasium Roads, Macquarie Park, June 2009, Project 71149.01*). The Certificate is included in Appendix B. The Certificate shows the site is zoned "SP2 Infrastructure- University". Under 'Matters arising under the *Contaminated Land Management Act, 1997*' Council advises, as of June 2009, the following:

- The land is not within land declared to be under an “investigation order” or “remediation order” under Part 3 of the Contaminated Land Management Act, as amended;
- The land is not subject to an “investigation order” or “remediation order” within the meaning of the Contaminated Land Management Act, as amended;
- The land is not the subject of a voluntary investigation proposal (or voluntary remediation proposal) that is the subject of the Environmental Protection Authority’s agreement under Section 19 or 26 of the Contaminated Land Management Act;
- Council has not identified that a site audit statement has been received in respect of the land.

The advice from Council in their planning certificate is very unlikely to have changed from 2009 to the present day.

3.4 Land Titles

Land titles were researched by legal researches Peter S. Hopley Pty Ltd, from 1905 to the present day. 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 three parts A – C, as marked on the attached cadastre (see Appendix B). The title deed search results are summarised in Tables 1- 3 below. In establishing the possible use of the site, information has also been drawn from other sources such as aerial photographs.

Table 1 – Land Ownership for Part A

Date of Transfer	Owner's Name	Occupation of Owner	Possible Site Use
20.04.1905	Eliza Knight	Married Woman	Rural (agriculture)
19.01.1911	Charles Alfred Learoyd	Wool Buyer	Rural (agriculture/wool storage)
01.12.1919?	Charles Boggio	Wool Buyer	Rural (agriculture/wool storage)
02.10.1919	John Alfred Thorn John William Robertson	French Polishers	Rural (agriculture)
19.08.1920	John William Robertson	French Polisher	Rural (agriculture)
16.08.1951	Rudolph Albert Karl Krix Ruby Letitia Krix	Retired Married Woman	Rural (agriculture)
10.12.1952	Ruby Letitia Krix	Widow	Rural (agriculture)
14.03.1958	Albert Charles Rudolph Krix Ernest Alfred Norman Krix	Horticulturists	Rural (agriculture/market garden)
20.01.1960	Sydney George Hope Raymond John Sydney Raymond	Poultry Farmers	Rural (poultry farming)
18.06.1963	John Sydney Raymond	Poultry Farmer	Rural (poultry farm)
31.03.1965	The Macquarie University#	Tertiary Education Institution	Grounds of Education Facility

= Current Owner

Table 2 – Land Ownership for Part B

Date of Transfer	Owner's Name	Occupation of Owner	Possible Site Use
20.04.1905	Eliza Knight	Married Woman	Rural (agriculture)
19.01.1911	Charles Alfred Learoyd	Wool Buyer	Rural (agriculture/wool storage)
01.12.1919?	Charles Boggio	Wool Buyer	Rural (agriculture/wool storage)
02.10.1919	John Alfred Thorn John William Robertson	French Polishers	Rural (agriculture)
19.08.1920	John William Robertson	French Polisher	Rural (agriculture)
16.08.1951	Albert Charles Rudolph Krix Ernest Alfred Norman Krix	Horticulturists	Rural (Orchard/Market Garden)
20.01.1960	Sydney George Hope Raymond John Sydney Raymond	Poultry Farmers	Rural (Poultry Farm)
18.06.1963	John Sydney Raymond	Poultry Farmer	Rural (Poultry Farm)
31.03.1965	The Macquarie University #	Tertiary Education Institution	Grounds of Education Facility

= Current Owner

Table 3 – Land Ownership for Part C

Date of Transfer	Owner's Name	Occupation of Owner	Possible Site Use
02.03.1911	Martin Baring Gardiner	Orchardist	Rural (orchard/market garden)
23.11.1912	Annie McBeath	Married Woman	Rural (agriculture)
08.05.1929	Peter Stewart McBeath	Builder	Rural (agriculture)
17.06.1929	Giovanni Lizzio	Orchardist	Rural (orchard/market garden)
04.05.1966?	State Planning Authority of NSW	Government	Unknown
26.07.1965	The Macquarie University#	Tertiary Education Institution	Grounds of Education Facility

= Current Owner

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 1965. The site was then used for educational purposes by State Planning Authority of NSW and Macquarie University until the present. The title deed search results for the site are included in Appendix B.

3.5 Historical Aerial Photographs

Selected historical aerial photographs were reviewed to establish changes to the physical features of the site over the years that photographs were available. These photos are included in Appendix B.

1930 – The site was in an area of orchards and other agricultural land uses, and associated building structures are evident. The north-eastern half of the site, with reference to the historic title deeds, was owned by an orchardist during this time. At least six building structures can be seen in the area with one smaller building located in the south-western corner of the site which, according to the historic title deeds, is within the land owned by a french polisher at the time. Surrounding land was made up of similar agricultural fields, market gardens and farms, with bushland to the south east.

1943 – The subject site does not appear changed from the image taken in 1930, however the small structure that was observed in the south-eastern portion of the site appears to have been removed. The surrounding area was still predominantly being used for market gardens, farms and orchards, although it seems the long rectangular structures to the south west, which were visible in the 1930 image, have mostly been removed.

1951 – No significant change to the landuse of the subject site or the surrounding area was observed in the 1943 photograph.

1961 – There appear to be poultry sheds in the south-western half of the site, with the remainder of the site appearing similar to that observed in the 1951 photograph. During this time, according to the historical title deeds, the site was owned by poultry farmers and an orchardist. More bushland vegetation had been cleared for poultry farming to the south east of the subject

site within the same portion of land, and land clearing activities are also observed to the south west of the site.

1970 - Macquarie University encompasses the site. The market gardens, farm sheds and orchards were removed. Most of the site was covered by a car park in the same location as the present day car park, although they have not been completely constructed at the time of the photograph. The land to the east of the subject site was not yet developed. The area at the western point of the subject site appears to have been cleared. University Avenue is visible on the southern boundary of the site. The surrounding area includes buildings which are part of Macquarie University.

1986 – The subject site resembles the current site, with tree landscaping present within the western point of the subject site and along the car park which covers the majority of the site. The surrounding land to the east had also been converted into an adjoining car park, and further building developments are observed to the north, north-east and south-west. University Avenue and Macquarie Drive are now clearly observed, as the roads surrounding the subject site were clearly paved.

2007 – The subject site appears unchanged to the 1986 image and to current site observations. The car park area is formed and the site landscaped. There was a cleared area to the south west of the site which appears to have been under construction.

4. GEOLOGY, HYDROGEOLOGY AND TOPOGRAPHY

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is located close to the boundary between Hawkesbury Sandstone and Ashfield Shale. The boundary is often marked by a thin (typically less than 6 m) transitional unit known as the Mittagong Formation.

Ashfield Shale typically comprises dark grey to black shale, siltstone and laminite which weathers to a residual clay profile of medium to high plasticity. Hawkesbury Sandstone typically comprises medium to coarse grained quartz sandstone with some shale bands or lenses.

The Mittagong Formation generally comprises quartz sandstone similar to, but finer grained than the underlying Hawkesbury Sandstone, with interbedded siltstone and shale bands and laminations.

The geological mapping was confirmed by the field work which identified shallow residual soils overlying shale, then siltstone and laminite.

A groundwater bore search of the Department of Water and Energy website database (previously held by the Department of Natural Resources) was conducted. Six groundwater bores were located within a 1 km radius of the site. A summary of the uses and recorded water levels are listed in the table below. The Groundwater Works Summary sheets obtained during the search are located in Appendix B.

Table 4 – Groundwater Bore Uses and Water Details

Groundwater Number	Authorised & Intended Use/Property	Standing Water Level	Water Bearing Zones
GW108110	Recreation (Groundwater)/Curzon Hall	7.30 m	0-9 m & 69-72 m
GW016863	Irrigation	-	15.20-17.60 m & 24.90-26.40 m
GW011296	Irrigation	-	58.20 m
GW109696	Monitoring Bore/Macquarie Uni Station Site	-	-
GW109694	Monitoring Bore/Macquarie Uni Station Site	-	-
GW109695	Monitoring Bore/Macquarie Uni Station Site	-	-

The western part of the site (the grassed island mound covered by a group of trees), is the local high point with the ground surface falling to Western Road by approximately 3.5 m. Most of the site is located on a gentle south-easterly sloping gradient, with slightly raised landscaped garden-beds around the car park to a high of approximately 1 m. Ground surface levels within the area of the proposed new buildings generally range from RL 76 m to RL 73 m relative to Australian Height Datum (AHD).

Department of Environment, Climate Change and Water (DECCW) Notices

The NSW DECCW publishes records of contaminated sites under Section 58 of the *Contaminated Land Management (CLM) Act 1997* on a public database accessed via the internet. The Notices relate to the investigation and/or remediation of site contamination considered to be significantly contaminated under the definition in the CLM Act. A search of the DECCW public database revealed that the subject site is not listed.

The NSW DECCW has also made available a public register of licences issued under Section 308 of the *Protection of the Environment Operations (POEO) Act 1997*. A search of the public register did not locate any listing for the subject site.

5. SITE LAYOUT AND DESCRIPTION

The site is an irregular-shaped area of approximately 7,203.7 m² with a northern boundary of Macquarie Drive and southern boundary of University Avenue. The site is located on a gentle, east and south-east facing hill which slopes at approximately 3 degrees. A local high spot/mound is located on the western end of the site and rises to approximately RL76 m relative to Australian Height Datum (AHD), however, the ground surface on the majority of the site typically varies from between RL 74 to RL 72 m.

At the time of the investigation the site was generally occupied by two, three-storey asphalt and concrete car parks (W1 and W2) with surrounding footpaths and grass covered areas. Western Road currently runs through the western end of the site. Batter slopes, approximately 1 m to 2 m high, are located along the eastern and southern sides of the site. The batters generally exposed ripped shale and clay filling over natural clay and weathered shale. Weathered shale was exposed on the mound on the western end of the site and towards the base of the batters along the eastern and southern sides of the site.

The site is bounded by roadways to the north, south and west which are generally set back approximately 10 m to 15 m from the boundary. Undeveloped grassed areas and on-grade carparks are generally located on the property to south and west of the site.

On the property to the east of the site there is a three storey, concrete carpark which is set back approximately 10 m from the common boundary.

To the north of the site, on the northern side of Macquarie Drive, there is a construction site for the Macquarie University Library. Bulk earthworks have been completed and construction of the structure has commenced.

The nearby land uses are the Gumnut Cottage Long Day Care Centre and the Cochlear Construction site both on the opposite side of University Avenue, an open-air asphalt-paved car park in the north-west, the library construction site on the opposite side of Macquarie Drive to the north, and multi-storey car park C1 to the east.

6. POTENTIAL FOR CONTAMINATION

The main potential of soil contaminants on the subject site are likely to be associated with the former orchard and market garden uses which includes the “surficial application” of pesticides and petroleum hydrocarbons associated with the storage of fuels for the use of plant and equipment. However, the disturbance of the site and the time since market gardens were present is likely to have reduced any potential impact.

The demolition of the former structures (houses, sheds) also has the potential to have impacted the site. Given the age of the structures, there is also the possibility that asbestos-cement products (fibro) were present and, depending on the degree of care taken during demolition, fragments of fibro may be present around the former building footprint. Lead impacts due to leaded paint on the painted surfaces could also be present. As the majority of the site is covered by asphalt-paved car parks, petroleum hydrocarbons from motor vehicles and PAHs from asphalt are also considered to be potential sources of contamination. In addition the use of filling from unknown sources for the low landscaped mounds around car parks W1 and W2 and the grassed section on the opposite side of Western Road from car park W1 may also be potentially contaminated depending on the source of the fill.

Based on the foregoing, the contaminants of concern are deemed to include:

- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn),
- TPH,
- BTEX,
- PAH,
- OCP,
- PCB,
- Phenols and
- asbestos.

7. FIELDWORK

7.1 Data Quality Objectives

The data quality objectives (DQO) of the Targeted Phase 2 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; and
- Optimising the Design for Obtaining Data.

The DQO's have been addressed within the report as follows in Table 5.

Table 5 - Data Quality Objectives

Data Quality Objective	Report Section Where Addressed
State the Problem	S1 Introduction
Identify the Decision	S11 Discussions, Recommendations and Conclusions
Identify Inputs to the Decision	S3 Review of Site information S6 Potential For Contamination S8 Sampling Rationale S9 Site Assessment Criteria S10 Results of Investigation
Define the Boundary of the Assessment	S3.2 Real Property Details Site Drawing - Appendix A
Develop a Decision Rule	S9 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S7 Fieldwork QA/QC Procedures and Results - Appendix F
Optimise the Design for Obtaining Data.	S8 Sampling Rationale QA/QC Procedures and Results - Appendix F

Data quality Indicators (DQI) were established as follows in Table 6.

Table 6 – Data Quality Indicators

Objective	Evaluation Procedure
Documentation completeness	Completion of field and laboratory documentation including chain-of-custody, test bore reports, calibration records etc.
Data completeness	Sampling from 50% of the number of sampling locations recommended by the EPA for a 0.7 ha site to provide a targeted Phase 2 Assessment, analysis of appropriate contaminants, soil horizons, QA samples etc
Data comparability	Use of NATA accredited analytical methods, use of a consistent sampling technique, commitment to equipment decontamination, field sample storage techniques etc.
Data representativeness	Sampling from targeted areas and to give general site coverage in order to obtain samples representative of contamination present.
Precision and accuracy for sampling and analysis	Use of NATA accredited analytical methods, achievement of 30-50% RPD for replicate analysis (as appropriate) and achievement of laboratory QC criteria.

7.2 Quality Assurance and Quality Control

7.2.1 Soil Sampling

Environmental sampling was performed according to standard operating procedures outlined in the *DP Field Procedures Manual* and summarised below. Sample handling and transport procedures were conducted as follows:

- Soil samples were collected directly from auger returns by an environmental scientist using disposable gloves;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately with teflon lined lids;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Collection of 10% replicate samples for QA/QC purposes;
- Placement of the sample jars and replicate sample bags into a cooled insulated and sealed container for transport to the laboratory; and
- Chain-of-Custody documentation was maintained at all times and countersigned by the receiving laboratory on the transfer of samples.

Envirolab Services Pty Ltd, a NATA accredited laboratory (accreditation number 2901), was employed to conduct analysis on all samples. The laboratory is required to carry out routine in-house QC procedures.

7.2.2 Piezometer Installation and Groundwater Sampling Methods

Three groundwater monitoring piezometers were installed; at Bore 1, Bore 3 and Bore 8. The bores were extended to depths of 12 m, 12 m and 3.5 m respectively. All groundwater piezometers were installed in test bore locations outside of the proposed building boundary.

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.

No free groundwater was observed during augering of the boreholes (i.e. within depths of 0.6 m to 3.5 m). The water level within the groundwater monitoring wells was measured prior to developing on 12/04/2010 and again prior to sampling on 16/04/2010. Initial measurements found that the monitoring well in BH 1 appeared to be filled with silt below a depth of 10.5 m (RL63.5 m), with the water level at 8.35 m. The depth of water encountered in BH3 on 12/04/21010 was 10.9 m. No groundwater was observed in the piezometer in BH 8 on both occasions.

After installation, the piezometers in Bore 1 and 3 were developed by removing three bore volumes of water (until dry) using disposable bailers. The wells were allowed to recharge and the groundwater samples were collected four days later. Respectively, the water levels on 16/04/2010 were 9.18 m and 11.47 m in BH1 and BH3. Normally, following the development of a well and prior to sampling, the well is micro-purged and field parameters (pH, dissolved oxygen, turbidity, electrical conductivity and temperature) are monitored. However, for the current assessment, there was an insufficient volume of water present for sample collection in both wells if micro-purging was undertaken. Therefore, it was not possible to micro-purge initially to stabilise the field parameters prior to sampling. As a result, collection of the groundwater samples was carried out using disposable bailers. 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. The laboratory analysis results are currently pending and will be reported at a later date once they have become available.

8. SAMPLING RATIONALE

The NSW EPA's publication *Sampling Design Guidelines* (1995) recommends that a minimum of 17 sampling points is required to characterise a site of 0.7 ha. It is understood that a condition requirement for DA is the submission of a Targeted Phase 2 Contamination Assessment, which is not a full Phase 2 that complies with the EPA's minimum sampling density. The objective of a Targeted Phase 2 Assessment is to target the Areas of Environmental Concern (AEC). For the current subject site, the AEC are the former market garden use and fill. This has been addressed in the current assessment by undertaking 50% of the required sampling density to adequately cover the site. Additional sampling locations were placed outside of site boundaries, around the perimeter of the subject site. The adopted approach is considered appropriate for this targeted Phase 2 Contamination Assessment to address DA Consent Condition C8 without the need for additional sampling locations.

Sample locations were selected to cover the area that will be subject to the construction works, to target areas most likely to be impacted from contamination (i.e. the filled area at the western point of the site and in the areas of the former structures, as well as addressing the previous land use of market gardens), to provide general site coverage and background information on the subsoil conditions at the site.

Soil samples were collected at broadly regular intervals or upon signs of potential contamination. 10% field replicate samples were collected for QA/QC purposes.

The samples considered most likely to be contaminated from each test bore were selected for laboratory analysis. The potential for contamination, with regard to each sample, was assessed based on the sample location within the profile (e.g. surface), source (filling/ natural) and signs of environmental concern (e.g. odours, staining).

9. SITE ASSESSMENT CRITERIA

9.1 Soil

The DECCW's standard, health risk based settings are defined in the *Guidelines for Assessing Former Orchards and Market Gardens*, (2005), Table 1 and the *Guidelines for the NSW Site Auditor Scheme*, 2nd edition, 2006, Appendix I. Both guidelines include the following land use scenarios:

- Residential with accessible soil and use of home grown produce. Includes child-care centres, primary schools, pre-schools, town houses and villas;
- Residential with minimal access to soil such as high rise apartments and flats;
- Parks, recreational open space or playing fields and including secondary schools;
- Commercial or industrial use.

In addition, the DECCW also sets provisional phytotoxicity-based investigation levels (PPIL) for the protection of plants in the appropriate setting (residential with gardens, areas outside of the building footprint of apartments and flats and open space).

With regard to the planned development, the above assumptions and the health risk settings, it is considered that the site would generally fall within a health risk setting appropriate to a commercial land use.

Given the above, PPILs are therefore not considered an appropriate part of the assessment criteria and consequently have not been used when assessing the site's suitability. Notwithstanding, where soils do not comply with the PPILs, this should be taken into account in the landscaping plan by either importing good quality soil and covering the site with clean soil to 0.5 m below ground level (which is generally below the root zone) or planting species that are tolerant to the metal of concern.

In the case of petroleum hydrocarbons, where other comprehensive assessment criteria are not available, the threshold concentrations for sensitive land use are used as specified in the NSW EPA publication *Guidelines for Assessing Service Station Sites* (1994).

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) the calculated 95% Upper Confidence Limit average (excluding any 'hotspot' concentrations) of the data set for the contaminant exceeds the SAC; and
- iii) the standard deviation of the results is greater than 50% of the HIL.

The proposed SAC with respect to the identified contaminants are presented in Table 7.

Table 7 – Site Assessment Criteria for Soil/ Filling

Contaminant	Adopted Criteria (SAC)	Guidelines																		
TPH C ₆ – C ₉ C ₁₀ – C ₃₆	65 mg/kg 1000 mg/kg	NSW EPA Contaminated Sites <i>Guidelines for Assessing Service Station Sites</i> (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	<table><tr><td>HIL</td><td>PPIL</td></tr><tr><td>500 mg/kg</td><td>20 mg/kg</td></tr><tr><td>100 mg/kg</td><td>3 mg/kg</td></tr><tr><td>600,000 mg/kg</td><td>400 mg/kg</td></tr><tr><td>5,000 mg/kg</td><td>100 mg/kg</td></tr><tr><td>1,500 mg/kg</td><td>600 mg/kg</td></tr><tr><td>75 mg/kg</td><td>1 mg/kg</td></tr><tr><td>3,000 mg/kg</td><td>60mg/kg</td></tr><tr><td>35,000 mg/kg</td><td>200 mg/kg</td></tr></table>	HIL	PPIL	500 mg/kg	20 mg/kg	100 mg/kg	3 mg/kg	600,000 mg/kg	400 mg/kg	5,000 mg/kg	100 mg/kg	1,500 mg/kg	600 mg/kg	75 mg/kg	1 mg/kg	3,000 mg/kg	60mg/kg	35,000 mg/kg	200 mg/kg	NSW EPA Contaminated Sites <i>Guidelines for the NSW Site Auditor Scheme</i> (2 nd Edition) (2006) Appendix II, Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for commercial or industrial (HIL Column 4 & PPIL Column 5).
HIL	PPIL																			
500 mg/kg	20 mg/kg																			
100 mg/kg	3 mg/kg																			
600,000 mg/kg	400 mg/kg																			
5,000 mg/kg	100 mg/kg																			
1,500 mg/kg	600 mg/kg																			
75 mg/kg	1 mg/kg																			
3,000 mg/kg	60mg/kg																			
35,000 mg/kg	200 mg/kg																			
Total Phenols	42,500 mg/kg																			
PAH Total Benzo(a)Pyrene	100 mg/kg 5 mg/kg																			
OCP aldrin + dieldrin chlordane DDT (including DDD, DDE, DDT) Heptachlor	50 mg/kg 250 mg/kg 1,000 mg/kg 50 mg/kg																			
Asbestos	No visible asbestos present in soil at the surface 0.001% asbestos fibres by weight 0.01% asbestos cement by weight	WA Department of Health <i>Guidelines for the Assessment, Remediation, and Management of Asbestos Contaminated Sites in Western Australia</i> , May 2009																		

9.2 Groundwater

Groundwater investigation levels (GILs) are sourced from the *Australian Water Quality Guidelines* (ANZECC (2000) (Table 8). Where applicable the 95% protection of freshwater species has been applied. The nearest receptors for groundwater are University Creek which is

less than 500 m east of the subject site, and Mars Creek which is less than 500 m north of the site. Both creeks flow north east into the Lane Cove River.

Table 8 – 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 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 Heptachlor	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 DECC (Department of Environment and Climate Change) *Waste Classification Guidelines* 2008, Revision July 2009. The DECC guideline does not specify the sampling density for waste classification.

10. RESULTS OF INVESTIGATION

10.1 Field Observations

Detailed descriptions of the materials encountered at each sampling location are given on the Test Bore Logs presented in Appendix D, together with notes defining classification methods and descriptive terms.

In general, the boreholes indicate that the site is underlain by variable depths of filling predominantly in the elevated southern half of the site and natural soil, overlying weathered shale. The typical sub-surface conditions encountered in the boreholes are summarised as follows:

- **ASPHALT:** Asphalt was encountered in BH12 - BH16 to depths of between 0.05 m to 0.08 m.
- **CONCRETE:** Concrete was encountered in BH3 and BH4 to depths of 0.12 m and 0.1 m respectively.
- **TOPSOIL:** Brown silty sand topsoil with some clay and trace rootlets was encountered in BH9-BH11 from the surface to depths of 0.1 m -0.3 m.
- **FILLING:** filling was encountered in BH2-BH16 to depths of between 0.2 m - 0.9 m. The filling generally included; humid silty clay filling with gravel and rootlets, clay soils with trace gravel and rootlets, as well as humid sandy gravel roadbase filling from boreholes located within the car park (BH12-16).

- **RESIDUAL SOILS:** natural clays were encountered in BH1, BH6-BH8, BH10, BH11, BH15 and BH16 starting from depths of 0.05 m to 0.7 m.
- **WEATHERED BEDROCK:** extremely low to very low strength light grey shale was encountered in all bores starting from between 0.3 m and 2.2 m below ground level.

No signs of gross contamination were observed at any of the sample locations.

10.2 Total Photoionisable Compounds (TOPIC) Results

The replicate soil samples, collected in sealed zip-lock bags, were allowed to equilibrate under ambient temperatures before screening for Total Photoionisable Compounds (TOPIC) using a calibrated photoionisation detector (PID). The PID provides an indication of the presence of volatile organic compounds in the soil.

Results of sample screening are shown in the Test Bore Logs in Appendix D. The PID readings were all low (less than 1 ppm in all screened samples). This, therefore, does not indicate the presence of contamination by volatile organic compounds.

10.3 Analytical Results

10.3.1 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 indicated that contaminant concentrations of BTEX, TPH C₆-C₉, PAH, OCP, PCB and phenols in soil samples analysed were well within the health-based SAC for commercial/ industrial land use and also below the laboratory's detection limits for reporting.

Low levels of PAH and benzo(a)pyrene were detected in samples BH5/0-0.1, BH7/0.1-0.3, BH10/0-0.2, BH12/0.4-0.5 and BH13/0.2-0.3; however, concentrations were found to be within the relevant SAC.

Heavy metal concentrations were generally low and all were well within their respective HILs.

Four samples within the subject site, BH12/0.4-0.5, BH13/0.2-0.3, BH14/0.1-0.2 and BH15/0.3-0.4 recorded TPH C₁₀-C₃₆ concentrations at levels above the adopted SAC. The concentration detected in sample BH15/0.3-0.4 (>250% of the HIL) classifies the sample location as a hotspot. TPH C₁₅-C₃₆ were also detected in samples BH2/0.1-0.3 (borehole within the subject site) and BH8/0-0.2 (outside of subject site boundary); however, the levels found in these two samples were within the adopted SAC.

