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REPORT
on
PRELIMINARY GEOTECHNICAL AND CONTAMINATION ASSESSMENT

KAMIRA COURT, VILLAWOOD
URBAN RENEWAL PROJECTS

Prepared for
MAJOR PROJECTS DIRECTORATE
OF HOUSING NSW

Project 45789
November 2008

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ACEA
The Association of Consulting Engineers Australia

Glossary of Terms

As	arsenic
ASS	Acid Sulphate Soils
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
DECC	Department of Environment and Climate Change
DNR	Department of Natural Resources
DP	Douglas Partners Pty Ltd
DWE	Department of Water and Energy
EPA	Environmental Protection Authority
GW	groundwater
ha	hectares
HIL	NSW EPA Contaminated Sites: *Guidelines for the NSW Site Auditors Scheme, 1998*. 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
PASS	Potential Acid Sulphate Soils

Pb	lead
PCB	polychlorinated biphenyls
PID	photoionisation detector
TPH	total petroleum hydrocarbons
TOPIC	total photoionisable compounds
VOC	Volatile Chlorinated Hydrocarbons
Zn	zinc

EXECUTIVE SUMMARY

This report details the methodology, scope of work and results of a combined preliminary geotechnical investigation and Phase 1 contamination assessment with limited soil sampling, undertaken by Douglas Partners Pty Ltd (DP) at a site described as Lot 37, Lot 38 and Lot 39 in Deposited Plan 202006 and Lot 136 in Deposited Plan 16186 in Fairfield local government, located south of Villawood Railway Station and east of Kamira Avenue, Villawood. The geotechnical and environmental investigations were commissioned by the Major Projects Directorate of Housing NSW.

The Kamira Court precinct is currently a vacant block of ground of approximately 1.5 ha. Previously, Kamira Court comprised 111 residential units which have all been demolished and the ground cleared. The land is to be redeveloped for public and private housing.

The objectives of the current investigation were

- Review of available site history information;
- Provide an assessment of the general potential for contamination of the site resulting from past and present site uses based on limited soil sampling;
- Based on the investigation results, comment on the likely suitability of the site for the proposed development and identify any development constraints associated with site contamination issues;
- Considering the site contamination issues, discussion on remedial and additional works required; Provision of a range of unit rates for suitable remediation options;
- Based on *in situ* geotechnical and laboratory testing, provide general and preliminary geotechnical comments on site preparation, earthworks, slope, groundwater, foundations and pavement.

A review of historical information indicated that the site covers four Lots which were historically vacant or used for residential purposes. Industrial or commercial activities on the site were not identified. The current registered proprietor is Housing Commission New South Wales.

According to Fairfield Council Section 149 Certificates, the site is within the floodplain and may be affected by local overland flooding in terms of local runoff.

The relevant Acid Sulphate Soil (ASS) and soil salinity risk maps indicate that the site is unlikely to be affected by either problem.

Eight test pits were excavated to profile the local lithology for both geotechnical and environmental purposes. The test pits were logged and surveyed in position and relative to Australian Height Datum (AHD). Soil samples were collected directly from the test pits for both geotechnical and contamination assessment.

Based on the limited programme of fieldwork carried out, it appears that the subsurface profile at this site may be roughly divided into two areas. The eastern half of the site appears to be deeply filled with 4 - 5 m of filling directly overlying shale, whereas the depth of the filling encountered over the western half was generally less than 0.8 m. In this area the filling was underlain by silty clay and shale. The deep filling also contained metal fragments, tiles, timber and fibre-cement fragments.

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, total phenols and asbestos.

The contamination assessment did not identify contamination by heavy metals, PAH, TPH, BTEX, Phenols, OCP, PCB and asbestos in regards of the proposed redevelopment with respect to health risk based criteria for residential with minimal access to soil and for open space use. Minor exceedances of the provisional phytotoxicity based investigation levels (PPIL) were detected for arsenic (TP4) and zinc (TP2). However, the results of the contamination assessment show that the site is compatible with the proposed residential use with the appropriate testing and management of soil in excess of the PPIL. This would require further testing of soil for use in landscaped areas.

Groundwater quality has not been assessed. Given the low contamination levels in the soil, leaching of contaminants into a deeper groundwater system is unlikely. Groundwater should be assessed, however, the risk is considered to be low.

A waste classification may be required for the off-site disposal of excavated soil. DP recommends future waste classification with reference to the *Waste Classification Guidelines*, April 2008, issued by the Department of Environment and Climate Change (DECC).

Considering the limited site investigation and the restricted programme of subsurface sampling, screening and chemical testing which was set out in the proposal and although asbestos has not been detected in this study, DP recommends further soil assessment during earthworks specifically to assess for the presence of asbestos contaminants. If basement excavations are planned and asbestos-based waste is detected in the soil and will be retained on site, a Remedial Action Plan (RAP) and an Asbestos Management Plan (AMP) should be prepared for the site. Estimated costs of remedial and additional contamination works that may be necessary for the site are provided in Table 12 in Section 14.

General and preliminary geotechnical comments on site preparation, excavation and earthworks, slope, groundwater, foundations and pavements are provided in Section 13.

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REPORT ON
PRELIMINARY GEOTECHNICAL AND CONTAMINATION ASSESSMENT
KAMIRA COURT, VILLAWOOD

1. INTRODUCTION

This report details the methodology, scope of work and results of a combined preliminary geotechnical investigation and Phase 1 contamination assessment with limited soil sampling, undertaken by Douglas Partners Pty Ltd (DP) at Kamira Court precinct, located south of Villawood Railway Station and east of Kamira Avenue, Villawood. The geotechnical and environmental investigations were commissioned by the Major Projects Directorate of Housing NSW.

The Kamira Court precinct is currently a vacant block of ground of approximately 1.5 ha. Previously, Kamira Court comprised 111 residential units which have all been demolished and the ground cleared. The land is to be redeveloped for public and private housing with plans to build up to units, of which approximately will revert to Housing NSW and the remainder will be sold privately.

The investigation included a review of available site history information, a site inspection, excavation of eight test pits with geotechnical logging, *in situ* testing, sampling, and laboratory testing, together with a limited soil sampling and analytical programme targeting a range of common contaminants. Details of the fieldwork and laboratory testing are given in the report together with comments relating to the geotechnical assessment and to the likely degree and extent of soil contamination and the suitability of the site for the proposed residential development.

Reference should be made to both Section 14 of this report (Limitations of this Report) and the general Notes Relating to this Report included within Appendix D. These describe the methods and procedures used in undertaking the work, limitations of this document and how it may be used.

2. SCOPE OF WORKS

The scope of the Preliminary Geotechnical and Contamination Assessment was as follows:-

- Undertake a site history search including a title deeds search, a review of historical aerial photographs, a search of the Contaminated Land Register for Notices issued under the *Contaminated Land Management Act 1997*, a search of the Register for Notices issued under the *Protection of the Environment Operations Act,* a search of the WorkCover dangerous goods licence database, and Council records (including Section 149 (2) Certificates);
- Review available site information with reference to local geology;
- Conduct a walkover inspection of the site to make an assessment of signs of potential contamination and relevant geotechnical aspects including slope stability;
- Excavate eight test pits to depths of 3 m, or prior refusal, to sample and log the soils. However, test pitting showed the presence of deep fill and four test pits (TP 4 – TP 7) were extended to depths of three to five meters to intercept the base of the fill (refer to Section 8.3);
- Survey all test pit locations to position relative to Australian Height Datum (AHD);
- Collect 12 soil/filling samples from eight test pits, nominally 1-2 samples from each sample location, plus a duplicate QA sample. Samples taken at changes in the strata or upon signs of contamination;
- Conduct laboratory analysis on selected soil samples (including 10% QA/QC) at a NATA accredited analytical laboratory for a combination of the following potential contaminants:
  - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Total Petroleum Hydrocarbons (TPH);
  - Monocyclic aromatic hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene – BTEX);

  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Phenols
  - Polychlorinated Biphenyls (PCB);
  - Organochlorine Pesticides (OCP);
  - Asbestos;
  - QA/QC sample analysed for BTEX, heavy metals and PAHs;
- Collect two undisturbed (U50) tube samples of the upper natural clay;
- *In situ* geotechnical testing and bulk sampling for laboratory testing, soil classification, strength and index;
- Conduct laboratory testing on selected soil samples for the preliminary geotechnical investigation:
  - Two Atterberg Limits and Linear Shrinkage tests;
  - Three Field Moisture Content tests;
  - Two Shrink-Swell Index tests;
  - Two California Bearing Ratio (CBR) tests with associated standard compaction tests
- Provision of a Preliminary Geotechnical and Contamination Assessment Report, providing general comments on the recorded level of contamination in the subsoils, a discussion of possible remediation options, including a range of unit rates for the alternative remedial methods and the likely suitability of the site for the proposed development. This report also includes a brief description of the topography, the local geology, soil types, geotechnical commentary including site classification in accordance with AS 2870-1996. The scope did not include an assessment of groundwater quality.

3. SITE DESCRIPTION

3.1 Site Identification

The Kamira Court precinct (hereafter referred to as 'the site') covers an area of approximately 1.5 ha and is located south of Villawood Road and east of Kamira Avenue, Villawood. The site comprises Lot 37, Lot 38 and Lot 39 in Deposited Plan 202006 and Lot 136 in Deposited Plan 16186 in Fairfield local government area. A locality map is shown in Drawing 1, Appendix A.

3.2 Site Description

The site is bounded by Kamira Avenue to the west, Villawood Road to the north, vacant land to the south and by the car park of the local shopping centre to the east. The site is subdivided in two parts by Kamira Court. Lot 37 in D.P. 202006 forms the northern part of the site and Lots 38 and 39 in D.P. 202006 and Lot 136 form the southern part in D.P. 16186. Plate 9, Appendix C shows the extent of the three lots forming the site in question.

The site is relatively flat with ground surface levels at the test pit locations (TP1 – TP8) ranging between RL 21.7 m at TP 6 and RL 24.7 m at TP 2, relative to Australian Height Datum (AHD). According to the surveyed test pit surface levels there is a slope upwards from the south-west of the site (TP 2) to the north-east (TP 6).

At the time of the investigation the site was mostly covered with grass and remnant stands of trees, as shown in Photos 1-7 (Plates 1-4, Appendix B). Where previous structures have been located on Lot 37 in D.P. 202006 (north of Kamira Court), the surface was partly bare with filling visible. In the north-east of Lot 37 there is a small pond with reeds, as shown in Photo 6, Plate 4 in Appendix B. The drainage channels of surface water runoff can also be seen in Photo 6.

Based on the test pit logging data and topography it appears that the site surface has been formed by previous earthworks at the site.

A small stockpile was identified on Lot 37 in D.P. 202006. Photo 4 in Plate 3 in Appendix B and Drawing 4 in Appendix A, show the location of the stockpile. The volume is estimated to be 4 - 5 m^3.

4. GEOLOGY AND HYDROGEOLOGY

Reference to the *Soil Landscapes from the Penrith 1:100 000 Sheet*, (Soil Conservation Service of NSW, 1989) indicates that the site is underlain by alluvial soils of the Richmond Soil Landscape, as shown in Drawing 2, Appendix A.

Reference to the *Penrith 1:100 000 Geological Sheet*, 1991 indicates the site is underlain by Bringelly Shale that typically comprises shale, carbonaceous claystone and laminite (interbedded shale, siltstone and fine grained sandstone). Test pitting confirmed the presence of filling on site overlying silty clays and shale interpreted to be the Bringelly Shale formation (see Drawing 3 in Appendix A).

Minor groundwater seepage was intercepted at test pit TP 7 at a depth of approximately 4.6 m. Regional groundwater would be anticipated to be contained within the shale. At the north-east of Lot 37 there is a small a surface water pond. As discussed in Section 6.4, the site is situated within a low-lying floodplain and may be affected by local overland flooding in terms of local runoff and it can be presumed that the surface water body is caused by local runoff. This area is, according to the survey of test pit TP 6, likely to be the lowest location of the site.

5. ACID SULPHATE SOILS AND SALINITY RISK

A review of the Prospect/Parramatta River *Acid Sulphate Soils Risk Map* (Edition 2, DLWC, 1997) indicated that the site is mapped as being located in an area of 'no known acid sulphate soil'. It is also noted that acid sulphate soils typically occur in areas with surface level less than about 5 m AHD whereas the site has a nominal level of 20 m AHD.

The potential for Acid Sulphate Soils (ASS) to be present on the site is, therefore, considered to be low.

A review of the *Salinity Potential West Sydney Map* showed that the property is not likely to be affected by a salinity risk.

6. SITE HISTORY

6.1 Site History

A site historical information review was conducted, comprising a title deeds search, a review of historical aerial photographs, a search of the Contaminated Land Register for Notices issued under the *Contaminated Land Management Act*, 1997, a search of the Register for Notices issued under the *Protection of the Environment Operations Act,* a search of the WorkCover dangerous goods licence database, and Fairfield Council records including Section 149 Certificates. The site history search records are presented in Appendix C.

It is understood that the most recent development on the site, comprising residential units built by the Housing Commission of NSW between 1950 and 1970, was demolished in recent years.

6.2 Title Deeds

A historical title deeds search is used to obtain ownership or occupancy information on the property, including company names and the occupations of individuals. The title information can assist in the identification of previous land uses and can therefore assist in establishing whether there were potentially contaminating activities occurring at the site. A summary of the records with the owner/occupier details and the possible site uses are presented in Table 1 and 2. The full title deed records are included in Appendix C.

The Kamira Court site covers four Lots. These are currently Lots 37, 38 and 39 in Deposited Plan 202006 and Lot 136 in Deposited Plan 16186 as marked on the attached cadastre (Appendix C). In establishing the possible use of the site, information has also been drawn from other sources such as aerial photographs.

Table 1 – Lot 136 D.P. 16186 - Summary of Title Deeds Search

Date	Owner/Occupier	Possible Site Use
19.08.1915	William Charles Wadley Lippman (Bank Manager)	Residential
13.05.1918	John Symonds (Engineer)	Residential
21.06.1928	John Symonds (Engineer) Thomas Kennedy (Engineer) Thomas Peters (Contractor)	Residential
19.06.1928	John Symonds (Engineer) Thomas Kennedy (Engineer) Leonard James Hopper (Investor) Edward Thomas Hopper (Investor)	Residential
28.06.1929	John Symonds (Engineer) Thomas Kennedy (Engineer) Leonard James Hopper (Investor) Edward Thomas Hopper (Investor) Antoine William Mary D'Apice (Solicitor)	Residential
06.01.1930	Ernest Morris (Carpenter)	Residential
22.11.1944	Ernest Morris (Carpenter) Laura Morris (Married Woman)	Residential
12.12.1961	Ernest Morris (Carpenter)	Residential
03.10.1962	Ralph Edward Morris (Supervisor)	Residential
06.09.1971	Sime Muskie (Fitter and Tuner)	Residential
23.11.1973	Housing Commission of New South Wales Current registered proprietor	Residential

Lot 136 in D.P. 16186 was purchased in 1915 by William Charles Wadley Lippman (Bank Manager) for probably residential purposes. From 1918 to 1929 the property was owned by an engineer, John Symonds *et al*.

Reference to the aerial photograph of 1928 (Plate 5, Appendix C) shows that the land was probably used for residential purposes. It appears likely to have maintained a residential use through to 1973 when the Housing Commission became the owner.

Since 23 November 1973 the Housing Commission of New South Wales has been the registered proprietor of Lot 136 in D.P. 16186.

Table 2 – Lots 37, 38 and 39 D.P. 202006 - Summary of Title Deeds Search

Date	Owner/Occupier	Possible Site Use
15.10.1947	Housing Commission of New South Wales	Residential
1952	Housing Commission of New South Wales Current registered proprietor	Residential

According to the results of the title search Lots 37-39 in D.P. 202006 were previously subdivided into 40 lots (Lot 45-Lot 54, Lot 68-Lot 71, Lot 112-Lot 139) in Deposited Plan 16186 in 1929, as shown in Plate 10, Appendix C.

The aerial photographs of 1928, 1943 and 1950 (Plates 1-3, Appendix C) didn't show any development or structures on Lot 37, Lot 38 and Lot 39. The land was apparently bushland and not used for any commercial/industrial or residential purposes. On this basis it was assessed that a title deeds search for these 40 lots would not provide any relevant data in regards to the contamination assessment.

The Housing Commission of New South Wales undertook the first development of Lot 37-39 in D.P. 202006 after the Second World War. In 1947 Housing Commission of New South Wales purchased the property and is still the current registered proprietor.

The title deed search results and cadastral map extracts are included in Appendix C

6.3 Aerial Photographs

Aerial photographs from 1928, 1943, 1950, 1961, 1970, 1978 and 1991 were obtained from the NSW Department of Lands. The 1943 and 2007 images were obtained from the NSW Department of Lands website (www.lands.nsw.gov.au). The aerial photographs are presented in Appendix C. These aerial photos were reviewed to assess the likely past uses of the site. The findings are summarised below.

1928 – Plate 1 shows two structures on Lot 136 in D.P. 16186. The building in the west of Lot 136 had the size typical of a residential house. The building in the east is smaller. The photograph shows the development of the first residential houses in Kamira Avenue, Villawood.

Lot 37, 38 and 39 in D.P. 202006 appeared to be bushland with a few tracks. The area showed no sign of special usage.

1943 – Plate 2 shows an aerial photograph of 1943. Lot 37, 38 and 39 in D.P. 202006 were still bushland without any identifiable structures or special usage.

The two buildings on Lot 136 were still present but the use cannot be interpreted. Markings can be seen that may represent the land boundary of Lot 136.

1950 – On the aerial photograph of 1950 (Plate 3) two buildings are still identifiable. There are no significant differences to the 1943 photograph.

1961 – Plate 4 shows a significant amount of new structures on Lot 37 – Lot 39. Considering that the Housing Commission of New South Wales owned Lot 37 – Lot 39 since 1947 it appears likely that the buildings were for residential purposes

The boundary of Lot 136 D.P. 16186 and two buildings can be still seen.

1970 – Construction of the buildings had been completed on Lot 37 – Lot 39 in D.P. 202006.

The marking of the land boundary of Lot 136 D.P. 16186 and the two buildings appear to be still present (Plate 5, Appendix C).

1978 – Plate 6 shows that a total of 14 buildings had been constructed on Lot 37 – Lot 39. The site also comprised remnant stands of trees, car parks and a landscaped area between the two main buildings in the north and south of Lot 37. The two buildings previously identified on Lot 136 in D.P. 18186 have been demolished and removed and Lot 136 appears to be undeveloped.

At this time the site was already divided by Kamira Court into Lot 37 in the north and Lot 38, Lot 39 in D.P. 202006 and Lot 136 in D.P. 18186 in the south of the site.

1991 – Plate 7 shows that there were no significant changes to the number, location and size of buildings on Lot 37 – Lot 39.

2007 – The buildings and structures have been demolished and removed. Plate 8 shows a vacant block of land.

6.4 Fairfield Council Section 149 Certificates and Council Records

The Section 149 Planning Certificates of Lot 37 in Deposited Plan 202006 as the main Lot of the site, issued by the Fairfield City Council were reviewed as part of this assessment.

The land is subject to a Draft Local Environmental Plan (Draft L.E.P.) The draft L.E.P. is attached in the Section 149 Planning Certificate. The land is also subject to a number of State Environmental Planning Policies including, *inter alia,* State Environmental Planning Policy No. 55 – Remediation of Land.

The site is identified as a Residential B zone. The land doesn't include or comprise critical habitats or include environmental heritage items.

According to the Section 149(2) Planning Certificate – Clause 7, the site '*is not affected by a policy adopted by Council or any other public authority and notified to Council that restricts development of the land because of the likelihood of land slip, subsidence, bushfire, tidal inundation and acid sulphate soils or any other risks'.*

Part of all of this land is within the floodplain and may be affected by local overland flooding. The term local overland flooding means inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

According to the Planning Certificate under Section 149 (2), the site has not been declared to be an "investigation area" or "remediation site" under Part 3 of the *Contaminated Land Management Act* 1997 and *'is not subject to an investigation or remediation order'* or *to a voluntary investigation/remediation proposal. The land is not subject of a site audit statement within the meaning of the Contaminated Land Act 1997.*

The Section 149(2) Planning Certificates are included in Appendix C.

A search of the Fairfield Council's history archives has not located any records pertaining directly to the subject site.

6.5 NSW Department of Environment and Climate Change (DECC) Notices

A search of Notices on the DECC website on 25 June 2008 indicated that there are currently no Notices and/or Licences under the *Protection of the Environment Operations Act* (1997) that pertain directly to the subject site. No Notices or Orders to investigate or remediate the site are reported to have been issued for the site under the *Contaminated Land Management Act,* 1997.

6.6 WorkCover Search

A search by WorkCover New South Wales of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover has not located any records relating to the current or historic storage of dangerous goods pertaining to Lot 37 – 39 in D.P. 202006 and Lot 136 in D.P. 16186.

7. POTENTIAL CONTAMINANTS

The desktop investigation showed no indication of industrial or commercial activities at the site which may be considered to be potentially contaminating. The potential soil contaminants on the subject site are likely to be associated with building, road construction and demolition wastes and the deep fill encountered during test pitting (refer to Section 11.1).

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

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

8. FIELD WORK

8.1 Sampling Rationale

The number of sample locations was based on the EPA publication *Sampling Design Guidelines* which recommends a minimum of 25 sampling locations for a site of 1.5 ha. DP recommended that eight sample locations be established. Based on the lower rate of the minimum sampling density recommended (30-50%), DP considers the adopted sampling density to be appropriate for a limited sampling programme. A total of 12 samples from eight test pit locations were analysed, nominally 1-2 samples per test location.

The test pit locations were placed over the site based on site observations, the site history review and with a view to providing appropriate site coverage. At least one sample location was placed on each of the Lots.

Soil samples were collected on changes in strata and signs of contamination. Sampling locations are indicated on Drawing 4 in Appendix A.

8.2 Environmental Sampling Procedures

All test pit locations were cleared for detectable services and pipes using Dial-Before-You-Dig information and electro-magnetic scanning by an accredited service locator.

Test pits TP1 and TP2 were placed one each in Lot 39 in D.P. 202006 and Lot 136 in D.P. 18186 (see Photo 1, Plate 1 in Appendix B). TP3 and TP4 were located in Lot 38 in D.P. 202006 (see Photo 2 and 3, Plate 1 and 2 in Appendix B). The largest lot (Lot 37 in D.P. 202006) was investigated by excavating four test pits (TP5 – TP8).

Test pits TP1 – TP 8 were generally located within the building footprint of previous structures. During the site inspection a significant unevenness of the ground level was noted around test pit TP4 as shown in Photo 3, Plate 2 in Appendix B. Similar conditions were noted at test pit TP7.

Test pits were logged and surveyed in position, using a differential GPS, and were surveyed using an optical level relative to Australian Height Datum (AHD). The surface levels of TP 1 – TP 8 are recorded in the Test Pit Records in Appendix D.

All strata and sampling data were recorded on DP Test Pit Log reports. The general sampling procedure is summarised below:-

- collect soil samples directly from test pits using disposable sampling equipment;
- transfer samples into laboratory-prepared glass jars, capping immediately and ensuring that the headspace within the sample jar is minimised;
- collect a split replicate at each location into a zip lock plastic bag;
- collect replicate samples for QA/QC purposes;
- label sample containers with individual and unique identification, including project number, sample location and sample depth; and
- place the glass jars, with Teflon lined lid, into a cooled, insulated and sealed container for transport to the laboratory.

The stockpiled soil was sampled, following the sampling procedures, as described above. A description of the soil is given in the Test Pit Log reports in Appendix D.

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

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

8.3 Geotechnical Fieldwork

The fieldwork for the preliminary geotechnical assessment was carried out in conjunction with the environmental sampling described in Section 8.2. The following additional work was carried out for geotechnical purposes.

- Geotechnical walkover inspection for the purpose of assessing of slope stability, site filling and other geotechnical issues affecting the development;
- Collection of three (and analysis of two) 'undisturbed' (U50) tube samples collected within the upper horizon of natural clay;
- Collection of bulk samples of natural soils and filling material at four locations; and
- Site supervision by a geotechnical engineer to assist with sampling and logging for geotechnical purposes

The eight test pits were excavated to depths of between 2.3 m and 5.0 m using a rubber-tyred backhoe. Pocket penetrometer testing was carried out in the sidewalls of the test pits and on disturbed samples from the excavator bucket to indicate the strength and consistency of the subsurface materials.

Groundwater levels and seepage into the test pits were observed during the short period of time over which the pits remained open. It is noted that variations in groundwater levels occur over time due to climatic and other factors.

As described previously, the test pits were set-out using a differential GPS and the ground surface levels were determined using an optical survey level, relative to AHD. The test pit locations are shown on Drawing 4.

9. LABORATORY TESTING

9.1 Analytical Rationale for Contamination Testing

The analytical scheme (Table 3) was designed to assess the potential for contamination which may have arisen from current and past use of the site. A total of 13 selected soil samples (including QA/QC replicate) were analysed for various combinations of the contaminants of concern.

Table 3 – Analytical Scheme for soil samples

Sample ID (Location – Depth)	Heavy Metals	TPH	BTEX	PAH	PCB	OCP	Phenols	Asbestos
TP1/0.15-0.4m	✓	✓	✓	✓	✓	✓	✓	✓
TP2/0.1-0.4m	✓	✓	✓	✓	✓	✓	✓	✓
TP3/0.1-0.25m	✓	✓	✓	✓	✓	✓	✓	✓
TP4/0.7-1.4m	✓	✓	✓	✓	✓	✓	✓	
TP5/0.0-0.5m	✓	✓	✓	✓	✓	✓	✓	
BD1/170908	✓			✓	✓	✓		
TP5/0.5-1.4m	✓	✓	✓	✓	✓	✓		✓
TP6/0.5-1.6m	✓	✓	✓	✓	✓	✓	✓	
TP6/2.7-3.2m	✓	✓	✓	✓	✓	✓		✓
TP7/0.3-1.0m	✓	✓	✓	✓	✓	✓		
TP7/3.2-3.9m	✓	✓	✓	✓	✓	✓	✓	✓
TP8/0.1-0.8m	✓	✓	✓	✓	✓	✓	✓	✓
Stockpile	✓	✓	✓	✓	✓	✓		✓
TS-170908			✓					

Note: BD1: field replicate of sample TP5/0.0-0.5m
TS: Spike

9.2 Geotechnical Testing

Selected samples of the materials intersected in the test pits were tested in the laboratory to determine soil classification and engineering properties. The following suite of geotechnical laboratory tests were undertaken:

- 2 No. Atterberg Limits and Linear Shrinkage tests;
- 3 No. Field Moisture Content Tests;
- 2 No. Shrink-Swell Index (I_{ss}) Tests; and

- 2 No. California Bearing Ratio (CBR) tests, with the associated standard compaction tests required for sample preparation.