Eight samples of filling (0.1 - 0.6 m) were analysed for asbestos. Four samples were located within the subject site and four outside of the site boundaries. Asbestos was not detected in any of the tested samples.

The laboratory results for soil analysis are summarised in Table 9, with NATA Laboratory Reports provided in Appendix E.

Table 9 - Results of Soil Analysis (All results in mg/kg unless otherwise stated)

Sample ID (Bore No. / depth(m))	Sampling Date	Heavy Metals								PAH		TPH				Benzene	Toluene	Ethylbenzene	Total Xylene ²	PCB ²	OCp ²	Phenols	Asbestos
		As	Cd	Cr ¹	Cu	Pb	Hg	Ni	Zn	B(a)P	total ²	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆								
Fill Samples From Within Site Boundary																							
BH2/0.1-0.3	1/04/2010	<4	<0.5	5	6	11	<0.1	3	22	<0.05	<PQL	<25	<50	190	290	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH5/0-0.1	29/03/2010	4	<0.5	9	10	38	<0.1	3	36	0.4	2.7	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH10/0-0.2	29/03/2010	8	<0.5	20	20	40	<0.1	2	34	0.2	1.8	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH12/0.4-0.5	6/04/2010	<4	<0.5	18	110	14	<0.1	23	42	0.1	0.7	<25	<50	470	1800	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH13/0.2-0.3	6/04/2010	<4	<0.5	19	69	8	<0.1	29	43	0.05	<PQL	<25	<50	<100	880	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH14/0.1-0.2	6/04/2010	<4	<0.5	45	52	8	<0.1	52	37	<0.05	<PQL	<25	<50	140	1100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH15/0.3-0.4	6/04/2010	<4	<0.5	54	44	15	<0.1	32	33	<0.05	0.4	<25	<50	1100	2400	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH16/0.2-0.3	6/04/2010	11	<0.5	18	22	28	<0.1	6	32	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BD2/010410	1/04/2010	<4	<0.5	6	7	15	<0.1	3	25	<0.05	<PQL	-	-	-	-	-	-	-	-	-	-	-	-
Fill Samples From Outside of Site Boundary																							
BH3/0.12-0.2	08/04/2010	<4	<0.5	19	92	6	<0.1	97	37	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH6/0-0.1	01/04/2010	9	<0.5	25	14	53	<0.1	3	38	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH7/0.1-0.3	31/03/2010	12	<0.5	31	32	48	0.1	10	55	0.3	2.4	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH8/0-0.2	29/03/2010	8	<0.5	18	13	44	<0.1	2	34	<0.05	<PQL	<25	<50	300	330	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH9/0.4-0.6	29/03/2010	10	<0.5	13	22	25	<0.1	2	15	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
Natural Samples From Outside of Site Boundary																							
BH3/0.2-0.5	08/04/2010	25	<0.5	8	12	18	<0.1	3	2	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH7/0.8-1.0	31/03/2010	8	<0.5	21	20	24	<0.1	1	8	<0.05	<PQL	<25	<50	<100	<100	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
Site Assessment Criteria (SAC)																							
HIL ³		500	100	60%	5000	1500	75	3000	35000	5	100	65 ⁶	1000 ⁶			1 ⁶	1.4 ⁶	3.1 ⁶	14 ⁶	50	50/250/1000/50 ⁵	42500	0.01% / 0.001% ⁷
PPIL ⁴		20	3	400	100	600	1	60	200	-	-	-	-			-	-	-	-	-	-	-	-

Notes:

- 1 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
- 2 where analytical results below laboratory practical quantitation limit (PQL) for all compounds, results quoted as <PQL of most compounds
- 3 Health based investigation levels for Commercial or Industrial
- 4 Provisional phytotoxicity based investigation levels
- 5 OCP thresholds given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
- 6 NSW EPA Service Station Guidelines
- 7 0.01% asbestos cement / 0.001% for asbestos fibres (WA Department of Health)
- ND Not detected at reporting limit of 0.1g/kg
- not analysed / not applicable
- PQL Laboratory practical quantitative limit
- BD Samples Replicate samples listed directly under corresponding sample
- BOLD** exceeds HIL
- BOLD** Contamination hotspot
- BOLD** exceeds PPIL

10.3.2 Groundwater

Groundwater sampling was conducted at BH1 and BH3 on 16 April 2010. The groundwater levels measured after the installation of the well and prior to sampling are presented in Table 10. Analytical results are summarised in Table 11, with NATA Laboratory Reports provided in Appendix E.

Table 10 - Groundwater Level Details

Bore Hole	Date	Depth to Ground Water Table (from top of well)(m)	Groundwater RL (m AHD)
BH1	12/04/2010	8.35 (silted up to 10.5 m)	(65.7 prior to developing with bailer)
	16/04/2010	9.18	(64.8 prior to sampling with bailer)
BH3	12/04/2010	10.9	(60.6 prior to developing with bailer)
	16/04/2010	11.47	(60.0 prior to sampling with bailer)
BH8	12/04/2010	(no groundwater)	-
	16/04/2010	(no groundwater)	-

The main purpose of the current Targeted Phase 2 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.

As part of the Targeted Phase 2 Contamination Assessment, three groundwater wells were constructed at BH1, BH3 and BH8. The wells were installed in bore holes outside of the boundaries of the subject site as it was not possible to construct them within the site boundaries due to access constrictions of the multistorey car parks. Groundwater samples was collected from BH1 and BH3 and analysed for a suite of common contaminants.

Table 11 - Laboratory Results of Groundwater Samples

Sample ID	Heavy Metals								PAH ²					TPH		BTEX				OCP ²										Hardness (mg CaCl ₂ /L)
	As	Cd	Cr ¹	Cu	Pb	Hg	Ni	Zn	Napthalene	Anthracene	Phenanthrene	Fluoranthene	Benzo(a)pyrene	C6-C9	C10-C36	Benzene	Toulene	Ethyl-benzene	Total Xylenes	Heptachlor	Aldrin	Dieldrin	DDE	DDT	Endrin	Endosulphan I	Endosulphan II	Methoxychlor		
GW1	2	0.4	<1	4	<1	<0.5	13	65	<1	<1	<1	<1	<1	<10	<250	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	26	
GW3	<1	0.8	<1	9	<1	<0.5	5	29	<1	<1	<1	<1	<1	<10	<250	<1	3.6	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	190	
BD1/160410	2	0.4	<1	17	<1	<0.5	11	50	<1	<1	<1	<1	<1	<10	<250	<1	<1	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	
Groundwater Investigation Levels (GIL) ³																														
Fresh water ⁴	13-24	0.18/1.03	3.3-1*	1.2/6.7	3.4	0.06	9.7/52.8	7.1/38.4	16	0.01*	0.6*	1*	0.1*	-	-	950	180*	80*	625*	0.09	0.001*	0.01*	0.03*	0.01	0.02	0.0002*	0.007*	0.005*	-	
Reference Values ⁶																														
														150	600															

- Notes:
- 1 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
 - 2 only those compounds for which GILs have been determined are included in the list
 - 3 ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (unless otherwise stated)
 - 4 Fresh water trigger values for slightly to moderately disturbed ecosystems - 95% species protection (Includes Hardness Modified Trigger Values for selected metals for GW1/GW3)
 - 6 Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination.
 - * insufficient data for reliable trigger value. Interim working value or low reliability value used for screening purposes
 - not defined/ not analysed/ not applicable
- Bold** exceeds GIL
- BD1/160410 Blind Duplicate of sample GW1

Laboratory results (Table 11) for arsenic, chromium, lead, mercury, TPH, toluene, benzene, ethyl benzene, xylene, PAH and OCP were below the adopted GIL. Most concentrations were less than the practical quantitation limits (PQL); however, toluene in sample ID GW3 (from BH3) of 3.6 µg/L and arsenic detected at 2 µg/L in sample ID GW1 (from BH1) were detected above the PQL. Cadmium was detected in sample GW1 at 0.4 µg/L compared to GIL value of 0.2 µg/L, copper in GW1 at 4 µg/L compared to GIL of 1.2 µg/L and in sample GW3, 9 µg/L compared to the GIL of 6.7 µg/L. Levels of nickel and zinc in sample GW1 were both over their respective GILs of 9.7 µg/L and 7.1 µg/L, with 13 µg/L of nickel and 65 µg/L of zinc found.

10.3.3 Preliminary Waste Classification

Laboratory results were compared to NSW DECC (Department of Environment and Climate Change) *Waste Classification Guidelines* 2008 Revision July 2009. The preliminary classification was generally conducted in accordance with the six step process as set out in the DECC guideline and summarised in Table 12 below.

Table 12 - Six Step Waste Classification

Step	Classification	Rationale
1. Is it special waste?	No	Waste was not observed to contain clinical or tyre waste, or asbestos-cement fragments.
2. Is it liquid waste?	No	Waste composed of soil matrix (i.e. no liquids)
3. Is the waste "pre-classified"?	No	Waste not observed to contain coal tar, batteries, lead paint or dangerous goods containers.
4. Does the waste have hazardous waste characteristics?	No	Waste not observed to/ or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances.
5. Chemical Assessment	Undertaken	Not liquid waste and does not possess hazardous characteristics.
6. Is the waste putrescible?	No	All observed components of material composed of materials pre-classified as non-putrescible (i.e. soil)

On the basis of the total and leachable (TCLP) concentrations obtained from the laboratory analysis, the filling material is provisionally classified as **General Solid Waste**. It should be noted that the waste classification is based on a limited number of samples and is thus preliminary in nature only. Laboratory results for waste classification are summarised in Table 13, with NATA Laboratory Reports provided in Appendix E.

Table 13: Results of Soil Analysis for Preliminary Waste Classification (All results in mg/kg unless otherwise stated)

Sample ID	Heavy Metals									Polycyclic Aromatic Hydrocarbons (PAH)		Total Petroleum Hydrocarbons (TPH)		Monocyclic Aromatic Hydrocarbons (BTEX)				Total Polychlorinated Biphenyls (PCB)	Organochlorine Pesticides (OCP) ⁵	Phenols	Asbestos
	Arsenic	Cadmium	Chromium ⁴	Copper	Lead	Mercury	Nickel		Zinc	Benzo(a)pyrene	PAH	C6-C9	C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylene				
	SCC ¹	SCC	SCC	SCC	SCC	SCC	SCC	TCLP1	SCC	SCC	SCC	SCC	SCC	SCC	SCC	SCC	SCC			SCC	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)			
Fill Samples From Within Site Boundary																					
BH2/0.1-0.3	<4	<0.5	5	6	11	<0.1	3	-	22	<0.05	<PQL	<25	530	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH5/0-0.1	4	<0.5	9	10	38	<0.1	3	-	36	0.4	2.7	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH10/0-0.2	8	<0.5	20	20	40	<0.1	2	-	34	0.2	1.8	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH12/0.4-0.5	<4	<0.5	18	110	14	<0.1	23	-	42	0.1	0.7	<25	2,320	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH13/0.2-0.3	<4	<0.5	19	69	8	<0.1	29	-	43	0.05	<PQL	<25	1,030	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH14/0.1-0.2	<4	<0.5	45	52	8	<0.1	52	0.04	37	<0.05	<PQL	<25	1,290	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH15/0.3-0.4	<4	<0.5	54	44	15	<0.1	32	-	33	<0.05	0.4	<25	3,550	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH16/0.2-0.3	11	<0.5	18	22	28	<0.1	6	-	32	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
Fill Samples From Outside of Site Boundary																					
BH3/0.12-0.2	<4	<0.5	19	92	6	<0.1	97	0.07	37	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH6/0-0.1	9	<0.5	25	14	53	<0.1	3	-	38	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH7/0.1-0.3	12	<0.5	31	32	48	0.1	10	-	55	0.3	2.4	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH8/0-0.2	8	<0.5	18	13	44	<0.1	2	-	34	<0.05	<PQL	<25	680	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
BH9/0.4-0.6	10	<0.5	13	22	25	<0.1	2	-	15	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	ND
Natural Samples From Outside of Site Boundary																					
BH3/0.2-0.5	25	<0.5	8	12	18	<0.1	3	-	2	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
BH7/0.8-1.0	8	<0.5	21	20	24	<0.1	1	-	8	<0.05	<PQL	<25	250	<0.5	<0.5	<1	<PQL	<PQL	<PQL	<PQL	-
Maximum values of Specific Contaminant Concentration for classification without TCLP ³																					
General Solid Waste (CT1) (mg/kg)	100	20	100	ND	100	4	40	2	ND	0.8	NA	650	10000	10	288	600	1000	NA	NA	288	NAG/NARFD
Restricted Solid Waste (CT2) (mg/kg)	400	80	400	ND	400	16	160	8	ND	3.2	NA	650	10000	40	1152	2400	4000	NA	NA	1152	NAG

- Notes
- 1

Specific Contaminant Concentration (Total Concentration)
- 2

Toxicity Characteristic Leaching Procedure (TCLP)
- 3

NSW DECC (2008) Waste Classification Guidelines Part 1: Classifying Waste, Table 1: Contaminant Threshold Values (CT1 & CT2) for classifying waste by chemical assessment without the leaching (TCLP) test.
- 4

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
- 5

Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
- NA

Not Applicable
- ND

Not Defined
- NAG

No Asbestos on Ground
- NARFD

No asbestos or respirable fibres detected
- Not tested
- BOLD

Exceeding SCC. TCLP analysis carried out on sample as a result

11. DISCUSSION, RECOMMENDATIONS AND CONCLUSION

The scope of work for the current assessment comprised a site walkover inspection, review of site history, intrusive soil and groundwater sampling with a view to obtaining data pertaining to the contamination status of the site, and to provide a preliminary assessment of the material to be excavated for waste classification purposes.

A review of historical information indicated that the site was previously in a rural/agricultural area. Prior to the establishment of Macquarie University in 1965 the site was used for agricultural purposes possibly including orchard, market gardens and poultry farming since at least 1929. Since the establishment of Macquarie University all structures related to the market gardens, farm sheds and orchards have been removed. The majority of the site is currently occupied by two and three-storey car parks, namely, W1 and W2. Landscaped garden beds and lawns are located around the car parks, and there is a landscaped mound with a stand of trees opposite car park W1 on the other side of Western Road, which makes up the western portion of the subject site. The current site and surrounding land uses are not considered to be significant in terms of the potential to adversely impact the site; however, there is the potential of contamination associated to the asphalt paving for the car parks, fuel and oil leaks from motor vehicles, the past land use of market gardens and the placement of fill during site development.

The analytical results for the soil samples submitted to the laboratory for analysis show that the concentrations of BTEX, TPH C₆-C₉, PAH, OCP, PCB and phenols in soil samples analysed were well within the health-based SAC for commercial/ industrial land use and also below the laboratory's detection limits for reporting, with generally low heavy metal concentrations all within their respective HILs and generally within the typical background ranges for soil. Although nickel levels in sample BH3/0.12-0.2 and arsenic levels in sample BH3/0.2-0.5 were above PPIL values, they were well within the HIL criteria. Exceedances in PPIL values may affect the growth of plants and vegetation; however, PPIL have not been included as part of the assessment criteria for this site.

Four samples within the subject site, BH12/0.4-0.5, BH13/0.2-0.3, BH14/0.1-0.2 and BH15/0.3-0.4 recorded TPH C₁₀-C₃₆ concentrations at levels above the adopted SAC. In reviewing the chromatograms for these samples which were provided by Envirolab, they appear to resemble the fingerprint of asphalt (with no coal tar). These samples were taken from locations within the

asphalt-paved car parks of W1 and W2. Concentrations detected in sample BH15/0.3-0.4 classify the sample location as a hotspot, which would normally require further delineation of the area affected by the contamination and subsequent remove the hotspot. However, as it is understood that the area in which BH15 is located (within car park W2), is to be excavated to a maximum depth of 6 m, the material classified as a hotspot will be removed as part of the excavations. TPH C₁₅-C₃₆ were also detected in samples BH2/0.1-0.3 (bore hole within subject site) and BH8/0-0.2 (outside of subject site boundary); however, the levels found in these two samples were within the adopted SAC.

Although asbestos was not observed during fieldwork or detected by laboratory analysis, the presence of asbestos in fill material is equivocal, as in the case of any site, therefore, precaution should be taken if asbestos-containing materials are uncovered during excavation and site development. If encountered, management and disposal of asbestos material conducted by an AS A licensed contractor is to be undertaken.

A groundwater assessment was carried out, with samples from BH1 and BH3 (from outside the site boundaries) forwarded to Envirolab, a NATA accredited laboratory, for chemical analysis. Laboratory results for arsenic, chromium, lead, mercury, TPH, toluene, benzene, ethyl benzene, xylene, PAH and OCP were below the adopted GIL, with most concentrations less than the practical quantitation limits (PQL). Toluene, however, was detected in low levels in sample ID GW3 of 3.6 µg/L and arsenic detected at 2 µg/L in sample ID GW1 were detected above the PQL. Cadmium, copper, nickel and zinc were detected at levels over the GIL values in sample GW1, with copper concentrations above the GIL in sample GW3. The detected levels are not considered to be significant as the copper and cadmium exceedances are only marginal. Zinc, nickel and copper are commonly detected at levels above the ANZECC (2000) Guidelines in groundwater, particularly in urban areas in Sydney, and it is likely that the resulting concentrations represent background concentration levels. Although the locations of the groundwater piezometers were outside of the site boundary, they are located in close proximity of the site boundaries and are considered to be indicative of the subject site area.

A preliminary waste classification was conducted based on the samples collected for the Phase 2 Contamination Assessment. On the basis of the total and leachable (TCLP) concentrations obtained, the filling material is provisionally classified as General Solid Waste. It should be noted that the waste classification is based on a limited number of samples and is thus

preliminary in nature only. It is recommended that a full waste classification assessment be undertaken at the time of stockpiling the excavated material from the subject site. It may be possible to classify the shale bedrock from the excavation as virgin excavated natural material (VENM). The fill soil may be able to be classified as excavated natural material (ENM) under the ENM Exemption, 2008; however, it is to be noted that the ENM criteria are stringent such that the potential for the material not meeting the ENM criteria is possible. The exemption allows for naturally occurring rock and soil that has been excavated, containing at least 98% (by weight) natural material, which does not contain acid sulphate soils (ASS) nor potential acid sulphate soils (PASS) (untreated or treated), to be defined as ENM provided it meets certain other assessment criteria. It, therefore, if results from the ENM assessment do not meet the criteria, the material cannot be considered to be ENM. If the material cannot be classified as ENM, then a waste classification for disposal to a landfill facility would apply as per the DECC's *Waste Classification Guidelines* (2008). An ENM assessment requires a minimum sampling density of 10 "five-sample" composite samples (comprising 50 samples in total) per 4000 tonnes of the material being tested. [Note: the DECCW has clarified that the specified sampling density should be applied to stockpiles between 0 – 4000 tonnes, and that no allowance should be made for pro-rata treatment of the sampling density].

Based on the review of the available site history, site observations and laboratory results, DP considers that the site can be made compatible with the proposed commercial development subject to the removal of the filling material from underneath the asphalt-paved car park that has recorded TPH levels above the SAC values for commercial land use. In light of the understanding that this material will be part of the excavated area from within the subject site, it is considered that the site is compatible with the proposed commercial development once the contaminated material has been appropriately removed.

12. LIMITATIONS

DP have performed investigation and consulting services for this project in accordance with current professional and industry standards. Whilst every effort has been made to accurately describe the site conditions, conditions may differ to those identified. Therefore DP, nor any other reputable consultant, cannot provide unqualified warranties nor does DP assume any liability for site conditions not observed or accessible during the time of the investigations.

Despite all reasonable care and diligence, the conditions encountered may not be representative of actual conditions. In addition, site characteristics may change over time in response to variations in natural conditions, chemical reactions and other events, e.g. groundwater movement and/or spillages of contaminating substances. These changes may occur subsequent to DP's investigations and assessment.

No site investigation can be thorough enough to provide absolute confirmation of the presence or absence of substances which may be considered contaminating, hazardous or polluting. Similarly, the level of investigation undertaken cannot be considered to unequivocally characterise the degree or extent of contamination on the site. In addition, regulatory or guideline criteria for the evaluation of environmental soil and groundwater quality are frequently being reviewed and concentrations of contaminants which are considered acceptable in the present may in the future be considered unacceptable.

This report has been prepared only for the use by Macquarie University; any reliance assumed by other parties on this report shall be at such parties own risk. Any ensuing liability resulting from use of the report by other parties cannot be transferred to DP.

DOUGLAS PARTNERS PTY LTD

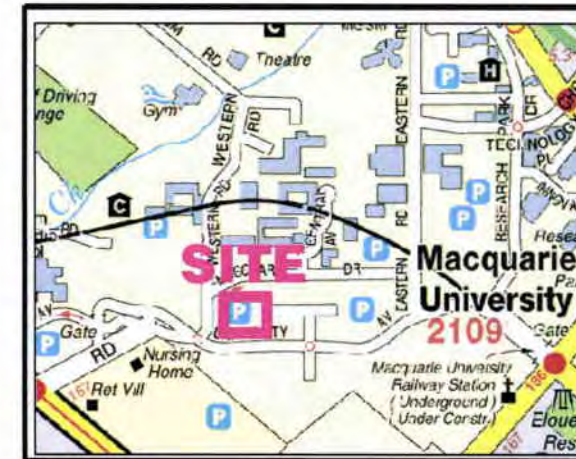
Sylvie Anbardjian
Environmental Scientist

Reviewed by



Lindsay Rockett
Senior Associate

APPENDIX A
Site Drawings



LOCALITY PLAN

APPROXIMATE OUTLINE OF PROPOSED BASEMENT



REFER TO DRAWINGS 2 & 3 FOR GEOTECHNICAL CROSS-SECTIONS A-A' AND B-B'

LEGEND

- ♦ AUGERED BORE LOCATION
- CORED BORE LOCATION
- ▲ PREVIOUS BOREHOLE FOR COCHLEAR SITE (MARCH 2008)



CLIENT: Macquarie University

DRAWN BY: PSCH

SCALE: As shown

OFFICE: Sydney

APPROVED BY: STE

DATE: 19.4.2010

TITLE: Location of Boreholes

Australian Hearing Hub

Cnr University Ave & Macquarie Dr., MACQUARIE PARK

PROJECT No: 71683

DRAWING No: 1

REVISION: A

APPENDIX B
Site History Documentation

Service First Registration Pty Ltd

ACN: 108 037 029
Ph: 02 9233 1314
Fax: 9233 2878

Suite 102, Level 1, 64 Castlereagh Street
Sydney 2000
PO Box 1539 Sydney 2000
DX 189 Sydney

Summary of Owners Report

LPMA
Sydney

Deeds Branch

Re: Macquarie Drive, Macquarie University

Description: - Lot 114 D.P. 1129623 (part)

As regards the part marked (A) on the attached cadastre

<u>Date of Acquisition and term held</u>	<u>Registered Proprietor(s) & Occupations where available</u>	<u>Reference to Title at Acquisition and sale</u>
20.04.1905 (1905 to 1911)	Eliza Knight (Married Woman)	Vol 1182 Fol 107
19.01.1911 (1911 to 1919)	Charles Alfred Learoyd (Wool Buyer)	Vol 1182 Fol 107
01.12.1919? (1919 to 1919)	Charles Boggio (Wool Buyer) (Section 94 Application not investigated)	Vol 1182 Fol 107
02.10.1919 (1919 to 1920)	John Alfred Thorn (French Polisher) John William Robertson (French Polisher)	Vol 1182 Fol 107
19.08.1920 (1920 to 1951)	John William Robertson (French Polisher)	Vol 1182 Fol 107
16.08.1951 (1951 to 1952)	Rudolph Albert Karl Krix (Retired) Ruby Letitia Krix (Married Woman)	Vol 1182 Fol 107 now Vol 6470 Fol 132
10.12.1952 (1952 to 1958)	Ruby Letitia Krix (Widow)	Vol 6470 Fol 132
14.03.1958 (1958 to 1960)	Albert Charles Rudolph Krix (Horticulturist) Ernest Alfred Norman Krix (Horticulturist)	Vol 6470 Fol 132 now Vol 7539 Fol's 238 & 239
20.01.1960 (1960 to 1963)	Sydney George Hope Raymond (Poultry Farmer) John Sydney Raymond (Poultry Farmer)	Vol 7539 Fol's 238 & 239 now Vol 7898 Fol 125
18.06.1963 (1963 to 1965)	John Sydney Raymond (Poultry Farmer)	Vol 7898 Fol 125
31.03.1965 (1965 to date)	# The Macquarie University	Vol 7898 Fol 125 now 114/1129623

Denotes Current Registered Proprietor

Service First Registration Pty Ltd

ACN: 108 037 029
Ph: 02 9233 1314
Fax: 9233 2878

Suite 102, Level 1, 64 Castlereagh Street
Sydney 2000
PO Box 1539 Sydney 2000
DX 189 Sydney