The detailed laboratory test results are included in Appendix F

The results of the Atterberg limits and Linear Shrinkage tests are summarised in Table 4.

Table 4 – Summary of Soil Classification Test Results

Test Location	Depth (m)	Material	Field Moisture Content (%)	Atterberg Limits			Linear Shrinkage (%)
				LL (%)	PL (%)	PI (%)	
TP1	1.0	Silty clay	18.9	51	22	29	12.5
TP6	1.0	Filling (silty clay)	24.1	49	22	27	11.5
TP8	1.0	Silty clay	20.3	-	-	-	-

The results of the Shrink-Swell Index (I_{ss}) tests are presented in Table 5.

Table 5 – Summary of Shrink-Swell Index Tests

Test Location	Depth (m)	Material	Shrink-Swell Index (I_{ss}) (%)
TP3	0.5 – 0.8	Silty clay	3.4
TP8	0.8 – 1.0	Silty clay	1.6

The two CBR samples were soaked for four days under a standard surcharge load of 4.5 kg. The CBR and compaction test results are summarised in Table 6 below.

Table 6 – Summary of CBR Tests

Test Location	Depth (m)	Material	Field Moisture Content (%)	Optimum Moisture Content (%)	Max. Dry Density (t/m^3)	Swell (%)	CBR (%)
TP1	0.5	Silty clay	25.3	25.0	1.58	2.2	2.5
TP8	1.2	Silty clay	20.9	16.5	1.77	4.0	1.0

10. CONTAMINATION SITE ASSESSMENT CRITERIA

In determining the appropriate criteria against which to assess the results of the chemical analysis, DP has made the following assumptions with regard to the planned development;

- There will be no individual houses or townhouses with private gardens;
- Housing will consist of low rise apartments;
- The areas in between buildings will include roads, paved areas, landscaping and lawns and will not include allotments for growing vegetables.

The DECC's standard, health risk based settings (health-based investigation levels – HIL) are defined in the *Guidelines for the NSW Site Auditor Scheme,* 2nd edition, 2006, Appendix I and it includes the following land uses;

- 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 DECC 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 and the standard, health risk settings we have assessed that the most appropriate settings are considered to be;

- Residential with minimal access to soil such as high rise apartments and flats where this soil will be under building slabs, roads or other pavements (HIL Column2, Appendix II);
- Recreational open space for the landscaped areas (HIL Column 3, Appendix II);
- PPIL for the protection of plants in landscaped areas and lawns (Column 5, Appendix II).

Appendix II of the *Guidelines for the NSW Site Auditor Scheme* and the NSW EPA publication *Guidelines for Assessing Service Station Sites* 1994 provides the health-based investigation levels for these settings and, together with the PPIL, these form the site acceptance criteria (SAC) for the assessment of the site. The adopted site assessment criteria are shown in Table 7, below.

In addition to the HIL concentrations, the following criteria are also considered:

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. Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/ management.

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

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

Note that for plant health, the PPIL are single number criteria as shown in Table 7 and, therefore, the statistical analysis would only apply to HILs.

Table 7 – Site Assessment Criteria for Contamination

Contaminant	Adopted Criteria (SAC)			Source
TPH				NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use - soils. Currently there are no other comprehensive, EPA endorsed investigation levels for petroleum hydrocarbons.
$C_6 – C_9$	65 mg/kg			
$C_{10} – C_{36}$	1000 mg/kg			
BTEX				
Benzene	1 mg/kg			
Toluene	1.4 mg/kg			
Ethylbenzene	3.1 mg/kg			
Xylene	14 mg/kg			
Metals	**HIL-Column 2**	**HIL-Column 3**	**PPIL-Column 5**	NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based Investigation Levels outlined in Column 2 and 3, and Provisional Phytotoxicity Investigation Levels outlined in Column 5.
Arsenic (total)	400 mg/kg	200 mg/kg	20 mg/kg	
Cadmium	80 mg/kg	40 mg/kg	3 mg/kg	
Chromium	48,000 mg/kg	24,000 mg/kg	400 mg/kg	
Copper	4,000 mg/kg	2,000 mg/kg	100 mg/kg	
Lead	1,200 mg/kg	600 mg/kg	600 mg/kg	
Mercury	60 mg/kg	30 mg/kg	1 mg/kg	
Nickel	2,400 mg/kg	600 mg/kg	60 mg/kg	
Zinc	28,000 mg/kg	14,000 mg/kg	200 mg/kg	
Total Phenols	34,000 mg/kg	17,000 mg/kg		
PAH				
Total	80 mg/kg	40 mg/kg		
Benzo(a)Pyrene	4 mg/kg	2 mg/kg		
PCB	40 mg/kg	20 mg/kg		
OCP				
Aldrin + Dieldrin	40 mg/kg	20 mg/kg		
Chlordane	200 mg/kg	100 mg/kg		
DDT+DDD+ DDE	800 mg/kg	400 mg/kg		
Heptachlor	40 mg/kg	20 mg/kg		
Asbestos	No asbestos present in soil at the surface			Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors

11. RESULTS OF SOIL INVESTIGATION

11.1 Fieldwork Results

Details of the sub-surface conditions encountered during the course of the investigation are included in the Test Pit Log Report Sheets (Appendix D), together with notes describing classification methods and descriptive terms. The test pit locations are shown on Drawing 4, Appendix A. Based on the limited programme of fieldwork carried out, it appears that the subsurface profile at this site may be roughly divided into two areas.

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

The eastern half of the site appears to be deeply filled with 4 – 5 m of filling directly overlying shale, whereas the depth of filling encountered over the western half (TP1 – TP3 and TP8) was generally less than 0.8 m.

The general sequence of materials encountered in the test pits is summarised as follows:

Topsoil

Surficial topsoil overlies filling to depths of approximately 0.1 m, except in parts of Lot 37 where the main residential buildings were located (at test pit locations TP 5 – TP 7). At these locations the fill is not covered by topsoil.

Filling

Filling generally comprised brown and grey or grey and red silty clay with some gravel, crushed shale, brick, timber, concrete, glass, ceramics and metal fragments. The filling encountered in TP2 (0.0-0.4m), TP6 (2.7-3.2m), TP7 (3.2-3.9m) and TP8 (0.1-0.8m) contained fragments of fibre-cement products. Styrofoam was found in TP 7. Traces of ash were detected in the filling at TP 3.

Filling encountered in TP4 – TP7 was between 4 m and 5 m deep. The deepest filling was intersected in TP7 (4.9 m). The deep filling also contained metal fragments, tiles, timber, and fibre-cement fragments in test pits TP6 and TP7. The fibre-cement fragments were sent for asbestos analysis. The results are given in Section 11.4. Over the eastern half of the site (TP4 – TP7) the filling was directly underlain by shale bedrock.

Natural Soils

The natural soil profile comprised red and grey silty clay with a trace of ironstone gravel typically of a stiff to hard consistency and at, or drier than, the Plastic Limit. The natural clay soil profile was only encountered over the western half of the site (TP1 – TP3 andTP8).

Bedrock

The silty clay is underlain by Bringelly Shale. The shale is typically grey and has some ironstaining. Bringelly shale was intersected in depths between 1.2 m and 1.9 m where shallow filling was encountered (TP 1 – TP 3 and TP 8). In test pits TP 4 and TP 5 Bringelly shale was encountered in depths to 3.8 / 3.9 m. In test pit TP6 the natural shale was intersected at a depth of 4.3 m. Over the eastern half of the site the underlying shale was interpreted to be generally low (and possibly medium) strength with shallow depth.

Perched water was intersected as minor seepage inflow at a depth of 4.6 m in test pit TP 7.

Table 8 summarises the subsurface profile encountered during the current investigation.

Table 8 – Subsurface Profile

Sampling Location	Topsoil	Filling (minimum depth in metres)	Silty Clay (minimum depth in metres)	Shale (minimum depth in metres)	Completion Depth in metres
TP1	0-0.1	0.1-0.4	0.4-1.9	1.9-2.4	2.4
TP2	0-0.1	0.1-0.4	0.4-1.2	1.2-2.3	2.3
TP3	0-0.1	0.1-0.25	0.25-1.6	1.6-3.0	3.0
TP4	0-0.1	0.1-3.9	-	3.9-4.2	4.2
TP5	-	0-3.8	-	3.8-4.0	4.0
TP6	-	0-4.3	-	4.3-4.5	4.5
TP7	-	0-4.9	-	4.9-5.0	5.0
TP8	0-0.1	0.1-0.8	0.8-1.2	1.2-1.9	1.9

11.2 Total Photoionisable Compounds (TOPIC)

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. The PID had a 10.6eV lamp and was calibrated with isobutylene gas at 100 ppm prior to commencement of fieldwork.

Results of sample screening are shown in the Test Bore Reports in Appendix D. The PID readings were 0 ppm in all screened samples and, therefore, do not indicate the presence of contamination by volatile organic compounds.

11.3 Laboratory Results

The collected soil samples (including QA/QC samples) were sent for analysis at a NATA accredited laboratory. The results of laboratory analysis of the soil are summarised in Tables 9 and Table 10. NATA Reports are also provided in Appendix E.

Table 9 - Laboratory Results - Soil

Sample ID	Heavy Metals								PAH		TPH		BTEX				Total Phenols	OCP			Total PCB[2]	Asbestos
	As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	Total[2]	Benzo(a)pyrene	C_6-C_9	C^{10}-C^{36}	Benzene	Toluene	Ethyl-Benzene	Total Xylene		Total OCP[2]	DDT+DDD+DDE[2]	Aldrin + Dieldrin[2]		
Filling Material																						
TP1/0.15-0.4m	9.0	<0.5	21.0	19.0	24.0	<0.1	8.0	99.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	NIL
TP2/0.1-0.4m	9.0	0.6	17.0	52.0	140.0	<0.1	13.0	**270.0**	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	NIL
TP3/0.1-0.25m	9.0	0.5	31.0	13.0	22.0	<0.1	9.0	18.0	0.06	0.06	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	NIL
TP4/0.7-1.4m	**26.0**	<0.5	12.0	34.0	19.0	<0.1	26.0	86.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	-
TP5/0.0-0.5m	9.0	<0.5	10.0	34.0	18.0	<0.1	20.0	71.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	-
BD1/170908	9.0	<0.5	9.0	31.0	16.0	<0.1	25.0	70.0	<PQL	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
TP5/0.5-1.4m	6.0	<0.5	9.0	29.0	17.0	<0.1	17.0	94.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.1	<0.1	<0.1	<0.1	NIL
PQL	<4.0	<1.0	<1.0	<1.0	<1.0	<0.1	<1.0	<1.0	<0.1/0.2	<0.05	<25	<250	< 0.5	< 0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	
Site Assessment Criteria[4]																						
HIL-Column 2[4]	400	80	48000	4000	1200	60	2400	28000	80	4	65[6]	1,000[6]	1[6]	1.4[6]	3.1[6]	14[6]	34000	-	800	40	40	
HIL-Column 3[5]	200	40	24000	2000	600	30	600	14000	40	2	65[6]	1,000[6]	1[6]	1.4[6]	3.1[6]	14[6]	17000	-	400	20	20	
PPIL	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 in normal environmental conditions

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

3 Field replicate of sample listed directly above

4 NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels residential with minimal access to soil (HIL Column 2)

5 NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels Parks, recrational open space, playing fields including secondary schools (HIL Column 3)

6 NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils

\- not analysed

NIL No asbestos found at reporting limit of 0.1g/kg, respirables fibres not detected

BOLD Indicates exceedance of HIL

Table 10 - Laboratory Results - Soil

Sample ID	Heavy Metals								PAH		TPH		BTEX				Total Phenols	OCP			Total PCB[2]	Asbestos
	As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	Total[2]	Benzo(a)pyrene	C_6-C_9	C^{10}-C^{36}	Benzene	Toluene	Ethyl-Benzene	Total Xylene		Total OCP[2]	DDT+DDD+DDE[2]	Aldrin + Dieldrin[2]		
Filling Material																						
TP6/0.5-1.6m	6.0	<0.5	11.0	50.0	22.0	<0.1	21.0	72.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	-
TP6/2.7-3.2m	9.0	<0.5	11.0	34.0	19.0	<0.1	24.0	110.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.1	<0.1	<0.1	<0.1	NIL
TP7/0.3-1.0m	6.0	<0.5	10.0	37.0	15.0	<0.1	25.0	110.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.1	<0.1	<0.1	<0.1	-
TP7/3.2-3.9m	4.0	<0.5	10.0	35.0	19.0	<0.1	17.0	78.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	NIL
TP8/0.1-0.8m	<4.0	<0.5	9.0	9.0	11.0	<0.1	3.0	27.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	NIL
Stockpile	5.0	<0.5	16.0	19.0	30.0	<0.1	15.0	73.0	<PQL	<0.05	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.1	<0.1	<0.1	<0.1	NIL
PQL	<4.0	<1.0	<1.0	<1.0	<1.0	<0.1	<1.0	<1.0	<0.1/0.2	<0.05	<25	<250	< 0.5	< 0.5	<1.0	<3.0	<5.0	<0.1	<0.1	<0.1	<0.1	
Site Assessment Criteria[4]																						
HIL-Column 2[4]	400	80	48000	4000	1200	60	2400	28000	80	4	65[6]	1,000[6]	1[6]	1.4[6]	3.1[6]	14[6]	34000	-	800	40	40	
HIL-Column 3[5]	200	40	24000	2000	600	30	600	14000	40	2	65[6]	1,000[6]	1[6]	1.4[6]	3.1[6]	14[6]	17000	-	400	20	20	
PPIL	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 in normal environmental conditions

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

3 Field replicate of sample listed directly above

4 NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels residential with minimal access to soil (HIL Column 2)

5 NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels Parks, recrational open space, playing fields including secondary schools (HIL Column 3)

6 NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils

\- not analysed

NIL No asbestos found at reporting limit of 0.1g/kg, respirables fibres not detected

BOLD Indicates exceedance of HIL

11.4 Asbestos Testing

Four fibre-cement fragments were sent for asbestos analysis. The results are summarised in Table 11.

Table 11 – Asbestos Testing of Bulk Material

Sampling Location	Depth	Asbestos fibres detected
TP2	0.1-0.4	No asbestos detected
TP6	2.7-3.2	No asbestos detected
TP7	3.2-3.9	No asbestos detected
TP8	0.1-0.8	No asbestos detected

12. ASSESSMENT OF LABORATORY RESULTS

12.1 Chemical Contaminants in Soil

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

The laboratory results (Table 9 and Table 10) indicated that contaminant concentrations of heavy metals in the soil samples analysed were within the health-based SAC for residential with minimum opportunities for soil access and for recreational open space and mostly within the Provisional Phytotoxicity-based Investigation Levels (PPIL), which are relevant for landscaped areas. Arsenic and zinc concentrations in soil sample TP4/0.7-1.4 m and respectively in soil sample TP2/0.1-0.4m exceed the PPIL levels.

PAH were detected only in one soil sample (TP3/0.1-0.25m). The PAH concentration of 0.06 mg/kg, consisting of Benzo(a)pyrene, was within the more sensitive health-based SAC for recreational open space.

The chemical analysis didn't detect any total petroleum hydrocarbons, BTEX, Phenols, polychlorinated biphenyls in the tested soil samples. The detection limits are listed in Tables 9 and Table 10.

12.2 Asbestos

Eight samples of filling and four fibre-cement fragments were analysed for asbestos. Asbestos minerals were not detected in any of these samples.

13. PRELIMINARY GEOTECHNICAL COMMENTS

13.1 General

The present site surface is relatively flat with a gentle slope down towards the north-eastern corner of the site. It is therefore considered that there is currently no significant risk of slope instability affecting the existing site.

Topographically, the site is understood to be within a defined floodplain and as such, due consideration should be given to the risks associated with flooding and inundation of the present site.

The relevant Acid Sulphate Soil (ASS) and soil salinity risk maps indicate that the site is unlikely to be affected by either problem.

Probably the most important aspect, at least from a geotechnical viewpoint, is the deep filling encountered over the eastern half of the site. This is likely to have a major impact on the type of foundation systems and earthworks required for the development of this site.

13.2 Site Classification

The significant depth of filling encountered over most of the site, of up to 5 m, would necessitate a 'Class P' site classification in accordance with AS 2870-1996 (Residential Slabs and Footings). In the absence of filling records and, in particular, density and compaction test results, the existing fill should be regarded as 'uncontrolled'.

Based on the relatively minor depth of filling encountered over the south-western part of the site (TP1 – TP3), a 'Class M' (moderately reactive) or 'Class H' (highly reactive) site classification may be possible. Further field investigation and laboratory soil testing would, however, be necessary to confirm the site classification appropriate for the final design of footings.

Based on the I_{ss} test results, the natural site soils are indicated to be moderately to highly reactive, such that significant volume changes could be expected for the clays in response to variations in the soil moisture content.

13.3 Site Preparation and Earthworks

The extent of earthworks will be controlled by design surface levels for flood mitigation, the extent of below-ground basements for the development and the need to remove any contaminated soil for environmental reasons. Material to be removed from site will generally require waste classification assessment prior to disposal at a licensed landfill.

Based on the observed conditions in the test pits, the excavation of a single basement for example (i.e. to about 3 m depth), would primarily involve the excavation of filling, natural clays and relatively weak, weathered shale. These materials should be readily excavated using conventional earthmoving equipment (e.g. bulldozers). Along the western side of the site, the lowest 0.5 – 1.0 m of excavation for a one-level basement would entail the removal of some medium strength shale. This may require the use of medium-sized ripping tynes and hydraulic rock hammering for excavation purposes.

Depending on the nature of the proposed residential developments and other factors, it may be possible to leave the existing filling *in situ* and fully support the superstructure of the buildings on piled foundations, socketed into the underlying shale. Alternatively, it may be possible to compact the existing filling *in situ* using heavy impact-rolling compaction plant. Further geotechnical information will generally be required to provide further assessment of these options.

13.4 Batter Slopes and Excavation Support

Within the filling and natural soils temporary batters of 1.5 Horizontal (H) : 1 Vertical (V), and permanent batters of 2H : 1V are suggested for excavations of up to 3 m depth. Permanent batters should be provided with erosion protection using vegetation cover or similar.

It is assumed that retaining/shoring walls for basements (single level assumed) will be limited to a maximum height of 3 m. The preliminary design of retaining walls that are capable of some outward rotation (e.g. cantilever walls or walls with a single row of 'tie-back' anchors) may be designed on the basis of a bulk density of 18 kN/m^3 for the retained material, and an active earth pressure coefficient (K_a) of 0.4 assuming a triangular earth pressure distribution on the rear of the wall. Additional allowance should be made for lateral pressures from surcharge loads above the wall and also for hydrostatic pressures.

13.5 Groundwater

Based on the minor amount of seepage noted in the test pits, it is considered that the construction of below-ground basements should not be adversely impacted by groundwater. Inflows should be readily handled by conventional 'sump-and-pump' methods.

Due to the topographic setting of the site and consequent risk of periodic flooding, it will be important to incorporate a comprehensive subfloor drainage system.

The system of subfloor drains should direct groundwater and the water collected from catch-drains in the basement, towards permanent sumps serviced by an activated pump system. Sizing of the pumps is usually carried out when bulk excavation of complete.

13.6 Foundations

Foundations for new buildings should be uniformly supported on the underlying shale bedrock, to avoid the potential for the settlement of footings supported in the existing uncontrolled filling and differential movement between footings supported on materials with a substantially different stiffness.

The use of piled foundations will generally be required over much of the site, where existing filling depths are in excess of one metre. Suitable pile types could include bored piers or continuous flight auger (CFA), concrete or grout-injected piles. Temporary liners or casing may be required to support the filling in some areas, with pumps likely to be required to remove seepage into open pier holes, prior to concrete placement.

The preliminary design of piles founded within low strength shale may be based on a maximum allowable end bearing pressure of 1500 kPa, and a maximum allowable shaft adhesion of 100 kPa (within low strength shale).

Piles proportioned on the basis of the above parameters would experience total settlements of less than 1% of the diameter, with differential settlements between adjacent columns of less than half of this value.

13.7 Pavements

The CBR results obtained for the two samples of the natural clay soils from this site are indicative of a material that exhibits a considerable loss in strength when it becomes saturated. A design CBR value of 2% is considered suitable for the preliminary design of pavements supported on either the natural clay subgrade, or a subgrade comprising reworked site soils derived either from the natural clay or existing filling material.

The low CBR value indicated for the site clays is such that some form of lime stabilisation may be required to improve these materials.

Further, it will be critically important to incorporate adequate surface and subsoil drainage for all pavement areas, to reduce the potential for saturation of the subgrade materials.

14. CONCLUSIONS AND RECOMMENDATIONS

The scope of work for the current assessment comprised a site walkover inspection, review of site history and a limited soil sampling programme for contamination and geotechnical purposes.

A review of historical information indicated that the site covers four Lots which were historically vacant or used for residential purposes. Industrial or commercial activities on the site were not identified. The current registered proprietor is Housing Commission New South Wales.

The contamination assessment did not identify contamination by heavy metals, PAH, TPH, BTEX, Phenols, OCP and PCB in regards of the proposed redevelopment with respect to health risk based criteria for residential with minimal access to soil and for open space use.

The provisional phytotoxicity based investigation levels were exceeded for arsenic (TP4) and zinc (TP2). These minor exceedances of the PPIL may occur at other locations within the fill. It should be noted that the exceedance of the arsenic PPIL was at a depth below 0.5 m (0.7 – 1.4 m) which is usually considered to be below the root zone.

However, the results of the contamination assessment show that the site is compatible with the proposed residential use with the appropriate testing and management of soil in excess of the PPIL. This would require further testing of soil for use in landscaped areas.

A waste classification may be required for the off-site disposal of excavated soil. DP recommends future waste classification with reference to the *Waste Classification Guidelines*, April 2008, issued by the Department of Environment and Climate Change (DECC).

If filling is to be excavated in areas where basements are planned, depending on the final proposed design for the site, the excavated soil should be stockpiled to allow waste classification assessment to be conducted prior to removal.

Considering the limited site investigation and the restricted programme of subsurface sampling, screening and chemical testing which was set out in the proposal and although asbestos has not been detected in this study, DP recommends further soil assessment during earthworks specifically to assess for the presence of asbestos contaminants.

Stockpiled soil and excavation pits should be assessed and if asbestos-containing products are detected via observation or sampling and analysis, the affected soil has to be classified as Special Waste. Before removal a competent occupational hygienist has to assess whether the asbestos waste is bonded or friable. Removal and disposal of bonded asbestos must be undertaken by a contractor holding a bonded asbestos removal licence (AS2 licence). If the asbestos waste is considered friable a friable asbestos removal licence (ASI licence) is required (WorkCover Guide, *Working with Asbestos* (2008)). Any asbestos removal works would also have to be conducted in a manner that is in compliance with the relevant requirements of WorkCover Guide, *Working with asbestos* (2008) and *Code of Practice for the Safe Removal of Asbestos,* National Occupational Health and Safety Commission, Canberra (2005). Footprints of asbestos-contaminated stockpiles should be validated by an Occupational Health & Safety Specialist.

If basement excavations are planned and asbestos-based waste is detected in the soil and is to be retained on site, a Remedial Action Plan (RAP) and an Asbestos Management Plan (AMP) should be prepared for the site.

Estimated costs of remedial and additional contamination works that may be necessary for the site are provided in Table 12, below.

Table 12 - Estimated Remediation and Additional Works Costs

Item	Estimated Cost
Waste Classification#	$15,000 - $25,000
Disposal of excavated soils (if required)*	$50 - $250/tonne
Asbestos Management Plan (if asbestos contaminated Soils retained on site)^	$4,000 - $6,000
Remedial Action Plan (if basements of deep excavations planned)	$5,000 - $8,000
Disposal of Asbestos Contaminated Soils as Special Waste (if required)*	$200 - $500/tonne

^ May include additional costs if material required to be imported to site for capping layer

* includes estimate of excavation, trucking and tipping costs only. For a more detailed assessment of the costs associated with disposal of asbestos contaminated soils should seek advice from a contractor with appropriate asbestos handling licenses. The actual cost would be dependant on contractor. Note if basements planned actual costs associated with remediation would only include that which would not normally be associated with excavation works

Dependent on volume of filling removed

Please note that the above estimates are “ball park” figures only and may not reflect the costs associated with remedial and management works and are dependent on the final proposed design for the site.

Groundwater quality has not been assessed. Given the low contamination levels in the soil, leaching of contaminants into a deeper groundwater system is unlikely. Groundwater should be assessed, however, the risk is considered to be low.

15. LIMITATIONS OF THIS REPORT

The scope of the site assessment activities and consulting services undertaken by DP were limited to those detailed in the proposal dated 13 August 2008 and accepted by Major Projects Directorate Department of Housing NSW, Sydney NSW 2000.

DP’s assessment is necessarily based upon the result of a limited site investigation and the restricted programme of subsurface sampling, screening and chemical testing which was set out in the proposal.

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DP cannot provide unqualified warranties with regards to site contamination nor does DP assume any liability for site conditions not observed or accessible during the time of the investigations.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated.

In addition, site characteristics may change over time due to activities such as spillages of contaminating substances. These changes may occur subsequent to DP's investigations and assessment.

This report, its associated documentation and the information herein have been prepared solely for the use of Major Projects Directorate Department of Housing NSW. Any reliance assumed by third parties on this report shall be at such parties' own risk.

DOUGLAS PARTNERS PTY LTD

Ulrike Krause
Senior Environmental Scientist

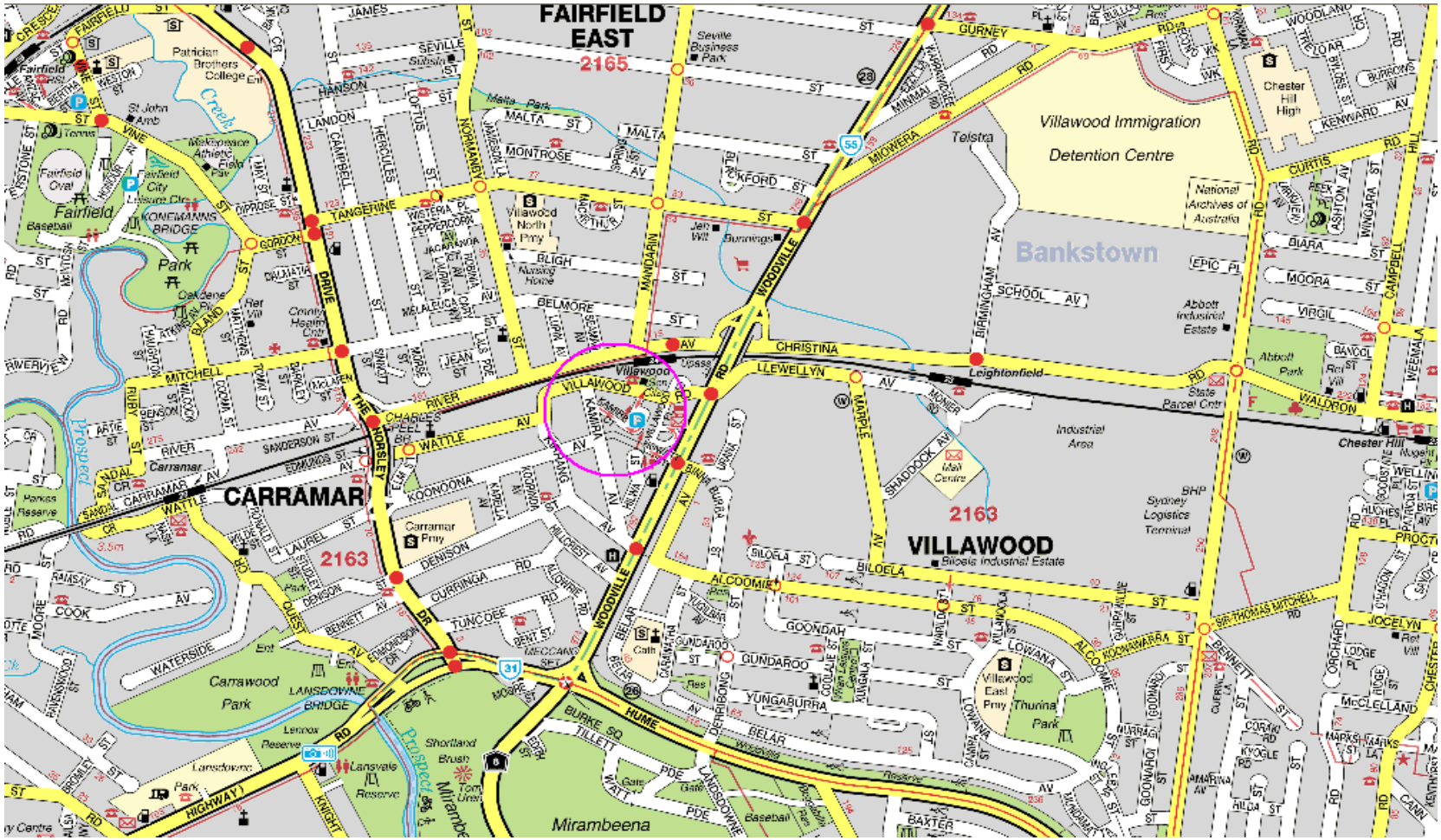
Reviewed by

Lindsay Rockett
Senior Associate

Mathew Mikhail
Geotechnical Engineer

Bruce McPherson
Principal

APPENDIX A
Site Drawings



Site Locality Preliminary Geotechnical and Contamination Assessment Kamira Court, Villawood NSW 2163	Project 45789	October 2008	Drawing 1

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LEGEND

Coordinate Grid (GDA94/MGA Zone 56)

Approximate Site Boundary

Rail Line

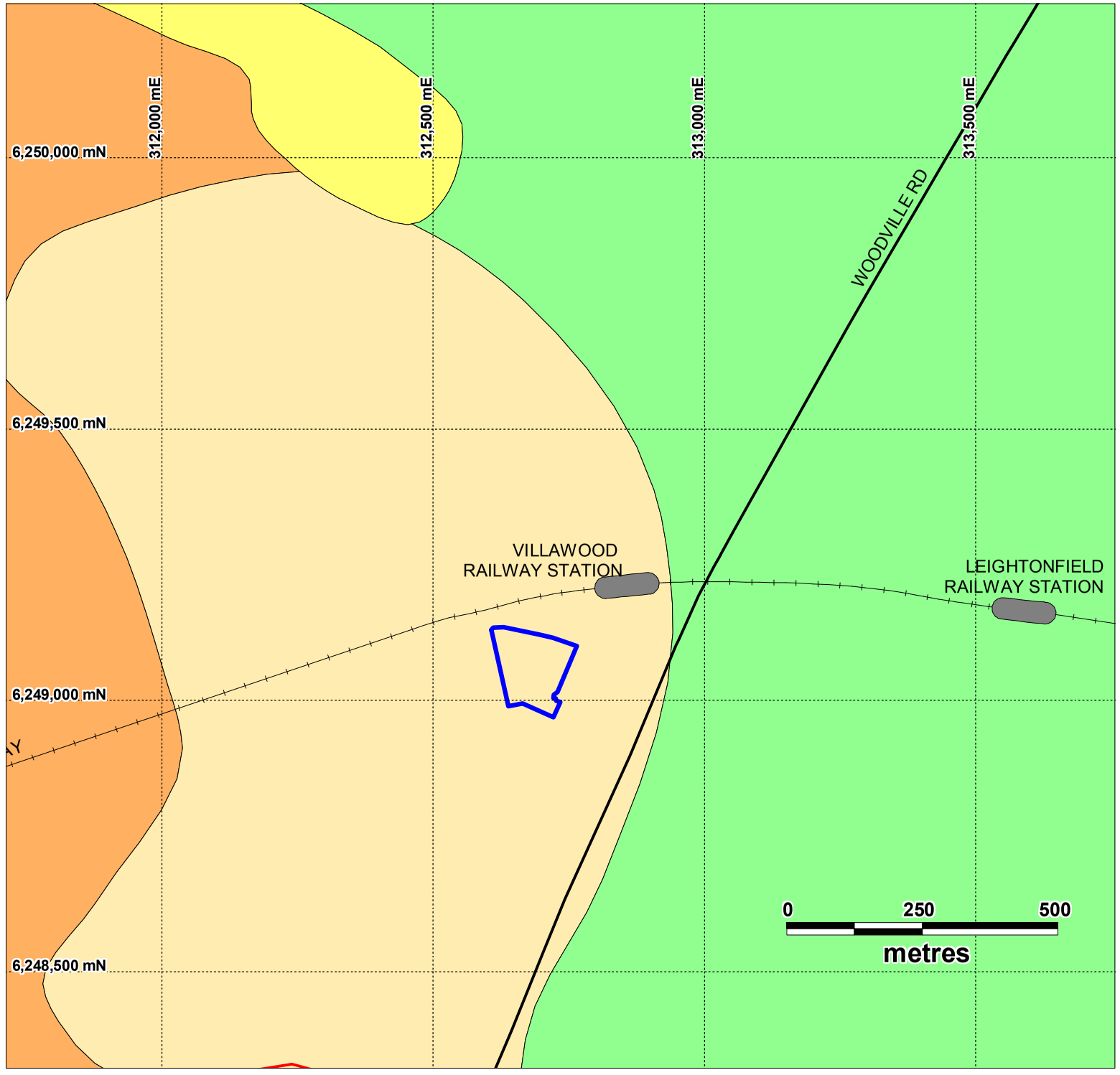
SOILS LEGEND

ALri
ALLUVIAL
RICHMOND SOILS LANDSCAPE

ALsc
ALLUVIAL
SOUTH CREEK SOILS LANDSCAPE

ALbp
ALLUVIAL
BERKSHIRE PARK SOILS LANDSCAPE

REbt
RESIDUAL
BLACKTOWN SOILS LANDSCAPE



NOTE: Soils mapping is extracted from 'Soil Landscapes of the Penrith 1:100,000 Sheet', 1989. Soil Conservation Service of NSW.

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

TITLE: **SOILS MAP**
URBAN RENEWAL PROJECT
KAMIRA COURT
VILLAWOOD, NSW

CLIENT: HOUSING NSW			
DRAWN BY: ALT	SCALE: 1:10,000	PROJECT No: 45789.0	OFFICE: SYDNEY
APPROVED BY:		DATE: 1 OCTOBER 2008	DRAWING No: 2

LEGEND

- Coordinate Grid (GDA94/MGA Zone 56)
- Approximate Site Boundary
- Rail Line

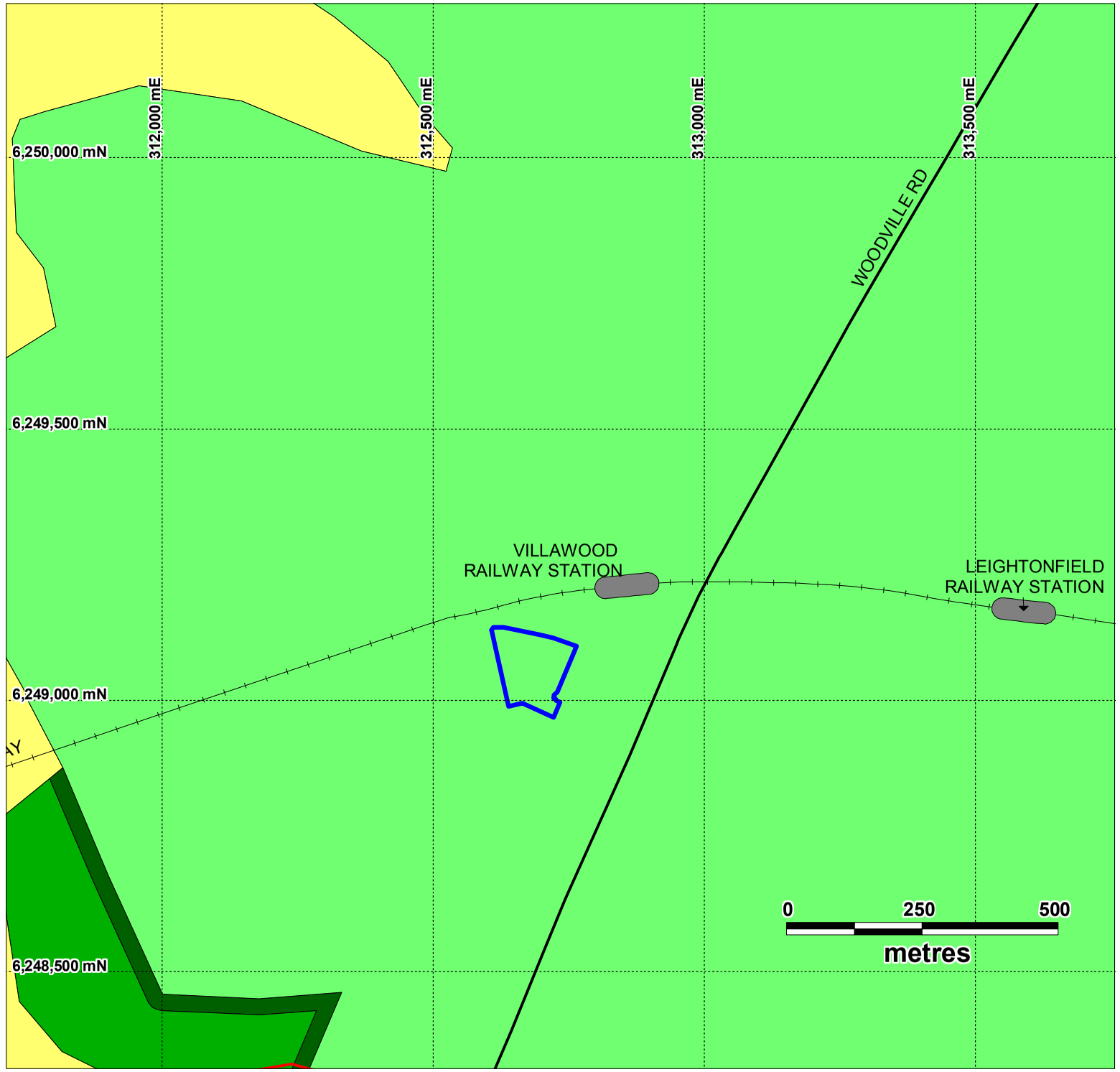
GEOLOGY LEGEND

Qpn
Quaternary Fluvial Sediment
Medium-grained sand, clay and silt

Rwm
Minchinbury Sandstone
Fine to medium-grained quartz-lithic sandstone

Rwa
Ashfield Shale
Dark-grey to black claystone-siltstone and fine sandstone -siltstone laminate

Rwb
Bringelly Shale
Shale, carbonaceous claystone,claystone, laminate,
fine to medium-grained lithic sandstone, rare coal and tuff



NOTE: Geological mapping is extracted from 'Penrith 1:100,000 Geological Sheet', 1991, Geological Survey of NSW.

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

TITLE: **GEOLOGY MAP**
URBAN RENEWAL PROJECT
KAMIRA COURT
VILLAWOOD, NSW

CLIENT: HOUSING NSW			
DRAWN BY: ALT	SCALE: 1:10,000	PROJECT No: 45789.0	OFFICE: SYDNEY
APPROVED BY:		DATE: 1 OCTOBER 2008	DRAWING No: 3

LEGEND

- Coordinate Grid (GDA94/MGA Zone 56)
- Approximate Site Boundary
- Test Pit Locations
- Stockpile Location

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

TITLE: **SITE PLAN AND TEST PIT LOCATIONS**
URBAN RENEWAL PROJECT
KAMIRA COURT
VILLAWOOD, NSW

CLIENT: HOUSING NSW			
DRAWN BY: ALT	SCALE: 1:1000	PROJECT No: 45789.0	OFFICE: SYDNEY
APPROVED BY:		DATE: 1 OCTOBER 2008	DRAWING No: 4

APPENDIX B
Site Photographs

PHOTO 1: View on Lot 136 D.P. 16186 and Lot 39 D.P. 202006 in NW direction

PHOTO 2: View on Lot 38 D.P. 202006 in WNW direction

Preliminary Geotechnical and Contamination Assessment Kamira Court, Villawood NSW 2163	**Project 45789**	**October 2008**	**Plate 1**

PHOTO 3: Eastern boundary of Lot 38 D.P. 202006, location of test pit TP 4

Preliminary Geotechnical and Contamination Assessment Kamira Court, Villawood NSW 2163	**Project 45789**	**October 2008**	**Plate 2**

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PHOTO 4: View on Lot 37 D.P. 202006 in W direction; Stockpile location

PHOTO 5: View on Lot 37 D.P. 202006 in NW direction

Preliminary Geotechnical and Contamination Assessment Kamira Court, Villawood NSW 2163	**Project 45789**	**October 2008**	**Plate 3**

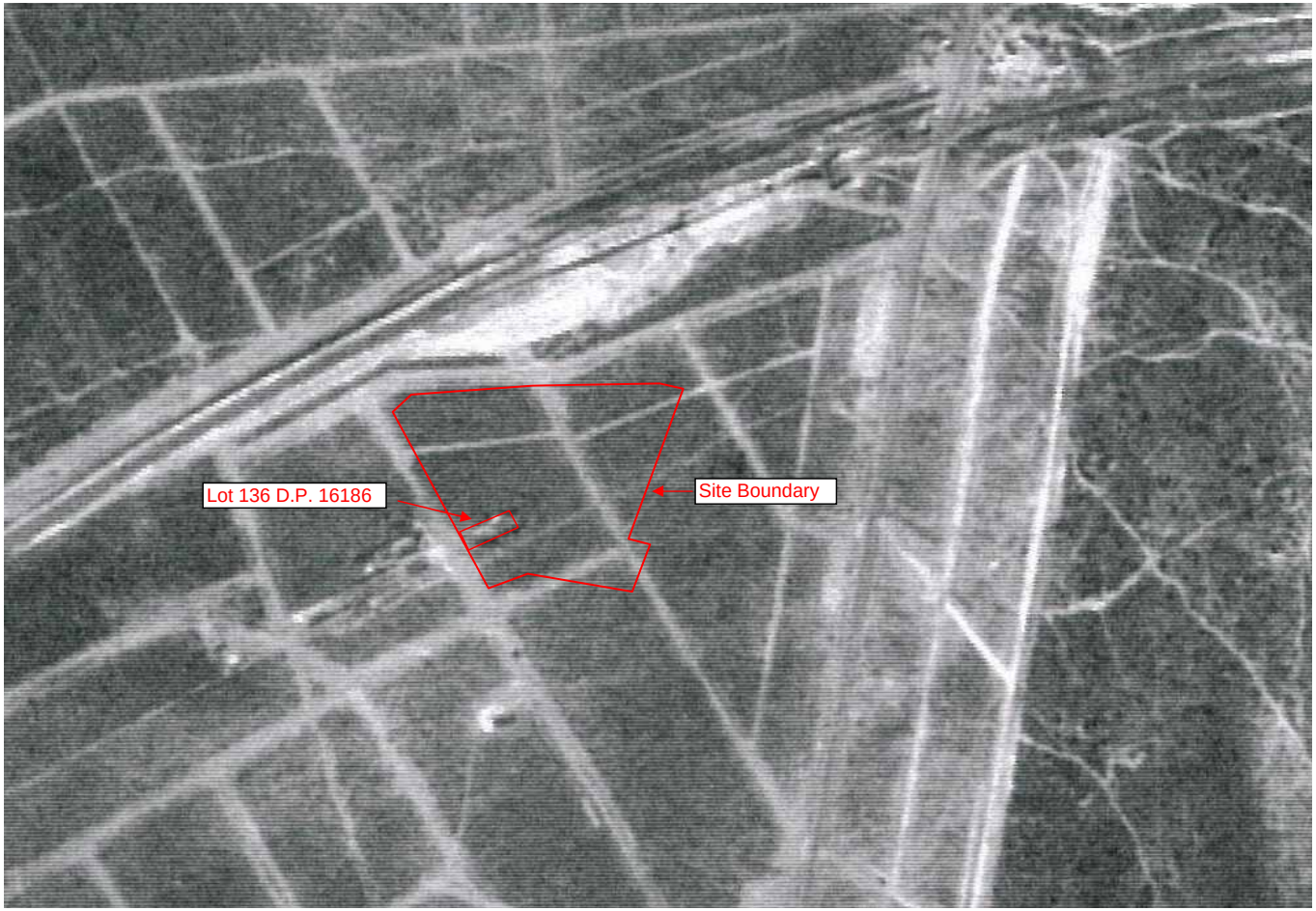
PHOTO 6: View on Lot 37 D.P. 202006 in NE direction, location of test pit TP 6

PHOTO 7: View on Lot 37 D.P. 202006 in N direction, location of test pit TP 7

Preliminary Geotechnical and Contamination Assessment Kamira Court, Villawood NSW 2163	**Project 45789**	**October 2008**	**Plate 4**

APPENDIX C
Site History Information
Results of DNR Search

APPENDIX C
Site History Information



Aerial Photograph 1928 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **1**

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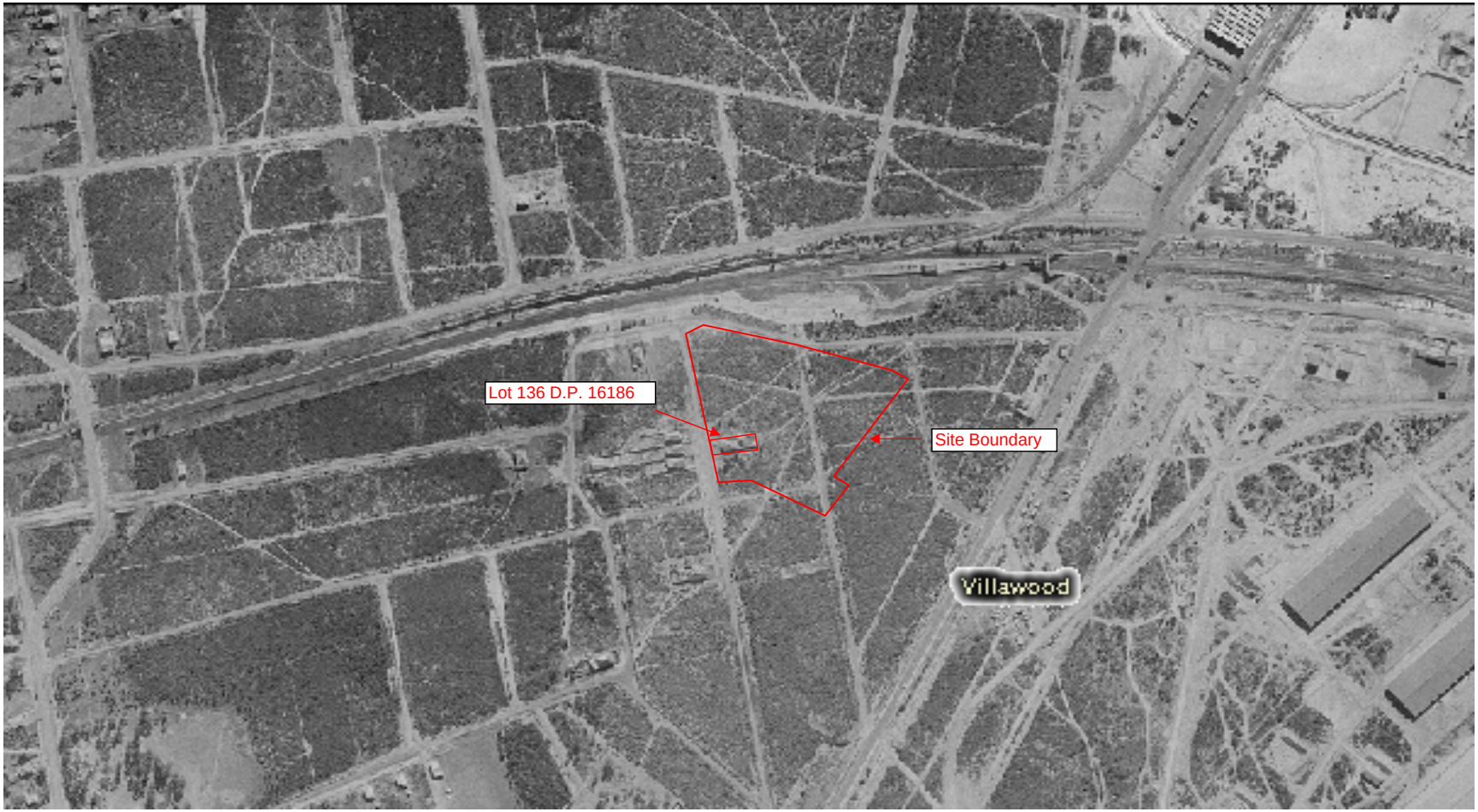

Aerial Photograph 1943 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **2**

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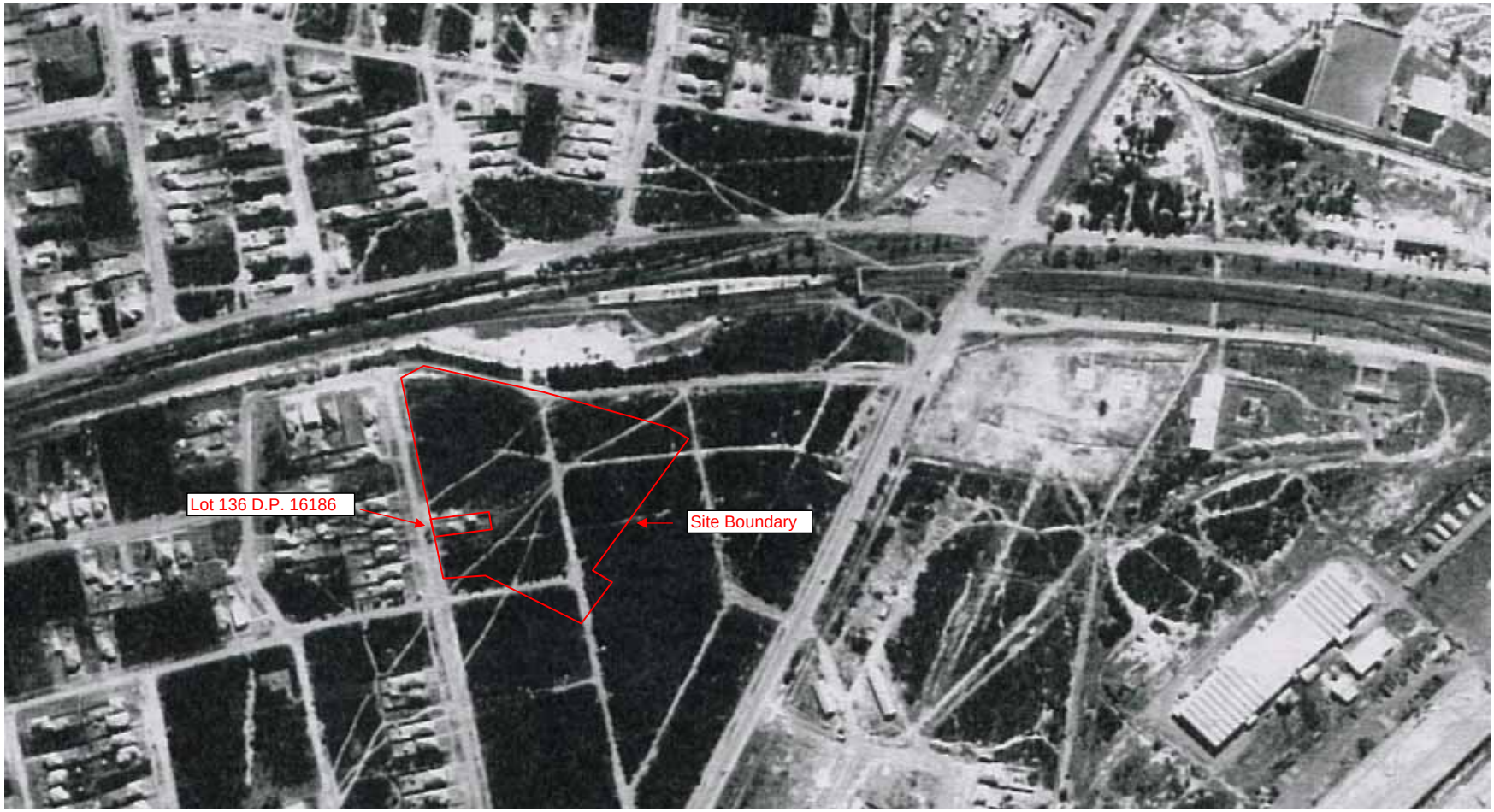

Aerial Photograph 1950 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **3**

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Aerial Photograph 1961 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **4**