As regards the part marked (B) on the attached cadastre

<u>Date of Acquisition and term held</u>	<u>Registered Proprietor(s) & Occupations where available</u>	<u>Reference to Title at Acquisition and sale</u>
20.04.1905 (1905 to 1911)	Eliza Knight (Married Woman)	Vol 1182 Fol 107
19.01.1911 (1911 to 1919)	Charles Alfred Learoyd (Wool Buyer)	Vol 1182 Fol 107
01.12.1919? (1919 to 1919)	Charles Boggio (Wool Buyer) (Section 94 Application not investigated)	Vol 1182 Fol 107
02.10.1919 (1919 to 1920)	John Alfred Thorn (French Polisher) John William Robertson (French Polisher)	Vol 1182 Fol 107
19.08.1920 (1920 to 1951)	John William Robertson (French Polisher)	Vol 1182 Fol 107
16.08.1951 (1951 to 1960)	Albert Charles Rudolph Krix (Horticulturist) Ernest Alfred Norman Krix (Horticulturist)	Vol 1182 Fol 107 now Vol 6470 Fol's 130 & 131
20.01.1960 (1960 to 1963)	Sydney George Hope Raymond (Poultry Farmer) John Sydney Raymond (Poultry Farmer)	Vol 6470 Fol's 130 & 131 now Vol 7898 Fol 124
18.06.1963 (1963 to 1965)	John Sydney Raymond (Poultry Farmer)	Vol 7898 Fol 124
31.03.1965 (1965 to date)	# The Macquarie University	Vol 7898 Fol 124 now 114/1129623

Denotes Current Registered Proprietor

As regards the part marked (C) on the attached cadastre

<u>Date of Acquisition and term held</u>	<u>Registered Proprietor(s) & Occupations where available</u>	<u>Reference to Title at Acquisition and sale</u>
02.03.1911 (1911 to 1912)	Martin Baring Gardiner (Orchardist)	Vol 1240 Fol 45
23.11.1912 (1912 to 1929)	Annie McBeath (Married Woman)	Vol 1240 Fol 45
08.05.1929 (1929 to 1929)	Peter Stewart McBeath (Builder) (Transmission Application not investigated)	Vol 1240 Fol 45
17.06.1929 (1929 to 1966)	Giovanni Lizzio (Orchardist)	Vol 1240 Fol 45
04.05.1966? (1966 to 1967)	State Planning Authority of New South Wales (pursuant to Resumption K 29865)	Vol 1240 Fol 45
26.07.1965 (Registered 09.05.1967) (1965 to date)	# The Macquarie University	Vol 1240 Fol 45 now 114/1129623

Denotes Current Registered Proprietor

Yours Sincerely
Mark Groll
30 March 2010
(Ph: 0412 199 304)



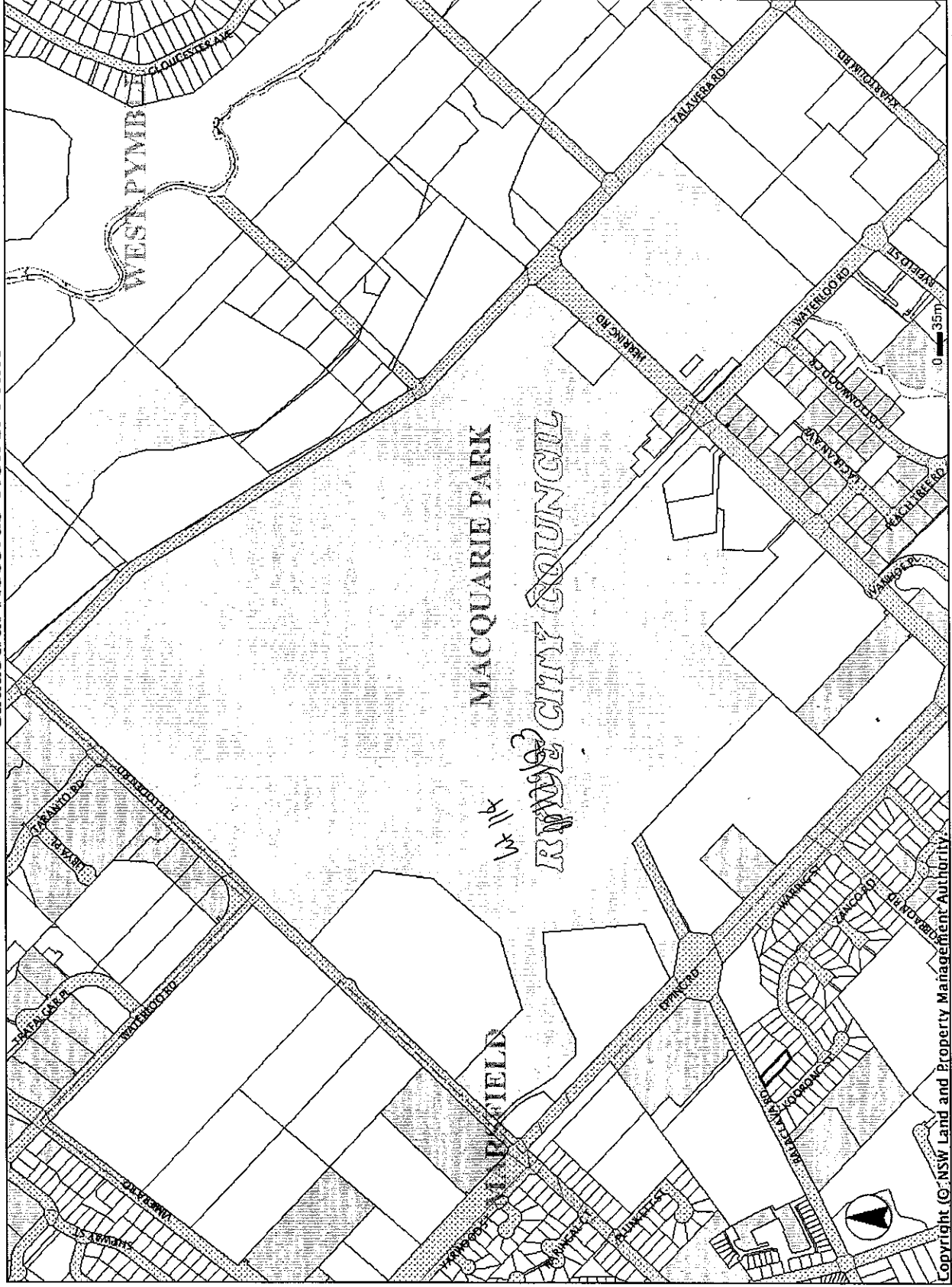
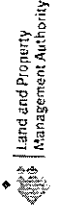
Email: grolly1@bigpond.net.au

Cadastral Records Viewer Print

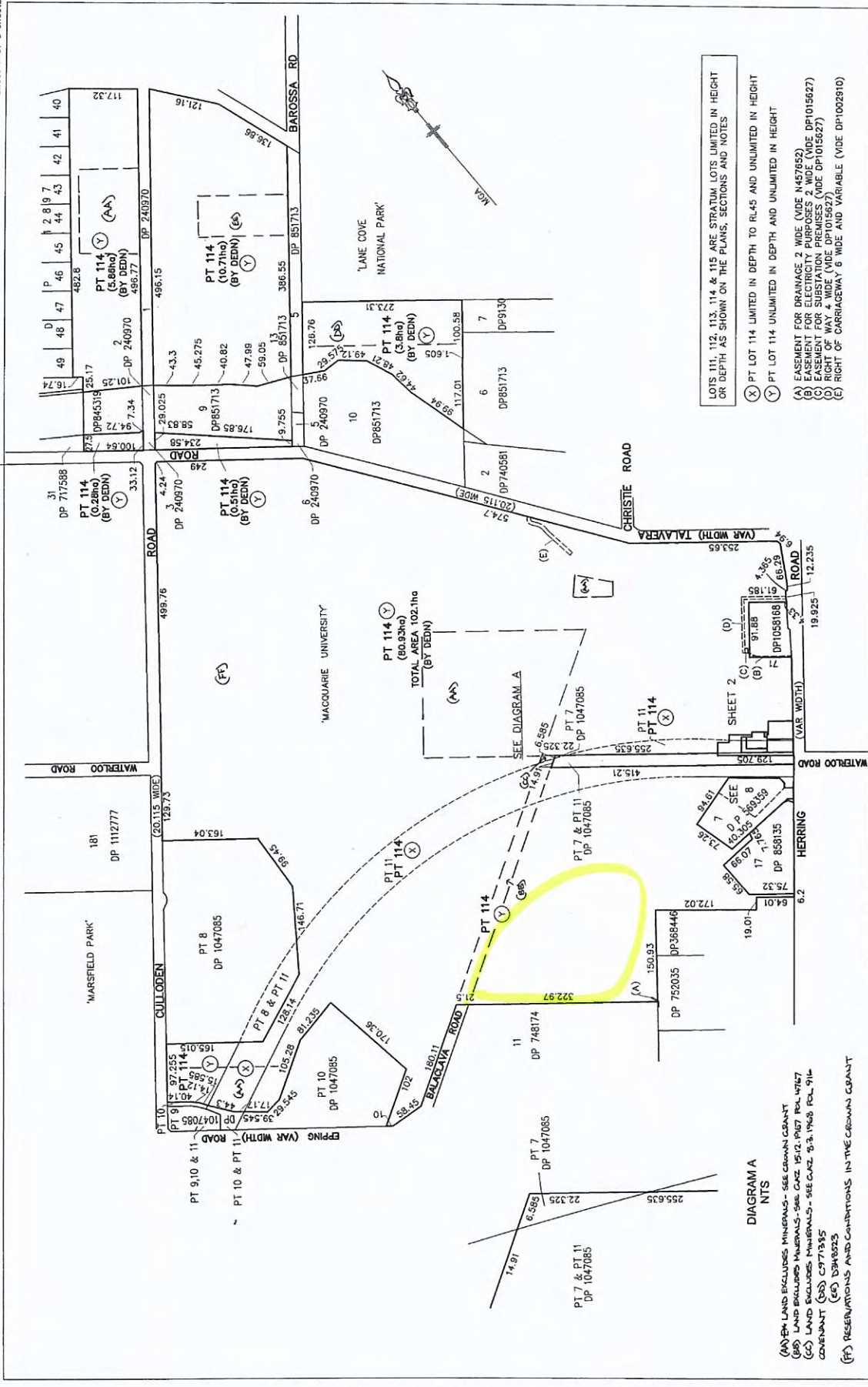
Current Feature
Lot A DP354089
Locality: MARSFIELD
LGA: RYDE
Parish: HUNTERS HILL
County: CUMBERLAND

LEGEND
Parcels and 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



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This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided.



Ref: R34123 / Doc: DP 1129623 P / Rev: 20-Aug-2008 / Sca: SC.OK / Ftr: 30-Mar-2010 07:47 / Pgs: ALL / Seq: 1 of 4

Surveyor: STEPHEN JOSEPH MITCHELL
 Date of Survey: 14 MAY 2008
 Surveyor's Ref: B545-009-535AC

PLAN OF ACQUISITION OF PART LOT 182 IN DP 1112777 AND PART LOT 1 IN DP 1047085

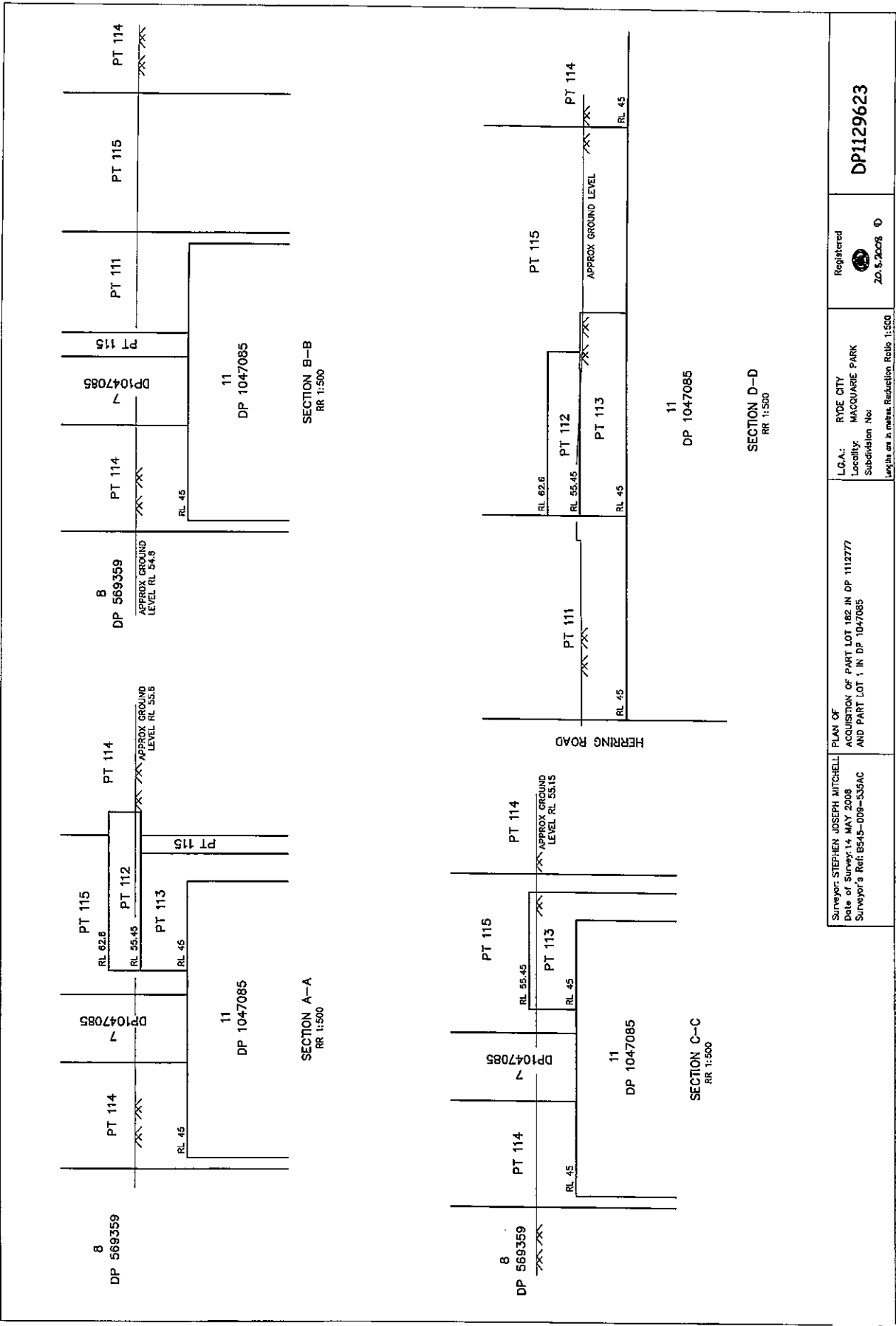
L.C.A.: RYDE CITY
 Locality: MACQUARIE PARK
 Subdivision No: 20.5.2006 D

Registered
 DP1129623 P

Lengths are in metres. Reduction Ratio 1:4000

PLAN FORM 2 (A2)

SSM 21836 FD RL 92.425 (A+D)	☒ 36° 35' 08" 38° 35' 14"	(MGA ORGUND)	HERRING	(VAR WIDTH)	SSM 24943 JD RCH 74.786 (AHD) PCEN 74.786 (ORIGIN OF LEVELS)	X	
Surveyor: STEPHEN JOSEPH MITCHELL Date of Survey: 14 MAY 2008 Surveyor's Ref: B545-009-535AC			PLAN OF ACQUISITION OF PART LOT 182 IN DP 112777 AND PART LOT 1 IN DP 1047085		L.C.A.: RIVE CITY Locality: MACQUARIE PARK Subdivision No: Lengths are in metres Reduction Ratio 1:500	Registered  20 S. 3008 O	DP1129623



DEPOSITED PLAN ADMINISTRATION SHEET		Sheet 1 of 1 sheet(s)
SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants. IT IS INTENDED TO ACQUIRE LOTS 111, 112 AND 113	 DP1129623 S *	
Use PLAN FORM 6A for additional certificates, signatures, seals and statements	Registered:  20.8.08  * Title System: TORRENS Purpose: ACQUISITION	
	PLAN OF ACQUISITION OF PART LOT 182 IN DP 1112777 AND PART LOT 1 IN DP 1047085	
	LGA: RYDE CITY Locality: MACQUARIE PARK Parish: HUNTERS HILL County: CUMBERLAND	
	Surveying Regulation, 2006 I, STEPHEN JOSEPH MITCHELL..... of c/- WHELAN INSITES...DX 288 SYDNEY..... 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, 2006 and was completed on: 14 MAY 2008..... The survey relates to Lots 111-113 INCLUSIVE..... (specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey) Signature  Dated: 11/7/08 Surveyor registered under the Surveying Act, 2002 Datum Line: X-Y Type: Urban/Rural	
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..... set out herein (insert 'subdivision' or 'new road') * Authorised Person/General Manager/Accredited Certifier Consent Authority: Date of Endorsement: Accreditation no: Subdivision Certificate no: File no: * Delete whichever is inapplicable.	Plans used in the preparation of survey/compilation DP 858135 DP 1047085 DP 1046092 DP 1058168 DP 1112777 (if insufficient space use Plan Form 6A annexure sheet) SURVEYOR'S REFERENCE: B545-009-535AC	

* OFFICE USE ONLY



Title Search

LEAP Searching
An Approved LPI NSW
Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: AUTO CONSOL 8665-1

SEARCH DATE	TIME	EDITION NO	DATE
30/3/2010	7:48 AM	4	4/9/2009

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS
AT MACQUARIE PARK
LOCAL GOVERNMENT AREA RYDE
PARISH OF HUNTERS HILL COUNTY OF CUMBERLAND
TITLE DIAGRAM SEE SCHEDULE OF PARCELS

FIRST SCHEDULE

THE MACQUARIE UNIVERSITY

SECOND SCHEDULE (46 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 LAND EXCLUDES MINERALS BY GOVT. GAZS. DATED 15.12.1967 FOL 4767 & 8.3.1968 FOL 916 AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO INDICATED IN THE TITLE DIAGRAM
- 3 LAND EXCLUDES MINERALS BY CROWN GRANTS AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO INDICATED IN THE TITLE DIAGRAM
- 4 THE LAND ABOVE DESCRIBED IS LIMITED IN STRATUM IN THE MANNER DESCRIBED IN DP1129623 AS REGARDS LOT 114 IN DP1129623
- 5 2207276 COVENANT
- 6 5785859 COVENANT
- 7 C971385 COVENANT AFFECTING THE PART OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 8 D348523 COVENANT AFFECTING THE PART OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 9 DP1015627 EASEMENT FOR SUBSTATION PREMISES AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 10 DP1015627 EASEMENT FOR ELECTRICITY PURPOSES 2 WIDE AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 11 N457652 EASEMENT FOR DRAINAGE 2 WIDE AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 12 DP858135 RIGHT OF FOOTWAY 3 WIDE & VARIABLE APPURTENANT TO THE LAND ABOVE DESCRIBED
- 13 5525606 LEASE TO ING INDUSTRIAL CUSTODIAN PTY LIMITED (SEE 7780116, 8584903 AND 8754723) OF PART BEING LOT 11 IN DP879843. EXPIRES: 26/10/2097.
- 7967611 LEASE OF LEASE 5525606 TO MACQUARIE RESEARCH

END OF PAGE 1 - CONTINUED OVER

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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PAGE 2

SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

LIMITED OF SUITE 301 IN THE BUILDING KNOWN AS THE
BECTON DICKINSON BUILDING, MACQUARIE UNIVERSITY
RESEARCH PARK, NORTH RYDE. EXPIRES: 31/5/2009.
OPTION OF RENEWAL: 6 YEARS AND 4 YEARS
RESPECTIVELY.

8304908 LEASE OF LEASE 5525606 TO BECTON DICKINSON PTY
LIMITED OF GROUND FLOOR AND FIRST FLOOR, BECTON
DICKINSON BUILDING, MACQUARIE UNIVERSITY, NORTH
RYDE. EXPIRES: 14/3/2009. OPTION OF RENEWAL: 6
YEARS WITH 1 FURTHER OPTION OF 4 YEARS.

AE254509 VARIATION OF LEASE 8304908 EXPIRY DATE NOW
14/3/2015.

AA547851 LEASE OF LEASE 5525606 TO APPRENTICES-TRAINEES
EMPLOYMENT LIMITED OF SUITE 4, LEVEL 2, BECTON
DICKINSON BUILDING, 4 RESEARCH DRIVE, NORTH RYDE.
EXPIRES: 10/10/2006. OPTION OF RENEWAL: 3 YEARS.

AB940882 LEASE OF LEASE 5525606 TO COVANCE PTY LIMITED OF
LEVEL 3, 4 RESEARCH PARK DRIVE, MACQUARIE
UNIVERSITY RESEARCH PARK, NORTH RYDE. EXPIRES:
11/4/2011. OPTION OF RENEWAL: 6 YEARS.

AC914801 LEASE OF LEASE 5525606 TO MACQUARIE CHRISTIAN
STUDIES INSTITUTE LTD OF SUITE 2.03, LEVEL 2, 4
RESEARCH PARK DRIVE, MACQUARIE UNIVERSITY RESEARCH
PARK, NORTH RYDE. EXPIRES: 24/9/2011. OPTION OF
RENEWAL: 5 YEARS.

AD85578 LEASE OF LEASE 5525606 TO VOICE PROJECT PTY LTD
OF SUITE 2.04, LEVEL 2, 4 RESEARCH PARK DRIVE,
MACQUARIE UNIVERSITY RESEARCH PARK, NORTH RYDE.
EXPIRES: 15/4/2012. OPTION OF RENEWAL: 5 YEARS.

AD151422 VARIATION OF LEASE AD85578

AE216039 LEASE OF LEASE 5525606 TO COVANCE PTY LIMITED OF
SUITE 3, LEVEL 2, 4 RESEARCH PARK DRIVE, MACQUARIE
UNIVERSITY RESEARCH PARK, NORTH RYDE. EXPIRES:
11/4/2011. OPTION OF RENEWAL: 6 YEARS.

AE216040 VARIATION OF LEASE AE216039

AE542368 TRANSFER OF LEASE AC914801 LESSEE NOW MACQUARIE
UNIVERSITY

AE542374 CHANGE OF NAME AFFECTING LEASE 7967611 LESSEE NOW
ACCESS MACQUARIE LIMITED

AE542375 VARIATION OF LEASE 7967611 EXPIRY DATE NOW
31/5/2010.

14 5626148 LEASE TO MURPX NO.1 PTY LIMITED & MURPX NO.2 PTY
LIMITED OF PART BEING LOT 10 IN DP879843. EXPIRES:
27/2/2008.

5666543 LEASE OF LEASE 5626148 TO SIEMENS LIMITED.
EXPIRES: 4/3/2009. OPTION OF RENEWAL: 4 YEARS WITH

END OF PAGE 2 - CONTINUED OVER

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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PAGE 3

SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

- 1 FURTHER PERIOD OF 4 YEARS.
- 5673896 MORTGAGE OF LEASE 5626148 TO WESTPAC BANKING CORPORATION
- 15 6946114 LEASE TO TALavera Herring Pty Limited & Challenger Listed Investments Limited of Lot 14 in DP884150. EXPIRES: 15/12/2098. (SEE AC550884, AC690715)
- AC690713 SURRENDER OF SUBLEASE 7037128 AS REGARDS PART BEING SUBSTATION PREMISES NO 6154, DESIGNATED (P) IN PLAN WITH AC690713
- 7037128 LEASE OF LEASE 6946114 TO GF GROUP SERVICES PTY LIMITED EXPIRES: 16/12/2009. OPTION OF RENEWAL: 5 YEARS WITH FURTHER 5 YEARS OPTION.
- AC690714 LEASE OF LEASE 6946114 TO ENERGYAUSTRALIA OF PART BEING SUBSTATION PREMISES NO 6154, TOGETHER WITH RIGHT OF WAY & EASEMENT DESIGNATED (E) IN PLAN WITH AC690714. EXPIRES: 31/8/2050.
- AC550884 TRANSFER OF LEASE 7037128 LESSEE NOW GF SERVICES COMPANY PTY LIMITED
- AC550885 VARIATION OF LEASE 7037128
- AC700758 VARIATION OF LEASE 6946114
- 16 7073235 LEASE TO PERPETUAL NOMINEES LIMITED OF LOT 15 IN DP1015627. EXPIRES: 17/8/2099.
- 7073236 LEASE OF LEASE 7073235 TO DOW CORNING AUSTRALIA PTY LIMITED OF PREMISES BEING PART OF THE MID-LEVEL BASEMENT, GROUND & LEVEL 1 SHOWN HATCHED IN PLANS MARKED 'A', 'B' & 'C' IN 7073236. EXPIRES: 17/8/2010. OPTION OF RENEWAL: 2 TERMS OF 5 YEARS.
- AA532629 LEASE OF LEASE 7073235 TO ENERGYAUSTRALIA OF SUBSTATION PREMISES 7740 TOGETHER WITH RIGHT OF WAY DESIGNATED (R) & EASEMENT DESIGNATED (C) AFFECTING ANOTHER PART OF THE LAND SHOWN IN PLAN WITH AA532629. EXPIRES: 31/12/2051.
- AB782239 LEASE OF LEASE 7073235 TO EMC GLOBAL HOLDINGS COMPANY OF THE WHOLE OF THE THIRD FLOOR. EXPIRES: 30/6/2010. OPTION OF RENEWAL: 5 YEARS.
- AB782240 LEASE OF LEASE 7073235 TO EMC GLOBAL HOLDINGS COMPANY OF THE WHOLE OF THE SECOND FLOOR. EXPIRES: 30/6/2010. OPTION OF RENEWAL: 5 YEARS.
- AA899464 MORTGAGE OF LEASE 7073235 TO NATIONAL AUSTRALIA BANK LIMITED
- AD915944 LEASE OF LEASE 7073236 TO ACCESS MACQUARIE LIMITED OF LEVEL 1, 3 INNOVATION ROAD, NORTH RYDE TOGETHER WITH CAR SPACES NUMBERED 85 TO 94 AND 155 TO 159. EXPIRES: 18/7/2010.
- 17 7294068 LEASE TO HUTCHISON TELECOMMUNICATIONS (AUSTRALIA) LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH 7294068

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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PAGE 4

SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

COMMENCES 6/3/2005. EXPIRES: 5/3/2010.