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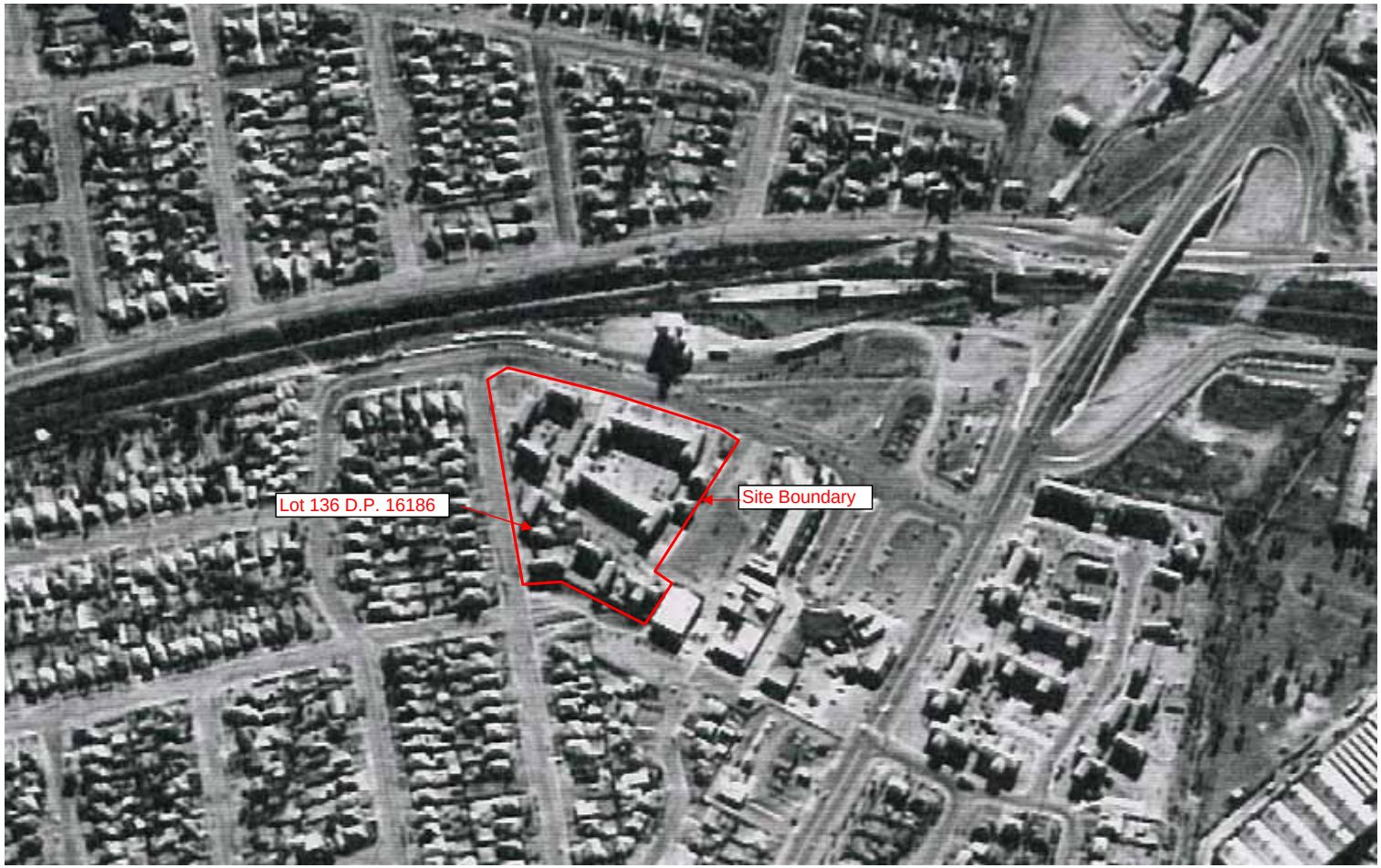

Aerial Photograph 1970 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **5**

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Aerial Photograph 1978 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **6**

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Aerial Photograph 1991 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **7**

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Aerial Photograph 2007 **Preliminary Geotechnical and Contamination Assessment** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **8**

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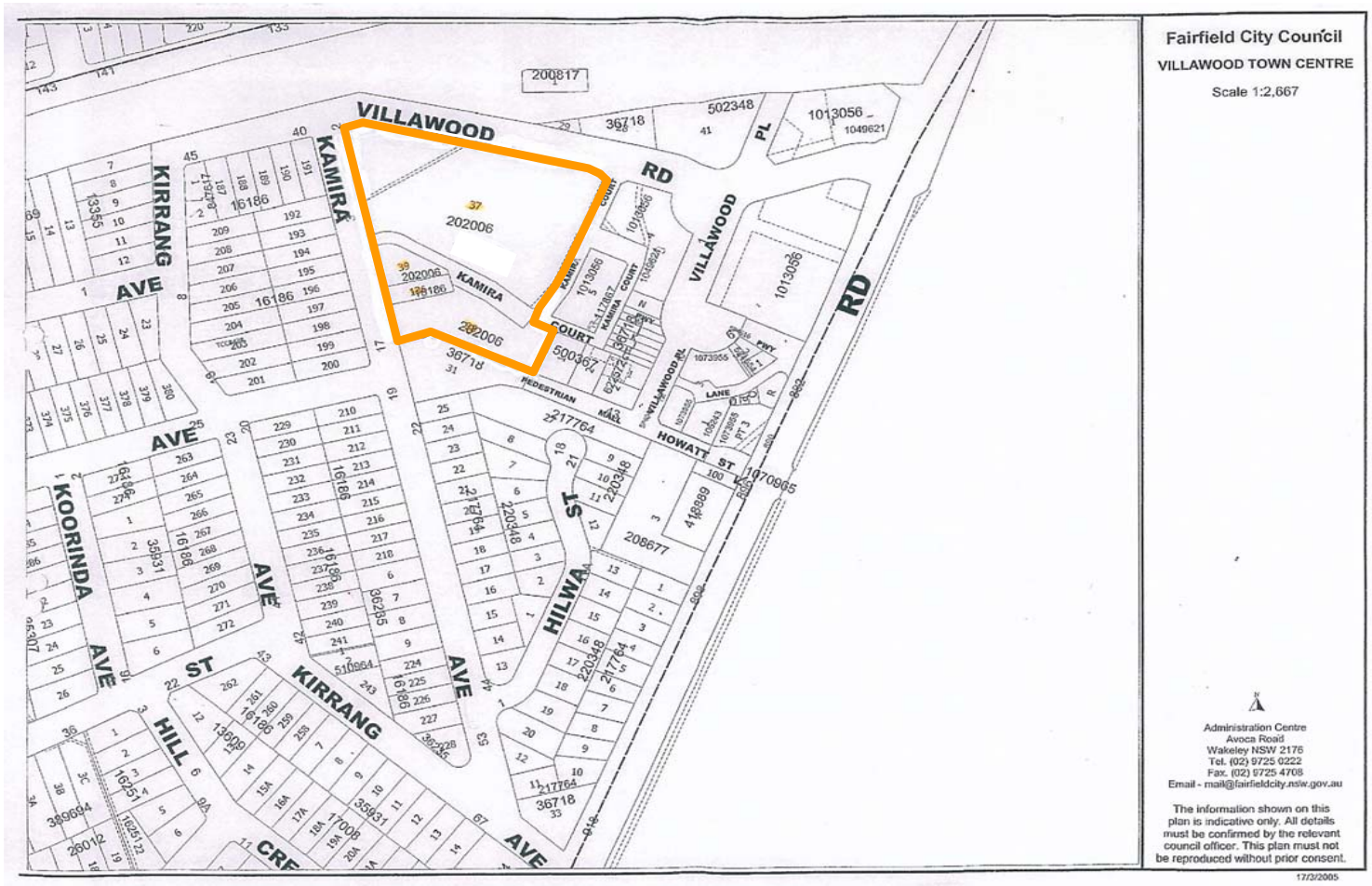
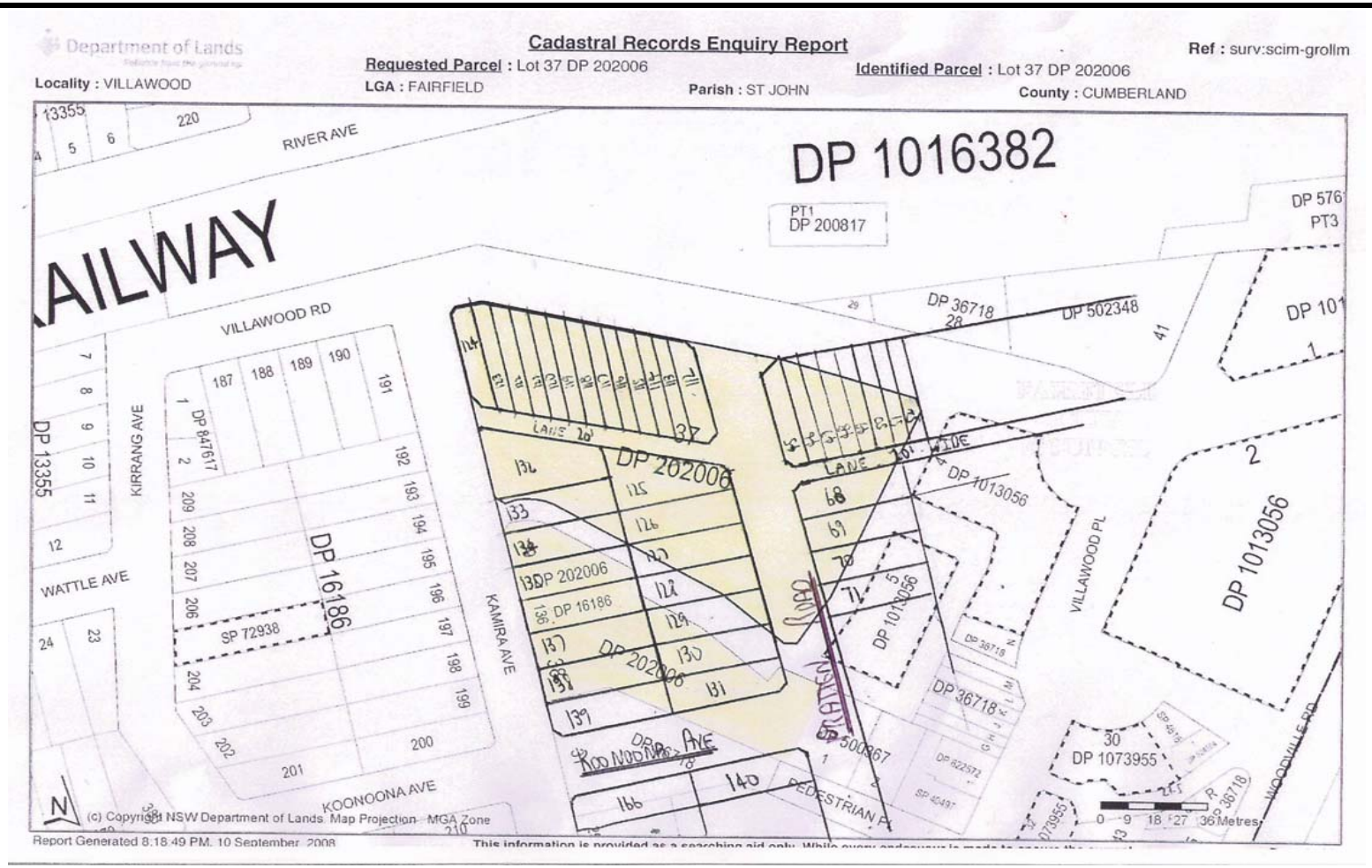


Cadastral Records **Geotechnical and Contamination Report** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **9**

Douglas Partners
Geotechnics · Environment · Groundwater



Cadastral Records, Subdivision of D.P. 16186 in 1929 **Geotechnical and Contamination Report** **Kamira Court, Villawood NSW 2163**	**Project** **45789**	**October** **2008**	**Plate** **10**

Douglas Partners
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ACN: 093 398 611
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

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

SUMMARY AS TO OWNERS.

Property: - Kamira Avenue, Villawood

Description: Lot 136 D.P. 16186 and Lots 37, 38 & 39 D.P. 202006

As regards Lot 136 D.P. 16186

19.08.1915	William Charles Wadley Lippmann *(Bank Manager)*	Vol 2598 Fol 181
13.05.1918	John Symonds *(Engineer)*	Vol 2598 Fol 181
21.06.1928	John Symonds *(Engineer)* Thomas Kennedy *(Engineer)* Thomas Peters *(Contractor)*	Vol 3907 Fol's 190 to 192
19.06.1928	John Symonds *(Engineer)* Thomas Kennedy *(Engineer)* Leonard James Hooper *(Investor)* Edward Thomas Hooper *(Investor)*	Vol 3907 Fol 190, Vol 3907 Fol 191, Vol 4343 Fol 58 & Vol 4343 Fol 59
28.06.1929	John Symonds *(Engineer)* Thomas Kennedy *(Engineer)* Leonard James Hooper *(Investor)* Edward Thomas Hooper *(Investor)* Antoine William Mary D'Apice *(Solicitor)*	Vol 3907 Fol 190, Vol 3907 Fol 191, Vol 4343 Fol 58 & Vol 4343 Fol 59
06.01.1930	Ernest Morris *(Carpenter)*	Vol 4388 Fol 244
22.11.1944	Ernest Morris *(Carpenter)* Laura Morris *(Married Woman)*	Vol 4388 Fol 244
12.12.1961	Ernest Morris *(Carpenter)*	Vol 4388 Fol 244
03.10.1962	Ralph Edward Morris *(Supervisor)* *(We have not investigated the Section 94 Application)*	Vol 4388 Fol 244
06.09.1971	Sime Muskie *(Fitter and Turner)*	Vol 4388 Fol 244

email: grolly1@bigpond.net.au

21/9/08

ACN: 093 398 611
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

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

23.11.1973	# Housing Commission of New South Wales	136/16186

 # Current Registered Proprietor

As regards Lots 37, 38 & 39 D.P. 202006

15.10.1947	# Housing Commission of New South Wales	37/202006, 38/202006 & 39/202006
As regards the parcels marked as Lot numbers on the attached cadastre.		
1952	# Housing Commission of New South Wales	37/202006, 38/202006 & 39/202006
As regards the parts marked as roads and lanes on the attached cadastre		

 # Current Registered Proprietor

email: grolly1@bigpond.net.au

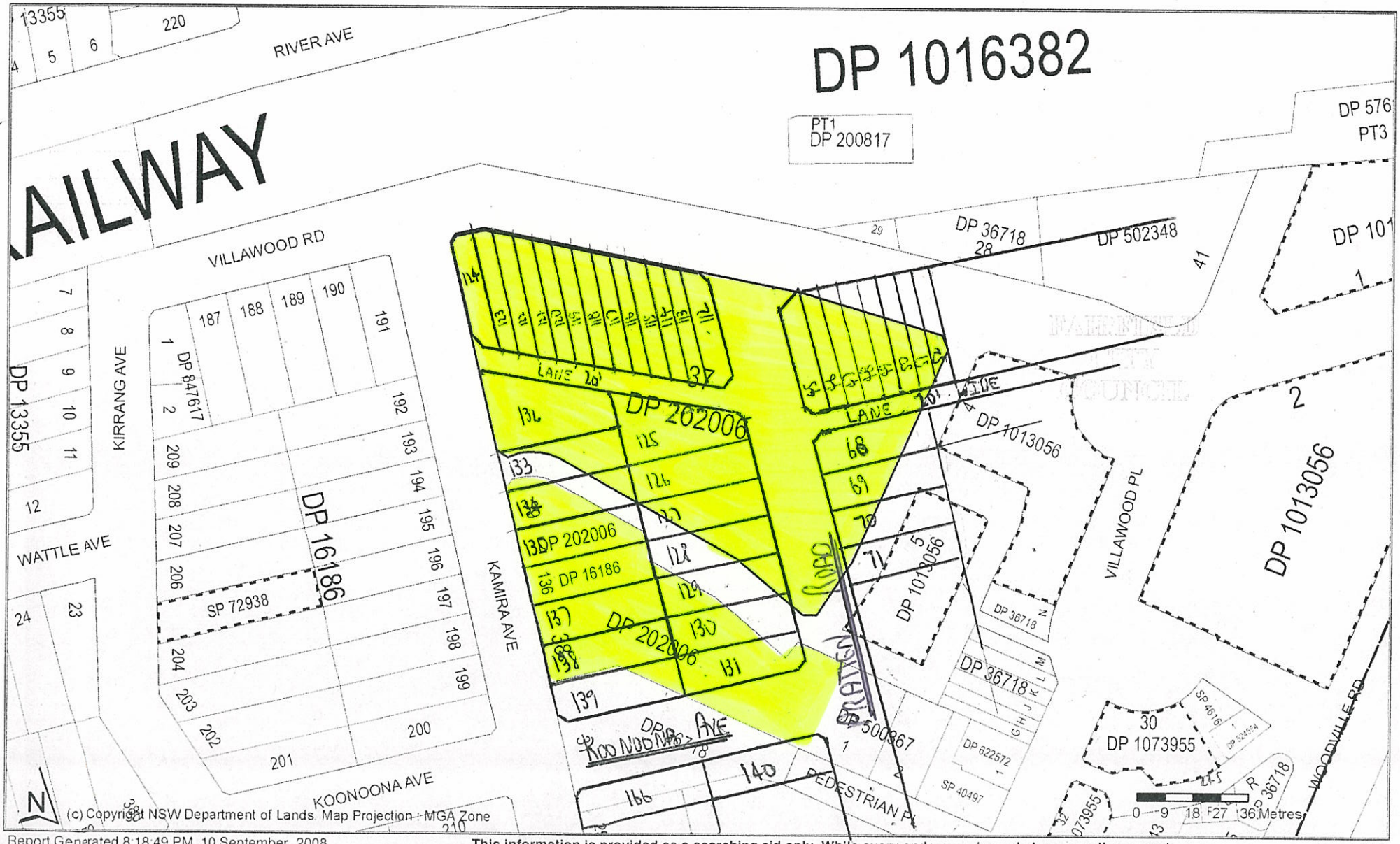
Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Ref : surv:scim-grollm

Requested Parcel : Lot 37 DP 202006 **Identified Parcel :** Lot 37 DP 202006

Locality : VILLAWOOD **LGA :** FAIRFIELD **Parish :** ST JOHN **County :** CUMBERLAND



Report Generated 8:18:49 PM, 10 September, 2008

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.

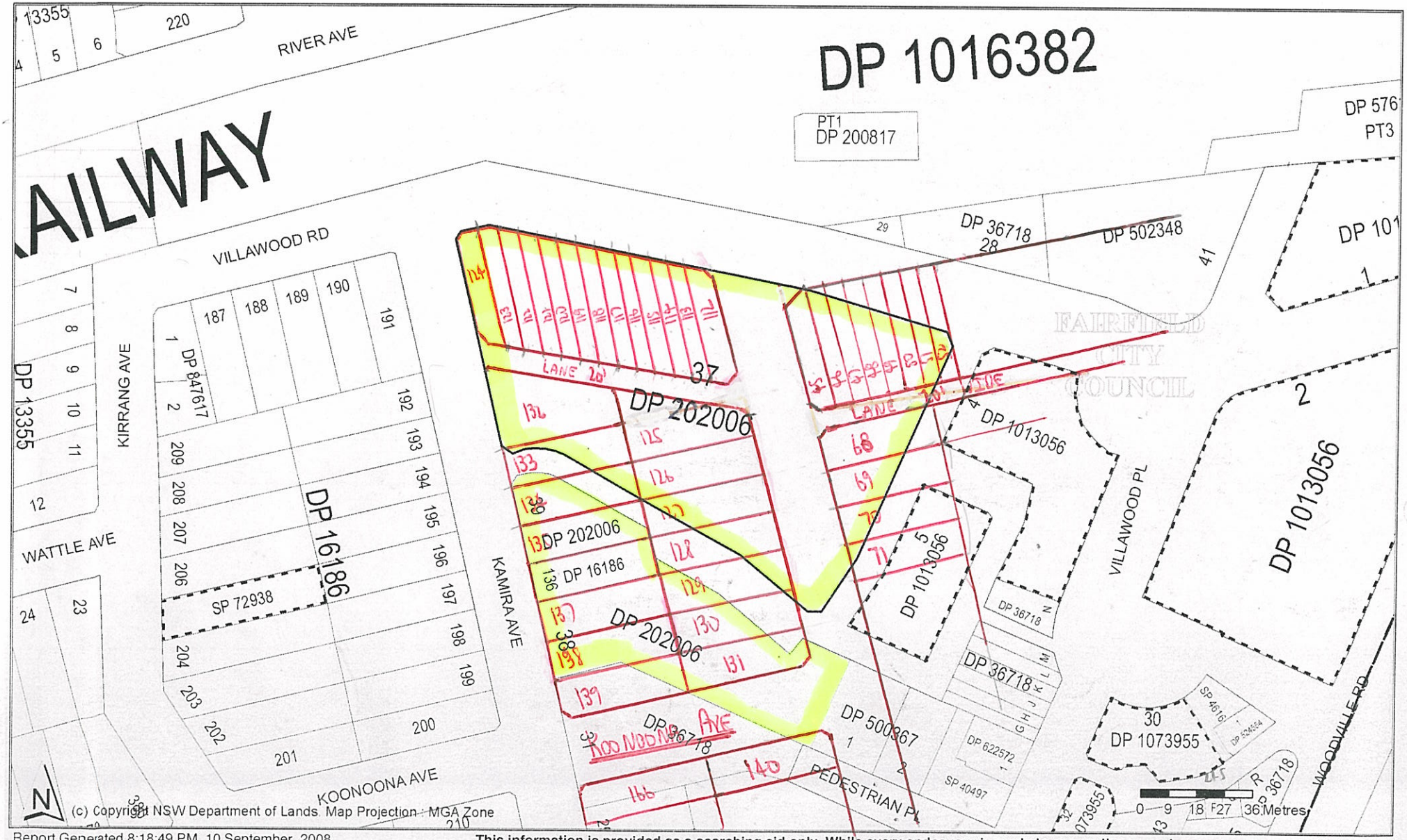
Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Ref : surv:scim-grollm

Requested Parcel : Lot 37 DP 202006 **Identified Parcel :** Lot 37 DP 202006

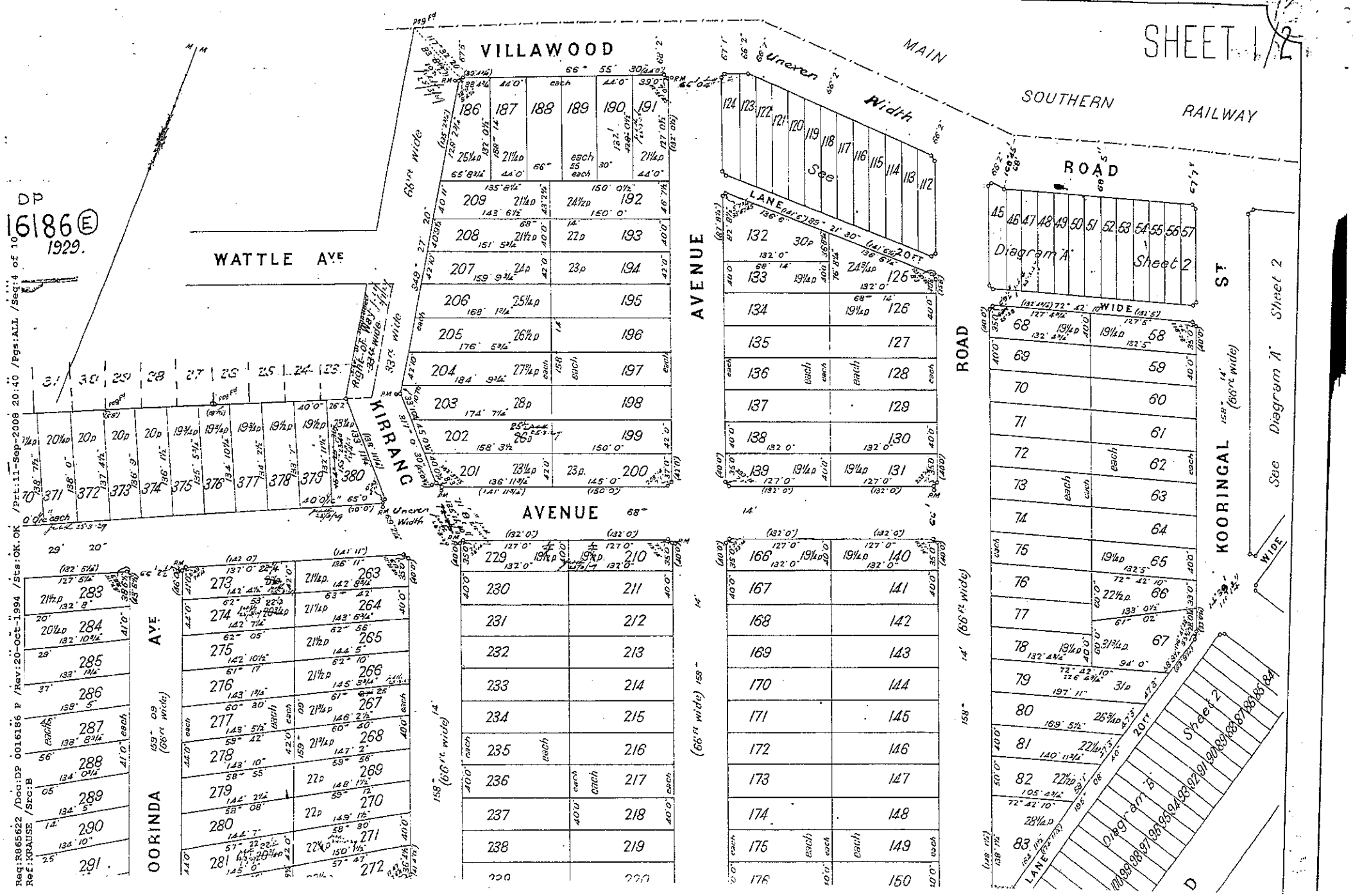
Locality : VILLAWOOD **LGA :** FAIRFIELD **Parish :** ST JOHN **County :** CUMBERLAND



(c) Copyright NSW Department of Lands. Map Projection : MGA Zone

Report Generated 8:18:49 PM, 10 September, 2008

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. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.


SHEET 1/2
DP 16186 (E) 1929.
VILLAWOOD
WATTLE AVE
KIRRANG AVENUE
OORINDA AVE.
MAIN ROAD
SOUTHERN RAILWAY
KOORINGAL ST
Diagram A
Sheet 2
See Diagram A Sheet 2
Req:R865622 /Doc:DP 0016186 P /Rev:20-Oct-1994 /Sts:OK.OK /Prt:11-Sep-2008 20:40 /Pgs:ALL /Seq:4 of 10
Ref:KRAUSE /Src:B

SH 2/2 (E)

SHEET 2/2

DEP 29th July 1929

PLAN 16186 (E)

Diagram "A"

SOUTHERN RAILWAY

ROAD

WIDE

ROAD

ST.

B785141 (2 sht) 22 2 29

SH 1/2

Municipality of Fairfield.

B785141 (2 Shts) 22.2.29

PLAN
OF
VILLAWOOD ESTATE No. 2

being a subdivision of part of the land comprised in Certs of Title Vol 3907 Fols 190 191 & 192

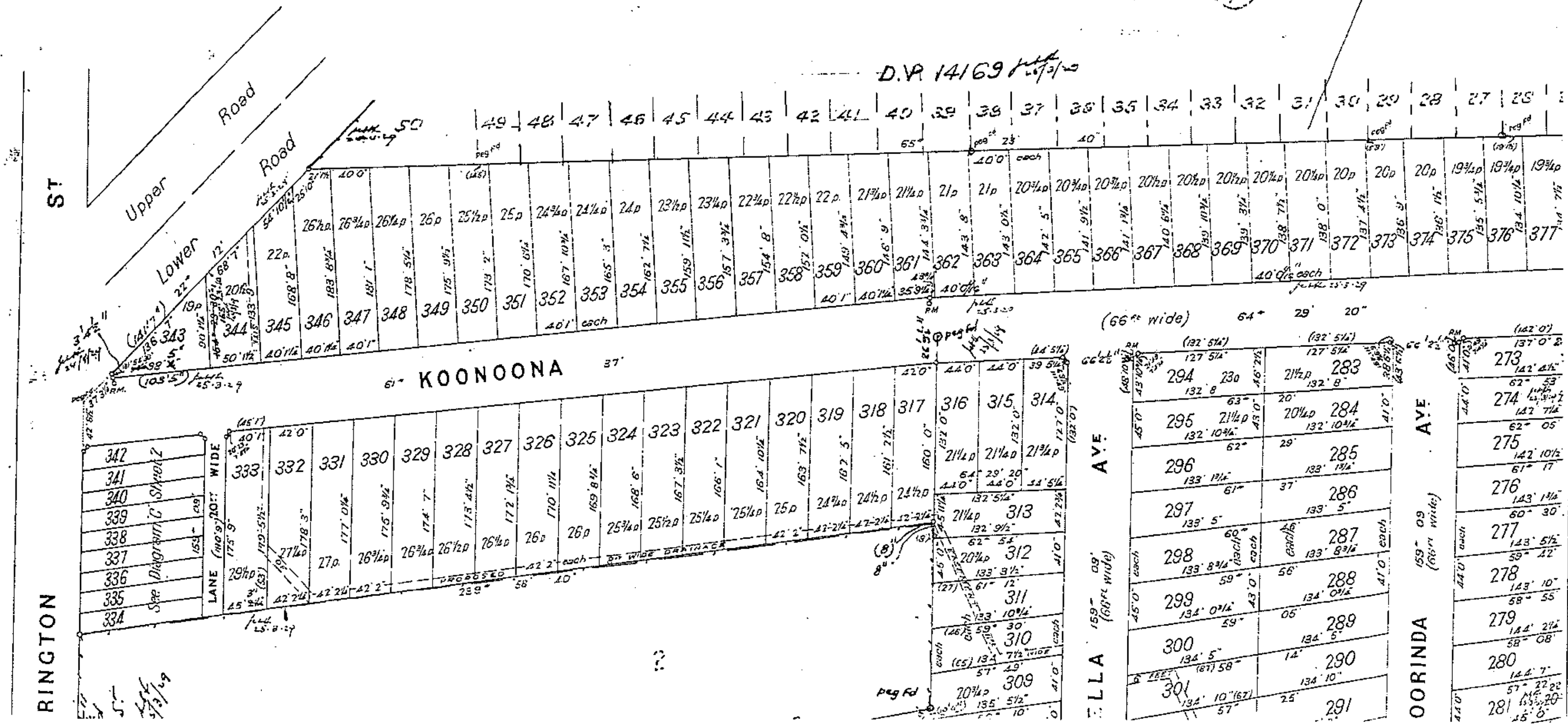
Parish of St John County of Cumberland

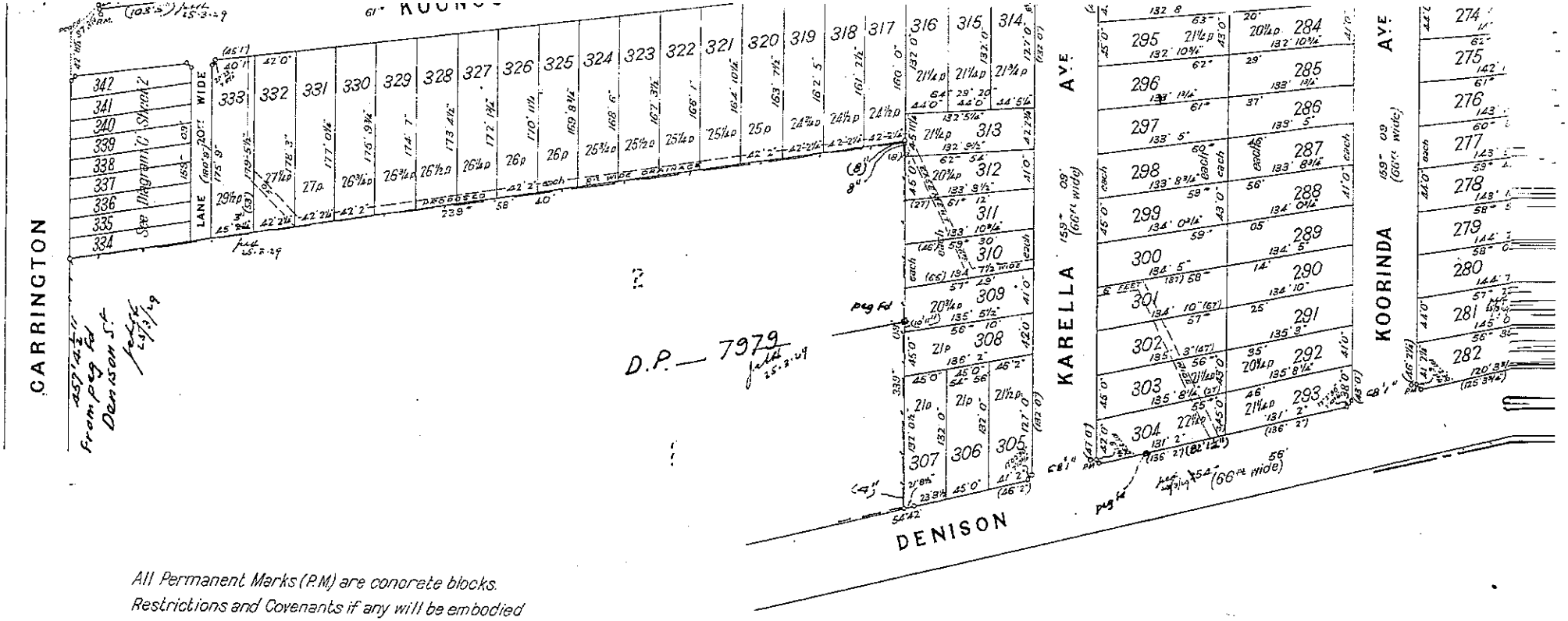
Scale 100 ft to an Inch

0 20 40 60 80 100 200 300 400

DEP PLAN 16186 (E)

29th July 1929.





All Permanent Marks (P.M) are concrete blocks.
Restrictions and Covenants if any will be embodied in the Transfers of the Lots shown hereon.
Any new Streets or Lanes shown on this plan are intended to be dedicated to the Public.
It is intended to grant Right of Drainage along Drainage Easements to the Fairfield Council
Corner splays and widenings of Streets shown hereon are intended to be dedicated to the Public

Date of Survey May 1928
Datum line of Azimuth A-B. (See Sheet 2)

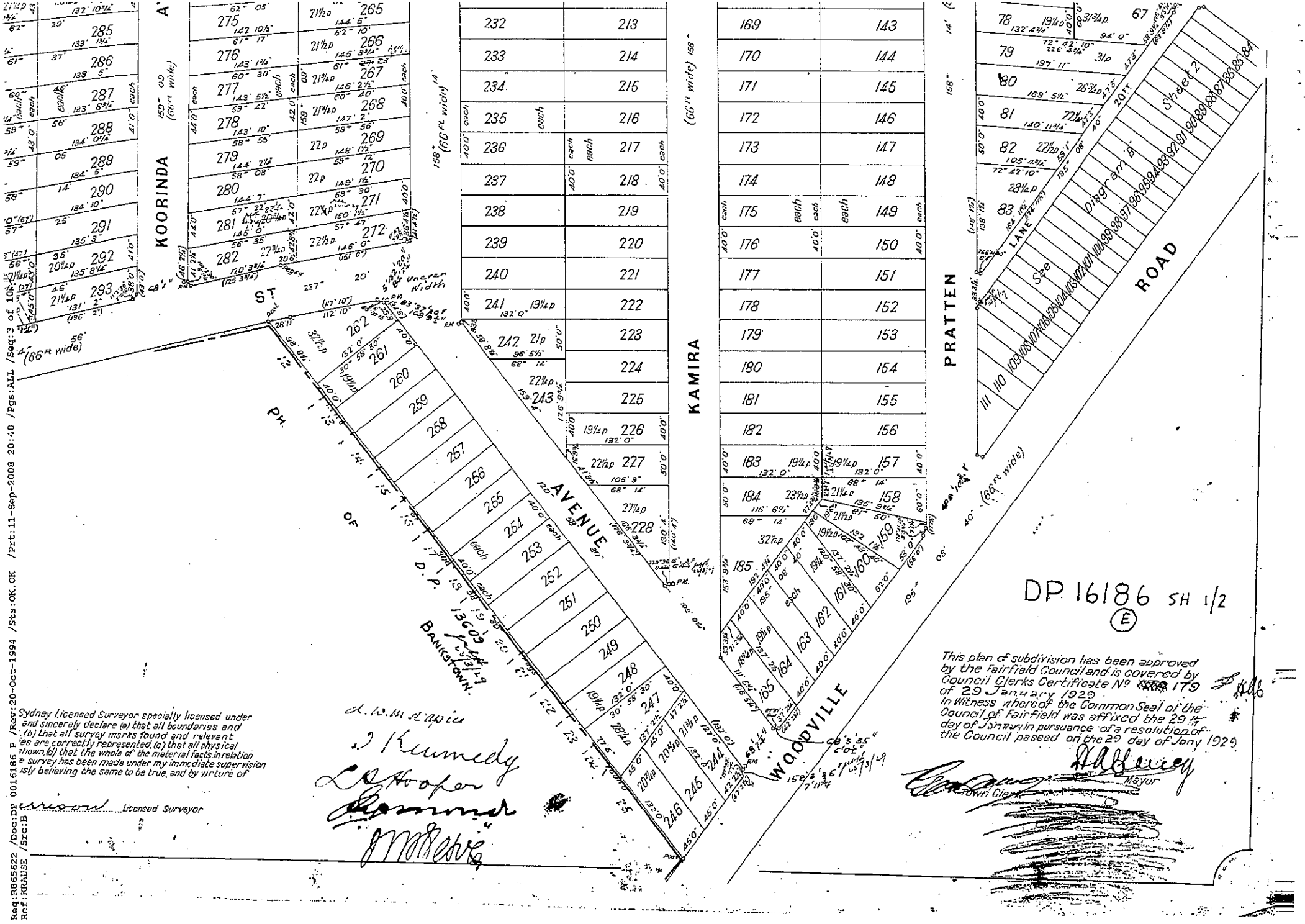
DP 16186 SH 1/2 (E)

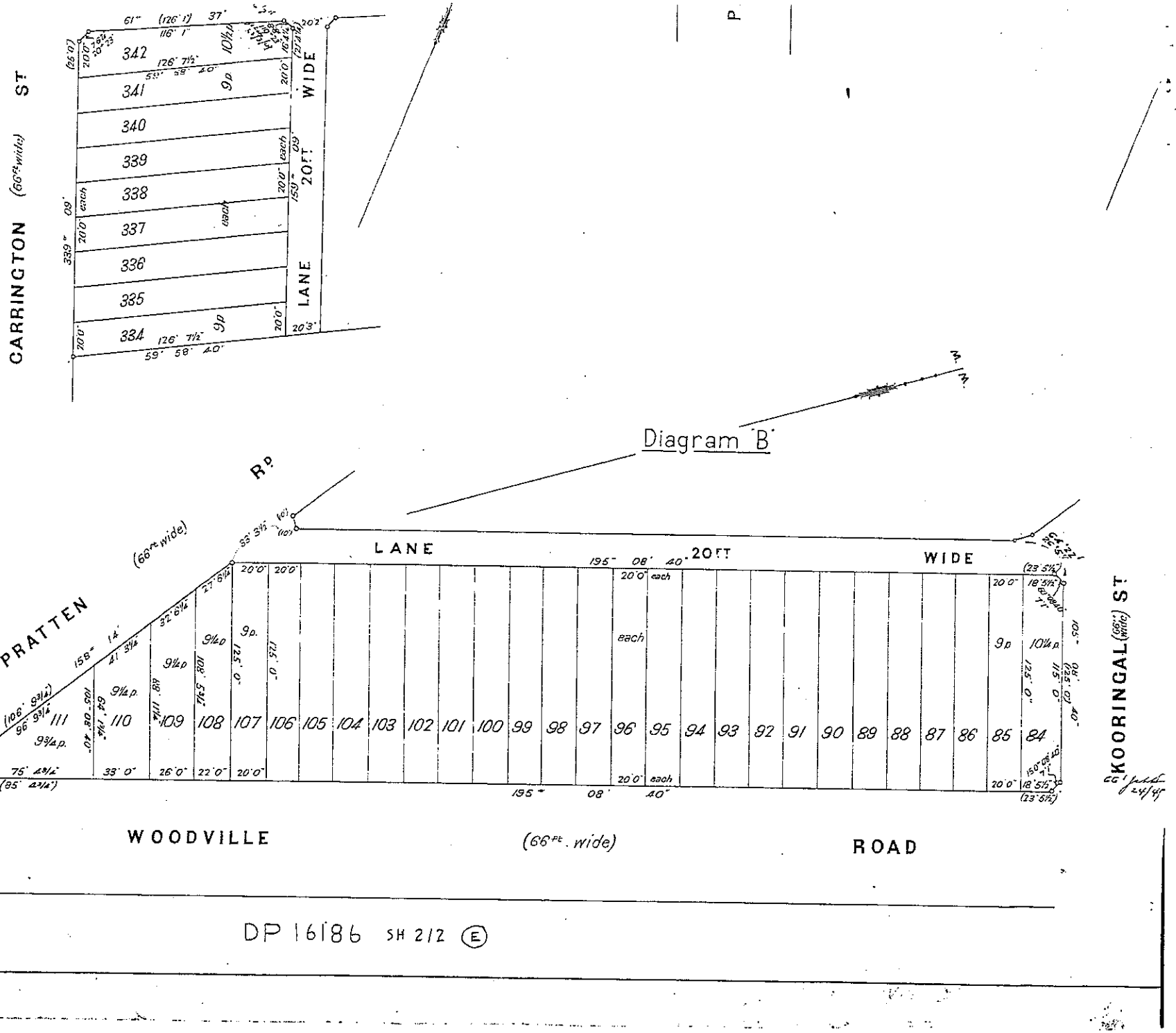
Two Sheets

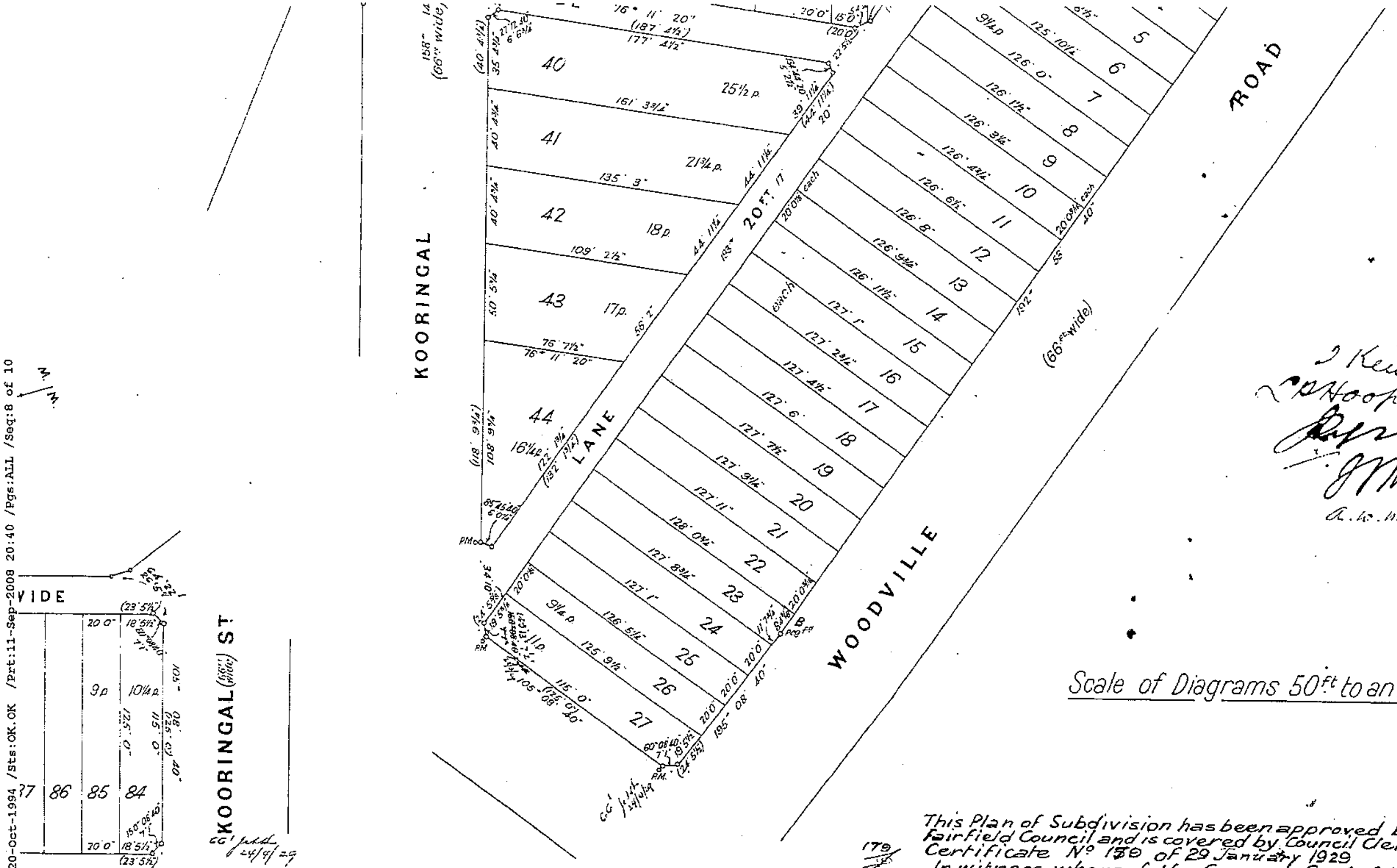
I John Alexander Harrison of 350 George St Sydney Licensed Surveyor specially licensed under the Real Property Act 1900, do hereby solemnly and sincerely declare (a) that all bounderies and measurements shown on this plan are correct. (b) that all survey marks found and relevant physical objects on or adjacent to the bounderies are correctly represented (c) that all physical objects indicated actually exist in the positions shown (d) that the whole of the material facts in relation to the land are correctly represented. (e) that the survey has been made under my immediate supervision and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Oaths Act 1900.

Subscribed and declared before me at Sydney
this 16th day of May A.D. 1928. Edw Houston J.P.

J.A. Harrison Licensed Surveyor







Scale of Diagrams 50ft to an Inch

This Plan of Subdivision has been approved by the Fairfield Council and is covered by Council Clerk's Certificate No 130 of 29 January 1929
In witness whereof the Common Seal of the Council was affixed the 29 day of Jany 1929 in pursuance of a Resolution of the Council passed on the 29th day of January 1929

Town Clerk

Mayor

DP 16186 SH 2/2

Sheet 2 of plan referred to in my Declaration dated 16/5/28

Licensed Surveyor

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 2/2

FEET	INCHES	METRES
2	-	0.61
2	0 1/2	0.62
2	1 5/8	0.65
2	9 1/4	0.845
2	9 1/2	0.85
3	1 3/4	0.96
5	2 1/2	1.585
5	4 3/4	1.645
5	5 3/4	1.67
5	7 3/4	1.72
5	9	1.755
6	0 1/4	1.835
6	4	1.93
6	6 3/4	2
6	7	2.005
6	9 1/2	2.07
7	1	2.16
7	1 5/4	2.18
7	4	2.235
7	6 1/4	2.29
7	6 1/2	2.3
7	7 7/8	2.335
8	-	2.44
8	3	2.515
8	4 3/4	2.56
8	5 1/8	2.57
9	2 1/2	2.805
10	-	3.05
10	6	3.2
11	7 3/4	3.55
12	4	3.76
15	-	4.57
15	0 1/8	4.575
15	5 1/4	4.705
15	9 3/4	4.82
16	1 1/2	4.915
16	4 1/4	4.985
17	-	5.18
18	5 1/2	5.625
18	7 1/4	5.67
19	-	5.79
19	1 1/4	5.825
19	3 1/2	5.93
19	5 5/8	5.935
20	-	6.095
20	0 1/8	6.1
20	0 3/8	6.105
20	0 3/4	6.115
20	2	6.145
20	2 1/4	6.155
20	3	6.17
20	5 1/4	6.23
20	9 3/4	6.345
21	4 1/4	6.51
21	5 1/4	6.535
21	10 3/4	6.675
21	11	6.68
22	-	6.705
22	5 1/2	6.845
23	2 1/4	7.065
23	2 1/2	7.075
23	5 1/2	7.15
23	7 1/4	7.195
24	-	7.315
24	1 1/4	7.345
24	5 1/2	7.455
24	5 5/8	7.46
25	-	7.62
25	2 3/4	7.69
25	10 1/2	7.885
26	-	7.925
26	5	8.05
27	6 1/4	8.39
27	8 3/4	8.45
27	9 1/4	8.465
27	11	8.51
28	0 3/4	8.555

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 2/2 CONTD

FEET	INCHES	METRES
32	6 1/4	9.91
33	-	10.06
33	3 1/2	10.145
34	10	10.615
35	4 3/4	10.79
36	4 3/4	11.095
39	11 1/4	12.175
40	4 3/4	12.315
41	3 1/4	12.58
41	4 3/4	12.615
44	11 1/4	13.695
50	5 3/4	15.385
52	5 1/4	15.985
55	-	16.765
56	2	17.12
57	5 1/4	17.505
57	10 1/4	17.635
64	1 3/4	19.55
65	-	19.81
66	-	20.115
66	2 1/2	20.18
66	10	20.37
67	10 1/4	20.68
71	3	21.715
72	3 3/4	22.04
75	4 3/4	22.98
76	4 1/4	23.275
76	7 1/2	23.355
77	4 1/2	23.585
85	4 3/4	26.03
88	11 1/4	27.11
89	-	27.125
94	0 1/4	28.655
94	0 1/2	28.665
96	9 3/4	29.51
99	0 1/4	30.18
105	0 1/2	32.015
106	9 3/4	32.555
108	5 3/4	33.065
108	9 3/4	33.165
109	2 1/2	33.285
110	0 1/2	33.54
112	4	34.24
115	-	35.05
115	5	35.18
115	9 3/4	35.3
116	1	35.38
116	2 1/2	35.42
117	-	35.66
118	9 3/4	36.215
122	1 3/4	37.23
123	4 1/2	37.605
124	5 1/4	37.93
125	-	38.1
125	3 3/4	38.195
125	5	38.225
125	5 1/4	38.235
125	7	38.28
125	8 1/2	38.315
125	9 1/2	38.34
125	11	38.38
126	-	38.405
126	1	38.43
126	1 1/2	38.445
126	2 1/2	38.47
126	3 1/4	38.485
126	4 1/4	38.515
126	4 3/4	38.525
126	5 1/4	38.54
126	6 1/2	38.57
126	7 1/2	38.595
126	8	38.61
126	9 3/4	38.65
126	11 1/2	38.695
127	1	38.735
127	2 3/4	38.78
127	4 1/2	38.825

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 2/2 CONTD

FEET	INCHES	METRES
127	6	38.86
127	7	38.865
127	7 1/2	38.9
127	8 3/4	38.93
127	9 1/4	38.945
127	11	38.99
128	0 3/4	39.035
128	9 3/4	39.26
128	10 1/4	39.275
130	0 1/4	39.63
131	3	40.005
132	1 3/4	40.28
132	5 3/4	40.38
133	8 1/4	40.75
134	-	40.845
134	11	41.125
135	3	41.225
136	1 3/4	41.455
137	4 1/2	41.87
138	7 1/4	42.245
140	-	42.67
155	5	47.37
161	8 3/4	49.17
177	4 1/2	54.06
187	4 1/2	57.11
220	0 1/8	67.06
220	0 3/4	67.08
220	5 1/4	67.19
220	9 3/4	67.3
221	5 1/4	67.49
222	5 1/2	67.81
223	5 1/2	68.11
666	10	203.22
1108	9 3/4	337.97
1118	9 3/4	341.01
1131	3	344.8

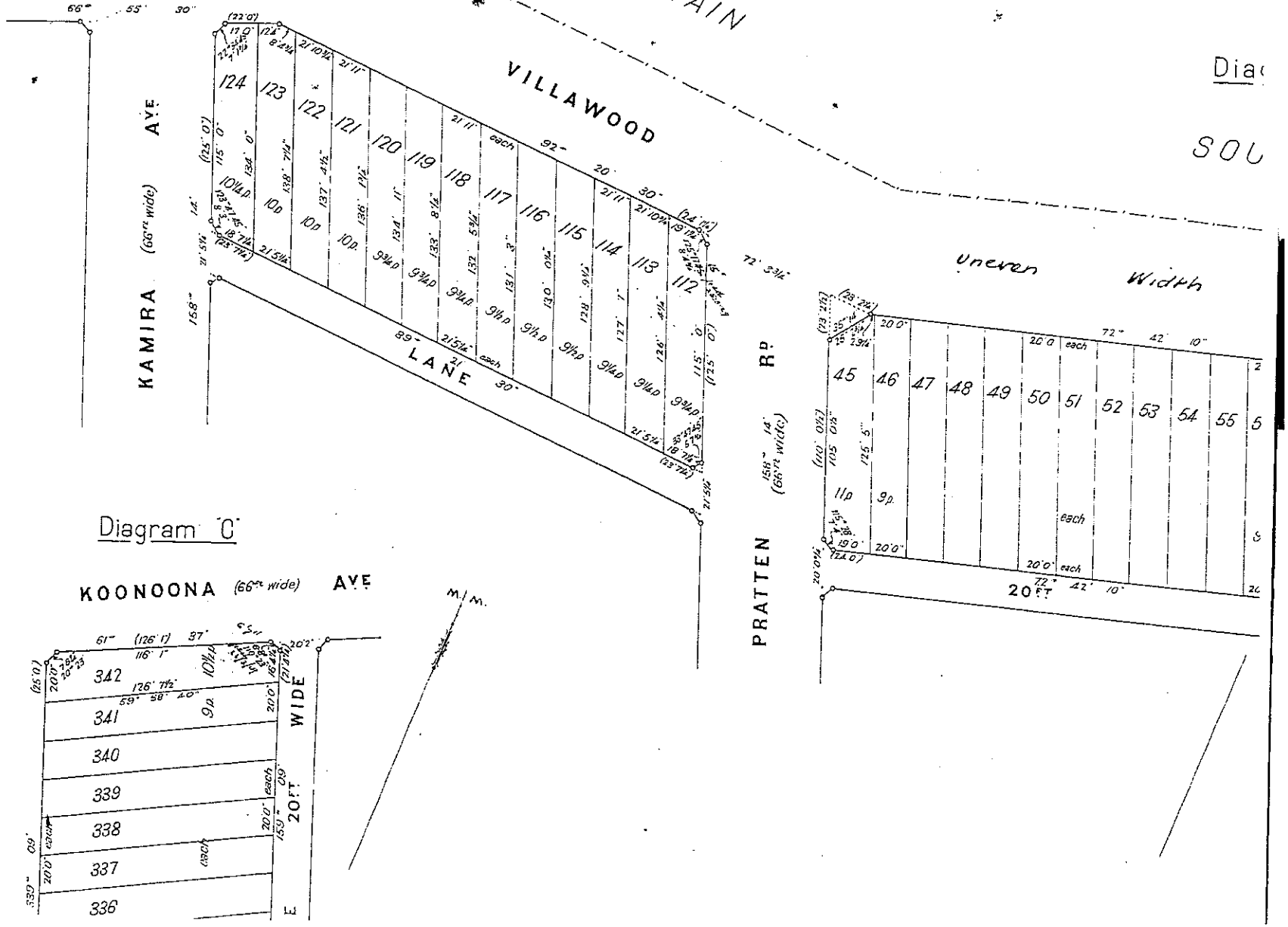
AC	RD	P	SQ M
-	-	9	227.6
-	-	9 1/4	234
-	-	9 1/2	240.3
-	-	9 3/4	246.6
-	-	10	252.9
-	-	10 1/4	259.3
-	-	10 1/2	265.6
-	-	11	278.2
-	-	15 1/4	385.7
-	-	16 1/4	411
-	-	17	430
-	-	18	455.3
-	-	21 3/4	550.1
-	-	25 1/2	645