9989367 VARIATION OF LEASE 7294068

AD302350 TRANSFER OF LEASE 7294068 LESSEE NOW ACN 124 348
670 PTY LIMITED

AD302351 TRANSFER OF LEASE 7294068 LESSEE NOW CROWN CASTLE
AUSTRALIA PTY LIMITED

18 7294069 LEASE TO HUTCHISON TELECOMMUNICATIONS (AUSTRALIA)
LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH 7294069
COMMENCES 6/3/2010. EXPIRES: 5/3/2015.

9989368 VARIATION OF LEASE 7294069

AD302350 TRANSFER OF LEASE 7294069 LESSEE NOW ACN 124 348
670 PTY LIMITED

AD302351 TRANSFER OF LEASE 7294069 LESSEE NOW CROWN CASTLE
AUSTRALIA PTY LIMITED

19 7294070 LEASE TO HUTCHISON TELECOMMUNICATIONS (AUSTRALIA)
LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH 7294070
COMMENCES 6/3/2015. EXPIRES: 5/3/2020.

9989369 VARIATION OF LEASE 7294070

AD302350 TRANSFER OF LEASE 7294070 LESSEE NOW ACN 124 348
670 PTY LIMITED

AD302351 TRANSFER OF LEASE 7294070 LESSEE NOW CROWN CASTLE
AUSTRALIA PTY LIMITED

20 7604074 LEASE TO JEBGO PTY LIMITED OF PART OF MACQUARIE
UNIVERSITY SPORTS ASSOCIATION GYMNASIUM, GYMNASIUM
ROAD, MACQUARIE UNIVERSITY AS SHOWN IN PLAN WITH
7604074. EXPIRES: 8/10/2005. OPTION OF RENEWAL: 5
YEARS.

21 7971449 LEASE TO WENTWORTH AVE MOTEL PTY LIMITED OF LOT 10
IN DP1002910. EXPIRES: 30/6/2009.

AC370636 LEASE OF LEASE 7971449 TO VALUE LODGING PTY
LIMITED EXPIRES: 30/3/2015. OPTION OF RENEWAL: 10
YEARS.

8172159 MORTGAGE OF LEASE 7971449 TO WESTPAC BANKING
CORPORATION

AB811586 MORTGAGE OF LEASE 7971449 TO WESTPAC BANKING
CORPORATION

AC370637 VARIATION OF LEASE AC370636 EXPIRY DATE NOW
29/6/2010

* AE983696 TRANSFER OF LEASE 7971449 LESSEE NOW TRUST
COMPANY OF AUSTRALIA LIMITED

* AF146177 VARIATION OF LEASE AC370636

22 8067766 LEASE TO MACQUARIE UNIVERSITY UNION LIMITED OF THE
GUMNUT CHILDCARE CENTRE BUILDING, MACQUARIE UNIVERSITY,
NORTH RYDE. EXPIRES: 31/12/2019. OPTION OF RENEWAL: 20
YEARS.

AD591089 TRANSFER OF LEASE 8067766 LESSEE NOW U@MQ LIMITED

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

23 8067767 LEASE TO MACQUARIE UNIVERSITY UNION LIMITED OF THE
SAM BUILDING, MACQUARIE UNIVERSITY, NORTH RYDE.
EXPIRES: 31/12/2019. OPTION OF RENEWAL: 20 YEARS.

AB577359 LEASE OF LEASE 8067767 TO UNIVERSITY CO-OPERATIVE
BOOKSHOP LIMITED OF BOOKSHOP AND MULTI MEDIA
CENTRE, LEVEL 1 AND STORE ROOM, LEVEL 0, SAM
BUILDING, MACQUARIE UNIVERSITY, NORTH RYDE.
EXPIRES: 31/12/2011. OPTION OF RENEWAL: 8 YEARS
LESS ONE DAY.

AB577378 LEASE OF LEASE 8067767 TO M.B. DEVELOPMENTS PTY
LIMITED OF DENTAL SURGERY OF LEVEL 0, SAM BUILDING,
MACQUARIE UNIVERSITY, NORTH RYDE. EXPIRES:
31/12/2008. OPTION OF RENEWAL: 5 YEARS.

AB707911 LEASE OF LEASE 8067767 TO QUICKI SMOOTHI BARS PTY
LIMITED OF FRUJU, LEVEL 1, SAM BUILDING, MACQUARIE
UNIVERSITY, NORTH RYDE. EXPIRES: 31/8/2009. OPTION
OF RENEWAL: 5 YEARS.

AC787258 LEASE OF LEASE 8067767 TO STA TRAVEL PTY LIMITED
OF LOCK-UP SHOP KNOWN AS STA TRAVEL AGENCY, LEVEL
1, SAM BUILDING, MACQUARIE UNIVERSITY, NORTH RYDE.
EXPIRES: 31/5/2011.

AC879600 LEASE OF LEASE 8067767 TO GULCIN OZKAN OF FOOD
OUTLET, THE QUARRY FOOD COURT, LEVEL 1 AND
STOREROOM, LEVEL 0, SAM BUILDING, MACQUARIE
UNIVERSITY, NORTH RYDE. EXPIRES: 31/7/2009. OPTION
OF RENEWAL: 3 YRS.

AD591090 TRANSFER OF LEASE 8067767 LESSEE NOW U@MQ LIMITED

AD884790 LEASE OF LEASE 8067767 TO UNIVERSITY CO-OPERATIVE
BOOKSHOP LIMITED OF UNIVERSITY CO-OPERATIVE
BOOKSHOP, LEVEL 0, U@MQ BUILDING, MACQUARIE
UNIVERSITY, NORTH RYDE. EXPIRES: 31/12/2011. OPTION
OF RENEWAL: EIGHT YEARS LESS 1 DAY.

AD884801 LEASE OF LEASE 8067767 TO JK UNITED PTY LIMITED
OF KITCHEN CAFE, LEVEL 2. EXPIRES: 31/12/2010.
OPTION OF RENEWAL: 5 YEARS.

AD947794 LEASE OF LEASE 8067767 TO ELIZABETH SHAKEH
YEGHYKIAN OF PHARMACY SHOP, LEVEL 1, U@MQ BUILDING,
MACQUARIE UNIVERSITY, NORTH RYDE. EXPIRES:
20/9/2009. OPTION OF RENEWAL: 2 YEARS.

AE253754 LEASE OF LEASE 8067767 TO NATIONAL AUSTRALIA BANK
OF LEVEL 0 MARKET PLACE, U@MQ BUILDING, MACQUARIE
UNIVERSITY, NORTH RYDE. EXPIRES: 31/5/2013.

* AE730256 LEASE OF LEASE 8067767 TO FOOD MATRIX PTY LIMITED
OF PASTA, SALADS AND PIZZA BAR, PART LEVEL 1, U@MQ
BUILDING, MACQUARIE UNIVERSITY, NORTH RYDE.
EXPIRES: 31/1/2011. OPTION OF RENEWAL: 3 YEARS.

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

- * AE730257 LEASE OF LEASE 8067767 TO FOOD MATRIX PTY LIMITED OF SANDWICH AND SUSHI BAR, PART LEVEL 1 AND SANDWICH AND SUSHI BAR STOREROOM, PART LEVEL 0, U@MQ BUILDING, MACQUARIE UNIVERSITY, NORTH RYDE. EXPIRES: 31/1/2011. OPTION OF RENEWAL: 3 YEARS.
- 24 9478584 LEASE TO MACQUARIE UNIVERSITY UNION LIMITED OF PART OF THE BUILDING KNOWN AS E3A/ INTERNATIONAL BUILDING, MACQUARIE UNIVERSITY, SHOWN HATCHED IN PLAN (PAGE 44) WITH 9478584. EXPIRES: 1/7/2011. OPTION OF RENEWAL: 10 YEARS.
- AD591091 TRANSFER OF LEASE 9478584 LESSEE NOW U@MQ LIMITED
- 25 9668644 LEASE TO GF GROUP SERVICES PTY LIMITED OF CAR SPACE NUMBER 1 TO 400 OF PART OF LEVELS 1, 2 AND 3, IN BUILDING F5A/B LOCATED AT MACQUARIE UNIVERSITY, SHOWN HATCHED IN PLAN (PAGES 23 TO 25) WITH 9668644. EXPIRES: 16/12/2007. OPTION OF RENEWAL: 2 YEARS AND WITH 2 FURTHER OPTIONS OF 5 YEARS.
- 26 AA589812 LEASE TO TELSTRA CORPORATION LIMITED OF THE WORKS AREA SHOWN HATCHED BLACK IN PLAN B WITH AA589811. COMMENCES 1/8/2008. EXPIRES: 31/7/2013.
- 27 AA589813 LEASE TO TELSTRA CORPORATION LIMITED OF THE WORKS AREA SHOWN HATCHED BLACK IN PLAN B WITH AA589811. COMMENCES 1/8/2013. EXPIRES: 31/7/2018.
- 28 AC363118 LEASE TO ENERGYAUSTRALIA OF SUB STATION PREMISES NO. 8450 DESIGNATED (P) TOGETHER WITH RIGHT OF WAY DESIGNATED (R) AND EASEMENT FOR ELECTRICITY (E1) SHOWN IN DP1089928. EXPIRES: 30/11/2055.
- 29 AC363119 LEASE TO ENERGYAUSTRALIA OF SUBSTATION PREMISES 1796 TOGETHER WITH RIGHT OF WAY & EASEMENT FOR ELECTRICITY PURPOSES AFFECTING THE PART DESIGNATED (C) IN PLAN WITH AC363119. EXPIRES: 30/4/2026.
- 30 U149333 LEASE TO COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION OF PART BEING E6B SHOWN HATCHED IN PLAN WITH U149333. EXPIRES 28.2.2043
- 31 DP1002910 RIGHT OF CARRIAGEWAY 6 METRE(S) WIDE AND VARIABLE AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM APPURTENANT TO THE PART FORMERLY COMPRISED IN LOT10 DP1002910
- 32 DP1015627 RIGHT OF WAY 4 WIDE AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM
- 33 AD441295 LEASE TO CAMPUS LIVING FUNDS MANAGEMENT LIMITED OF LOT 181 KNOWN AS MACQUARIE UNIVERSITY VILLAGE, 22 CULLODEN ROAD, RYDE. EXPIRES: 31/12/2035.
- AD501938 LEASE OF LEASE AD441295 TO CAMPUS LIVING ACCOMMODATION COMPANY LIMITED EXPIRES: 31/12/2010.
- AD602914 MORTGAGE OF LEASE AD501938 TO NATIONAL AUSTRALIA

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

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SECOND SCHEDULE (46 NOTIFICATIONS) (CONTINUED)

-
- TRUSTEES LIMITED
AD602915 MORTGAGE OF LEASE AD441295 TO NATIONAL AUSTRALIA
TRUSTEES LIMITED
- 34 AD779068 LEASE TO ACCESS MACQUARIE LIMITED OF FLOORS 3 AND 4
OF BLOCK E3B. EXPIRES: 31/12/2012. OPTION OF RENEWAL: 5
YEARS.
- 35 AE374591 POSITIVE COVENANT
- * 36 AE617163 CAVEAT BY ENERGYAUSTRALIA AFFECTING LOT 114 IN
DP1129623
- * AF122879 CAVEATOR CONSENTED
- * 37 AE619771 CAVEAT BY ENERGYAUSTRALIA AFFECTING LOT 114 IN
DP1129623
- * AF122879 CAVEATOR CONSENTED
- * 38 AE661415 CAVEAT BY ENERGYAUSTRALIA AFFECTING LOT 114 IN
DP1129623
- * AF122879 CAVEATOR CONSENTED
- * 39 AE807757 CAVEAT BY ENERGYAUSTRALIA AFFECTING LOT 114 IN
DP1129623
- * AF122879 CAVEATOR CONSENTED
- 40 DP1129078 EASEMENT FOR WATER SUPPLY 2 METRE(S) WIDE AFFECTING
THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED
IN DP1129078
- 41 DP1129137 EASEMENT FOR ELECTRICITY SUBSTATION PURPOSES 3.3
METRE(S) WIDE AFFECTING THE PART(S) OF LOT 114 IN
DP1129623 SHOWN SO BURDENED IN DP1129137
- 42 DP1129137 EASEMENT FOR ELECTRICITY PURPOSES 2 METRE(S) WIDE
AFFECTING THE PART(S) OF LOT 114 IN DP1129623 SHOWN SO
BURDENED IN DP1129137
- 43 DP1129137 RIGHT OF CARRIAGEWAY VARIABLE WIDTH AFFECTING THE
PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN
DP1129137
- 44 DP1134313 RIGHT OF CARRIAGEWAY 4 METRE(S) WIDE AFFECTING THE
PART(S) OF LOT 114 IN DP1129623 SHOWN SO BURDENED IN
DP1134313
- 45 DP1134313 EASEMENT FOR ELECTRICITY AND OTHER PURPOSES 2 AND 3.3
METRE(S) WIDE AFFECTING THE PART(S) OF LOT 114 IN
DP1129623 SHOWN SO BURDENED IN DP1134313
- * 46 AF122879 LEASE TO ACCESS MACQUARIE LIMITED OF SUITES 301, 303,
305 TO 308, 314, 315 AND 317 TO 319, LEVEL 8, BUILDING
E7A, MACQUARIE UNIVERSITY. EXPIRES: 31/12/2011.

NOTATIONS

DP269228 NOTE: PLAN OF PROPOSED EASEMENT FOR WATER SUPPLY AFFECTING
LOT 114 IN DP1129623

DP269297 NOTE: PLAN OF PROPOSED RIGHT OF CARRIAGEWAY AFFECTING LOT

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH
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NOTATIONS (CONTINUED)

182 IN DP1112777
DP269858 NOTE: PLAN IS FOR PROPOSED RIGHT OF CARRIAGEWAY AFFECTING
LOT 182 IN DP1112777
DP1022219 NOTE: PLAN OF PROPOSED EASEMENT (S) AFFECTING LOT 114 IN
DP1129623
DP1027394 NOTE: PLAN IS FOR LEASE PURPOSES AFFECTING LOT 114 IN
DP1129623
DP1045836 NOTE: PLAN FOR LEASE PURPOSES BEING SUBSTATION PREMISES NO
4873 AFFECTING LOT 114 IN DP1129623
UNREGISTERED DEALINGS: DP1145723.

SCHEDULE OF PARCELS

LOT 181 IN DP1112777
LOT 114 IN DP1129623

TITLE DIAGRAM

DP1112777
DP1129623.

*** END OF SEARCH ***

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* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register. Leap Searching hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 92B(2) of the Real Property Act.



Photo 1: Aerial Photograph 1930

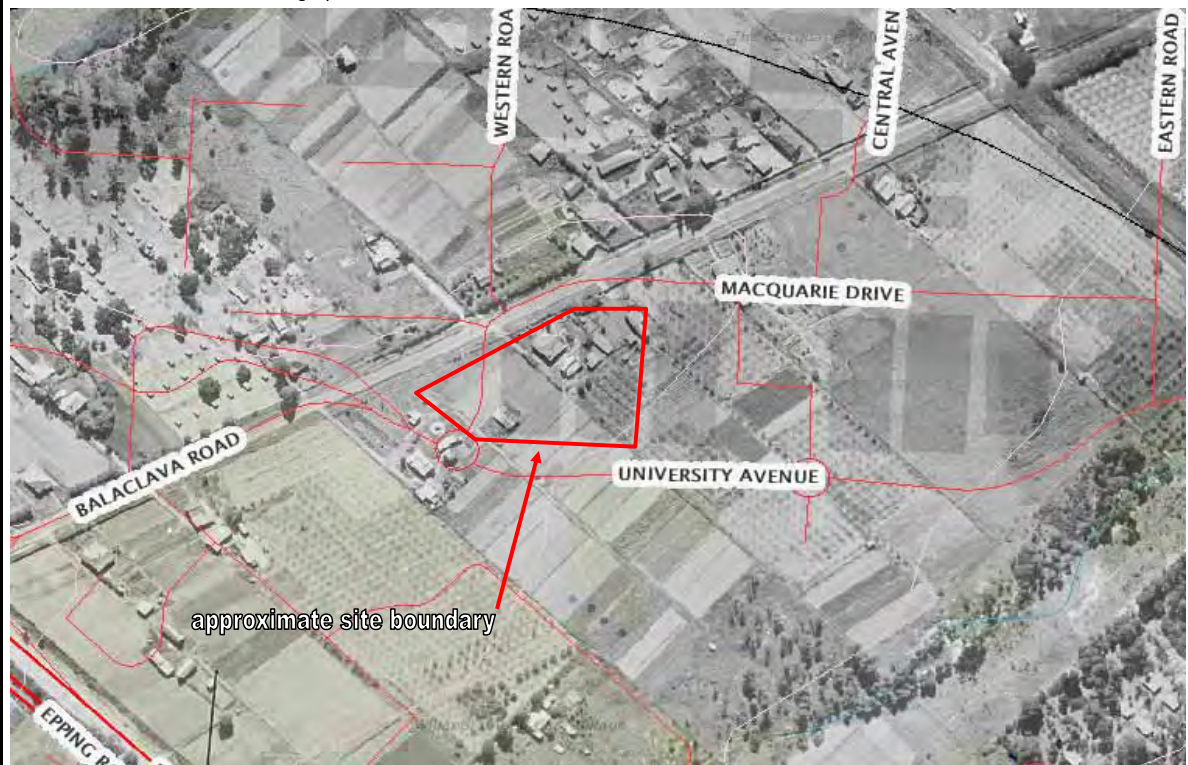


Photo 2: Aerial Photograph 1943

Phase 2 Contamination Assessment
Proposed Macquarie University Hearig Hub
University Avenue, Macquarie Park

Project
71683.01

April
2010

Plate
1



Photo 3: Aerial Photograph 1951



Photo 4: Aerial Photograph 1961

Phase 2 Contamination Assessment
Proposed Macquarie University Hearig Hub
University Avenue, Macquarie Park

Project
71683.01

April
2010

Plate
2



Photo 5: Aerial Photograph 1970

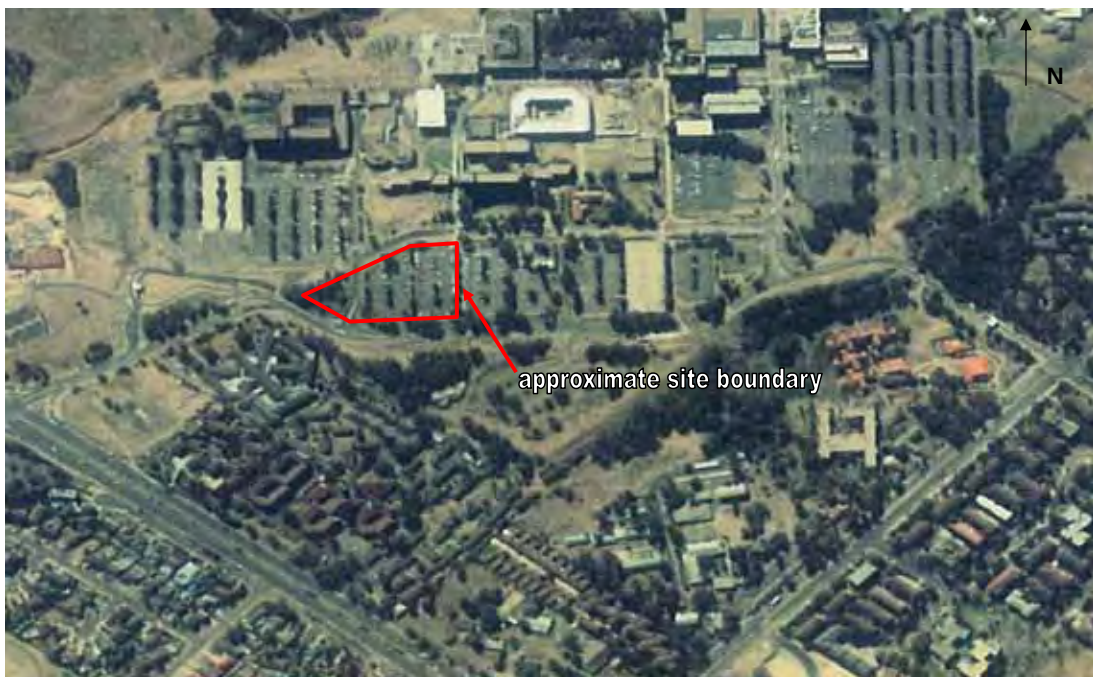


Photo 6: Aerial Photograph 1986

Phase 2 Contamination Assessment
Proposed Macquarie University Hearig Hub
University Avenue, Macquarie Park

Project
71683.01

April
2010

Plate
3



Photo 7: Aerial Photograph 2007

Phase 2 Contamination Assessment
Proposed Macquarie University Hearig Hub
University Avenue, Macquarie Park

Project
71683.01

April
2010

Plate
4

Locked Bag 2069, North Ryde NSW 1670
DX 8403 Ryde
Facsimile 9952 8070
Telephone 9952 8222

City of Ryde



**PLANNING CERTIFICATE UNDER
SECTION 149 ENVIRONMENTAL PLANNING
AND ASSESSMENT ACT, 1979**

Cert No: PLN2009/1339
Date: 27 May 2009
Your Ref:

Applicant: Douglas Partners
96 Hermitage Road
WEST RYDE NSW 2114

DOUGLAS PARTNERS

5 JUN 2009

Property: 192 Balaclava Rd MACQUARIE PARK NSW 2113
Description: Lot 114 DP 1129623

Ppty Ref: 543339

INFORMATION PROVIDED PURSUANT TO SECTION 149(2) OF THE ACT.

1. NAMES OF RELEVANT LOCAL ENVIRONMENTAL PLANS, DRAFT LOCAL ENVIRONMENTAL PLANS, DEVELOPMENT CONTROL PLANS, STATE ENVIRONMENTAL PLANNING POLICIES AND REGIONAL ENVIRONMENTAL PLANS APPLYING TO THE LAND

a) LOCAL ENVIRONMENTAL PLAN AND DEEMED ENVIRONMENTAL PLANNING INSTRUMENTS

Ryde Planning Scheme - 1 June 1979 as amended.

b) DRAFT LOCAL ENVIRONMENTAL PLANS as exhibited under Section 66(1) (b) of the Act

Draft Ryde Local Environmental Plan 2008

Zone B4 Mixed Use

Objectives of zone

To provide a mixture of compatible land uses.

To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.

To create vibrant, active and safe communities and economically sound employment centres.

To create safe and attractive environments for pedestrians.

To recognise and reinforce topography, landscape setting and unique location in design and land-use.

1. Permitted without consent

Home based child care; Home occupations;

2. Permitted with consent

Boarding houses; Building identification signs; Business identification signs; Business premises; Child care centres; Community facilities; Educational establishments; Entertainment facilities; Function centres; Hotel or motel accommodation; Information and education facilities; Office premises; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Retail premises; Roads; Seniors housing; Shop top housing; Any other development not specified in 1 or 3.

3. Prohibited

Advertisements (except Building identification signs and Business identification signs); Agriculture; Biosolid waste applications; Biosolids treatment facilities; Brothels; Depots; Hazardous industries; Hazardous storage establishments; Heavy industries; Home occupation (sex services); Liquid fuel depots; Offensive industries; Offensive storage establishments; Sex service premises; Stock and sale yards; vehicle body repair workshops; Vehicle repair stations; Vehicle sales or hire premises; Waste or resource management facilities; Water recycling facilities; Water treatment facilities.

Draft Ryde Local Environmental Plan 2008

Zone SP2 Infrastructure - University.

Objectives of zone

To provide for infrastructure and related uses.

To prevent development that is not compatible with or that may detract from the provision of infrastructure.

To ensure the orderly development of the land.

To ensure that development does not have an adverse effect upon nearby land.

1. Permitted without consent

Nil

2. Permitted with consent

The purpose shown on the Land Zoning Map , including any development that is ordinarily incidental or ancillary to development for that purpose; Public utility undertakings; Recreation areas; Roads.

3. Prohibited

Any development not specified in Items 1 and 2.

Under draft Local Environmental Plan 2008 the property 192 Balaclava Road Marsfield (Macquarie University) is listed in Schedule 1 Additional permitted uses as follows:

(1) This clause applies to land at 192 Balaclava Road Marsfield (Macquarie University) being part Lot 18 DP1058168

(2) Development for the purpose of agriculture, dwelling houses, hospitals, places of public worship, service stations and residential accommodation (associated with the University)

c) DEVELOPMENT CONTROL PLANS

City of Ryde Development Control Plan 2006.

Attention is drawn to Part 4.5 Macquarie Park Corridor North Ryde of DCP 2006.

Development Control Plan No.34 – Exempt and Complying Development.