B785141 22.2.29

SH 2/2

B785141(2shts) 22.2.29

DP 16186 SH 2/2 (E)



CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2

FEET	INCHES	METRES
-	4	0.1
-	8	0.205
3	3 1/2	1.065
3	4 1/2	1.02
4	3 3/4	1.315
4	5 1/4	1.35
4	7 1/4	1.405
5	7 3/4	1.72
5	9	1.755
5	11	1.805
6	-	1.82
6	0 1/2	1.84
6	1 3/4	1.875
6	2	1.88
6	4	1.93
6	4 1/4	1.935
6	4 3/4	1.95
6	9 1/4	2.065
6	9 1/2	2.07
6	10	2.065
7	-	2.135
7	1	2.16
7	1 1/2	2.17
7	4	2.225
7	4 1/4	2.24
7	6 1/4	2.29
7	8 1/2	2.35
7	10 3/4	2.405
7	11	2.415
7	11 3/4	2.43
8	-	2.44
8	3	2.515
8	6	2.56
9	1 1/2	2.78
9	5 3/4	2.85
9	10 1/8	3
10	7 1/2	3.24
10	11	3.325
12	1 1/2	3.695
15	11 7/8	4.875
16	9 3/4	5.125
19	-	5.75
19	6 1/4	5.95
20	-	6.055
20	6	6.25
20	8	6.3
21	1 1/2	6.44
21	2 3/4	6.47
21	8 1/2	6.615
23	3 1/2	7.1
25	8	7.825
25	10	7.875
26	2	7.975
26	3 1/4	8.005
27	-	8.23
27	4 3/4	8.35
28	0 1/4	8.54
28	1	8.56
28	11	8.815
29	8	9.04
32	10 3/4	10.025
33	-	10.06
33	0 1/4	10.065
33	0 1/2	10.07
33	1 3/4	10.105
33	3 1/4	10.14
33	3 1/2	10.145
33	4 3/4	10.18
33	8 3/4	10.28
33	10 1/4	10.32
33	10 1/2	10.325
34	8	10.565
34	10 1/4	10.625
35	-	10.67
35	9 1/4	10.905
36	4 1/2	11.085
36	8 1/4	11.12

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2 CONTD

FEET	INCHES	METRES
36	11 3/4	11.27
37	-	11.28
37	2 1/4	11.335
37	3 1/4	11.36
38	-	11.58
38	6 1/2	11.745
39	-	11.885
39	3 1/4	11.97
39	4 3/4	12.01
39	5 1/4	12.02
39	10 3/4	12.16
40	-	12.19
40	0 1/8	12.195
40	0 3/4	12.21
40	1	12.215
40	1 1/4	12.225
40	9 1/2	12.435
40	11	12.47
40	11 3/4	12.49
41	-	12.495
41	2	12.55
41	2 1/4	12.555
41	4 1/2	12.61
41	6	12.65
41	8 1/2	12.715
42	-	12.8
42	2	12.85
42	2 1/4	12.86
42	2 1/2	12.865
42	2 3/4	12.87
42	5	12.93
42	8 1/2	13.015
42	8 3/4	13.025
42	10	13.055
43	-	13.105
43	2 3/4	13.175
43	6 1/2	13.27
43	10 3/4	13.38
44	-	13.41
44	5 1/4	13.545
45	-	13.715
45	0 3/4	13.735
45	1	13.74
45	3	13.79
45	11 1/4	14
46	-	14.02
46	2	14.07
46	2 1/4	14.08
46	2 1/2	14.085
46	3 1/4	14.105
46	7 1/2	14.21
47	-	14.325
47	2 1/2	14.39
47	3	14.4
48	10 3/4	14.905
49	4 3/4	15.055
50	-	15.24
50	1 1/2	15.28
53	-	16.155
54	10 1/2	16.725
58	-	17.68
58	8 1/4	17.89
58	9 1/4	17.915
59	1	18.01
60	-	18.29
62	-	18.9
63	9 1/4	19.435
64	10 1/4	19.765
65	-	19.81
65	8 3/4	20.035
66	-	20.115
66	0 1/4	20.125
66	1	20.14
66	2	20.17
66	2 1/2	20.18
66	7	20.295
67	-	20.42

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2 CONTD

FEET	INCHES	METRES
67	1	20.445
67	3 1/2	20.51
67	5	20.55
67	7	20.6
68	-	20.725
68	1	20.75
68	2	20.775
68	5	20.855
68	6	20.88
68	7	20.905
68	7 1/4	20.91
69	2 1/4	21.09
69	8 3/4	21.255
70	-	21.335
71	8	21.845
71	8 1/2	21.855
73	2	22.3
75	9 1/2	23.1
76	8 1/4	23.375
77	0 1/4	23.475
77	5	23.595
78	3	23.85
82	1 1/4	25.025
82	8 1/2	25.21
83	7	25.475
84	2 1/4	25.66
87	-	26.52
87	8 1/2	26.735
88	-	26.82
90	1 1/4	27.465
94	-	28.65
96	5 1/2	29.4
98	5	29.995
98	8 1/2	30.085
103	5	31.52
105	4 3/4	32.125
106	9	32.535
108	9 1/2	33.16
109	0 1/4	33.23
111	1 3/4	33.875
111	5 1/4	33.965
112	10	34.39
115	6 1/2	35.215
116	5 1/4	35.49
117	10	35.915
120	3 3/4	36.67
125	3 3/4	38.195
126	9 3/4	38.65
127	-	38.71
127	0 1/2	38.72
127	4 3/4	38.83
127	5	38.835
127	5 1/4	38.845
129	2 3/4	39.39
130	4	39.725
131	2	39.98
132	-	40.235
132	0 1/2	40.245
132	1 1/4	40.265
132	1 1/2	40.27
132	4 3/8	40.345
132	4 3/4	40.355
132	5	40.36
132	5 1/4	40.365
132	5 1/2	40.375
132	8	40.435
132	9 1/2	40.475
132	10 3/4	40.505
132	11 1/2	40.525
133	0 1/2	40.55
133	1 5/4	40.585
133	3 1/2	40.625
133	5	40.665
133	7	40.715
133	8 3/4	40.76
133	9	40.765
133	10 3/4	40.81

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2 CONTD

FEET	INCHES	METRES
133	11 1/4	40.825
134	0 3/4	40.86
134	2 1/2	40.905
134	5	40.97
134	7 1/2	41.035
134	10	41.095
134	10 1/4	41.105
135	2 3/4	41.22
135	3	41.225
135	5 1/2	41.29
135	5 3/4	41.295
135	8 1/4	41.355
135	9 3/4	41.395
136	1 1/2	41.49
136	2	41.505
136	6	41.605
136	6 1/4	41.61
136	7	41.63
136	9	41.68
136	11	41.73
136	11 3/4	41.75
137	-	41.76
137	1	41.785
137	2 1/2	41.82
138	-	42.06
138	1 1/4	42.095
138	4 1/2	42.175
138	7 1/2	42.255
138	11 1/4	42.35
139	3 1/4	42.45
139	10 3/4	42.64
140	4	42.775
140	6 1/4	42.83
140	11 3/4	42.97
141	1 3/4	43.02
141	6	43.13
141	6 1/4	43.135
141	7	43.155
141	9 1/2	43.22
141	11	43.255
141	11 3/4	43.275
142	-	43.28
142	4 1/2	43.395
142	5	43.41
142	7 1/4	43.465
142	8 3/4	43.505
142	10 1/2	43.55
143	0 1/2	43.6
143	1 3/4	43.63
143	5 1/2	43.725
143	6 1/2	43.75
143	6 3/4	43.76
143	8	43.79
143	10	43.84
144	2 1/4	43.95
144	3 3/4	43.985
144	5	44.02
144	7	44.07
145	-	44.195
145	3 3/4	44.29
146	-	44.5
146	2 1/2	44.565
146	9	44.73
147	2	44.855
148	1 1/4	45.14
148	1 1/2	45.15
149	1 1/2	45.455
149	4 3/4	45.535
150	-	45.72
150	0 1/2	45.735
150	1 1/2	45.76
151	-	46.025
151	5 3/4	46.17
152	0 1/2	46.34
153	9 3/4	46.88
154	8	47.14
155	-	47.245

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2 CONTD

FEET	INCHES	METRES
157	3 3/4	47.95
157	4 1/8	47.96
158	3 1/2	48.245
159	4	48.565
159	9 3/4	48.71
159	11 1/2	48.755
160	-	48.77
161	2 1/2	49.125
162	5	49.505
162	7 1/4	49.56
163	7 1/2	49.875
164	10 1/4	50.25
164	11 1/2	50.28
165	3	50.37
166	1	50.62
166	3 3/4	50.69
166	3 7/8	50.7
167	3 1/2	50.99
167	10 3/4	51.17
168	1 3/4	51.28
168	6	51.36
168	8	51.41
169	5 1/2	51.65
169	8 3/4	51.73
170	6 1/4	51.97
170	11 1/4	52.1
172	1 3/4	52.47
173	2	52.78
173	4 1/2	52.84
174	7	53.21
174	7 1/4	53.22
174	11 1/2	53.33
175	9	53.57
175	9 1/2	53.58
175	9 3/4	53.55
176	3 3/4	53.74
176	5 3/4	53.79
177	0 1/4	53.96
178	3	54.33
178	5 1/4	54.39
179	5 1/2	54.7
180	9	55.09
181	1	55.15
183	8 3/4	56
184	9 3/4	56.33
192	4 1/4	58.62
197	11	60.32
226	4 3/4	69.01
228	11	69.77
333	3 1/4	101.52
440	-	134.11
444	-	135.33
447	-	136.25
550	-	167.64
998	8 1/2	304.41
1105	4 3/4	336.92
1111	5 1/4	338.77
1132	-	345.03
1140	4	347.57
1160	3 3/4	353.66
1162	5	354.3
1168	1 3/4	356.09
1176	3 3/4	358.54
1178	5 1/4	359.15
1192	4 1/4	363.42
1197	11	365.12

AC	RD	P	SQ M
-	-	2 1/2	63.2
-	-	18 3/4	474.2
-	-	19	480.6
-	-	19 1/4	486.9
-	-	19 1/2	493.2
-	-	19 3/4	499.5
-	-	20	505.9
-	-	20 1/4	512.2

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 16186 SH 1/2 CONTD

AC	RD	P	SQ M
-	-	20 1/2	518.5
-	-	20.55	519.8
-	-	20 3/4	524.8
-	-	21	531.1
-	-	21 1/4	537.5
-	-	21 1/2	543.8
-	-	21 3/4	550.1
-	-	22	556.4
-	-	22 1/4	562.8
-	-	22 1/2	569.1
-	-	22 3/4	575.4
-	-	23	581.7
-	-	23 1/4	588.1
-	-	23 1/2	594.4
-	-	24	607
-	-	24 1/4	613.4
-	-	24 1/2	619.7
-	-	24 3/4	626
-	-	25	632.3
-	-	25 1/4	638.6
-	-	25 1/2	645
-	-	25 3/4	651.3
-	-	26	657.6
-	-	26 1/4	663.9
-	-	26 1/2	670.3
-	-	26 3/4	676.6
-	-	27	682.9
-	-	27 1/4	689.2
-	-	27 3/4	701.9
-	-	28	708.2
-	-	28 1/4	714.5
-	-	29 1/2	746.1
-	-	30	758.8
-	-	31	784.1
-	-	31 3/4	803
-	-	32 1/2	822

Plan Form No. 1 (for transfers, leases, etc)

Municipality of Fairfield
Shire of
(At Villawood)

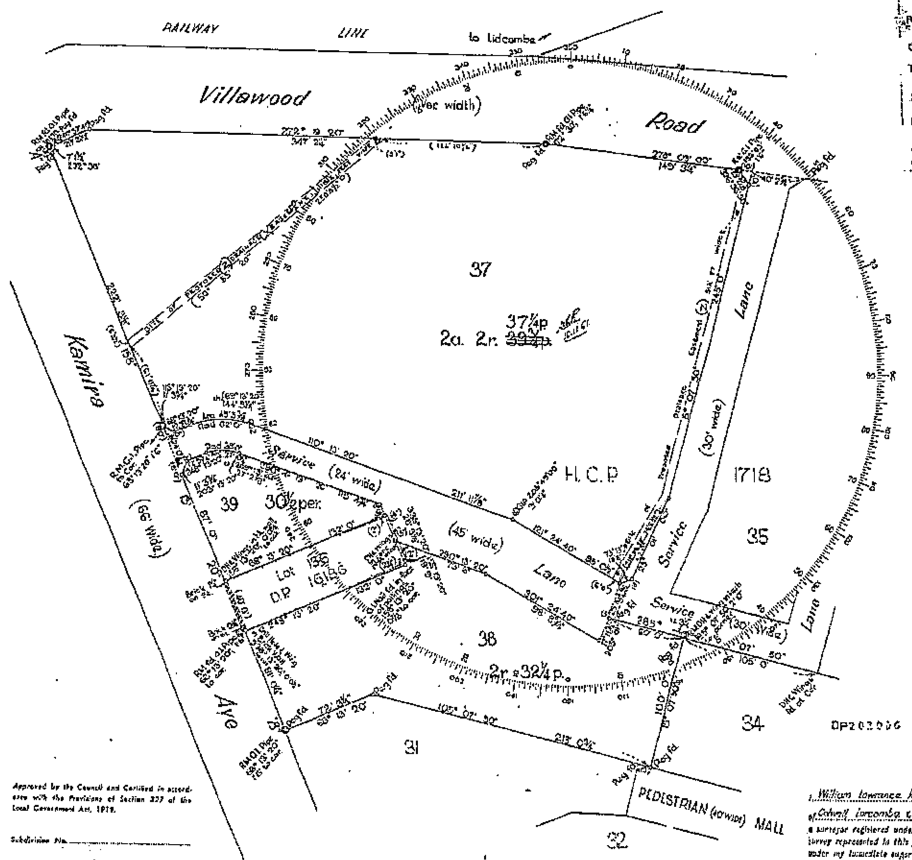
PLAN

of Subdivision of Housing Commission Land
being Lot 30, H.C.P. 1718
Parish of St John County of Cumberland
Scale 60 Feet to an Inch.

DP 202006

Registered [redacted] 8-5-62

Title System: Torrens
Purpose: Subdivision
Ref. map: Fairfield Roll 1
Last Plan: H.C.P. 1718.



Approved by the Council and Certified in accordance with the Provisions of Section 327 of the Local Government Act, 1919.

Subdivision No. ....

Council Clerk ....

Enter Line of Arrows "A-B"

I, William Lawrence Rein
of Colwell, Larcombe & Rein, 129 Pitt St, Sydney
a surveyor registered under the Surveyors Act, 1929-1948, hereby certify that the survey represented in this plan is accurate and has been made *~~(1) by me~~ (2) under my immediate supervision in accordance with the Survey Practice Regulations, 1933, and was completed on † 6th December 1960

(Signature) Wm. L. Rein
Surveyor registered under the Surveyors Act, 1929-48.

*Strike out either (1) or (2). †Insert date of Survey.

M.P.D.I. 6344 S.75 L. A/114

Ref 2199

This margin to be left free from notation

This is the plan marked " " referred to in ....
Dated ....

Signatures of parties to be made in this margin.

DP 202006

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 202006

FEET	INCHES	METRES
-	0 1/2	0.013
-	0 3/4	0.019
-	0 7/8	0.022
-	1 1/4	0.032
-	2	0.051
-	2 1/4	0.057
-	4	0.102
-	5	0.127
1	1 3/8	0.340
1	6	0.457
1	6 1/8	0.460
1	6 1/4	0.464
2	10	0.864
3	0 1/4	0.921
5	-	1.524
6	-	1.829
7	1 3/4	2.178
7	2 5/8	2.200
8	-	2.438
8	0 1/8	2.442
9	1	2.769
9	6 1/2	2.908
10	-	3.048
10	8	3.251
11	3 3/4	3.448
12	9 3/4	3.905
12	9 7/8	3.908
13	2 1/8	4.016
13	2 7/8	4.035
15	4 1/4	4.680
17	11 3/4	5.480
19	9	6.020
22	10	6.960
24	-	7.315
25	10 3/4	7.893
27	2 7/8	8.303
27	10 1/4	8.490
28	3 1/8	8.614
29	3 1/2	8.926
30	-	9.144
40	-	12.192
40	2 3/4	12.262
44	5 1/4	13.545
45	-	13.716
45	4 3/8	13.827
45	5 3/8	13.853
50	-	15.240
60	-	18.288
61	11 1/4	18.879
66	-	20.117
72	3 1/4	22.028
73	3	22.327
74	6 3/8	22.717
81	0 1/4	24.695
87	-	26.518
95	0 1/2	28.969
98	8 3/4	30.093
100	-	30.480
105	-	32.004
115	4 3/4	35.173
117	11 3/4	35.960
122	10 1/4	37.446
132	-	40.234
149	3 1/4	45.498
205	-	62.484
211	11 7/8	64.614
218	0 3/4	66.465
222	3 1/8	67.745
245	-	74.676
250	4 1/2	76.314
330	-	100.584
347	2 1/4	105.823
440	2 3/4	134.182
556	-	169.469

AC	RD	P.	SQ M
-	-	30 1/2	771.4
-	2	32 1/4	2839

AC	RD	P.	HA
2	2	37 1/4	1.1

AMENDMENTS OR ADDITIONS NOTED ON PLAN IN REGISTRAR GENERAL'S OFFICE.

I, Bruce Richard Davies, Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this 15th day of February, 1977

LegalStream Australia Pty Ltd

ABN: 80 002 801 498
Level 15, 115 Pitt Street, SYDNEY NSW 2000, AUSTRALIA * DX654, SYDNEY
Tel: (02) 9231 0122 Fax: (02) 9233 6411 www.legalstream.com.au

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LPI NSW
Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 136/16186

SEARCH DATE	TIME	EDITION NO	DATE
21/9/2008	11:42 AM	-	-

VOL 4388 FOL 244 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 136 IN DEPOSITED PLAN 16186
LOCAL GOVERNMENT AREA FAIRFIELD
PARISH OF ST JOHN COUNTY OF CUMBERLAND
TITLE DIAGRAM DP16186

FIRST SCHEDULE

THE HOUSING COMMISSION OF NEW SOUTH WALES (T N603245)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 B930826 COVENANT

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

krause PRINTED ON 21/9/2008

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 37/202006

SEARCH DATE	TIME	EDITION NO	DATE
21/9/2008	11:42 AM	-	-

VOL 9186 FOL 85 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 37 IN DEPOSITED PLAN 202006
AT VILLAWOOD
LOCAL GOVERNMENT AREA FAIRFIELD
PARISH OF ST JOHN COUNTY OF CUMBERLAND
TITLE DIAGRAM DP202006

FIRST SCHEDULE

THE HOUSING COMMISSION OF NEW SOUTH WALES

SECOND SCHEDULE (1 NOTIFICATION)

1 J662786 EASEMENT FOR DRAINAGE AFFECTING THE SITE OF PROPOSED DRAINAGE EASEMENT 6 FEET WIDE IN DP202006

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 38/202006

SEARCH DATE	TIME	EDITION NO	DATE
21/9/2008	11:42 AM	-	-

VOL 9186 FOL 86 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 38 IN DEPOSITED PLAN 202006
AT VILLAWOOD
LOCAL GOVERNMENT AREA FAIRFIELD
PARISH OF ST JOHN COUNTY OF CUMBERLAND
TITLE DIAGRAM DP202006

FIRST SCHEDULE

THE HOUSING COMMISSION OF NEW SOUTH WALES

SECOND SCHEDULE (0 NOTIFICATIONS)

NIL

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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LegalStream Australia Pty Ltd

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 39/202006

SEARCH DATE	TIME	EDITION NO	DATE
21/9/2008	11:42 AM	-	-

VOL 9186 FOL 87 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 39 IN DEPOSITED PLAN 202006
AT VILLAWOOD
LOCAL GOVERNMENT AREA FAIRFIELD
PARISH OF ST JOHN COUNTY OF CUMBERLAND
TITLE DIAGRAM DP202006

FIRST SCHEDULE

THE HOUSING COMMISSION OF NEW SOUTH WALES

SECOND SCHEDULE (0 NOTIFICATIONS)

NIL

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

krause PRINTED ON 21/9/2008

WorkCover
NEW SOUTH WALES

Our Ref: D08/092963
Your Ref: Ulrike Krause

DOUGLAS PARTNERS
18 SEP 2008

17 September 2008

Attention: Mr Krause
Douglas Partners
PO Box 472
West Ryde DC NSW 1685

Dear Mr Krause

RE SITE: Lot 37-39 DP202006, Lot 136 DP16186 Villawood NSW 2163.

I refer to your search request of 15th September 2008 requesting information on licences to Keep Dangerous Goods for the above site.

A search of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover has not located any records pertaining to the above-mentioned premises.

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

Brent Jones
Senior Licenceing Officer
Dangerous Goods

FairfieldCity
Celebrating diversity

Fairfield City Council, Administration Centre, 86 Avoca Road, Wakeley 2176
Tel: (02) 9725 0222 Fax: (02) 9725 4249 ABN: 83 140 439 239
All communications to:
Fairfield City Council, PO Box 21, Fairfield NSW 1860
Email address: mail@fairfieldcity.nsw.gov.au

18 September 2008

Douglas Partners
PO Box 472
WEST RYDE NSW 2114

Dear Sir/ Madam

Following is your planning certificate as requested. Should you have any further queries please contact Council's Environmental Standards Department on (02) 9725 0848.

PLANNING CERTIFICATE

(under section 149 of the Environmental Planning and Assessment Act 1979 as amended)

Applicant:	**Douglas Partners**
Certificate No.:	**2880**
Applicant's Reference:	**ULRIKE KRAUSE**
Issue Date:	**18 September 2008**
Receipt No.:	**109921**

PROPERTY ADDRESS:	**2 Kamira Avenue VILLAWOOD**
LEGAL DESCRIPTION:	**Lot: 37 DP: 202006**

for
Alan Young
City Manager
Fairfield City Council

PLEASE NOTE: This is page 1 of 10. Should this certificate or any subsequent copy not contain this many pages, please confirm with council prior to acting on the basis of information contained in this certificate.

Information provided under
Section 149(2) of the Environmental Planning and Assessment Act 1979

Notes:

(1) The following prescribed matters may apply to the land to which this certificate relates.

(2) Where this certificate refers to a specific allotment (or allotments) within a strata plan, the certificate is issued for the whole of the land within the strata plan, not just the specific allotment(s) referred to, and any information contained in the certificate may relate to the whole, or any part, of the strata plan.

(3) The following information is provided pursuant to Section 149(2) of the Environmental Planning and Assessment Act 1979 as prescribed by Schedule 4 of the Environmental Planning and Assessment Regulation 2000 and is applicable as at the date of this certificate.

(4) Information provided in this certificate should be interpreted in conjunction with the relevant plans, policies and documents held at Council. In order to obtain copies of these documents you may purchase them by either contacting Council's Environmental Standards Department on (02) 9725 0848 or attending Council's Administration Centre at 86 Avoca Road, Wakeley.

---

1. Names of relevant State Environmental Planning Policies (SEPPs), Regional Environmental Plans (REPs), Local Environmental Plans (LEPs) and Development Control Plans (DCPs)

(a) Names of the relevant Local Environmental Plans (LEPs) and amendments that apply to the land.

Fairfield Local Environmental Plan 1994.
Government Gazette No.104.
12th August 1994.
As Amended.

(b) Whether a Draft Local Environmental Plan as exhibited under Section 66(1)(b) of the Act applies to the land.

Council has resolved to prepare a draft Local Environmental Plan (DLEP) affecting the land, pursuant to Section 66 1(b) of the Environmental Planning & Assessment Act (E.P. & A.), 1979. (See attached Draft L.E.P. list.)

(c) Each development control plan applying to the land that has been made by the relevant planning authority under Division 6 of Part 3 of the Act (including any made by the council under section 72, or the Director-General under section 51A, before the repeal of those sections).

The land is subject to Draft & adopted Development Control Plans. (See attached schedule).

(d) Names of Regional Environmental Plans and Draft REPs applying to the land.

The following Regional Environmental Plans apply:
Sydney Regional Environmental Plan No.9 - Extractive Industries

The Greater Metropolitan Regional Environmental Plan No. 2 - Georges River Catchment (GMREP 2)

The following Draft Regional Environmental Plans apply:

No Draft Regional Environmental Plans apply

(e) Names of State Environmental Planning Policies and Draft SEPPs applying to the land.

The following State Environmental Planning Policies apply:

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

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

State Environmental Planning Policy - Major Projects - 2005.

State Environmental Planning Policy No. 37 - Continued Mines and Extractive Industries

State Environmental Planning Policy No. 45 - Permissibility of Mining

State Environmental Planning Policy No. 50 - Canal Estates

State Environmental Planning Policy No. 10 - Retention of Low-Cost Rental Accommodation

State Environmental Planning Policy No. 55 - Remediation of Land

State Environmental Planning Policy No. 64 - Advertising and Signage

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

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

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

State Environmental Planning Policy No. 32 - Urban Consolidation (Redevelopment of Urban Land).

State Environmental Planning Policy (Infrastructure) 2007

The following Draft State Environmental Planning Policies apply:
Draft State Environmental Planning Policy - Subdivision

2. Zoning and land use under relevant LEPs

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

(a) What is the identity of the zone?
Residential B

(b) What is permitted without development consent?
Nil.

(c) What is permitted only with development consent?
Any purpose other than a purpose included in item (b) or (d).