**d) STATE AND REGIONAL ENVIRONMENTAL PLANNING POLICIES AND INSTRUMENTS
(includes Draft Policies)**

The Minister for Planning has notified Council that the following State Environmental Planning Policies and Regional Environmental Plans apply to the land and should be specified in this certificate:

State Environmental Planning Policies

State Environmental Planning Policy No. 1 - Development Standards.

State Environmental Planning Policy No. 4 - Development Without Consent and Miscellaneous Exempt and Complying Development.

State Environmental Planning Policy No. 6 - Number of Storeys in a Building.

State Environmental Planning Policy No. 10 - Retention of Low Cost Rental Accommodation (as amended).

State Environmental Planning Policy No. 19 - Bushland in Urban Areas

State Environmental Planning Policy No. 21 - Caravan Parks.

State Environmental Planning Policy No. 22 - Shops and Commercial Premises (as amended).

State Environmental Planning Policy No. 32 - Urban Consolidation.

State Environmental Planning Policy No. 33 - Hazardous and Offensive Development

State Environmental Planning Policy No. 50 - Canal Estate Development

State Environmental Planning Policy No. 55 - Remediation of Land.

State Environmental Planning Policy No.62 - Sustainable Aquaculture

State Environmental Planning Policy No. 64 - Advertising and Signage

State Environmental Planning Policy No. 65 - Design Quality of Residential Flat Development.

State Environmental Planning Policy No. 70 - Affordable Housing (Revised Schemes).

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (as amended).

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

State Environmental Planning Policy (Temporary Structures and Places of Public Entertainment) 2007.

State Environmental Planning Policy (Repeal of Concurrence and Referral Provisions) 2004.

State Environmental Planning Policy (Major Projects) 2005 (as amended).

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Draft State Environmental Planning Policy No. 66 - Integration of Land Use and Transport 2001.

Draft State Environmental Planning Policy (Application of Development Standards) 2004.

State Environmental Planning Policy (Infrastructure) 2007.

Regional Environmental Plans

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

2. ZONING AND LAND USE UNDER RELEVANT LOCAL ENVIRONMENTAL PLANS

For each local environmental plan and deemed environmental planning instrument applying to the land that includes the land in any zone (however described):-

(a) ZONING

Business Special - Mixed Activity
Reserved for Proposed County Road
Special Uses 'C' - University

(b) ZONING TABLE

The purposes for which development may or may not be carried out in accordance with the above Zone are as follows:-

Business Special - Mixed Activity

PURPOSES PERMISSIBLE WITHOUT CONSENT
Nil

PURPOSES PERMISSIBLE WITH CONSENT
Any purpose other than those referred to as prohibited

PURPOSES PROHIBITED
Brothels; caravan parks; car repair stations; gas holders; offensive or hazardous industries; industries referred to in Schedule 3 of the Ordinance; junk yards; liquid fuel depots; motor showrooms.

Reserved for Proposed County Road

Enquiries regarding this reservation should be directed to the Roads and Traffic Authority.

Council may, with the consent of the Commissioner for Main Roads, consent to the erection of a building, the carrying out or alteration of a work of a permanent character or the making or altering of a permanent excavation, where, in Council's opinion, the purpose for which the land is reserved cannot be carried into effect within a reasonable time.

No development which would spoil or waste land so as to render it unfit for the purpose for which it is reserved is permitted.

Special Uses 'C' - University

PURPOSES PERMISSIBLE WITHOUT CONSENT
Nil

PURPOSES PERMISSIBLE WITH CONSENT
Agriculture; drainage; dwelling-houses; hospitals; open space; places of public worship; purposes ordinarily incidental or subsidiary to university purposes; roads; service stations;

telecommunications facilities; university colleges; university hostels; universities; utility installations (other than gas holders or generating works)

PURPOSES PROHIBITED

Any purpose other than those permissible with consent.

Environmentally Sensitive Land

The land has been identified by Council as being 'environmentally sensitive land'. The use of exempt and complying development provisions within Local Environmental Plan No.116 gazetted on the 25 November 2005 may be restricted.

A map identifying all such land and known as 'Environmentally Sensitive Areas For Exempt and Complying Development' is available for viewing at Council's Customer Service Centre.

(c) DEVELOPMENT STANDARDS FOR THE ERECTION OF A DWELLING HOUSE

The Ryde Planning Schema Ordinance provides that a dwelling house shall not be erected on an allotment of land within any residential zone unless the allotment has a minimum area of 740sq.m (exclusive of access corridor) and a minimum 3m wide road frontage and access corridor width for hatchet-shaped allotments. A minimum area of 580sq.m, a minimum road frontage of 10m and a minimum width of 15m at a distance of 7.5m from the road alignment is required for other allotments.

Under the Draft Plan no development standards apply to the land that fix minimum land dimensions for the erection of a dwelling – house on the land.

(d) CRITICAL HABITAT

NO. The land does not include or comprise critical habitat under the Ryde Planning Scheme.

NO. The land does not include or comprise critical habitat under Draft Ryde Local Environmental Plan 2008.

(e) CONSERVATION AREA (however described)

NO. The land has not been identified as being within a heritage conservation area under the Ryde Planning Scheme.

NO. The land has not been identified as being within a heritage conservation area under the Draft Plan

(f) ITEMS OF ENVIRONMENTAL HERITAGE (however described)

YES. An item of environmental heritage under the Ryde Planning Scheme is situated on the land.

YES. An item of environmental heritage under the Draft Plan is situated on the land.

OTHER PRESCRIBED INFORMATION

3. COMPLYING DEVELOPMENT

Whether or not the land is land on which no complying development may be carried out under the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 and, if no complying development may be carried out on that land under that Policy, the reason why complying development may not be carried out on that land.

No. Complying development under SEPP (Exempt and Complying Development Codes) 2008 may not be carried out on this land for the reason the land is not zoned R1, R2, R3, R4 or an equivalent residential zoning under an environmental planning instrument.

Note: Complying Development under *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* can only be carried out on a lot with an area not less than 580 square metres (for a non hatchet-shaped allotment) or not less than 740 square metres (for a hatchet-shaped allotment).

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the Coastal Protection Act 1979, but only to the extent that the council has been so notified by the Department of Public Works

The land is not affected by the operation of section 38 or 39 of the Coastal Protection Act 1979.

5. MINE SUBSIDENCE

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

The land has not been proclaimed to be a mine subsidence district within the meaning of Section 15 of the Mine Subsidence Compensation Act, 1961.

6. ROAD WIDENING AND ROAD REALIGNMENT

Whether or not the land is affected by any road widening

The land is affected by road widening or road realignment under:

- | | |
|---|-----|
| (a) Division 2 of Part 3 of the Roads Act 1993; - | YES |
| (b) any environmental planning instrument; - | YES |
| (c) any resolution of Council; - | NO |

Contact the Roads and Traffic Authority for further information.

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Whether or not the land is affected by a policy adopted by the council, or adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by council, that restricts the development because of the likelihood of:

- | | |
|---|------|
| (i) landslip | NO. |
| (ii) bush fire | YES. |
| (iii) tidal inundation | NO. |
| (iv) subsidence | YES. |
| (v) acid sulphate soil | NO. |
| (vi) any other risk (other than flooding) | NO. |

Note: The fact that land has not been identified as being affected by a policy to restrict development because of the risks referred to does not mean that the risk is non-existent.

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

- 1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls. YES
- 2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls. YES
- 3) Words and expressions in this clause have the same meanings as in the instrument set out in the schedule to the standard instrument (Local Environmental Plans) Order 2006.

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument, deemed planning instrument or draft environmental planning instrument applying to the land provides for the acquisition of the land by a public authority, as referred to in section 27 of the Act

The Ryde Planning Scheme Ordinance provides for the acquisition of reserved land by a public authority as referred to Section 27 of the Environmental Planning and Assessment Act 1979.

9. CONTRIBUTIONS PLAN

The name of each contributions plan applying to the land:

City of Ryde Section 94 Development Contributions Plan 2007

10. BUSH FIRE PRONE LAND

The land described in this certificate is bush fire prone land in accordance with the Environmental Planning and Assessment Act, 1979.

11. MATTERS ARISING UNDER THE CONTAMINATED LAND MANAGEMENT ACT 1997

- (a) The land to which this certificate relates IS NOT within land declared to be an investigation area or remediation site under Part 3 of the Act.
- (b) The land to which this certificate relates IS NOT subject to an investigation order or a remediation order within the meaning of the Act.
- (c) The land to which this certificate relate IS NOT the subject of a voluntary investigation proposal (or voluntary remediation proposal) the subject of the EPA's agreement under section 19 or 26 of the Act.
- (d) The land to which this certificate relates IS NOT the subject of a site audit statement within the meaning of Part 4 of the Act.

12. PROPERTY VEGETATION PLANS

The land is not subject to a property vegetation plan under the Native Vegetation Act 2003.

13. ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

There has not been an order made under the Trees (Disputes between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

14. DIRECTIONS UNDER PART 3A

There is no direction in force under section 75P (2)(c1) of the Environmental Planning and Assessment Act 1979.

15. SENIORS HOUSING

There has not been any development consent granted since 12 October 2007 for development to which State Environment Planning Policy (Housing for seniors or People with a Disability) 2004 applies.

ADDITIONAL INFORMATION PROVIDED UNDER SECTION 149(5) OF THE ACT

Environmental planning instruments or development control plans may place restrictions on matters such as:

- i) the purpose for which buildings, works or land may be erected, carried out or used;
- ii) the extent of development permitted;
- iii) minimum site requirements; and/or

- iv) the means of vehicular access to the land.

The instruments and the plans should be examined in relation to the specific restrictions which may apply to any development which may be proposed.

The land is subject to a Tree Preservation Order and Tree Management Policy, details of which are available at Council's Customer Service Centre.

There are exemptions from Council's Tree Preservation Order and Tree Management Policy relating to various species of trees; noxious trees; dying, dead or dangerous trees; and trees within three (3) metres of certain buildings.

Council has established a Significant Tree Register. Inclusion of a tree in the Register means that exemptions from the Tree Preservation Order will not apply to that tree.

Registers of Consents may be examined at Council's Customer Service Centre for particulars relating to development consents which may have been issued for the use or development of the land.

Enquiries regarding areas Reserved for County Road and County Open Space should be directed to the Roads and Traffic Authority and Department of Urban Affairs and Planning respectively.

The information provided concerning the Coastal Protection Act, 1979 is only to the extent that the Council has been notified by the Department of Public Works and Services.

Council has adopted by resolution a policy concerning the management of contaminated land. This policy applies to all land in the City of Ryde and will restrict development of the land if the circumstances set out in the policy prevail. Copies of the policy are available on Council's Website at www.ryde.nsw.gov.au.

FURTHER ADDITIONAL INFORMATION UNDER SECTION 149(5) OF THE ACT

The following Draft Development Control Plans apply to the land:-

City of Ryde Draft Development Control Plan 2008

Bush Fire Prone Land

The following map indicates the property has been identified as bush fire prone land: City of Ryde - Bush Fire Prone Land Map certified by the Commissioner for the NSW Rural Fire Service.

Bushland

The following studies /internal reports indicate the land may contain both endangered and inadequately conserved bushland: Urban Bushland in the Ryde LGA by OCULUS Landscape Architecture Urban Design Environmental Planning April 2001.

This report identifies that the subject property contains both endangered and inadequately conserved bushland. Details are available by inspection of the report and maps held by Council's Customer Service Centre. For any proposed development of the land existing endangered bushland must be retained and all proposed development must take into account any aspects that may adversely effect the sustainability of the subject bushland. For development of land containing inadequately conserved bushland further investigation may be required to determine the condition and value of the existing bushland.

The Commonwealth Minister for the Environment and Heritage has listed the Blue Gum High Forest and the Turpentine Ironbark Forest of the Sydney Basin Bioregion as critically endangered ecological communities under the Environment Protection and Biodiversity and Conservation Act 1999, which is Federally administered legislation.

Council records show that your property may contain a Turpentine-Ironbark Forest community. Any action or activity that is proposed on this land which, is likely to have a significant impact on this endangered community, must be referred to the Minister for assessment and approval. It is the proponents responsibility to obtain this approval and any questions relating to this can be referred to the Department of the Environment Heritages Community Information Unit on 1800 803 772.

Heritage

The property is within 100 metres of a heritage item as listed in Schedule 15 of the Ryde Planning Scheme Ordinance. Your attention is drawn to Clause 88 of the Ordinance which addresses the need to assess the impact of proposed development on properties in the vicinity of a heritage item on the heritage significance, visual curtilage and setting of the heritage item itself.

Demolition of a Building

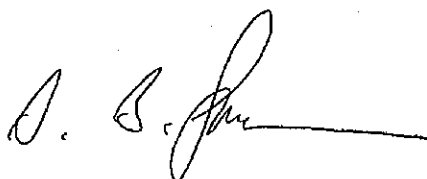
Council consent is required for the demolition in whole or in part of any buildings on the site and may be required for any building works or changes to the appearance of the building on the site . Contact Council's Customer Service Centre for further information.

Subsidence

The following studies/reports indicate that the land is subject to subsidence: Maps Titled - 'Instability Risk Zones in the City of Ryde' dated 22 August, 2003 to be read in conjunction with Report titled 'Ryde City Council Instability Risk Zones - City of Ryde Geotechnical Advice - Areas of Extensive Man- made fill' 23 June 2003 by Geotechnique Pty Ltd. These maps and reports identify that the subject land is affected by subsidence risk. Details are available by inspection of the maps and report held by Council's Customer Service Centre. For proposed development of geotechnical report may be required to accurately define the degree of risk associated with the proposed development.

Master Plan - Macquarie Park Corridor, North Ryde adopted 17 February 2004 applies to the land.

Note: The information in this certificate is current as of the date of the certificate.



Dominic Johnson
Group Manager – Environment and Planning



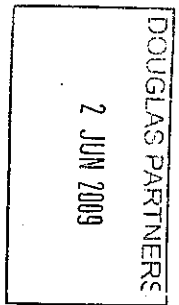
Locked Bag 2069, North Ryde NSW 1670
DX 8403 Ryde
Facsimile 9952 8070
Telephone 9952 8222

City of Ryde



**PLANNING CERTIFICATE UNDER
SECTION 149 ENVIRONMENTAL PLANNING
AND ASSESSMENT ACT, 1979**

Cert No: PLN2009/1340
Date: 27 May 2009
Your Ref:



Applicant: Douglas Partners
96 Hermitage Road
WEST RYDE NSW 2114

Property: 105 Culloden Rd MACQUARIE PARK NSW 2113
Description: Lot 8 DP 1047085

Ppty Ref: 536246

INFORMATION PROVIDED PURSUANT TO SECTION 149(2) OF THE ACT.

1. NAMES OF RELEVANT LOCAL ENVIRONMENTAL PLANS, DRAFT LOCAL ENVIRONMENTAL PLANS, DEVELOPMENT CONTROL PLANS, STATE ENVIRONMENTAL PLANNING POLICIES AND REGIONAL ENVIRONMENTAL PLANS APPLYING TO THE LAND

a) LOCAL ENVIRONMENTAL PLAN AND DEEMED ENVIRONMENTAL PLANNING INSTRUMENTS

Ryde Planning Scheme - 1 June 1979 as amended.

b) DRAFT LOCAL ENVIRONMENTAL PLANS as exhibited under Section 66(1) (b) of the Act

Draft Ryde Local Environmental Plan 2008

Zone SP2 Infrastructure - University.

Objectives of zone

To provide for infrastructure and related uses.

To prevent development that is not compatible with or that may detract from the provision of infrastructure.

To ensure the orderly development of the land.

To ensure that development does not have an adverse effect upon nearby land.

1. Permitted without consent

Nil

2. Permitted with consent

The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose; Public utility undertakings; Recreation areas; Roads.

3. Prohibited

Any development not specified in Items 1 and 2.

Under draft Local Environmental Plan 2008 the property 192 Balaclava Road Marsfield (Macquarie University) is listed in Schedule 1 Additional permitted uses as follows:

- (1) This clause applies to land at 192 Balaclava Road Marsfield (Macquarie University) being part Lot 18 DP1058168
- (2) Development for the purpose of agriculture, dwelling houses, hospitals, places of public worship, service stations and residential accommodation (associated with the University)

c) DEVELOPMENT CONTROL PLANS

City of Ryde Development Control Plan 2006.

Attention is drawn to Part 4.5 Macquarie Park Corridor North Ryde of DCP 2006.

Development Control Plan No. 34 – Exempt and Complying Development.

d) STATE AND REGIONAL ENVIRONMENTAL PLANNING POLICIES AND INSTRUMENTS (includes Draft Policies)

The Minister for Planning has notified Council that the following State Environmental Planning Policies and Regional Environmental Plans apply to the land and should be specified in this certificate:

State Environmental Planning Policies

State Environmental Planning Policy No. 1 - Development Standards.

State Environmental Planning Policy No. 4 - Development Without Consent and Miscellaneous Exempt and Complying Development.

State Environmental Planning Policy No. 6 - Number of Storeys in a Building.

State Environmental Planning Policy No. 10 - Retention of Low Cost Rental Accommodation (as amended).

State Environmental Planning Policy No. 19 - Bushland in Urban Areas

State Environmental Planning Policy No. 21 - Caravan Parks.

State Environmental Planning Policy No. 32 - Urban Consolidation.

State Environmental Planning Policy No. 33 - Hazardous and Offensive Development

State Environmental Planning Policy No. 50 - Canal Estate Development

State Environmental Planning Policy No. 55 - Remediation of Land.

State Environmental Planning Policy No.62 - Sustainable Aquaculture

State Environmental Planning Policy No. 64 - Advertising and Signage

State Environmental Planning Policy No. 65 - Design Quality of Residential Flat Development.

State Environmental Planning Policy No. 70 - Affordable Housing (Revised Schemes).

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (as amended).

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

State Environmental Planning Policy (Temporary Structures and Places of Public Entertainment) 2007.

State Environmental Planning Policy (Repeal of Concurrence and Referral Provisions) 2004.

State Environmental Planning Policy (Major Projects) 2005 (as amended).

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Draft State Environmental Planning Policy No. 66 - Integration of Land Use and Transport 2001.

Draft State Environmental Planning Policy (Application of Development Standards) 2004.

State Environmental Planning Policy (Infrastructure) 2007.

State Environmental Planning Policy (Repeal of Concurrence and Referral Provisions) 2008.

State Environmental Planning Policy (Seniors Living) 2004(as amended).

Regional Environmental Plans

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

2. ZONING AND LAND USE UNDER RELEVANT LOCAL ENVIRONMENTAL PLANS

For each local environmental plan and deemed environmental planning instrument applying to the land that includes the land in any zone (however described):-

(a) ZONING

Special Uses 'C' - University

(b) ZONING TABLE

The purposes for which development may or may not be carried out in accordance with the above Zone are as follows:-

Special Uses 'C' - University

PURPOSES PERMISSIBLE WITHOUT CONSENT

Nil

PURPOSES PERMISSIBLE WITH CONSENT

Agriculture; drainage; dwelling-houses; hospitals; open space; places of public worship; purposes ordinarily incidental or subsidiary to university purposes; roads; service stations; telecommunications facilities; university colleges; university hostels; universities; utility installations (other than gas holders or generating works)

PURPOSES PROHIBITED

Any purpose other than those permissible with consent.

Environmentally Sensitive Land

The land has been identified by Council as being 'environmentally sensitive land'. The use of exempt and complying development provisions within Local Environmental Plan No.116 gazetted on the 25 November 2005 may be restricted.

A map identifying all such land and known as 'Environmentally Sensitive Areas For Exempt and Complying Development' is available for viewing at Council's Customer Service Centre.

(c) DEVELOPMENT STANDARDS FOR THE ERECTION OF A DWELLING HOUSE

The Ryde Planning Schema Ordinance provides that a dwelling house shall not be erected on an allotment of land within any residential zone unless the allotment has a minimum area of 740sq.m (exclusive of access corridor) and a minimum 3m wide road frontage and access corridor width for hatchet-shaped allotments. A minimum area of 580sq.m, a minimum road frontage of 10m and a minimum width of 15m at a distance of 7.5m from the road alignment is required for other allotments.

Under the Draft Plan no development standards apply to the land that fix minimum land dimensions for the erection of a dwelling – house on the land.

(d) CRITICAL HABITAT

NO. The land does not include or comprise critical habitat under the Ryde Planning Scheme.

NO. The land does not include or comprise critical habitat under Draft Ryde Local Environmental Plan 2008.

(e) CONSERVATION AREA (however described)

NO. The land has not been identified as being within a heritage conservation area under the Ryde Planning Scheme..

No. The land has not been identified as being within a heritage conservation area under the Draft Plan

(f) ITEMS OF ENVIRONMENTAL HERITAGE (however described)

No. An item of environmental heritage under the Ryde Planning Scheme is not situated on the land.

No. An item of environmental heritage under the Draft Plan is not situated on the land.

OTHER PRESCRIBED INFORMATION

3. COMPLYING DEVELOPMENT

Whether or not the land is land on which no complying development may be carried out under the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 and, if no complying development may be carried out on that land under that Policy, the reason why complying development may not be carried out on that land.

No. Complying development under SEPP (Exempt and Complying Development Codes) 2008 may not be carried out on this land for the reason the land is not zoned R1, R2, R3, R4 or an equivalent residential zoning under an environmental planning instrument.

Note: Complying Development under *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* can only be carried out on a lot with an area not less than 580 square metres (for a non hatchet-shaped allotment) or not less than 740 square metres (for a hatchet-shaped allotment).

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the Coastal Protection Act 1979, but only to the extent that the council has been so notified by the Department of Public Works

The land is not affected by the operation of section 38 or 39 of the Coastal Protection Act 1979.

5. MINE SUBSIDENCE

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

The land has not been proclaimed to be a mine subsidence district within the meaning of Section 15 of the Mine Subsidence Compensation Act, 1961.

6. ROAD WIDENING AND ROAD REALIGNMENT

Whether or not the land is affected by any road widening

The land is not affected by any road widening or road realignment under:

- (a) Division 2 of Part 3 of the Roads Act 1993,
- (b) any environmental planning instrument
- (c) any resolution of Council.

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Whether or not the land is affected by a policy adopted by the council, or adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by council, that restricts the development because of the likelihood of:

- (i) landslip NO.
- (ii) bush fire NO.
- (iii) tidal inundation NO.
- (iv) subsidence NO.
- (v) acid sulphate soil NO.
- (vi) any other risk (other than flooding) NO.

Note: The fact that land has not been identified as being affected by a policy to restrict development because of the risks referred to does not mean that the risk is non-existent.

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

- 1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls. YES
- 2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls. YES
- 3) Words and expressions in this clause have the same meanings as in the instrument set out in the schedule to the standard instrument (Local Environmental Plans) Order 2006.

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument, deemed planning instrument or draft environmental planning instrument applying to the land provides for the acquisition of the land by a public authority, as referred to in section 27 of the Act

No environmental planning instrument, deemed environmental planning instrument or draft environmental planning instrument applying to the land provides for the acquisition of the land by a public authority as referred to in Section 27 of the Act.

9. CONTRIBUTIONS PLAN

The name of each contributions plan applying to the land:

City of Ryde Section 94 Development Contributions Plan 2007

10. BUSH FIRE PRONE LAND

The land described in this certificate is not bush fire prone land as defined under the Environmental Planning and Assessment Act 1979.

11. MATTERS ARISING UNDER THE CONTAMINATED LAND MANAGEMENT ACT 1997

- (a) The land to which this certificate relates IS NOT within land declared to be an investigation area or remediation site under Part 3 of the Act.
- (b) The land to which this certificate relates IS NOT subject to an investigation order or a remediation order within the meaning of the Act.
- (c) The land to which this certificate relate IS NOT the subject of a voluntary investigation proposal (or voluntary remediation proposal) the subject of the EPA's agreement under section 19 or 26 of the Act.
- (d) The land to which this certificate relates IS NOT the subject of a site audit statement within the meaning of Part 4 of the Act.

12. PROPERTY VEGETATION PLANS

The land is not subject to a property vegetation plan under the Native Vegetation Act 2003.

13. ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

There has not been an order made under the Trees (Disputes between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

14. DIRECTIONS UNDER PART 3A

There is no direction in force under section 75P (2)(c1) of the Environmental Planning and Assessment Act 1979.

15. SENIORS HOUSING

There has not been any development consent granted since 12 October 2007 for development to which State Environment Planning Policy (Housing for seniors or People with a Disability) 2004 applies.

ADDITIONAL INFORMATION PROVIDED UNDER SECTION 149(5) OF THE ACT

Environmental planning instruments or development control plans may place restrictions on matters such as:

- i) the purpose for which buildings, works or land may be erected, carried out or used;
- ii) the extent of development permitted;
- iii) minimum site requirements; and/or
- iv) the means of vehicular access to the land.

The instruments and the plans should be examined in relation to the specific restrictions which may apply to any development which may be proposed.

The land is subject to a Tree Preservation Order and Tree Management Policy, details of which are available at Council's Customer Service Centre.

There are exemptions from Council's Tree Preservation Order and Tree Management Policy relating to various species of trees; noxious trees; dying, dead or dangerous trees; and trees within three (3) metres of certain buildings.

Council has established a Significant Tree Register. Inclusion of a tree in the Register means that exemptions from the Tree Preservation Order will not apply to that tree.

Registers of Consents may be examined at Council's Customer Service Centre for particulars relating to development consents which may have been issued for the use or development of the land.