(d) What is prohibited?
Abattoirs, advertisements, agriculture, amusement centres, amusement parks, animal establishments, brothels, bulky goods salesrooms or showrooms, business premises, camping grounds and caravan parks, carparks other than those provided by the Council, communication facilities, entertainment facilities, extractive industry, forestry, gaming taverns, generating works, hazardous industry, hazardous storage establishments, helicopter landing sites, heliports, hotels, industry, institutions, intensive agriculture, junkyards, light industry, medical centres, mines, motels, motor showrooms, offensive industry, offensive storage establishments, plant hire, plant nurseries, recreation facilities, refreshment rooms, roadside stalls, rural industry, sawmills, service stations, shops, stock and sales yards, transport depots, transport terminals, vehicle body repair workshops, vehicle repair stations, veterinary hospitals, warehouses.

(e) Whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed.

Under Fairfield LEP 1994, there are no minimum or maximum land dimension requirements relating to the permissibility of dwelling houses in the zone. However, Council will have regard to the merits of land dimensions and Guidelines for Residential Development (DCP 1/97) when considering development proposals for a dwelling house on the land.

(f) Whether the land includes or comprises critical habitat.

No

(g) Whether the land is in a conservation area (however described).

No

(h) Whether an item of environmental heritage (however described) is situated on the land.

No

Attention is drawn however to Clause 31 of Fairfield LEP 1994: "When determining an application for consent to carry out development on land in the vicinity of a heritage item, the Council must take into consideration the likely effect of the proposed development on the heritage significance of that heritage item and on its setting."

3. (Repealed)

(This section is deliberately left blank)

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 notified by the Department of Public Works.

No, this land is not affected.

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.

No, this land is not affected.

6. Road widening and road realignment

Whether or not the land is affected by any road widening or road realignment under Division 2 or Part 3 of the *Roads Act* 1993, any environmental planning instrument, or any resolution of the council.

The land is not affected by any road widening proposal under Division 2 of Part 3 of the Roads Act, any Environmental Planning Instrument or any resolution of the Council.

7. Council and other public authority policies on hazard risk restrictions

Whether or not the land is affected by a policy:

(a) adopted by the council, or

(b) 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 the council,

that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk.

Council's policies on hazard risk restrictions are as follows:

(i) Landslip

The land is not affected by a policy adopted by Council or adopted by any other public authority and notified to Council (for the express purpose of its adoption by that authority being referred to in Planning Certificates issued by Council) that restricts development on the land because of the likelihood of land slip or subsidence.

(ii) Bushfire

Council has been supplied by the NSW Rural Fire Service with a hazard map for the purposes of a bush fire risk management plan applying to land within the Fairfield local government area. Based on that map, it appears the land referred to in this certificate is not bush fire prone as defined in section 4 of the Environmental Planning and Assessment Act , 1979.

(iii) Tidal Inundation

The land is not affected by a policy adopted by Council or adopted by any other public authority and notified to Council (for the express purpose of

its adoption by that authority being referred to in Planning Certificates issued by Council) that restricts development on the land because of the likelihood of tidal inundation.

(iv) Subsidence

No, the land is not so affected

(v) Acid Sulphate Soils

The land is not affected by a policy adopted by Council or adopted by any other public authority and notified to Council (for the express purpose of its adoption by that authority being referred to in Planning Certificates issued by Council) that restricts development on the land because of the likelihood of acid sulfate soils or any other risk.

(vi) Any other risks

No, the land is not so affected

7A. Flood related development controls information

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.

Part or all of this land is within the floodplain and may be affected by local overland flooding. This parcel is not in an area in which Council's current programme of overland flood risk mapping has been completed. . The term local overland flooding means inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

Part or all of this land is within the floodplain and may be affected by local overland flooding. This parcel is not in an area in which Council's current programme of overland flood risk mapping has been completed. . The term local overland flooding means inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

Note:

(1) 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 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.

The land is not reserved for acquisition.

9. Contributions plans

The name of each contributions plan applying to the land.

Fairfield City Council Section 94 Developer Contributions Plan No. 1999 applies to all land within the City of Fairfield.
Fairfield City Council Section 94A Levy Development Contributions Plan 2007 applies to all land within the City of Fairfield.

10. Matters arising under the Contaminated Land Management Act 1997

Section 59(2) of the *Contaminated Land Management Act* 1997 prescribes the following additional matters that are to be specified in a planning certificate:

(a) that the land to which the certificate relates is within land declared to be an "investigation area" or "remediation site" under Part 3 of that Act (if it is within such an area or site at the date when the certificate is issued),

(b) that the land to which the certificate relates is subject to an "investigation order" or a "remediation order" within the meaning of that Act (if it is subject to such an order at the date when the certificate is issued),

(c) that the land to which the certificate relates is the subject of a voluntary investigation proposal (or voluntary remediation proposal) the subject of the Environment Protection Authority's agreement under section 19 or 26 of that Act (if it is the subject of such a proposal, and the proposal has been not been fully carried out, at the date when the certificate is issued).

(d) that the land to which the certificate relates is the subject of a site audit statement within the meaning of Part 4 of that Act (if copy of such a statement has been provided at any time to the local authority issuing the certificate).

Council has adopted by resolution a policy (commencing 1 August 2000), on contaminated land which may restrict the development of land. This policy is implemented when zoning or land use changes are proposed on lands which have previously been used for certain purposes. Consideration of Council's adopted policy and the application of provisions under the State Legislation is warranted.

The land is not within an investigation area or remediation site under Part 3 of the Contaminated Land Management Act 1997.

The land is not subject to an investigation order or a remediation order within the meaning of the Contaminated Land Management Act 1997.

The land is not subject to a voluntary investigation proposal (or voluntary remediation proposal) that is the subject of the Environment Protection Authority's agreement under Section 19 or 26 of the Contaminated Land Management Act 1997.

The land is not subject of a site audit statement within the meaning of the Contaminated Land Management Act 1997.

11. Bush fire prone land

Whether all, or part, of the land is bush fire prone land (as defined in the Environmental Planning and Assessment Act 1979).

Council has been supplied by the NSW Rural Fire Service with a hazard map for the purposes of a bush fire risk management plan applying to land within the Fairfield local government area. Based on that map, it appears the land referred to in this certificate is not bush fire prone as defined in section 4 of the Environmental Planning and Assessment Act , 1979.

12. Property vegetation plans

Whether or not the land is land to which a property vegetation plan under the Native Vegetation Act 2003 applies (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under the Act).

Council has not been informed of any such plan that affects this land.

13. Order under Trees (Disputes between Neighbours) Act 2006

Whether an order has been made under the Trees (Disputes between Neighbours) Act 2006 to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

No

14. Directions under Part 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

No such direction applies to the land.

15. Site compatibility certificates and conditions for seniors housing

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

(a) a statement of whether there is a current site compatibility certificate (of which the council is aware), issued under clause 25 of that Policy in respect of proposed development on the land and, if there is a certificate, the statement is to include:
(i) the period for which the certificate is current, and
(ii) that a copy may be obtained from the head office of the Department of Planning, and

No such certificate applies to the land.

(b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

No such terms apply to the land.

16. Site compatibility certificates for infrastructure

A statement of whether there is a valid site compatibility certificate (of which the council is aware), issued under clause 19 of *State Environmental Planning Policy (Infrastructure) 2007* in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(a) the period for which the certificate is valid, and
(b) that a copy may be obtained from the head office of the Department of Planning.

No such certificate applies to the land.

Fairfield City Council
Draft LEP Register
(Exhibited Draft Plans or Draft Plans on Exhibition)
as at 18 June 2008

DRAFT LEP NO.	PURPOSE	LOCATION
47	Rezone part of site from 6(a) Existing & Proposed Recreation to 4(a) General Industrial	10-16 Robert Street, Smithfield (lots 1-4, DP499648)
82	Clarify certain requirements in relation to heritage items and include an additional property as a heritage item	All heritage listed items in Fairfield City. Property at 112 Cumberland St (lot 1, DP771455) – include as a heritage item
84	Permit the additional use of mixed use development comprising professional office suites on the ground floor level of Residential flat buildings.	Street block bounded by Hughes and Hill Streets, Park and Mcburney Roads, Cabramatta
96	Permit business premises, car parking and shops (provided subject site is amalgamated with adjoining parcel at 154 The Boulevarde, Fairfield Heights.	181 Station Street, Fairfield Heights (Lot P, DP 383407)
102	To: * rezone properties bounded by Nelson Street Lane as Business 3(a1) – Sub-Regional Business Centre – Retail/Commercial which will not permit residential development * amend the existing Business 3(a) – Sub Regional Business Centre – Mixed Use and amending the objectives of this zone so they reflect the objectives in the Strategic Plan for the Fairfield Town Centre * prohibit Strata subdivision of new building stock or future redevelopments	Applies to the Fairfield Town Centre which is the area currently zoned Business 3(a) – Sub Regional Business Centre.
106	To establish site-specific development standards and principles that promote the orderly development of the Sunnybrook Hotel site, and to rezone part of the land to which this plan applies to 2(b)	Sunnybrook Hotel, cnr of Hume Highway and Liverpool Street, Cabramatta, being lot 1, DP 583848, lot 2, DP 617315 and lot 10, DP 748219
112	Adjust references within the Local Environmental Plan that refer to Development Control Plans that will become obsolete, or required updated referencing, for when the new City-Wide Development Control Plan comes into effect. This LEP is prepared in accordance with Section 73A of the Environmental Planning and Assessment Act 1979.	Applies to all land in the City of Fairfield.
122	To: * Reclassify part of Adams Reserve from 'Community' to 'Operational' land to	* Reclassification applies to Part of No. 243 Sackville Street, Canley Vale (Adams Reserve) being part of Lot D, DP 35362

	permit construction of the Canley Vale Link Road and sale of part of the reserve (No. 65-67 Canley Vale Road, Canley Vale being Lots A and B, DP 35362) * Rezone part of Adams Reserve from Recreation 6(a) to Business 3(c) to permit a multi-storey commercial/residential development with Council consent under the Canley Corridor Development Control Plan No. 37	* Rezoning applies to No. 65-67 Canley Vale Road, Canley Vale being Lots A and B, DP 35362)

DEVELOPMENT CONTROL PLANS - As at 9 April 2008 (*Note: Some *"In Force"* Development Control Plans may be under review, check with Council for date of last amendment)

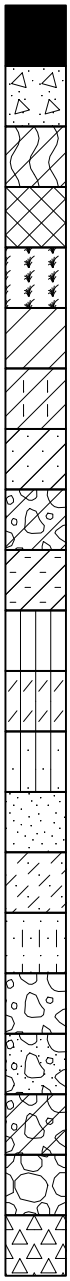
TITLE	STATUS*	DATE APPLIES FROM
GENERAL		
Fairfield City-Wide Development Control Plan 2006	In Force	July 2006
Fairfield City-Wide Development Control Plan 2006 - **Amendment 1** (Chapter 5 – Single Dwelling)	**Adopted August 2006**	**Effective September 2006**
Fairfield City-Wide Development Control Plan 2006 - **Amendment 2** (Chapter 6 – Multi-Unit Housing)	**Adopted November 2006**	**Effective December 2006**
Fairfield City-Wide Development Control Plan 2006 - **Amendment 3** (Subdivision and other anomalies)	**Adopted November 2006**	**Effective December 2006**
Fairfield City-Wide Development Control Plan 2006 - **Amendment 4** (Anomalies found in Chapter 10 - Miscellaneous Development)	**Adopted March 2007**	**Effective April 2007**
Fairfield City-Wide Development Control Plan 2006 - **Amendment 5** (Child Care Centres and Subdivision)	**Adopted March 2007**	**Effective April 2007**
Exempt and Complying Development (No.29)	In Force	Oct 1999
Development Standards Relating to Public Roads (No.32)	In Force	Dec 1999
SITE SPECIFIC		
Fairfield Town Centre (2006)	In Force	Dec 2006
Cabramatta Town Centre (5/2000)	In Force	Aug-2000
Canley Corridor DCP No. 37 – Canley Vale and Canley Heights Local Town Centres - **Amendment No. 1**: Development controls for Master Plan Site No. 2, Adams Reserve, Canley Vale Road, Canley Vale - **Amendment No. 2**: Development controls for Master Plan Site No. 4, 45-47 Peel St, Canley Heights	In Force **Adopted September 2006** **Adopted 11 March 2008**	March 2006 **Not Effective** – Can only take effect following gazettal of an amendment to Fairfield LEP 1994, which will rezone the land to permit the development **Effective 9 April 2008**
Fairfield Heights Town Centre (10/94)	In Force	October 1994
Bonnyrigg Town Centre (28)	In Force	May 2004
PROPOSED AMENDMENTS TO DCPs		
Site Specific (Sunnybrook Hotel)	Not to commence until gazettal of LEP 106.	To be advised

APPENDIX D

Test Pit Report Results & Notes Relating to this Report

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

SILT

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

GRAVEL

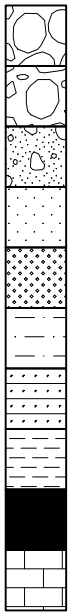
SANDY GRAVEL

CLAYEY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

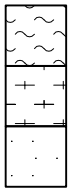
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

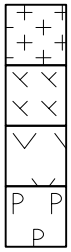


SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.4 AHD
EASTING: 312639.5
NORTHING: 6249038.1
DIP/AZIMUTH: 90°/--

PIT No: 1
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	TOPSOIL - brown silty clay topsoil, with a trace of gravel and rootlets. M<Wp							
		FILLING - brown mottled red brown, silty clay filling with some building rubble, brick, glass fragments, M~Wp		E	0.15		PID<1ppm		
24	0.4	SILTY CLAY - stiff to very stiff, light grey and red brown, silty clay with a trace of ironstone gravel. M~Wp			0.4		pp=200kPa PID<1ppm		
				B	0.5		pp=250kPa		
				E	0.7				
	1			D	1.0		pp=200kPa		1
23		- grading to light grey, mottled red brown at 1.3m			1.5		pp=200kPa		
					1.8		pp=200-250kPa		
	1.9	SHALE - very low to low strength, grey shale with some ironstaining							2
22	2.4	Pit discontinued at 2.4m - refusal							
	3								3
21									
	4								4
20									

RIG: Backhoe - 600mm bucket
LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	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: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.7 AHD
EASTING: 312646
NORTHING: 6249022.3
DIP/AZIMUTH: 90°/--

PIT No: 2
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
24	0.1	TOPSOIL - brown silty sand topsoil, with a trace of rootlets, humid, fibre-cement fragments			0.1		PID<1ppm		
		FILLING - brown sandy filling, with some clay and gravel and building rubble (bricks, glass, ceramic fragments), humid		E					
	0.4				0.4		PID<1ppm		
		SILTY CLAY - hard, light grey and red brown, silty clay with a trace of ironstone gravel. M<Wp			0.5		pp>400kPa		
		- some 20mm diameter tree roots at 0.5m		E					
					0.8		pp>400kPa		
1					0.9				1
				U_{50}					
					1.15				
	1.2	SHALE - very low strength, grey shale with some ironstaining							
23									
2		- grading to low strength at 2.0m							2
	2.3	Pit discontinued at 2.3m							
		- refusal							
22									
3									3
21									
4									4
20									

RIG: Backhoe - 600mm bucket

LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.1 AHD
EASTING: 312672.9
NORTHING: 6249004.9
DIP/AZIMUTH: 90°/--

PIT No: 3
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
24	0.1	TOPSOIL - brown silty sand topsoil, with a trace of rootlets, humid		E	0.1		PID<1ppm		
	0.25	FILLING - brown silty clay filling with some gravel, M<Wp, brick, timber, ash			0.2		pp=250kPa PID<1ppm		
		SILTY CLAY - very stiff to hard, light grey and red brown, silty clay with a trace of ironstone gravel, M~Wp		B	0.5		pp>400kPa		
				U_{50}					
	0.8	SILTY CLAY - hard, light grey mottled red brown, silty clay with a trace of ironstone gravel, M<Wp			0.85				
23	1			D	1.0		pp>400kPa		1
					1.5		pp>400kPa		
	1.6	SHALE - very low strength, grey shale with some ironstaining							
22	2	- grading to very low to low strength at 2.8m							2
	3								3
	3.0	Pit discontinued at 3.0m - target depth reached							
21									
	4								4
20									

RIG: Backhoe - 600mm bucket

LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.8 AHD
EASTING: 312707.6
NORTHING: 6248986.6
DIP/AZIMUTH: 90°/--

PIT No: 4
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
23	0.1	TOPSOIL - brown silty clay filling, with some sand and a trace of rootlets, M<Wp							
		FILLING - brown and grey, silty clay filling with some gravel and crushed shale, M<Wp							
		- some brick fragments at 0.7m			0.7		PID<1ppm		
22	1.0	FILLING - light grey and red brown, silty clay filling with a trace of ironstone gravel and building rubble, M~Wpm, appears moderately compacted		D E	1.0		pp=200kPa		1
		- metal pipe at 1.4m			1.4		PID<1ppm		
				E					
21	2.0	- tiles, brick, sandstone and shale fragments at 2.0m			2.0		pp=250kPa		2
	3.0				3.0		pp=150kPa		3
					3.5		pp=200kpa		
20	3.9	SHALE - very low to low strength, grey shale with some ironstaining		D	4.0				4
19	4.2	Pit discontinued at 4.2m - refusal							

RIG: Backhoe - 600mm bucket
LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PiD	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	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: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.1 AHD
EASTING: 312703.8
NORTHING: 6249044.5
DIP/AZIMUTH: 90°/--

PIT No: 5
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
23	0.0	FILLING - brown silty clay filling, with some gravel and crushed shale and building rubble, M<Wp			0.0		PID<1ppm		
	0.2	FILLING - brown and grey, shaly clay filling, M<Wp, shale pieces to 100mm size, appears moderately compacted		E					
					0.5		PID<1ppm		
				E					
22	1			B	1.0		pp=400kPa		1
					1.4		PID<1ppm		
					1.5		pp=400kPa		
	1.8	FILLING - light grey and red brown, silty clay filling with some gravel and crushed shale fragments, M~Wp, concrete, timber, appears poorly compacted		E					
21	2			D	2.0		pp=75kPa		2
					2.2				
		- metal reinforcement bar in filling at 2.5m							
20	3	- shale fragments							3
					3.2		PID<1ppm		
				E					
	3.8	SHALE - very low to low strength, grey shale with some ironstaining			3.8				
19	4 4.0	Pit discontinued at 4.0m - refusal							4

RIG: Backhoe - 600mm bucket

LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 21.7 AHD
EASTING: 312715.09
NORTHING: 6249095.44
DIP/AZIMUTH: 90°/--

PIT No: 6
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
21	0	FILLING - brown and grey, silty clay filling with some gravel and crushed shale, M<Wp		E	0.0		PID<1ppm		
		- timber		D	0.5		PID<1ppm pp=150kPa		
				E					
	1			D	1.0		PP=100kPa		1
20	2				2.0		pp=150-200kPa		2
19		- tiles, fibre-cement fragments between 2.3-3.2m			2.7		PID<1ppm		
	3	- some metal fragments at 3.0m		E	3.0		pp=100kPa		3
					3.2				
18		- timber and metal fragments at 3.8m							
	4				4.0		pp=100-150kPa		4
	4.3	SHALE - very low to low strength, grey shale with some ironstaining							
17	4.5	Pit discontinued at 4.5m - refusal							

RIG: Backhoe - 600mm bucket
LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 22.8 AHD
EASTING: 312681.6
NORTHING: 6249095.4
DIP/AZIMUTH: 90°/---

PIT No: 7
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown and grey, silty clay filling with some gravel and crushed shale fragments, M<Wp			0.05		PID<1ppm		
				E					
				E	0.3		PID<1ppm		
				D	0.5		pp=200kPa		
22		- some metal fragments in filling at 0.8m							
	1			D	1.0		pp=150-200kPa		1
		- styrofoam at 1.4m		D	1.5		pp=150-200kPa		
21		- grading to slightly shaly at 1.89m							
	2	- metal fragments, concrete, tiles at 2.0m		D	2.0		pp=200kPa		2
				D	2.5		pp=100kPa		
20									
	3			D	3.0		pp=100kPa		3
		- fibre-cement fragments and tiles at 3.2-3.3m			3.2		PID<1ppm		
		- some wood fragments at 3.4m		E					
19					3.9				
	4								4
		- perched groundwater observed at 4.2m						▽	
		- grading to M>Wp at 4.6m							
18					4.8		PID<1ppm		
	4.9	SHALE - very low to low strength, grey shale with some ironstaining		E					
	5 5.0				5.0				5

Pit discontinued at 5.0m - refusal

RIG: Backhoe - 600mm bucket
LOGGED: Mikhail

WATER OBSERVATIONS: Groundwater seepage observed at 4.6m (very minor)

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.0 AHD
EASTING: 312628.6
NORTHING: 6249105.4
DIP/AZIMUTH: 90°/--

PIT No: 8
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
24	0.1	TOPSOIL - brown silty clay filling, with a trace of rootlets, M<Wp			0.1		PID<1ppm		
		FILLING - brown and grey, silty clay filling with some gravel and building rubble (brick and glass fragments, fibre-cement products), concrete, tiles, M<Wp		E					
	0.8	SILTY CLAY - very stiff, light grey and red brown, silty clay with a trace of ironstone gravel, M<Wp		E U_{50}	0.8		(2 samples) pp=300kPa PID<1ppm		
23	1			D B	1.0		pp=300kPa		1
	1.2	SHALE - very low strength, grey shale with some ironstaining - grading to very low to low strength at 1.4m			1.2				
	1.9	Pit discontinued at 1.9m - refusal							
22	2								2
21	3								3
20	4								4

RIG: Backhoe - 600mm bucket

LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

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

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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TEST PIT LOG

CLIENT: Housing NSW
PROJECT: Urban Renewal Project
LOCATION: Kamira Court, Villawood

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

PIT No: Stockpile
PROJECT No: 45789
DATE: 17 Sep 08
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - brown and yellow brown, silty clay and sand filling with some building rubble (brick, concrete, metal fragments), humid		E	0.0		Stockpile		
		Pit discontinued at 0.1m							

RIG: Backhoe - 600mm bucket

LOGGED: Mikhail

WATER OBSERVATIONS: No free groundwater observed

REMARKS: E = Environmental sample
One stockpile is located on Lot 37 DP 202006

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: BJM
Date: 16/10/08

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NOTES RELATING TO THIS REPORT

Introduction

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

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

Description and Classification Methods

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

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

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

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

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

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

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

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

Sampling

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

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

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

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

Drilling Methods.

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

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

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

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

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water

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

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

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

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  as 4, 6, 7
  N = 13

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

  as 15, 30/40 mm.

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

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

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

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

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

The information provided on the plotted results comprises: —

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

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

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

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

q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

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

q_c = (12 to 18) c_u

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

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

Hand Penetrometers

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

Two relatively similar tests are used.

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

Laboratory Testing

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

Bore Logs

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

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

Ground Water

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

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

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

Engineering Reports

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

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

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

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

Site Anomalies

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

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section

is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS IN THE SYDNEY AREA

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

Under this system rocks are classified by Rock Type, Degree of Weathering, Strength, Stratification Spacing, and Degree of Fracturing. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc.) where these are relevant.

ROCK TYPE DEFINITIONS

Rock Type	Definition
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments
Sandstone:	More than 50% of the rock consists of sand sized (.06 to 2mm) fragments
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated

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

DEGREE OF WEATHERING

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

STRATIFICATION SPACING

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

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics (Reference).

Strength Term	Is(50) MPa	Field Guide	Approx. qu MPa*
Extremely Low:	0.03	Easily remoulded by hand to a material with soil properties	0.7
Very Low:	0.1	May be crumbled in the hand. Sandstone is “sugary” and friable.	2.4
Low:	0.3	A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium:	1	A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
High:	3	A piece of core 150 mm long x 50 mm dia. cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very High:	10	A piece of core 150 mm long x 50 mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely High:		A piece of core 150 mm long x 50 mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	

* The approximate unconfined compressive strength (qu) shownin the table is based on an assumed ratio to the point load index of 24:1. This ratio may vary widely.

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300 mm - 1000 mm with occasional longer sections and occasional sections of 100 mm - 300 mm.
Unbroken:	The core does not contain any fracture.

REFERENCE

International Society of Rock Mechanics, Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1 Final Draft October 1972

APPENDIX E
Laboratory Reports and Chain of Custody Documentation

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Kamira Court
Project No: 45789 Sampler: Ulrike Krause
Project Mgr: Lindsay Rockett Mob. Phone: 0418635390
Email: Ulrike.Krause@douglaspartners.com.au
Date Required: 23/09/08 Lab Quote No.

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/ TPH	OCP/ PCB	PAH	Phenols	Other: Asbestos	Notes
TP 1	0.05-0.4m	1	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Asbestos sample in plastic bag
TP 2	0.1-0.4m	2	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Asbestos sample in plastic bag
TP 3	0.1-0.25m	3	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Asbestos sample in plastic bag
TP 4	0.7-1.4m	4	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP 5	0.0-0.5m	5	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BD1-170908		6	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓			✓			
TP 5	0.5-1.4m	7	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	Asbestos sample in plastic bag
TP 6	0.5-1.6m	8	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP 6	2.7-3.2m	9	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	Asbestos sample in plastic bag

Lab Report No.
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Ulrike Krause Signed: Date & Time: 18/09/08 Received By: Simon Date & Time: 18/9/8 1:30 pm

Relinquished by: Ulrike Krause Signed: Date & Time: 18/09/08 Received By: Date & Time:

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200

Job No: 22789
Date received: 18/9/8
Time received: 1:30
Received by: SS
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Kamira Court
Project No: 45789 Sampler: Ulrike Krause
Project Mgr: Lindsay Rockett Mob. Phone: 0418635390
Email: Ulrike.Krause@douglaspartners.com.au
Date Required: 23/09/08 Lab Quote No.