Enquiries regarding areas Reserved for County Road and County Open Space should be directed to the Roads and Traffic Authority and Department of Urban Affairs and Planning respectively.

The information provided concerning the Coastal Protection Act, 1979 is only to the extent that the Council has been notified by the Department of Public Works and Services.

Council has adopted by resolution a policy concerning the management of contaminated land. This policy applies to all land in the City of Ryde and will restrict development of the land if the circumstances set out in the policy prevail. Copies of the policy are available on Council's Website at www.ryde.nsw.gov.au.

FURTHER ADDITIONAL INFORMATION UNDER SECTION 149(5) OF THE ACT

The following Draft Development Control Plans apply to the land:-

City of Ryde Draft Development Control Plan 2008

Heritage

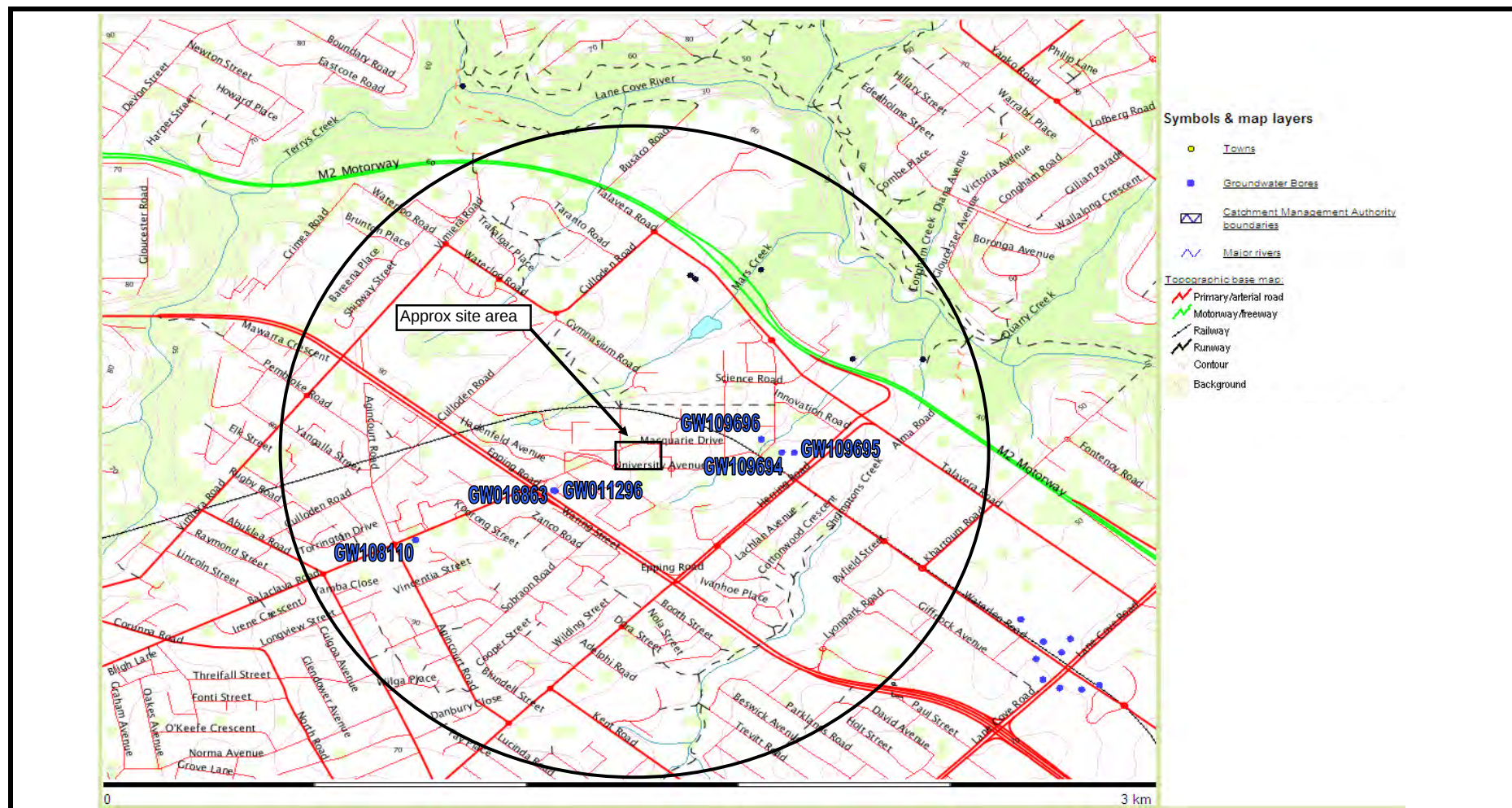
The property is within 100 metres of a heritage item as listed in Schedule 15 of the Ryde Planning Scheme Ordinance. Your attention is drawn to Clause 88 of the Ordinance which addresses the need to assess the impact of proposed development on properties in the vicinity of a heritage item on the heritage significance, visual curtilage and setting of the heritage item itself.

Master Plan - Macquarie Park Corridor, North Ryde adopted 17 February 2004 applies to the land.

Note: The information in this certificate is current as of the date of the certificate.



Dominic Johnson
Group Manager – Environment and Planning 



Groundwater Bores Within 1km Radius of Subject Site
Proposed Macquarie University Hub, University Drive, Macquarie Park
Macquarie University

Project
71683.01

April
2010

Plate
1

APPENDIX C
Site Photographs



Photo 1: Panorama of subject site taken from University Avenue facing north



Photo 2: Location of BH1 at the rear of car park W1



Photo 3: Location of BH2 adjacent to W1 and W2

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 2
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Photo 4: Location of BH3 facing Macquarie Drive



Photo 5: Walkway along eastern boundary of subject site (W2 car park) and C1 car park

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 3
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Photo 6: Facing south onto University Avenue from in front of W1 car park



Photo 7: Facing east along University Avenue beside W2 car park

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 4
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Photo 8: Walkway between W2 and C1 car park



Photo 9: Facing west from opposite side of University Avenue with subject site to the right of image

Phase 2 Contamination Assessment
Proposed Australian Hearing Hub
University Avenue, Macquarie Park

Project
71683.01

April
2010

Plate
5



Photo 10: Landscaped mounted on opposite side of Western road. Photo taken from outside of W1 car park

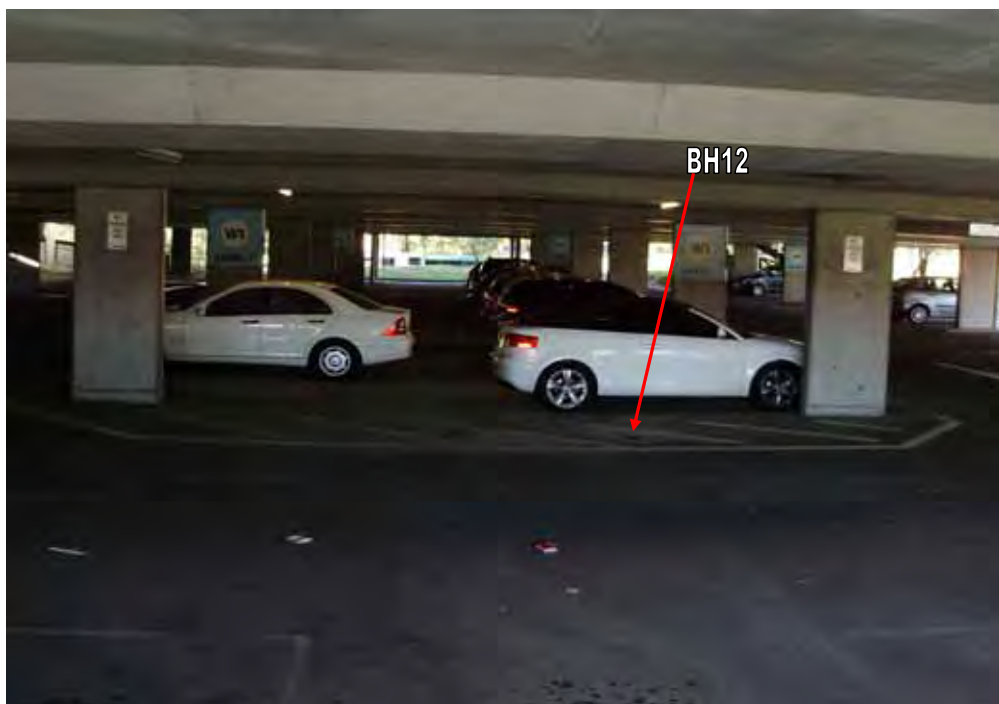


Photo 11: Location of BH12 within W1 car park facing south towards University Avenue

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 6
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Photo 12: BH14 located within car park W2



Photo 13: Location of BH15 within car park W2 facing east towards C1 car park

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 7
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Photo 14: BH16 within car park W2 facing south towards University Avenue



Photo 15: Car park ramp leading down from W1 to W2

Phase 2 Contamination Assessment Proposed Australian Hearing Hub University Avenue, Macquarie Park	Project 71683.01	April 2010	Plate 8
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APPENDIX D
Test Bore Logs
Notes Relating to this Report

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL

	BITUMINOUS CONCRETE
	CONCRETE
	TOPSOIL
	FILLING
	PEAT
	CLAY
	SILTY CLAY
	SILT
	SANDY CLAY
	GRAVELLY CLAY
	SHALY CLAY
	CLAYEY SILT
	SANDY SILT
	SAND
	CLAYEY SAND
	SILTY SAND
	GRAVEL
	SANDY GRAVEL
	COBBLES/BOULDER
	TALUS

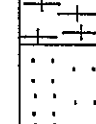
SEDIMENTARY ROCK

	BOULDER CONGLOMERATE
	CONGLOMERATE
	CONGLOMERATIC SANDSTONE
	SANDSTONE FINE GRAINED
	SANDSTONE COARSE GRAINED
	SILTSTONE
	LAMINITE
	MUDSTONE, CLAYSTONE, SHALE
	COAL
	LIMESTONE

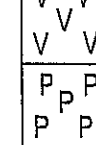
SEAMS

	SEAM >10mm
	SEAM <10mm

METAMORPHIC ROCK

	SLATE, PHYLLITE, SCHIST
	GNEISS
	QUARTZITE

IGNEOUS ROCK

	GRANITE
	DOLERITE, BASALT
	TUFF
	PORPHYRY



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Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 74.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 71683.01
DATE: 09 Apr 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
74	0.05	TOPSOIL - dark grey brown, silty clay topsoil with some grass rootlets, moist		A/E	0.0		PID<1ppm		Gatic cover
				A/E	0.1				Bentonite
				A/E	0.5		PID<1ppm		
		CLAY - stiff, brown clay with a trace of ironstone gravel, moist		A/E	0.6				
				A/E	0.8		PID<1ppm		
				A/E	1.0				
73	1.0	CLAY - stiff, mottled orange and light grey clay, moist		S	1.0		2,6,8 N = 14		
					1.45				
72	2.2	SHALE - very low strength, grey brown shale with ironstone bands			2.5				
71	3.5	SHALE/SILTSTONE - extremely low and very low strength, extremely and highly weathered, fragmented, light grey and grey brown, shale/siltstone with some clay bands and medium strength bands		R	3.5				
70	4.75			C	4.75				
69	5.6			C	5.6				
68	6.15	SILTSTONE - medium strength, highly weathered, fragmented and fractured, grey brown siltstone with some extremely low and very low to low strength bands			6.3		PL(A) = 0.6MPa		Backfilled with gravel
67	7.2			C	7.2		PL(A) = 0.4MPa		
66	7.45	LAMINITE - low to medium strength, highly to moderately weathered then fresh, fractured to slightly fractured, grey brown laminite (approximately 20% fine grained sandstone laminations)			7.9		PL(A) = 0.3MPa		
		8.0-8.30m: extremely low strength band							
65	8.5	LAMINITE - medium strength, fresh stained, slightly fractured, grey brown laminite (approximately 20-40% fine grained sandstone laminations and bands)			8.5		PL(A) = 0.3MPa		
					8.8		PL(A) = 0.3MPa		
					9.2		PL(A) = 0.4MPa		Machine slotted PVC screen

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: Uncased

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.5m; NMLC-Coring to 12.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. 10% water loss from 11.0m. Standpipe installed to 12.0m

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED

Initials:

Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 74.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 71683.01
DATE: 09 Apr 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
84	10.0	LAMINITE - high strength, fresh, slightly fractured, light grey and grey, laminite (approximately 50% fine grained sandstone laminations and bands)		C	10.14		PL(A) = 1.9MPa			
				10.25						
63	11			C	11.3		PL(A) = 1.9MPa			
62	12				12.0		PL(A) = 1.5MPa			
	12.15	Bore discontinued at 12.15m				12.15			12	End cap
61	13								13	
60	14								14	
59	15								15	
58	16								16	
57	17								17	
56	18								18	
55	19								19	

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: Uncased

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.5m; NMLC-Coring to 12.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. 10% water loss from 11.0m. Standpipe installed to 12.0m

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 74.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 2
PROJECT No: 71683.01
DATE: 01 Apr 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
74		FILLING - brown, silty sand filling with some gravel, humid		A/E*	0.1		PID<1ppm			
					0.3					
				A/E	0.5		PID<1ppm			
	0.8				0.7					
					0.8					
1		SHALE - very low strength, light grey shale		E	1.0		PID<1ppm			
				A	1.3		9,23/150mm refusal			
				S						
2										
2.8		SILTSTONE - alternate bands of very low to low and low to medium strength, extremely to highly weathered, fragmented, light grey and red brown siltstone with some medium strength ironstone bands		C	2.8					
3										
4										
4.05										
4.7				C			PL(A) = 0.3MPa			
5										
5.8										
5.85							PL(A) = 0.7MPa			
6		SILTSTONE - low to medium and medium strength, highly to moderately weathered, fragmented and highly fractured, dark grey and brown siltstone. Some very low to low strength bands		C	6.75		PL(A) = 0.6MPa			
7										
7.15							PL(A) = 0.4MPa			
7.5										
7.85		SANDSTONE - medium strength, moderately to slightly weathered then fresh, fractured to slightly fractured, light grey and grey brown, fine grained sandstone with approximately 20% siltstone bands and laminations								
8										
8.2				C			PL(A) = 0.5MPa			
8.8										
9.2							PL(A) = 0.7MPa			
9.7							PL(A) = 0.6MPa			
							PL(A) = 0.8MPa			

RIG: DT 100

DRILLER: Younan

LOGGED: Mikhail/SI

CASING: HQ to 2.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.0m; Rotary to 2.8m; NMLC-Coring to 11.9m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample
 *Denotes field replicate sample BD2/010410 collected

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
University Avenue, Macquarie Park

SURFACE LEVEL: 74.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 2
PROJECT No: 71683.01
DATE: 01 Apr 10
SHEET 2 OF 2

[illegible]

RIG: DT 100

DRILLER: Younan

LOGGED: Mikhail/SI

CASING: HQ to 2.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.0m; Rotary to 2.8m; NMLC-Coring to 11.9m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample
*Denotes field replicate sample BD2/010410 collected

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (s/50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	>	Water seep
		≡	Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 71.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 71683.01
DATE: 08 Apr 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.12	CONCRETE		A/E	0.12		PID<1ppm		Galic cover
	0.2	FILLING - brown silty clay filling with gravel		A/E	0.2		PID<1ppm		
		SHALE - very low strength, light grey brown shale			0.5				Bentonite
				E	0.8				
	1				1.0				
	1.4	SHALE - very low strength, light grey brown shale with ironstone bands		A/E	1.4		PID<1ppm		
				R	1.5				
	2.5	SILTSTONE - extremely low to very low then very low strength, extremely and highly weathered, fragmented and highly fractured, light grey and grey brown siltstone			2.5				
				C					Machine slotted PVC screen
	3.6				3.85				
				C					
	4.87	LAMINITE - medium strength, highly to moderately then slightly weathered, fractured to slightly fractured, light grey to grey and red brown laminite with some very low strength bands (50% siltstone and 50% fine grained sandstone)			4.85		PL(A) = 0.6MPa		
	4.93				4.95				
					5.45		PL(A) = 0.7MPa		
	5.73	SANDSTONE - high then medium strength, moderately to slightly weathered, fractured to slightly fractured, light grey brown to red brown, fine to medium grained sandstone			5.75		PL(A) = 1.8MPa		
				C					
					6.8		PL(A) = 0.6MPa		Backfilled with gravel
	7.1	LAMINITE - medium then high strength, fresh then moderately weathered, slightly fractured, light grey to grey and brown laminite (approximately 25% fine grained sandstone laminations and bands). Some very low strength bands			7.7		PL(A) = 0.9MPa		
	7.9	SANDSTONE - high strength, fresh stained to fresh, slightly fractured, light grey to grey, fine grained sandstone with siltstone laminations and bands. Some very low strength bands			7.9		PL(A) = 1.4MPa		
					8.0				
				C	8.55		PL(A) = 1.2MPa		
					9.3		PL(A) = 1.4MPa		
				C	9.52				

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: HW to 1.5m

TYPE OF BORING: Diatube to 0.12m; Solid flight auger to 1.5m; Rotary to 2.5m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. Standpipe installed to 12.0m

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED

Initials:

Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 71.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 71683.01
DATE: 08 Apr 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
61		SANDSTONE - high strength, fresh stained to fresh, slightly fractured, light grey to grey, fine grained sandstone with siltstone laminations and bands. Some very low strength bands (<i>continued</i>)		C	10.25		PL(A) = 1.9MPa			
11					11.05		PL(A) = 3.4MPa			
60					11.8		PL(A) = 1.1MPa			
12	12.0	Bore discontinued at 12.0m			12.0			12	End cap	
59										
13								13		
58										
14								14		
57										
15								15		
56										
16								16		
55										
17								17		
54										
18								18		
53										
19								19		
52										

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: HW to 1.5m

TYPE OF BORING: Diatube to 0.12m; Solid flight auger to 1.5m; Rotary to 2.5m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. Standpipe installed to 12.0m

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
			Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 70.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 4
PROJECT No: 71683.01
DATE: 07 Apr 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
	0.1	CONCRETE								
	0.5	FILLING - brown, sandy gravel filling with some clay, damp		A/E	0.2 0.3		PID<1ppm			
		SHALE - extremely low to very low strength, light grey shale		A/E	0.6 0.8		PID<1ppm			
	1									
	1.5			R						
	2.5	SILTSTONE - extremely low to very low strength, extremely to highly weathered, light grey and red brown, siltstone with some medium strength ironstone bands								
	3			C						
	3.55	SANDSTONE - low strength, highly to moderately weathered, fragmented, light grey and red brown, fine grained sandstone with some siltstone bands and high strength ironstone bands								
	4				3.6		PL(A) = 1MPa			
					4.2		PL(A) = 1.3MPa			
	5	LAMINITE - alternate bands of very low and high strength, slightly weathered, fractured, light grey and brown laminite (approximately 80% fine grained sandstone and 20% siltstone laminations and bands)		C						
	5.0				5.2		PL(A) = 1.7MPa			
	6	6.45m: grey and dark grey with increasing siltstone			6.5 6.6		PL(A) = 1.3MPa			
	7	LAMINITE - medium strength, slightly weathered, fractured, light grey to grey laminite (approximately 50% fine grained sandstone and 50% siltstone laminations and bands)			7.2		PL(A) = 2.6MPa			
	7.55	LAMINITE - high strength, fresh, slightly fractured, light grey to grey laminite (approximately 50% fine grained sandstone and 50% siltstone laminations and bands)		C						
	8				8.25		PL(A) = 1.4MPa			
	9				9.35 9.5		PL(A) = 1.2MPa			

RIG: Bobcat

DRILLER: Salib

LOGGED: Mikhail/SI

CASING: HW to 1.5m

TYPE OF BORING: Diatube to 0.1m; 100mm diameter solid flight auger (TC-bit) to 1.5m; Rotary to 2.5m; NMLC-Coring to 12.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 70.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 71683.01
DATE: 07 Apr 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
		LAMINITE - high strength, fresh, slightly fractured, light grey to grey laminite (approximately 50% fine grained sandstone and 50% siltstone laminations and bands) (continued)			10.25		PL(A) = 2.1MPa			
	11			C	11.1		PL(A) = 2.5MPa			
	12				12.0		PL(A) = 2.7MPa			
	12.2	Bore discontinued at 12.2m			12.2					
	13									
	14									
	15									
	16									
	17									
	18									
	19									

RIG: Bobcat

DRILLER: Salib

LOGGED: Mikhail/SI

CASING: HW to 1.5m

TYPE OF BORING: Diatube to 0.1m; 100mm diameter solid flight auger (TC-bit) to 1.5m; Rotary to 2.5m; NMLC-Coring to 12.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 5
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
73	0.3	FILLING - brown and grey, sand filling with some crushed shale gravel, humid		E	0.0		PID<1ppm			
		SHALE - very low strength, light grey shale			0.1					
1				A	0.8					
72	1.0									
2										
71										
3	3.0	SILTSTONE - low to medium strength, moderately to slightly weathered, fragmented, grey brown siltstone			3.0					
70										
4	3.55	SILTSTONE - medium and medium to high strength, moderately to slightly weathered then fresh stained, fragmented to highly fractured and fractured, grey to dark grey siltstone		C	3.9		PL(A) = 0.9MPa			
69					4.05					
5				C	4.55		PL(A) = 1MPa			
68										
6	5.85	SILTSTONE & SANDSTONE - medium strength, fresh, slightly fractured, grey siltstone and fine grained sandstone			5.6		PL(A) = 0.8MPa			
67					5.8					
7	6.6	LAMINITE - high strength, fresh stained then fresh, slightly fractured, light grey and grey, laminite (approximately 50% fine grained sandstone laminations and bands)			6.35		PL(A) = 0.8MPa			
66										
8				C	7.35		PL(A) = 2MPa			
65										
9					8.4		PL(A) = 1.5MPa			
64					8.65					
				C	8.85					
					9.25		PL(A) = 2.1MPa			

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: HW to 2.5m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		≡	Water level

CHECKED
Initials:
Date:



Douglas Partners
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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 5
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
10.2		LAMINITE - high strength, fresh stained then fresh, slightly fractured, light grey and grey, laminite (approximately 50% fine grained sandstone laminations and bands) (<i>continued</i>)		C	10.15		PL(A) = 1.2MPa			
11										
11.27		SANDSTONE - high strength, fresh, fractured and slightly fractured, light grey, fine grained sandstone			11.75		PL(A) = 2.6MPa			
12	12.0	Bore discontinued at 12.0m			12.0					
13										
14										
15										
16										
17										
18										
19										

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: HW to 2.5m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 6
PROJECT No: 71683.01
DATE: 01 Apr 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
73.0		FILLING - brown, silty sand filling with some clay, humid		A/E	0.0		PID<1ppm			
					0.1					
				A/E	0.4		PID<1ppm			
					0.6					
72.1	0.7	SILTY CLAY - very stiff, light grey and orange brown, silty clay, M<Wp, high plasticity		A/E	1.0		PID<1ppm		1	
71.2	1.2	SHALE - extremely low strength, light grey shale		S	1.45		5,10,14 N = 24			
		- becoming very low strength at 1.8m							2	
				R	2.5					
70.3	3.0	SILTSTONE - extremely low to very low strength, extremely to highly weathered, fragmented, light grey and brown, siltstone. Some medium strength ironstone bands		C	3.0				3	
					4.0				4	
				C					5	
68.5	5.22									
					6.1				6	
67.3	6.3	LAMINITE - very low and low strength, highly weathered, fragmented to highly fractured, grey brown laminite with medium to high strength ironstone bands			6.65		PL(A) = 1MPa			
67.7	7.05	LAMINITE - medium strength, slightly weathered, fractured to slightly fractured, grey laminite with approximately 20% fine grained sandstone laminations		C	7.15		PL(A) = 0.9MPa		7	
		7.4-7.65m: very low strength band								
67.8	8.13	LAMINITE - high strength, slightly weathered then fresh, slightly fractured and unbroken, light grey to grey laminite with approximately 30% fine grained sandstone laminations and bands			8.25		PL(A) = 1.9MPa		8	
					8.7					
67.4				C	9.05		PL(A) = 1.1MPa		9	

RIG: Bobcat

DRILLER: Salib

LOGGED: Mikhail/SI

CASING: HW to 3.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.5m; Rotary to 3.0m; NMLC-Coring to 11.85m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength 1s(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		□	Water level

CHECKED

Initials:

Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/---

BORE No: 6
PROJECT No: 71683.01
DATE: 01 Apr 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
63		LAMINITE - high strength, slightly weathered then fresh, slightly fractured and unbroken, light grey to grey laminite with approximately 30% fine grained sandstone laminations and bands (<i>continued</i>)		C	10.2		PL(A) = 1.7MPa			
62	11									11
					11.65		PL(A) = 1.8MPa			
61	11.85	Bore discontinued at 11.85m			11.85					12
60	12									13
59	13									14
58	14									15
57	15									16
56	16									17
55	17									18
54	18									19
53	19									

RIG: Bobcat

DRILLER: Salib

LOGGED: Mikhail/SI

CASING: HW to 3.0m

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.5m; Rotary to 3.0m; NMLC-Coring to 11.85m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 70.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 71683.01
DATE: 31 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
70.0		FILLING - brown, silty clay filling with some sand and gravel, M<Wp		A/E	0.1		PID<1ppm			
					0.3					
					0.5					
	0.7			A/E	0.7		PID<1ppm			
				B	0.8					
		SILTY CLAY - very stiff, orange brown and red brown, silty clay with a trace of ironstone gravel, M<Wp, high plasticity - becoming light grey and orange brown from 1.2m		A/E	1.0		PID<1ppm 5,10,14 N = 24		1	
				S	1.45					
	1.9									
		SHALE - very low strength, light grey shale			2.5				2	
				R						
	3.0				3.0				3	
		SANDSTONE - alternate bands of very low to low and medium strength, highly weathered, fragmented and highly fractured, light grey brown, fine grained sandstone with some high strength ironstone bands		C						
					4.0				4	
	4.25				4.15		PL(A) = 2.6MPa			
		LAMINITE - very low to low strength, highly weathered, fragmented and fractured, grey laminite with approximately 20% fine grained sandstone laminations. Some high strength bands			4.8		PL(A) = 1.4MPa		5	
	5.25									
		LAMINITE - high strength, slightly weathered then fresh stained, fractured to slightly fractured, light grey and grey, laminite with approximately 30% fine grained sandstone laminations and bands. Some very low strength bands		C	5.55		PL(A) = 1.8MPa		6	
					6.35		PL(A) = 1.1MPa			
	7.0				7.0				7	
		LAMINITE - high strength, fresh stained, slightly fractured, light grey and grey, laminite with approximately 20% fine grained sandstone laminations			7.2		PL(A) = 1.3MPa			
									8	
	8.55				8.35		PL(A) = 1.8MPa			
		LAMINITE - medium then medium to high strength, fresh, fractured to slightly fractured, light grey to grey, laminite with approximately 40% fine grained sandstone laminations and bands		C					9	
					9.55		PL(A) = 0.5MPa			

RIG: Bobcat

DRILLER: Steve S

LOGGED: SI

CASING: HW to 2.5m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: 15% water loss from 9.5m. M = Moisture content; Wp = Plastic Limit. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength ls(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED	
Initials:	
Date:	



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
University Avenue, Macquarie Park

SURFACE LEVEL: 70.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 7
PROJECT No: 71683.01
DATE: 31 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing			Water	Well Construction Details	
				Type	Depth	Sample		Results & Comments	
80		LAMINITE - medium then medium to high strength, fresh, fractured to slightly fractured, light grey to grey, laminite with approximately 40% fine grained sandstone laminations and bands <i>(continued)</i>		C	10.1		PL(A) = 1MPa		
					10.2				
59	11								
	11.45	SANDSTONE - very high strength, fresh, slightly fractured, light grey, fine grained sandstone with some siltstone laminations			11.5		PL(A) = 3.1MPa		
58	12 12.0	Bore discontinued at 12.0m			12.0				
57	13								
56	14								
55	15								
54	16								
53	17								
52	18								
51	19								

RIG: Bobcat

DRILLER: Steve S

LOGGED: S/

CASING: HW to 2.5m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 3.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: 15% water loss from 9.5m. M = Moisture content; Wp = Plastic Limit. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND		
A	Auger sample	pp Pocket penetrometer (kPa)
D	Disturbed sample	PID Photo ionisation detector
B	Bulk sample	S Standard penetration test
U	Tube sample (x mm dia.)	PL Point load strength ls(50) MPa
W	Water sample	V Shear Vane (kPa)
C	Core drilling	▷ Water seep
		≡ Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 72.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/-

BORE No: 8
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
72	0.3	FILLING - brown, silty sand filling with some clay, humid		E*	0.0		PID<1ppm		0.3m stickup	
		SILTY CLAY - stiff to very stiff, light grey and orange brown, silty clay, M<Wp, high plasticity		E	0.2		pp = 200kPa PID<1ppm		Bentonite pellet plug	
					0.4					
					0.6					
71	1.1	SHALE - very low strength, light grey shale							1	Backfilled with 20mm pea gravel
70	2								2	Machine slotted PVC screen
69	3								3	
	3.5	Bore discontinued at 3.5m - target depth reached								End-cap
68	4								4	
67	5								5	
66	6								6	
65	7								7	
64	8								8	
63	9								9	

RIG: DT 100

DRILLER: R Ennis

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 3.5m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample
 *Denotes field replicate sample BD2/290310 collected

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED

Initials:

Date:



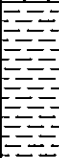
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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 74.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 9
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
74	0.1	TOPSOIL - brown, silty sand topsoil with some clay, a trace of gravel and rootlets, humid		E	0.0		PID<1ppm			
					0.1					
		FILLING - brown, silty clay filling with some sand and gravel, M<Wp		E	0.4		PID<1ppm			
					0.6					
73	0.9	SHALE - very low strength, light grey shale								
72	2.0	Bore discontinued at 2.0m - target depth reached								
71										
70										
69										
68										
67										
66										
65										

RIG: DT 100

DRILLER: R Ennis

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 76.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 10
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
76		FILLING - brown, silty sand filling with some clay, humid		E	0.0		PID<1ppm			
	0.3	SILTY CLAY - stiff to very stiff, light grey and orange brown, silty clay, M<Wp, high plasticity			0.2					
				E	0.6		pp = 200kPa PID<1ppm			
					0.8					
75	1									
	1.4	SHALE - very low strength, light grey shale								
74	2	Bore discontinued at 2.0m - target depth reached								
73	3									
72	4									
71	5									
70	6									
69	7									
68	8									
67	9									

RIG: DT 100

DRILLER: R Ennis

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 2.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	>	Water seep
		≡	Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
University Avenue, Macquarie Park

SURFACE LEVEL: 75.9 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 11
PROJECT No: 71683.01
DATE: 29 Mar 10
SHEET 1 OF 1

[illegible]

RIG: DT 100

DRILLER: R Ennis

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 1.5m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: M = Moisture content; Wp = Plastic Limit. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep
		≡	Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 12
PROJECT No: 71683.01
DATE: 06 Apr 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
73	0.08	ASPHALTIC CONCRETE		E	0.1		PID<1ppm			
	0.2	FILLING - grey, sandy gravel (roadbase) filling, humid		E	0.2					
		FILLING - brown and grey, silty clay filling with some gravel, humid		E	0.4		PID<1ppm			
	0.8	SHALE - extremely low strength, light grey shale		E	0.5					
1	1.0	Bore discontinued at 1.0m - target depth reached			0.8		PID<1ppm			
72					1.0					
2										
71										
3										
70										
4										
69										
5										
68										
6										
67										
7										
66										
8										
65										
9										
64										

RIG: 2T excavator

DRILLER: Brad

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 1.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

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

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 73.2 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 13
PROJECT No: 71683.01
DATE: 06 Apr 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
73	0.08	ASPHALTIC CONCRETE		E	0.2		PID<1ppm			
	0.3	FILLING - grey, sandy gravel (roadbase) filling, humid		E	0.3					
	0.6	SHALE - extremely low strength, light grey shale		E	0.4		PID<1ppm			
		Bore discontinued at 0.6m - target depth reached			0.6					
71	1									
70	2									
69	3									
68	4									
67	5									
66	6									
65	7									
64	8									
	9									

RIG: 2T excavator

DRILLER: Brad

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 0.6m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED

Initials:

Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
 University Avenue, Macquarie Park

SURFACE LEVEL: 72.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/-

BORE No: 14
PROJECT No: 71683.01
DATE: 06 Apr 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details	
				Type	Depth	Sample	Results & Comments			
72.3	0.06	ASPHALTIC CONCRETE		E	0.1		PID<1ppm			
	0.3	FILLING - grey, sandy gravel (roadbase) filling, humid			0.2					
		SHALE - extremely low strength, light grey shale		E	0.5		PID<1ppm			
	0.8	Bore discontinued at 0.8m - target depth reached			0.6					
71	1									
70	2									
69	3									
68	4									
67	5									
66	6									
65	7									
64	8									
63	9									

RIG: 2T excavator

DRILLER: Brad

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 0.8m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED

Initials:

Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
University Avenue, Macquarie Park

SURFACE LEVEL: 72.0 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 15
PROJECT No: 71683.01
DATE: 06 Apr 10
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing			Water	Well Construction Details	
				Type	Depth	Sample		Results & Comments	
72	0.05	ASPHALTIC CONCRETE		E	0.1		PID<1ppm		
	0.3	FILLING - grey, sandy gravel (roadbase) filling, humid		E	0.2		PID<1ppm		
	0.5	FILLING - brown, silty clay filling with some gravel, humid			0.3				
	0.8				0.4				
71	1.0	SILTY CLAY - stiff to very stiff, light grey and brown, silty clay with a trace of ironstone gravel, M<Wp, medium plasticity							
		SHALE - extremely low strength, light grey shale							
		Bore discontinued at 1.0m - target depth reached							
70	2								
69	3								
68	4								
67	5								
66	6								
65	7								
64	8								
63	9								

RIG: 2T excavator

DRILLER:Brad

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 1.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	>	Water seep
		≡	Water level

CHECKED
Initials:
Date:



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BOREHOLE LOG

CLIENT: Macquarie University
PROJECT: Phase 2 Contamination Assessment
LOCATION: Macquarie University Hearing Hub
University Avenue, Macquarie Park

SURFACE LEVEL: 71.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH 90°/--

BORE No: 16
PROJECT No: 71683.01
DATE: 06 Apr 10
SHEET 1 OF 1

[illegible]

RIG: 2T excavator

DRILLER: Brad

LOGGED: Mikhail

CASING: Uncased

TYPE OF BORING: 100mm diameter solid flight auger (TC-bit) to 1.2m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample

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

CHECKED
Initials:
Date:



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DESCRIPTION AND CLASSIFICATION OF ROCKS FOR ENGINEERING PURPOSES

DEGREE OF WEATHERING

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

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index ($I_{s(50)}$) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by Australian Standard 4133.4.1 - 1993.

Term	Symbol	Field Guide*	Point Load Index $I_{s(50)}$ MPa	Approx Unconfined Compressive Strength q_u ** MPa
Extremely low	EL	Easily remoulded by hand to a material with soil properties	<0.03	< 0.6
Very low	VL	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; too hard to cut a triaxial sample by hand. SPT will refuse. Pieces up to 3 cm thick can be broken by finger pressure.	0.03-0.1	0.6-2
Low	L	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long 40 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.	0.1-0.3	2-6
Medium	M	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.	0.3-1.0	6-20
High	H	Can be slightly scratched with a knife. A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow, rock rings under hammer.	1 - 3	20-60
Very high	VH	Cannot be scratched with a knife. Hand specimen breaks with pick after more than one blow, rock rings under hammer.	3 - 10	60-200
Extremely high	EH	Specimen requires many blows with geological pick to break through intact material, rock rings under hammer.	>10	> 200

Note that these terms refer to strength of rock material and not to the strength of the rock mass, which may be considerably weaker due to rock defects.

* The field guide assessment of rock strength may be used for preliminary assessment or when point load testing is not able to be done.

** The approximate unconfined compressive strength (q_u) shown in the table is based on an assumed ratio to the point load index of 20:1. This ratio may vary widely.

STRATIFICATION SPACING

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

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks. The orientation of rock defects is measured as an angle relative to a plane perpendicular to the core axis. Note that where possible, recordings of the actual defect spacing or range of spacings is preferred to the general terms given below.

Term	Description
Fragmented	The core consists mainly of fragments with dimensions less than 20 mm.
Highly Fractured	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured	Core lengths are mainly 40 mm - 200 mm with occasional shorter and longer sections.
Slightly Fractured	Core lengths are generally 200 mm - 1000 mm with occasional shorter and longer sections.
Unbroken	The core does not contain any fracture.

ROCK QUALITY DESIGNATION (RQD)

This is defined as the ratio of sound (i.e. low strength or better) core in lengths of greater than 100 mm to the total length of the core, expressed in percent. If the core is broken by handling or by the drilling process (i.e. the fracture surfaces are fresh, irregular breaks rather than joint surfaces) the fresh broken pieces are fitted together and counted as one piece.

SEDIMENTARY ROCK TYPES

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

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

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



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NOTES RELATING TO THIS REPORT

Introduction

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

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

Description and Classification Methods

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

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

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

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

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

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

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

Very dense greater than 50 greater than 25

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

Sampling

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

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

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

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

Drilling Methods.

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

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

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

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

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow

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

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

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

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

as 4, 6, 7
 N = 13

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

as 15, 30/40 mm.

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

Occasionally, the test method is used to obtain

samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

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

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

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

The information provided on the plotted results comprises: —

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

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

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

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

$$q_c \text{ (MPa)} = (0.4 \text{ to } 0.6) N \text{ (blows per 300 mm)}$$

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

$$q_c = (12 \text{ to } 18) c_u$$

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

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

soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

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

Two relatively similar tests are used.

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

Laboratory Testing

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

Bore Logs

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

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

Ground Water

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

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.

- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

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

Engineering Reports

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

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

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

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

Site Anomalies

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

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers,

Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

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APPENDIX E
Laboratory Reports
Chain-of-Custody Documentation



EnviroLab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 39691

Client:

Douglas Partners

96 Hermitage Rd

West Ryde

NSW 2114

Attention: Sylvie Anbardjian

Sample log in details:

Your Reference:

71683.01, Macquarie Uni Hearing Hub

No. of samples:

16 Soils

Date samples received:

08/04/10

Date completed instructions received:

08/04/10

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:

15/04/10

Date of Preliminary Report:

Not Issued

Issue Date:

14/04/10

NATA accreditation number 2901. This document shall not be reproduced except in full.

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Tests not covered by NATA are denoted with *.

Results Approved By:

Tania Notaras
Manager

Rhian Morgan
Metals Supervisor

Jacinta Hurst
Operations Manager

EnviroLab Reference: 39691

Revision No: R 00



vTPH & BTEX in Soil	UNITS	39691-1	39691-2	39691-3	39691-4	39691-5
Our Reference:	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH3/0.2-0.5	BH5/0-0.1	BH6/0-0.1
Your Reference	-----	1/04/2010	8/04/2010	8/04/2010	29/03/2010	1/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	10/4/10	10/4/10	10/4/10	10/4/10
vTPH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	130	140	74	123	121

vTPH & BTEX in Soil	UNITS	39691-6	39691-7	39691-8	39691-9	39691-10
Our Reference:	-----	BH7/0.1-0.3	BH7/0.8-1	BH8/0-0.2	BH9/0.4-0.6	BH10/0-0.2
Your Reference	-----	31/03/2010	31/03/2010	29/03/2010	29/03/2010	29/03/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	10/4/10	10/4/10	10/4/10	10/4/10	10/4/10
vTPH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	78	72	78	75	126

vTPH & BTEX in Soil	UNITS	39691-11	39691-12	39691-13	39691-14	39691-15
Our Reference:	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2	BH15/0.3-0.4	BH16/0.2-0.3
Your Reference	-----	6/04/2010	6/04/2010	6/04/2010	6/04/2010	6/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	10/4/10	10/4/10	10/4/10	10/4/10	10/4/10
vTPH C ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	79	77	73	80	67

sTPH in Soil (C10-C36)	UNITS	39691-1	39691-2	39691-3	39691-4	39691-5
Our Reference:	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH3/0.2-0.5	BH5/0-0.1	BH6/0-0.1
Your Reference	-----	1/04/2010	8/04/2010	8/04/2010	29/03/2010	1/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
TPH C10 - C14	mg/kg	<50	<50	<50	<50	<50
TPH C15 - C28	mg/kg	190	<100	<100	<100	<100
TPH C29 - C36	mg/kg	290	<100	<100	<100	<100
Surrogate o-Terphenyl	%	134	135	124	123	121

sTPH in Soil (C10-C36)	UNITS	39691-6	39691-7	39691-8	39691-9	39691-10
Our Reference:	-----	BH7/0.1-0.3	BH7/0.8-1	BH8/0-0.2	BH9/0.4-0.6	BH10/0-0.2
Your Reference	-----	31/03/2010	31/03/2010	29/03/2010	29/03/2010	29/03/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
TPH C10 - C14	mg/kg	<50	<50	<50	<50	<50
TPH C15 - C28	mg/kg	<100	<100	300	<100	<100
TPH C29 - C36	mg/kg	<100	<100	330	<100	<100
Surrogate o-Terphenyl	%	137	119	#	120	135

sTPH in Soil (C10-C36)	UNITS	39691-11	39691-12	39691-13	39691-14	39691-15
Our Reference:	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2	BH15/0.3-0.4	BH16/0.2-0.3
Your Reference	-----	6/04/2010	6/04/2010	6/04/2010	6/04/2010	6/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
TPH C10 - C14	mg/kg	<50	<50	<50	<50	<50
TPH C15 - C28	mg/kg	470	<100	140	1,100	<100
TPH C29 - C36	mg/kg	1,800	880	1,100	2,400	<100
Surrogate o-Terphenyl	%	#	125	129	#	119

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-1 BH2/0.1-0.3 1/04/2010 Soil	39691-2 BH3/0.12-0.2 8/04/2010 Soil	39691-3 BH3/0.2-0.5 8/04/2010 Soil	39691-4 BH5/0-0.1 29/03/2010 Soil	39691-5 BH6/0-0.1 1/04/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.5	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.5	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.4	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Surrogate p-Terphenyl-d14	%	110	113	109	113	109

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-6 BH7/0.1-0.3 31/03/2010 Soil	39691-7 BH7/0.8-1 31/03/2010 Soil	39691-8 BH8/0-0.2 29/03/2010 Soil	39691-9 BH9/0.4-0.6 29/03/2010 Soil	39691-10 BH10/0-0.2 29/03/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.4	<0.1	<0.1	<0.1	0.3
Pyrene	mg/kg	0.4	<0.1	<0.1	<0.1	0.3
Benzo(a)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Benzo(b+k)fluoranthene	mg/kg	0.4	<0.2	<0.2	<0.2	0.3
Benzo(a)pyrene	mg/kg	0.3	<0.05	<0.05	<0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Surrogate p-Terphenyl-d14	%	109	112	115	112	111

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-11 BH12/0.4-0.5 6/04/2010 Soil	39691-12 BH13/0.2-0.3 6/04/2010 Soil	39691-13 BH14/0.1-0.2 6/04/2010 Soil	39691-14 BH15/0.3-0.4 6/04/2010 Soil	39691-15 BH16/0.2-0.3 6/04/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	0.2	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	104	105	108	106	111

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-16 BD2/010410 1/04/2010 Soil
Date extracted	-	09/04/2010
Date analysed	-	09/04/2010
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Surrogate p-Terphenyl-d14	%	109

Organochlorine Pesticides in soil						
Our Reference:	UNITS	39691-1	39691-2	39691-3	39691-4	39691-5
Your Reference	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH3/0.2-0.5	BH5/0-0.1	BH6/0-0.1
Date Sampled	-----	1/04/2010	8/04/2010	8/04/2010	29/03/2010	1/04/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	97	93	93	93

Organochlorine Pesticides in soil						
Our Reference:	UNITS	39691-6	39691-7	39691-8	39691-9	39691-10
Your Reference	-----	BH7/0.1-0.3	BH7/0.8-1	BH8/0-0.2	BH9/0.4-0.6	BH10/0-0.2
Date Sampled	-----	31/03/2010	31/03/2010	29/03/2010	29/03/2010	29/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	91	90	91	97

Organochlorine Pesticides in soil						
Our Reference:	UNITS	39691-11	39691-12	39691-13	39691-14	39691-15
Your Reference	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2	BH15/0.3-0.4	BH16/0.2-0.3
Date Sampled	-----	6/04/2010	6/04/2010	6/04/2010	6/04/2010	6/04/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	89	95	92	90

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-1 BH2/0.1-0.3 1/04/2010 Soil	39691-2 BH3/0.12-0.2 8/04/2010 Soil	39691-3 BH3/0.2-0.5 8/04/2010 Soil	39691-4 BH5/0-0.1 29/03/2010 Soil	39691-5 BH6/0-0.1 1/04/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	97	93	93	93

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-6 BH7/0.1-0.3 31/03/2010 Soil	39691-7 BH7/0.8-1 31/03/2010 Soil	39691-8 BH8/0-0.2 29/03/2010 Soil	39691-9 BH9/0.4-0.6 29/03/2010 Soil	39691-10 BH10/0-0.2 29/03/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	91	90	91	97

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-11 BH12/0.4-0.5 6/04/2010 Soil	39691-12 BH13/0.2-0.3 6/04/2010 Soil	39691-13 BH14/0.1-0.2 6/04/2010 Soil	39691-14 BH15/0.3-0.4 6/04/2010 Soil	39691-15 BH16/0.2-0.3 6/04/2010 Soil
Date extracted	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Date analysed	-	09/04/2010	09/04/2010	09/04/2010	09/04/2010	09/04/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	89	95	92	90

Total Phenolics in Soil	UNITS	39691-1	39691-2	39691-3	39691-4	39691-5
Our Reference:	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH3/0.2-0.5	BH5/0-0.1	BH6/0-0.1
Your Reference	-----	1/04/2010	8/04/2010	8/04/2010	29/03/2010	1/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Total Phenolics in Soil	UNITS	39691-6	39691-7	39691-8	39691-9	39691-10
Our Reference:	-----	BH7/0.1-0.3	BH7/0.8-1	BH8/0-0.2	BH9/0.4-0.6	BH10/0-0.2
Your Reference	-----	31/03/2010	31/03/2010	29/03/2010	29/03/2010	29/03/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Total Phenolics in Soil	UNITS	39691-11	39691-12	39691-13	39691-14	39691-15
Our Reference:	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2	BH15/0.3-0.4	BH16/0.2-0.3
Your Reference	-----	6/04/2010	6/04/2010	6/04/2010	6/04/2010	6/04/2010
Date Sampled		Soil	Soil	Soil	Soil	Soil
Type of sample						
Date extracted	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-1 BH2/0.1-0.3 1/04/2010 Soil	39691-2 BH3/0.12-0.2 8/04/2010 Soil	39691-3 BH3/0.2-0.5 8/04/2010 Soil	39691-4 BH5/0-0.1 29/03/2010 Soil	39691-5 BH6/0-0.1 1/04/2010 Soil
Date digested	-	09/04/10	09/04/10	09/04/10	09/04/10	09/04/10
Date analysed	-	12/04/10	12/04/10	12/04/10	12/04/10	12/04/10
Arsenic	mg/kg	<4	<4	25	4	9
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	5	19	8	9	25
Copper	mg/kg	6	92	12	10	14
Lead	mg/kg	11	6	18	38	53
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	97	3	3	3
Zinc	mg/kg	22	37	2	36	38

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-6 BH7/0.1-0.3 31/03/2010 Soil	39691-7 BH7/0.8-1 31/03/2010 Soil	39691-8 BH8/0-0.2 29/03/2010 Soil	39691-9 BH9/0.4-0.6 29/03/2010 Soil	39691-10 BH10/0-0.2 29/03/2010 Soil
Date digested	-	09/04/10	09/04/10	09/04/10	09/04/10	09/04/10
Date analysed	-	12/04/10	12/04/10	12/04/10	12/04/10	12/04/10
Arsenic	mg/kg	12	8	8	10	8
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	31	21	18	13	20
Copper	mg/kg	32	20	13	22	20
Lead	mg/kg	48	24	44	25	40
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	1	2	2	2
Zinc	mg/kg	55	8	34	15	34

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	39691-11 BH12/0.4-0.5 6/04/2010 Soil	39691-12 BH13/0.2-0.3 6/04/2010 Soil	39691-13 BH14/0.1-0.2 6/04/2010 Soil	39691-14 BH15/0.3-0.4 6/04/2010 Soil	39691-15 BH16/0.2-0.3 6/04/2010 Soil
Date digested	-	09/04/10	09/04/10	09/04/10	09/04/10	09/04/10
Date analysed	-	12/04/10	12/04/10	12/04/10	12/04/10	12/04/10
Arsenic	mg/kg	<4	<4	<4	<4	11
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	18	19	45	54	18
Copper	mg/kg	110	69	52	44	22
Lead	mg/kg	14	8	8	15	28
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	23	29	52	32	6
Zinc	mg/kg	42	43	37	33	32

Acid Extractable metals in soil		
Our Reference:	UNITS	39691-16
Your Reference	-----	BD2/010410
Date Sampled	-----	1/04/2010
Type of sample		Soil
Date digested	-	09/04/10
Date analysed	-	12/04/10
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.5
Chromium	mg/kg	6
Copper	mg/kg	7
Lead	mg/kg	15
Mercury	mg/kg	<0.1
Nickel	mg/kg	3
Zinc	mg/kg	25

Moisture						
Our Reference:	UNITS	39691-1	39691-2	39691-3	39691-4	39691-5
Your Reference	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH3/0.2-0.5	BH5/0-0.1	BH6/0-0.1
Date Sampled	-----	1/04/2010	8/04/2010	8/04/2010	29/03/2010	1/04/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Moisture	%	11	12	10	5.1	12

Moisture						
Our Reference:	UNITS	39691-6	39691-7	39691-8	39691-9	39691-10
Your Reference	-----	BH7/0.1-0.3	BH7/0.8-1	BH8/0-0.2	BH9/0.4-0.6	BH10/0-0.2
Date Sampled	-----	31/03/2010	31/03/2010	29/03/2010	29/03/2010	29/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Moisture	%	17	18	11	15	13

Moisture						
Our Reference:	UNITS	39691-11	39691-12	39691-13	39691-14	39691-15
Your Reference	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2	BH15/0.3-0.4	BH16/0.2-0.3
Date Sampled	-----	6/04/2010	6/04/2010	6/04/2010	6/04/2010	6/04/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Date analysed	-	9/4/10	9/4/10	9/4/10	9/4/10	9/4/10
Moisture	%	1.0	5.6	6.6	3.6	13

Moisture		
Our Reference:	UNITS	39691-16
Your Reference	-----	BD2/010410
Date Sampled	-----	1/04/2010
Type of sample		Soil
Date prepared	-	9/4/10
Date analysed	-	9/4/10
Moisture	%	11

Asbestos ID - soils						
Our Reference:	UNITS	39691-1	39691-2	39691-6	39691-8	39691-9
Your Reference	-----	BH2/0.1-0.3	BH3/0.12-0.2	BH7/0.1-0.3	BH8/0-0.2	BH9/0.4-0.6
Date Sampled	-----	1/04/2010	8/04/2010	31/03/2010	29/03/2010	29/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	12/4/10	12/4/10	12/4/10	12/4/10	12/4/10
Sample Description	-	Approx 30g Sandy Soi	Approx 35g Sandy Soil & Rocks	Approx 35g Soil	Approx 35g Soil	Approx 35g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Asbestos ID - soils				
Our Reference:	UNITS	39691-11	39691-12	39691-14
Your Reference	-----	BH12/0.4-0.5	BH13/0.2-0.3	BH15/0.3-0.4
Date Sampled	-----	6/04/2010	6/04/2010	6/04/2010
Type of sample		Soil	Soil	Soil
Date analysed	-	12/4/10	12/4/10	12/4/10
Sample Description	-	Approx 35g Soil & Rocks	Approx 35g Soil & Rocks	Approx 35g Soil & Rocks
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Metals in TCLP USEPA1311						
Our Reference:	UNITS	39691-1	39691-10	39691-11	39691-12	39691-13
Your Reference	-----	BH2/0.1-0.3	BH10/0-0.2	BH12/0.4-0.5	BH13/0.2-0.3	BH14/0.1-0.2
Date Sampled	-----	1/04/2010	29/03/2010	6/04/2010	6/04/2010	6/04/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/04/10	09/04/10	09/04/10	09/04/10	09/04/10
Date analysed	-	12/04/10	12/04/10	12/04/10	12/04/10	12/04/10
pH of soil for fluid# determ.	pH units	7.60	7.30	7.30	7.90	7.70
pH of soil for fluid # determ. (acid)	pH units	1.60	1.60	1.60	1.60	1.60
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.10	5.30	5.20	5.40	5.40

Metals in TCLP USEPA1311			
Our Reference:	UNITS	39691-14	39691-15
Your Reference	-----	BH15/0.3-0.4	BH16/0.2-0.3
Date Sampled	-----	6/04/2010	6/04/2010
Type of sample		Soil	Soil
Date extracted	-	09/04/10	09/04/10
Date analysed	-	12/04/10	12/04/10
pH of soil for fluid# determ.	pH units	8.50	8.30
pH of soil for fluid # determ. (acid)	pH units	1.60	1.70
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.20	5.20

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following distillation.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
ASB.1	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTPH & BTEX in Soil						Base II Duplicate II %RPD		
Date extracted	-			9/4/10	39691-1	9/4/10 9/4/10	LCS-2	9/4/10
Date analysed	-			10/4/10	39691-1	9/4/10 10/4/10	LCS-2	10/4/10
vTPH C ₆ - C ₉	mg/kg	25	GC.16	<25	39691-1	<25 <25	LCS-2	79%
Benzene	mg/kg	0.5	GC.16	<0.5	39691-1	<0.5 <0.5	LCS-2	89%
Toluene	mg/kg	0.5	GC.16	<0.5	39691-1	<0.5 <0.5	LCS-2	60%
Ethylbenzene	mg/kg	1	GC.16	<1.0	39691-1	<1.0 <1.0	LCS-2	62%
m+p-xylene	mg/kg	2	GC.16	<2.0	39691-1	<2.0 <2.0	LCS-2	91%
o-Xylene	mg/kg	1	GC.16	<1.0	39691-1	<1.0 <1.0	LCS-2	107%
Surrogate aaa-Trifluorotoluene	%		GC.16	129	39691-1	130 128 RPD: 2	LCS-2	121%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
sTPH in Soil (C10-C36)						Base II Duplicate II %RPD		
Date extracted	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Date analysed	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
TPH C ₁₀ - C ₁₄	mg/kg	50	GC.3	<50	39691-1	<50 <50	LCS-2	81%
TPH C ₁₅ - C ₂₈	mg/kg	100	GC.3	<100	39691-1	190 <100	LCS-2	87%
TPH C ₂₉ - C ₃₆	mg/kg	100	GC.3	<100	39691-1	290 140 RPD: 70	LCS-2	84%
Surrogate o-Terphenyl	%		GC.3	120	39691-1	134 124 RPD: 8	LCS-2	119%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Date extracted	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Date analysed	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	98%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	98%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	98%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	95%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	100%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	LCS-2	96%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	39691-1	<0.2 <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	39691-1	<0.05 <0.05	LCS-2	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		GC.12 subset	114	39691-1	110 115 RPD: 4	LCS-2	107%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Organochlorine Pesticides in soil						Base II Duplicate II %RPD		
Date extracted	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Date analysed	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
HCB	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	100%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	109%
Heptachlor	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	85%
delta-BHC	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	102%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	107%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Endosulfan.I	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	102%
Dieldrin	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	113%
Endrin	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	93%
pp-DDD	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	114%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	LCS-2	97%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	92	39691-1	93 98 RPD: 5	LCS-2	89%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PCBs in Soil						Base II Duplicate II %RPD		
Date extracted	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Date analysed	-			09/04/2010	39691-1	09/04/2010 09/04/2010	LCS-2	09/04/2010
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	LCS-2	99%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	39691-1	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	92	39691-1	97 98 RPD: 1	LCS-2	76%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Total Phenolics in Soil						Base II Duplicate II %RPD		
Date extracted	-			9/4/10	39691-1	9/4/10 9/4/10	LCS-1	9/4/10
Date analysed	-			9/4/10	39691-1	9/4/10 9/4/10	LCS-1	9/4/10
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	39691-1	<5.0 <5.0	LCS-1	94%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Date digested	-			09/04/10	39691-1	09/04/10 09/04/10	LCS-1	09/04/10
Date analysed	-			12/04/10	39691-1	12/04/10 12/04/10	LCS-1	12/04/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	39691-1	<4 <4	LCS-1	98%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	39691-1	<0.5 <0.5	LCS-1	97%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	39691-1	5 6 RPD: 18	LCS-1	100%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	39691-1	6 5 RPD: 18	LCS-1	102%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	39691-1	11 12 RPD: 9	LCS-1	98%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	39691-1	<0.1 <0.1	LCS-1	99%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	39691-1	3 2 RPD: 40	LCS-1	99%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	39691-1	22 20 RPD: 10	LCS-1	97%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank
Moisture				
Date prepared	-			9/4/10
Date analysed	-			9/4/10
Moisture	%	0.1	LAB.8	<0.10

QUALITY CONTROL	UNITS	PQL	METHOD	Blank
Asbestos ID - soils				
Date analysed	-			[NT]

QUALITY CONTROL	UNITS	PQL	METHOD	Blank
Metals in TCLP USEPA1311				
Date extracted	-			09/04/10
Date analysed	-			12/04/10

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	39691-11	9/4/10 9/4/10	39691-2	9/4/10
Date analysed	-	39691-11	10/4/10 10/4/10	39691-2	10/4/10
vTPH C6 - C9	mg/kg	39691-11	<25 <25	39691-2	76%
Benzene	mg/kg	39691-11	<0.5 <0.5	39691-2	86%
Toluene	mg/kg	39691-11	<0.5 <0.5	39691-2	62%
Ethylbenzene	mg/kg	39691-11	<1.0 <1.0	39691-2	64%
m+p-xylene	mg/kg	39691-11	<2.0 <2.0	39691-2	83%
o-Xylene	mg/kg	39691-11	<1.0 <1.0	39691-2	96%
Surrogate aaa-Trifluorotoluene	%	39691-11	79 77 RPD: 3	39691-2	124%
QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Date analysed	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
TPH C10 - C14	mg/kg	39691-11	<50 <50	39691-2	88%
TPH C15 - C28	mg/kg	39691-11	470 520 RPD: 10	39691-2	96%
TPH C29 - C36	mg/kg	39691-11	1800 2300 RPD: 24	39691-2	91%
Surrogate o-Terphenyl	%	39691-11	# #	39691-2	134%

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QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Date analysed	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Naphthalene	mg/kg	39691-11	<0.1 <0.1	39691-2	81%
Acenaphthylene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	39691-11	<0.1 <0.1	39691-2	95%
Phenanthrene	mg/kg	39691-11	0.2 0.2 RPD: 0	39691-2	95%
Anthracene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	39691-11	<0.1 <0.1	39691-2	93%
Pyrene	mg/kg	39691-11	0.1 0.1 RPD: 0	39691-2	97%
Benzo(a)anthracene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	39691-11	0.2 0.2 RPD: 0	39691-2	93%
Benzo(b+k)fluoranthene	mg/kg	39691-11	<0.2 <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	39691-11	0.1 0.1 RPD: 0	39691-2	115%
Indeno(1,2,3-c,d)pyrene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	39691-11	0.1 <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	39691-11	104 105 RPD: 1	39691-2	104%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Date analysed	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
HCB	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
alpha-BHC	mg/kg	39691-11	<0.1 <0.1	39691-2	98%
gamma-BHC	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
beta-BHC	mg/kg	39691-11	<0.1 <0.1	39691-2	107%
Heptachlor	mg/kg	39691-11	<0.1 <0.1	39691-2	85%
delta-BHC	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Aldrin	mg/kg	39691-11	<0.1 <0.1	39691-2	100%
Heptachlor Epoxide	mg/kg	39691-11	<0.1 <0.1	39691-2	104%
gamma-Chlordane	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Endosulfan I	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
pp-DDE	mg/kg	39691-11	<0.1 <0.1	39691-2	104%
Dieldrin	mg/kg	39691-11	<0.1 <0.1	39691-2	110%
Endrin	mg/kg	39691-11	<0.1 <0.1	39691-2	95%
pp-DDD	mg/kg	39691-11	<0.1 <0.1	39691-2	115%
Endosulfan II	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
pp-DDT	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]

Envirolab Reference: 39691
Revision No: R 00



Client Reference: 71683.01, Macquarie Uni Hearing Hub

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Endrin Aldehyde	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	39691-11	<0.1 <0.1	39691-2	97%
Methoxychlor	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%	39691-11	93 98 RPD: 5	39691-2	96%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Date analysed	-	39691-11	09/04/2010 09/04/2010	39691-2	09/04/2010
Arochlor 1016	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	39691-11	<0.1 <0.1	39691-2	98%
Arochlor 1260	mg/kg	39691-11	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%	39691-11	93 98 RPD: 5	39691-2	82%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	39691-2	9/4/10
Date analysed	-	[NT]	[NT]	39691-2	9/4/10
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	39691-2	94%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	39691-11	09/04/10 09/04/10	39691-2	09/04/10
Date analysed	-	39691-11	12/04/10 12/04/10	39691-2	12/04/10
Arsenic	mg/kg	39691-11	<4 <4	39691-2	91%
Cadmium	mg/kg	39691-11	<0.5 <0.5	39691-2	84%
Chromium	mg/kg	39691-11	18 17 RPD: 6	39691-2	93%
Copper	mg/kg	39691-11	110 110 RPD: 0	39691-2	106%
Lead	mg/kg	39691-11	14 13 RPD: 7	39691-2	94%
Mercury	mg/kg	39691-11	<0.1 <0.1	39691-2	98%
Nickel	mg/kg	39691-11	23 21 RPD: 9	39691-2	89%
Zinc	mg/kg	39691-11	42 49 RPD: 15	39691-2	81%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 30-40g of sample in it's own container.

Total Petroleum Hydrocarbons in soil (semivol):# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Asbestos was analysed by Approved Identifier: Matt Mansfield

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.



EnviroLab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 39691-A

Client:

Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Sylvie Anbardjian

Sample log in details:

Your Reference:

71683.01, Macquarie Uni Hearing Hub

No. of samples:

Additional Testing on 2 Soils

Date samples received:

08/04/10

Date completed instructions received:

19/04/10

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:

27/04/10

Date of Preliminary Report:

Not Issued

Issue Date:

23/04/10

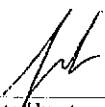
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Tests not covered by NATA are denoted with *.

Results Approved By:


Jacinta Hurst
Operations Manager

EnviroLab Reference: 39691-A
Revision No: R 00



Metals in TCLP USEPA1311			
Our Reference:	UNITS	39691-A-2	39691-A-13
Your Reference	-----	BH3/0.12-0.2	BH14/0.1-0.2
Date Sampled	-----	8/04/2010	6/04/2010
Type of sample		Soil	Soil
Date extracted	-	22/4/10	[NA]
Date analysed	-	22/4/10	22/4/10
pH of soil for fluid# determ.	pH units	9.00	[NA]
pH of soil for fluid # determ. (acid)	pH units	1.50	[NA]
Extraction fluid used	-	1	[NA]
pH of final Leachate	pH units	5.30	[NA]
Nickel in TCLP	mg/L	0.07	0.04

Method ID	Methodology Summary
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Metals in TCLP USEPA1311						Base II Duplicate II %RPD		
Date extracted	-			22/4/10	[NT]	[NT]	LCS-1	22/4/10
Date analysed	-			22/4/10	[NT]	[NT]	LCS-1	22/4/10
Nickel in TCLP	mg/L	0.02	Metals.20 ICP-AES	<0.02	[NT]	[NT]	LCS-1	108%

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable.

Surrogates: 60-140% is acceptable for general organics and 10-140% for

SVOC and speciated phenols.



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 40012

Client:

Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Sylvie Anbardjian

Sample log in details:

Your Reference:	<u>71683.01, Macquarie Uni</u>
No. of samples:	3 Waters
Date samples received:	16/04/10
Date completed instructions received:	16/04/10

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:	23/04/10
Date of Preliminary Report:	Not Issued
Issue Date:	27/04/10

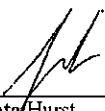
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Results Approved By:


Jacinta Hurst
Operations Manager

Envirolab Reference: 40012
Revision No: R 00



vTPH & BTEX in Water	UNITS	40012-1	40012-2	40012-3
Our Reference:	-----	GW1	GW3	BD1/160410
Your Reference	-----	16/04/2010	16/04/2010	16/04/2010
Date Sampled				
Type of sample		Water	Water	Water
Date extracted	-	23/04/2010	23/04/2010	23/04/2010
Date analysed	-	23/04/2010	23/04/2010	23/04/2010
TPH C ₆ - C ₉	µg/L	<10	<10	<10
Benzene	µg/L	<1.0	<1.0	<1.0
Toluene	µg/L	<1.0	3.6	<1.0
Ethylbenzene	µg/L	<1.0	<1.0	<1.0
m+p-xylene	µg/L	<2.0	<2.0	<2.0
o-xylene	µg/L	<1.0	<1.0	<1.0
Surrogate Dibromofluoromethane	%	108	89	91
Surrogate toluene-d8	%	98	109	109
Surrogate 4-BFB	%	76	92	88

sTPH in Water (C10-C36)				
Our Reference:	UNITS	40012-1	40012-2	40012-3
Your Reference	-----	GW1	GW3	BD1/160410
Date Sampled	-----	16/04/2010	16/04/2010	16/04/2010
Type of sample		Water	Water	Water
Date extracted	-	20/4/10	20/4/10	20/4/10
Date analysed	-	20/4/10	20/4/10	20/4/10
TPH C10 - C14	µg/L	<50	<50	<50
TPH C15 - C28	µg/L	<100	<100	<100
TPH C29 - C36	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	87	81	89

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	40012-1 GW1 16/04/2010 Water	40012-2 GW3 16/04/2010 Water	40012-3 BD1/160410 16/04/2010 Water
Date extracted	-	20/04/2010	20/04/2010	20/04/2010
Date analysed	-	20/04/2010	20/04/2010	20/04/2010
Naphthalene	µg/L	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1
Fluorene	µg/L	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	<1
Benzo(b+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Surrogate p-Terphenyl-d14	%	137	123	139

OCP in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	40012-1 GW1 16/04/2010 Water	40012-2 GW3 16/04/2010 Water	40012-3 BD1/160410 16/04/2010 Water
Date extracted	-	20/4/10	20/4/10	20/4/10
Date analysed	-	20/4/10	20/4/10	20/4/10
HCB	µg/L	<0.2	<0.2	<0.2
alpha-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCLMX	%	107	110	119

HM in water - dissolved				
Our Reference:	UNITS	40012-1	40012-2	40012-3
Your Reference	-----	GW1	GW3	BD1/160410
Date Sampled	-----	16/04/2010	16/04/2010	16/04/2010
Type of sample		Water	Water	Water
Date prepared	-	19/4/10	19/4/10	19/4/10
Date analysed	-	19/4/10	19/4/10	19/4/10
Arsenic-Dissolved	µg/L	2	<1	2
Cadmium-Dissolved	µg/L	0.4	0.8	0.4
Chromium-Dissolved	µg/L	<1	<1	1
Copper-Dissolved	µg/L	4	9	17
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.5	<0.5	<0.5
Nickel-Dissolved	µg/L	13	5	11
Zinc-Dissolved	µg/L	65	29	50

Miscellaneous Inorganics	UNITS	40012-1	40012-2
Our Reference:	-----	GW1	GW3
Your Reference	-----	16/04/2010	16/04/2010
Date Sampled		Water	Water
Type of sample			
Date prepared	-	20/04/10	20/04/10
Date analysed	-	20/04/10	20/04/10
Hardness by calculation	mgCaCO ₃ /L	26	190
Calcium - Dissolved	mg/L	4.8	48
Magnesium - Dissolved	mg/L	3.4	18

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Metals.22 ICP-MS	Determination of various metals by ICP-MS.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTPH & BTEX in Water						Base II Duplicate II %RPD		
Date extracted	-			23/04/2010	[NT]	[NT]	LCS-W1	23/04/2010
Date analysed	-			23/04/2010	[NT]	[NT]	LCS-W1	23/04/2010
TPH C ₆ - C ₉	µg/L	10	GC.16	<10	[NT]	[NT]	LCS-W1	100%
Benzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	100%
Toluene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	99%
Ethylbenzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	100%
m+p-xylene	µg/L	2	GC.16	<2.0	[NT]	[NT]	LCS-W1	101%
o-xylene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	100%
Surrogate Dibromofluoromethane	%		GC.16	94	[NT]	[NT]	LCS-W1	100%
Surrogate toluene-d8	%		GC.16	101	[NT]	[NT]	LCS-W1	99%
Surrogate 4-BFB	%		GC.16	78	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
sTPH in Water (C10-C36)						Base II Duplicate II %RPD		
Date extracted	-			20/4/10	[NT]	[NT]	LCS-W2	20/4/10
Date analysed	-			20/4/10	[NT]	[NT]	LCS-W2	20/4/10
TPH C ₁₀ - C ₁₄	µg/L	50	GC.3	<50	[NT]	[NT]	LCS-W2	82%
TPH C ₁₅ - C ₂₈	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W2	116%
TPH C ₂₉ - C ₃₆	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W2	87%
Surrogate o-Terphenyl	%		GC.3	94	[NT]	[NT]	LCS-W2	77%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Water						Base II Duplicate II %RPD		
Date extracted	-			20/04/2010	[NT]	[NT]	LCS-W1	20/04/2010
Date analysed	-			20/04/2010	[NT]	[NT]	LCS-W1	20/04/2010
Naphthalene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	96%
Acenaphthylene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	99%
Phenanthrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	96%
Anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	95%

Client Reference: 71683.01, Macquarie Uni

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Water						Base II Duplicate II %RPD		
Pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	101%
Benzo(a)anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	95%
Benzo(b+k)fluoranthene	µg/L	2	GC.12 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	99%
Indeno(1,2,3-c,d)pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		GC.12 subset	120	[NT]	[NT]	LCS-W1	123%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
OCP in water						Base II Duplicate II %RPD		
Date extracted	-			20/4/10	[NT]	[NT]	LCS-W1	20/4/10
Date analysed	-			20/4/10	[NT]	[NT]	LCS-W1	20/4/10
HCB	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	97%
gamma-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	101%
Heptachlor	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	103%
delta-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	102%
Heptachlor Epoxide	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	103%
gamma-Chlordane	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	106%
Dieldrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	105%
Endrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	109%
pp-DDD	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	100%
Endosulfan II	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDT	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS-W1	105%
Methoxychlor	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	96	[NT]	[NT]	LCS-W1	104%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			19/04/10	[NT]	[NT]	LCS-W1	19/4/10
Date analysed	-			19/04/10	[NT]	[NT]	LCS-W1	19/4/10
Arsenic-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	108%
Cadmium-Dissolved	µg/L	0.1	Metals.22 ICP-MS	<0.1	[NT]	[NT]	LCS-W1	113%
Chromium-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	109%
Copper-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	102%
Lead-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	102%
Mercury-Dissolved	µg/L	0.5	Metals.21 CV-AAS	<0.5	[NT]	[NT]	LCS-W1	114%
Nickel-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	104%
Zinc-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS-W1	107%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics						Base II Duplicate II %RPD		
Date prepared	-			20/04/10	[NT]	[NT]	LCS-W2	20/04/10
Date analysed	-			20/04/10	[NT]	[NT]	LCS-W2	20/04/10
Hardness by calculation	mgCaCO ₃ /L	1	Metals.20 ICP-AES	<1	[NT]	[NT]	[NR]	[NR]
Calcium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	[NT]	[NT]	LCS-W2	105%
Magnesium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	[NT]	[NT]	LCS-W2	103%

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

APPENDIX F
Quality Assurance and Quality Control

QA/QC PROCEDURES AND RESULTS

FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field QC procedures for sampling as prescribed in Douglas Partners *Field Procedures Manual* were followed at all times during the contamination assessment and are summarised below. Field sampling comprised duplicate sampling of one duplicate every ten samples taken.

Replicate Samples

The field QC comprised the collection of replicate samples during the course of sampling. Fifteen primary soil samples and one blind replicate soil sample were analysed. Relative Percentage Differences (RPD) was calculated as an assessment of the result consistency (see below).

Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for duplicate samples. Laboratory reports state that a RPD of $\pm$ 30-50% is considered acceptable. Laboratory results also note that the RPDs should be ignored where results are less than 5 times the PQL.

Comparative laboratory results of original and replicate sample are shown below in Table 1 and Table 2.

Table 1 – Comparative Results of Replicate Soil Sample Analysis - Intra-Laboratory Soil Sample

Sample ID	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total PAH	Benzo(a)Pyrene
BH2/0.1-0.3	<4	<0.5	5	6	11	<0.1	3	22	<0.1	<0.05
BD2/010410	<4	<0.5	6	7	15	<0.1	3	25	<0.1	<0.05
PQL	<4	<0.5	<1	<1	<1	<0.1	<1	<1	<0.1	<0.05
Difference	0	0	1	1	4	0	0	3	0	0
RPD (%)	0	0	18	15	31	0	0	13	0	0

**Table 2 – Comparative Results of Replicate Groundwater Sample Analysis - Intra-Laboratory
Groundwater Sample**

Sample ID	Heavy Metals								PAH	TPH	BTEX	OCP
	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn				
GW1	2	0.4	<1	4	<1	<0.5	13	65	<PQL	<PQL	<PQL	<PQL
BD1/160410	2	0.4	1	17	<1	<0.5	11	50	<PQL	<PQL	<PQL	<PQL
PQL	<1	<0.1	<1	<1	<1	<0.5	<1	<1	<0.1	<250	<2	<<0.2
Difference	0	0	0	4	0	0	2	15	0	0	0	0
RPD	0	0	0	21	0	0	17	26	0	0	0	0

The calculated RPD values were within the acceptable range. It is therefore considered that the results indicate an acceptable consistency between the sample and its replicate and indicate that suitable field sampling methodology was adopted and laboratory precision was achieved.

LABORATORY QA/QC PROCEDURES

The following QA/QC procedures were conducted by the laboratory.

Reagent Blank

This sample is prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. The laboratory results for reagent blanks for soil analyses indicated concentrations of all analytes to be below laboratory detection limits. These results are included in the laboratory reports in Appendix E.

Spike Recovery

This is a sample replicate prepared by adding a known amount of analyte prior to analysis, and then treated exactly the same as all other samples. The recovery result indicates the proportion of the known concentration of the analyte that is detected during analysis. These results are included in the laboratory reports in Appendix E. The spike recovery rates are compared with limits as specified in Envirolab Services Quality Control System, and any exceedances are highlighted in the report. The spike recovery all fell within the acceptable range. On this basis, it is considered that the spike recovery results are acceptable.

Surrogate Recovery

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis to each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis. The surrogate recovery rates are compared with limits as specified in Envirolab Services and any exceedances are highlighted in the report. As no exceedances and no comments were noted on the report, it is considered that the results indicate that the analytical results are not significantly affected by matrix interference.

Duplicates

These are additional portions of a sample which are analysed in exactly the same manner as all other samples. The duplicate sample results are included in the laboratory results in Appendix E.

In overall terms, therefore, the data quality objectives have been attained and the quality of the investigation data is considered acceptable.