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/ TPH	OCP/ PCB	PAH	Phenols	Other: Asbestos	Notes
TP 7	0.3-1.0m	10	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
TP 7	3.2-3.9m	11	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Asbestos sample in plastic bag
TP 8	0.1-0.8m	12	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Asbestos sample in plastic bag
Stockpile		13	17/09/08	S	glass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	Asbestos sample in plastic bag
TS-170908		14		S	glass									Only BTEX					

Lab Report No.
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Ulrike Krause Signed: Date & Time: Received By: Simon Sony Date & Time: 18/9/18 1:32

Relinquished by: Ulrike Krause Signed: Date & Time: 18/09/08 Received By: Date & Time:

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 22789

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Ulrike Krause

Sample log in details:

Your Reference:	**45789, Kamira Court**
No. of samples:	14 Soils
Date samples received:	18/09/08
Date completed instructions received:	18/09/08

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:	23/09/08
Date of Preliminary Report:	Not Issued
Issue Date:	23/09/08

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:

Jacinta Hurst
Operations Manager

Joshua Lim
Chemist

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-1 TP1/0.05-0.4 17/09/2008 Soil	22789-2 TP2/0.1-0.4 17/09/2008 Soil	22789-3 TP3/0.1-0.25 17/09/2008 Soil	22789-4 TP4/0.7-1.4 17/09/2008 Soil	22789-5 TP5/0.0-0.5 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	20/09/2008	20/09/2008	20/09/2008	20/09/2008	20/09/2008
vTPH C6 - C9	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	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	122	129	127	129	117

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil	22789-11 TP7/3.2-3.9 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	20/09/2008	20/09/2008	20/09/2008	20/09/2008	20/09/2008
vTPH C6 - C9	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	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	136	120	127	124	123

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil	22789-14 TS-170908 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	20/09/2008	20/09/2008	20/09/2008
vTPH C6 - C9	mg/kg	<25	<25	[NA]
Benzene	mg/kg	<0.5	<0.5	96%
Toluene	mg/kg	<0.5	<0.5	96%
Ethylbenzene	mg/kg	<1	<1	99%
m+p-xylene	mg/kg	<2	<2	99%
o-Xylene	mg/kg	<1	<1	99%
Surrogate aaa-Trifluorotoluene	%	125	128	99

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	22789-1	22789-2	22789-3	22789-4	22789-5
Your Reference	----------	TP1/0.05-0.4	TP2/0.1-0.4	TP3/0.1-0.25	TP4/0.7-1.4	TP5/0.0-0.5
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	102	112	107	110	110

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	22789-7	22789-8	22789-9	22789-10	22789-11
Your Reference	----------	TP5/0.5-1.4	TP6/0.5-1.6	TP6/2.7-3.2	TP7/0.3-1.0	TP7/3.2-3.9
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	109	104	106	106	105

sTPH in Soil (C10-C36)			
Our Reference:	UNITS	22789-12	22789-13
Your Reference	----------	TP8/0.1-0.8	Stockpile
Date Sampled	----------	17/09/2008	17/09/2008
Type of sample		Soil	Soil
Date extracted	-	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008
TPH C_{10} - C_{14}	mg/kg	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100
Surrogate o-Terphenyl	%	122	119

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-1 TP1/0.05-0.4 17/09/2008 Soil	22789-2 TP2/0.1-0.4 17/09/2008 Soil	22789-3 TP3/0.1-0.25 17/09/2008 Soil	22789-4 TP4/0.7-1.4 17/09/2008 Soil	22789-5 TP5/0.0-0.5 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
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	<0.1	<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	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.06	<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-d_{14}	%	97	100	101	101	101

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-6 BD1-170908 17/09/2008 Soil	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
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	<0.1	<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	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<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-d_{14}	%	107	101	102	100	105

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-11 TP7/3.2-3.9 17/09/2008 Soil	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	102	111	105

Organochlorine Pesticides in soil						
Our Reference:	UNITS	22789-1	22789-2	22789-3	22789-4	22789-5
Your Reference	----------	TP1/0.05-0.4	TP2/0.1-0.4	TP3/0.1-0.25	TP4/0.7-1.4	TP5/0.0-0.5
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
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	%	84	85	81	87	88

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil	22789-11 TP7/3.2-3.9 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
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	%	88	83	82	82	82

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	93	94

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-1 TP1/0.05-0.4 17/09/2008 Soil	22789-2 TP2/0.1-0.4 17/09/2008 Soil	22789-3 TP3/0.1-0.25 17/09/2008 Soil	22789-4 TP4/0.7-1.4 17/09/2008 Soil	22789-5 TP5/0.0-0.5 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Arochlor 1016	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	%	84	85	81	87	88

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil	22789-11 TP7/3.2-3.9 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Arochlor 1016	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	%	88	83	87	82	82

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil
Date extracted	-	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	93	94

Total Phenolics in Soil						
Our Reference:	UNITS	22789-1	22789-2	22789-3	22789-4	22789-5
Your Reference	----------	TP1/0.05-0.4	TP2/0.1-0.4	TP3/0.1-0.25	TP4/0.7-1.4	TP5/0.0-0.5
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	22/09/2008	22/09/2008	22/09/2008	22/09/2008	22/09/2008
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil				
Our Reference:	UNITS	22789-8	22789-11	22789-12
Your Reference	----------	TP6/0.5-1.6	TP7/3.2-3.9	TP8/0.1-0.8
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil
Date extracted	-	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	22/09/2008	22/09/2008	22/09/2008
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS --- --- 	22789-1 TP1/0.05-0.4 17/09/2008 Soil	22789-2 TP2/0.1-0.4 17/09/2008 Soil	22789-3 TP3/0.1-0.25 17/09/2008 Soil	22789-4 TP4/0.7-1.4 17/09/2008 Soil	22789-5 TP5/0.0-0.5 17/09/2008 Soil
Date digested	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Arsenic	mg/kg	9	9	9	26	9
Cadmium	mg/kg	<0.5	0.6	0.5	<0.5	<0.5
Chromium	mg/kg	21	17	31	12	10
Copper	mg/kg	19	52	13	34	34
Lead	mg/kg	24	140	22	19	18
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	13	9	26	20
Zinc	mg/kg	99	270	18	86	71

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS --- --- 	22789-6 BD1-170908 17/09/2008 Soil	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil
Date digested	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Arsenic	mg/kg	9	6	6	9	6
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	9	9	11	11	10
Copper	mg/kg	31	29	50	34	37
Lead	mg/kg	16	17	22	19	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	25	17	21	24	25
Zinc	mg/kg	70	94	72	110	110

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-11 TP7/3.2-3.9 17/09/2008 Soil	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil
Date digested	-	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008
Arsenic	mg/kg	4	<4	5
Cadmium	mg/kg	<0.5	<0.5	<0.5
Chromium	mg/kg	10	9	16
Copper	mg/kg	35	9	19
Lead	mg/kg	19	11	30
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	17	3	15
Zinc	mg/kg	78	27	73

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-1 TP1/0.05-0.4 17/09/2008 Soil	22789-2 TP2/0.1-0.4 17/09/2008 Soil	22789-3 TP3/0.1-0.25 17/09/2008 Soil	22789-4 TP4/0.7-1.4 17/09/2008 Soil	22789-5 TP5/0.0-0.5 17/09/2008 Soil
Date prepared	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Moisture	%	17	7.5	18	14	11

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-6 BD1-170908 17/09/2008 Soil	22789-7 TP5/0.5-1.4 17/09/2008 Soil	22789-8 TP6/0.5-1.6 17/09/2008 Soil	22789-9 TP6/2.7-3.2 17/09/2008 Soil	22789-10 TP7/0.3-1.0 17/09/2008 Soil
Date prepared	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008	19/09/2008	19/09/2008
Moisture	%	11	12	17	20	17

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	22789-11 TP7/3.2-3.9 17/09/2008 Soil	22789-12 TP8/0.1-0.8 17/09/2008 Soil	22789-13 Stockpile 17/09/2008 Soil
Date prepared	-	19/09/2008	19/09/2008	19/09/2008
Date analysed	-	19/09/2008	19/09/2008	19/09/2008
Moisture	%	18	23	13

Asbestos ID - soils						
Our Reference:	UNITS	22789-1	22789-2	22789-3	22789-7	22789-9
Your Reference	----------	TP1/0.05-0.4	TP2/0.1-0.4	TP3/0.1-0.25	TP5/0.5-1.4	TP6/2.7-3.2
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	22/09/2008	22/09/2008	22/09/2008	22/09/2008	22/09/2008
Sample Description	-	30g clay	30g clay	30g clay	30g clay	30g clay
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	22789-11	22789-12	22789-13
Your Reference	----------	TP7/3.2-3.9	TP8/0.1-0.8	Stockpile
Date Sampled	----------	17/09/2008	17/09/2008	17/09/2008
Type of sample		Soil	Soil	Soil
Date analysed	-	22/09/2008	22/09/2008	22/09/2008
Sample Description	-	30g clay	30g clay	30g clay
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

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 hexane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with hexane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following disitillation.
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	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
Date analysed	-			20/9/08	22789-1	20/09/2008 || 20/09/2008	LCS-1	20/9/08
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	22789-1	<25 || <25	LCS-1	99%
Benzene	mg/kg	0.5	GC.16	<0.5	22789-1	<0.5 || <0.5	LCS-1	86%
Toluene	mg/kg	0.5	GC.16	<0.5	22789-1	<0.5 || <0.5	LCS-1	105%
Ethylbenzene	mg/kg	1	GC.16	<1	22789-1	<1 || <1	LCS-1	101%
m+p-xylene	mg/kg	2	GC.16	<2	22789-1	<2 || <2	LCS-1	102%
o-Xylene	mg/kg	1	GC.16	<1	22789-1	<1 || <1	LCS-1	101%
Surrogate aaa-Trifluorotoluene	%		GC.16	132	22789-1	122 || 125 || RPD: 2	LCS-1	132%
QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
Date analysed	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	22789-1	<50 || <50	LCS-1	118%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	22789-1	<100 || <100	LCS-1	115%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	22789-1	<100 || <100	LCS-1	132%
Surrogate o-Terphenyl	%		GC.3	120	22789-1	102 || 103 || RPD: 1	LCS-1	113%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/9/08	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/9/08
Date analysed	-			19/9/08	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/9/08
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	92%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	87%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	89%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	88%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	94%
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	LCS-1	108%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	22789-1	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	22789-1	<0.05 || <0.05	LCS-1	99%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	105	22789-1	97 || 95 || RPD: 2	LCS-1	112%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
Date analysed	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
HCB	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	107%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	107%
Heptachlor	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	107%
delta-BHC	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	103%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	113%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	121%
Dieldrin	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	111%
Endrin	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	98%
pp-DDD	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	115%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	LCS-1	103%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	91	22789-1	84 || 86 || RPD: 2	LCS-1	91%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
Date analysed	-			19/09/2008	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/09/2008
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	LCS-1	91%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	22789-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	91	22789-1	84 || 86 || RPD: 2	LCS-1	106%
QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			19/9/08	22789-1	19/09/2008 || 19/09/2008	LCS-1	19/9/08
Date analysed	-			22/9/08	22789-1	22/09/2008 || 22/09/2008	LCS-1	22/9/08
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5	22789-1	<5 || <5	LCS-1	97%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			19/09/08	22789-1	19/09/2008 || 19/09/2008	LCS-3	19/09/08
Date analysed	-			19/09/08	22789-1	19/09/2008 || 19/09/2008	LCS-3	19/09/08
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	22789-1	9 || 8 || RPD: 12	LCS-3	99%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	22789-1	<0.5 || <0.5	LCS-3	102%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	22789-1	21 || 17 || RPD: 21	LCS-3	104%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	22789-1	19 || 17 || RPD: 11	LCS-3	105%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	22789-1	24 || 26 || RPD: 8	LCS-3	99%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	22789-1	<0.1 || <0.1	LCS-3	114%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	22789-1	8 || 5 || RPD: 46	LCS-3	104%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	22789-1	99 || 84 || RPD: 16	LCS-3	102%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	LAB.8	<0.1

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

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
Date analysed	-	22789-12	20/09/2008 || 20/09/2008	22789-2	20/9/08
vTPH C_6 - C_9	mg/kg	22789-12	<25 || <25	22789-2	88%
Benzene	mg/kg	22789-12	<0.5 || <0.5	22789-2	79%
Toluene	mg/kg	22789-12	<0.5 || <0.5	22789-2	92%
Ethylbenzene	mg/kg	22789-12	<1 || <1	22789-2	90%
m+p-xylene	mg/kg	22789-12	<2 || <2	22789-2	90%
o-Xylene	mg/kg	22789-12	<1 || <1	22789-2	88%
Surrogate aaa-Trifluorotoluene	%	22789-12	125 || 133 || RPD: 6	22789-2	130%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
Date analysed	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
TPH C_{10} - C_{14}	mg/kg	22789-12	<50 || <50	22789-2	111%
TPH C_{15} - C_{28}	mg/kg	22789-12	<100 || <100	22789-2	106%
TPH C_{29} - C_{36}	mg/kg	22789-12	<100 || <100	22789-2	109%
Surrogate o-Terphenyl	%	22789-12	122 || 119 || RPD: 2	22789-2	112%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/9/08
Date analysed	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/9/08
Naphthalene	mg/kg	22789-12	<0.1 || <0.1	22789-2	88%
Acenaphthylene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	22789-12	<0.1 || <0.1	22789-2	84%
Phenanthrene	mg/kg	22789-12	<0.1 || <0.1	22789-2	84%
Anthracene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	22789-12	<0.1 || <0.1	22789-2	83%
Pyrene	mg/kg	22789-12	<0.1 || <0.1	22789-2	88%
Benzo(a)anthracene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	22789-12	<0.1 || <0.1	22789-2	99%
Benzo(b+k)fluoranthene	mg/kg	22789-12	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	22789-12	<0.05 || <0.05	22789-2	84%
Indeno(1,2,3-c,d)pyrene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	22789-12	111 || 111 || RPD: 0	22789-2	103%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
Date analysed	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
HCB	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	22789-12	<0.1 || <0.1	22789-2	99%
gamma-BHC	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	22789-12	<0.1 || <0.1	22789-2	96%
Heptachlor	mg/kg	22789-12	<0.1 || <0.1	22789-2	103%
delta-BHC	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	22789-12	<0.1 || <0.1	22789-2	96%
Heptachlor Epoxide	mg/kg	22789-12	<0.1 || <0.1	22789-2	102%
gamma-Chlordane	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	22789-12	<0.1 || <0.1	22789-2	111%
Dieldrin	mg/kg	22789-12	<0.1 || <0.1	22789-2	101%
Endrin	mg/kg	22789-12	<0.1 || <0.1	22789-2	77%
pp-DDD	mg/kg	22789-12	<0.1 || <0.1	22789-2	96%
Endosulfan II	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	22789-12	<0.1 || <0.1	22789-2	70%
Methoxychlor	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	22789-12	93 || 96 || RPD: 3	22789-2	84%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
Date analysed	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/2008
Arochlor 1016	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	22789-12	<0.1 || <0.1	22789-2	87%
Arochlor 1260	mg/kg	22789-12	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	22789-12	93 || 96 || RPD: 3	22789-2	109%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	22789-2	19/9/08
Date analysed	-	[NT]	[NT]	22789-2	22/9/08
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	22789-2	96%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/08
Date analysed	-	22789-12	19/09/2008 || 19/09/2008	22789-2	19/09/08
Arsenic	mg/kg	22789-12	<4 || 5	22789-2	100%
Cadmium	mg/kg	22789-12	<0.5 || <0.5	22789-2	93%
Chromium	mg/kg	22789-12	9 || 13 || RPD: 36	22789-2	100%
Copper	mg/kg	22789-12	9 || 12 || RPD: 29	22789-2	77%
Lead	mg/kg	22789-12	11 || 16 || RPD: 37	22789-2	79%
Mercury	mg/kg	22789-12	<0.1 || <0.1	22789-2	109%
Nickel	mg/kg	22789-12	3 || 7 || RPD: 80	22789-2	93%
Zinc	mg/kg	22789-12	27 || 41 || RPD: 41	22789-2	84%

QUALITY CONTROL Moisture	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	22789-1	19/09/2008 || 19/09/2008
Date analysed	-	22789-1	19/09/2008 || 19/09/2008
Moisture	%	22789-1	17 || 17 || RPD: 0
QUALITY CONTROL Moisture	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	22789-12	19/09/2008 || 19/09/2008
Date analysed	-	22789-12	19/09/2008 || 19/09/2008
Moisture	%	22789-12	23 || 23 || RPD: 0

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.
Asbestos was analysed by Approved Identifier: Joshua Lim

INS: Insufficient sample for this test	NT: Not tested	PQL: Practical Quantitation Limit
RPD: Relative Percent Difference	NA: Test not required	LCS: Laboratory Control Sample
NR: Not requested	<: Less than	>: Greater than

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:

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.

Douglas Partners
Geotechnics · Environment · Groundwater

DOUGLAS PARTNERS
8 OCT 2008

CHAIN OF CUSTODY

Project Name: Kamira Court
Project No: 45789 Sampler: Ulrike Krause
Project Mgr: Lindsay Rockett Mob. Phone: 0418635390
Email: Lindsay.Rockett@douglaspartners.com.au
Date Required: **08/10/08** Lab Quote No.

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes													Notes
						As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/ TPH	OCP/ PCB	PAH	Phenols	Other: Asbestos	
TP 2	0.1-0.4m	1	17/09/08	Bulk mat.	plastic													✓	Asbestos sample in plastic bag
TP 6	2.7-3.2m	2	17/09/08	Bulk mat.	plastic													✓	Asbestos sample in plastic bag
TP 7	3.2-3.9m	3	17/09/08	Bulk mat.	plastic													✓	Asbestos sample in plastic bag
TP 8	0.1-0.8 m	4	17/09/08	Bulk mat.	plastic													✓	Asbestos sample in plastic bag

Lab Report No.
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Ulrike Krause Signed: Date & Time: 3/10/08 Received By: Date & Time: 3/10/08 1230hrs

Relinquished by: Ulrike Krause Signed: Date & Time: 3/10/08 Received By: Date & Time:

Please forward results to Lindsay Rockett.

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200
Job No: 23205
Date received: 3/10/08
Time received: 1230hrs
Received by:
Temp: Cool/Ambient
Cooling: Ice/icepack
Security: Intact/Broken/None

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 23205

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Lindsay Rockett

Sample log in details:

Your Reference:	**45789, Kamira Court**
No. of samples:	4 Materials
Date samples received:	03/10/08
Date completed instructions received:	03/10/08

Analysis Details:
Please refer to the following pages for results and methodology summary.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Note, even after disintegration it can be difficult to detect the presence of asbestos in some asbestos -containing bulk materials using PLM and dispersion staining. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.

Report Details:

Date results requested by:	8/10/08
Date of Preliminary Report:	Not issued
Issue Date:	7/10/08

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:
Asbestos was analysed by Approved Identifier: Joshua Lim

Joshua Lim
Chemist

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Envirolab Ref: --	Sample ID: --	Date analysed -	Sample Description -	Asbestos ID in materials -	Asbestos Fibres -
23205-1	TP2/0.1-0.4	7/10/2008	40x10x10mm cement fragment	No asbestos detected	Not applicable
23205-2	TP6/2.7-3.2	7/10/2008	40x30x10mm cement fragment	No asbestos detected	Not applicable
23205-3	TP7/3.2-3.9	7/10/2008	40x30x10mm cement fragment	No asbestos detected	Not applicable
23205-4	Tp8/0.1-0.8	7/10/2008	30x30x5mm cement fragment	No asbestos detected	Not applicable

Method ID	Methodology Summary
AS4964-2004	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques.

APPENDIX F
Geotechnical Laboratory Test Results

Douglas Partners
Geotechnics · Environment · Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
PO Box 472
West Ryde NSW 1685
Australia

96 Hermitage Road
West Ryde NSW 2114
Phone (02) 9809 0666
Fax: (02) 9809 4095
sydney@douglaspartners.com.au

RESULT OF SHRINK-SWELL INDEX DETERMINATION

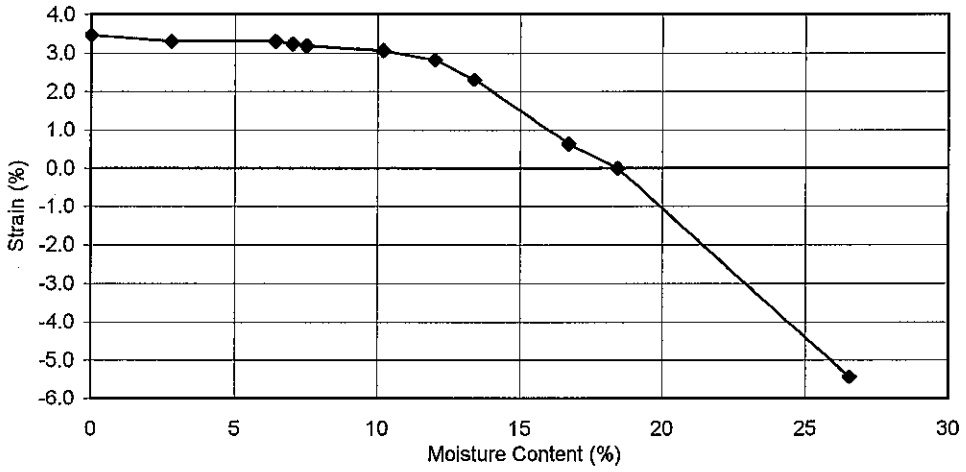
Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 A
Project :	URBAN RENEWAL PROJECT	**Report Date :**	14/10/08
		Date Sampled :	18/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	22/09/08
Test Location :	TP 3		
Depth / Layer :	0.5-0.8m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	3.3 %
Shrinkage - oven dried	3.5 %
Significant inert inclusions	4.0 %
Extent of cracking	MC
Extent of soil crumbling	0.1 %
Moisture content of core	18.4 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	500 kPa
Pocket penetrometer reading at final moisture content	90 kPa
Initial Moisture Content	16.3 %
Final Moisture Content	26.6 %
Swell under 25kPa	5.4 %



SHRINK-SWELL INDEX Iss 3.4% per Δ pF

Description: SILTY CLAY - Light grey and red brown silty clay with a trace of ironstone gravel

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking:
UC - Uncracked
SC - Slightly cracked
MC - Moderately cracked
HC - Highly cracked
FR - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

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Approved Signatory:

Tested:	JLG
Checked:	NW

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RESULT OF SHRINK-SWELL INDEX DETERMINATION

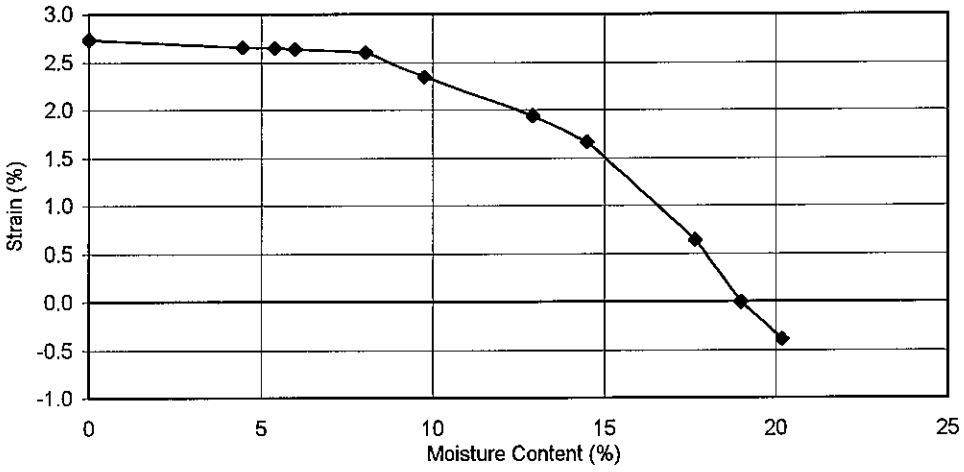
Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 B
Project :	URBAN RENEWAL PROJECT	**Report Date :**	29/09/08
		Date Sampled :	18/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	22/09/08
Test Location :	TP 8		
Depth / Layer :	0.8-1.0m	**Page:**	1 of 1

CORE SHRINKAGE TEST

Shrinkage - air dried	2.7 %
Shrinkage - oven dried	2.7 %
Significant inert inclusions	0.5 %
Extent of cracking	MC
Extent of soil crumbling	0.1 %
Moisture content of core	19.0 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	280 kPa
Pocket penetrometer reading at final moisture content	220 kPa
Initial Moisture Content	14.5 %
Final Moisture Content	20.2 %
Swell under 25kPa	0.4 %



SHRINK-SWELL INDEX Iss 1.6% per Δ pF

Description: SILTY CLAY - Light grey and red brown silty clay with a trace of ironstone gravel

Test Method(s): AS 1289.7.1.1 - 2003, AS 1289.2.1.1 - 2005

Sampling Method(s): AS 1289.1.3.1-1999

Extent of Cracking: **UC** - Uncracked; **SC** - Slightly cracked; **MC** - Moderately cracked; **HC** - Highly cracked; **FR** - Fractured

Remarks:

Note that NATA accreditation does not cover the performance of pocket penetrometer readings

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RESULTS OF MOISTURE CONTENT, PLASTICITY AND LINEAR SHRINKAGE TESTS

Client: HOUSING NSW

Project: URBAN RENEWAL PROJECT

Location: KAMIRA COURT, VILLAWOOD

Project No: 45789
Report No: S08-213
Report Date: 29/09/08

Date Sampled: 17/09/08
Date of Test: 24/09/08
Page: 1 of 1

TEST LOCATION	DEPTH (m)	DESCRIPTION	CODE	W_F %	W_L %	W_P %	PI %	*LS %
TP 1	1.0	SILTY CLAY - Stiff to very stiff, light grey and red brown silty clay with a trace of ironstone gravel	2,5	18.9	51	22	29	12.5 CU
TP 6	1.0	FILLING - Brown and grey silty clay filling with some gravel and crushed shale	2,5	24.1	49	22	27	11.5 CU

Legend:
W_F Field Moisture Content
W_L Liquid limit
W_P Plastic limit
PI Plasticity index
LS Linear shrinkage from liquid limit condition (Mould length 150mm)

NO No Result
NP Non Plas

Test Methods:
Moisture Content: AS 1289 2.1.1 - 2005
Liquid Limit: AS 1289 3.1.2 - 1995, 3.1.1 - 1995
Plastic Limit: AS 1289 3.2.1 - 1995
Plasticity Index: AS 1289 3.3.1 - 1995
Linear Shrinkage: AS 1289 3.4.1 - 1995
Cone Liquid Limit: AS 1289 3.9.1 - 2002
AS 1289.1.3.1 - 1999

Code
Sample history for plasticity tests
1. Air dried
2. Low temperature (<50°C) oven dried
3. Oven (105°C) dried
4. Unknown

Method of preparation for plasticity tests
5. Dry sieved
6. Wet sieved
7. Natural

*Specify if sample crumbled CR or curled CU

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001

Remarks:

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Approved Signatory:

Tested: LW
Checked: NW

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RESULTS OF MOISTURE CONTENT TEST

Client	HOUSING NSW	**Project No:**	45789
		Report No:	S08-213
Project	URBAN RENEWAL PROJECT	**Report Date:**	24/09/08
		Date Sampled	17/09/08
Location	KAMIRA COURT, VILLAWOOD	**Date of Test:**	19/09/08
		Page:	1 of 1

TEST LOCATION	DEPTH (m)	DESCRIPTION	MOISTURE CONTENT (%)
TP1	1.0	SILTY CLAY – Stiff to very stiff, light grey and red brown silty clay with a trace of ironstone gravel	18.9
TP6	1.0	FILLING – Brown and grey silty clay filling with some gravel and crushed shale	24.1
TP8	1.0	SILTY CLAY – Very stiff, light grey and red brown silty clay with a trace of ironstone gravel	20.3

Test Method(s): AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001

Remarks:

Approved Signatory:

Tested: LW
Checked: NW

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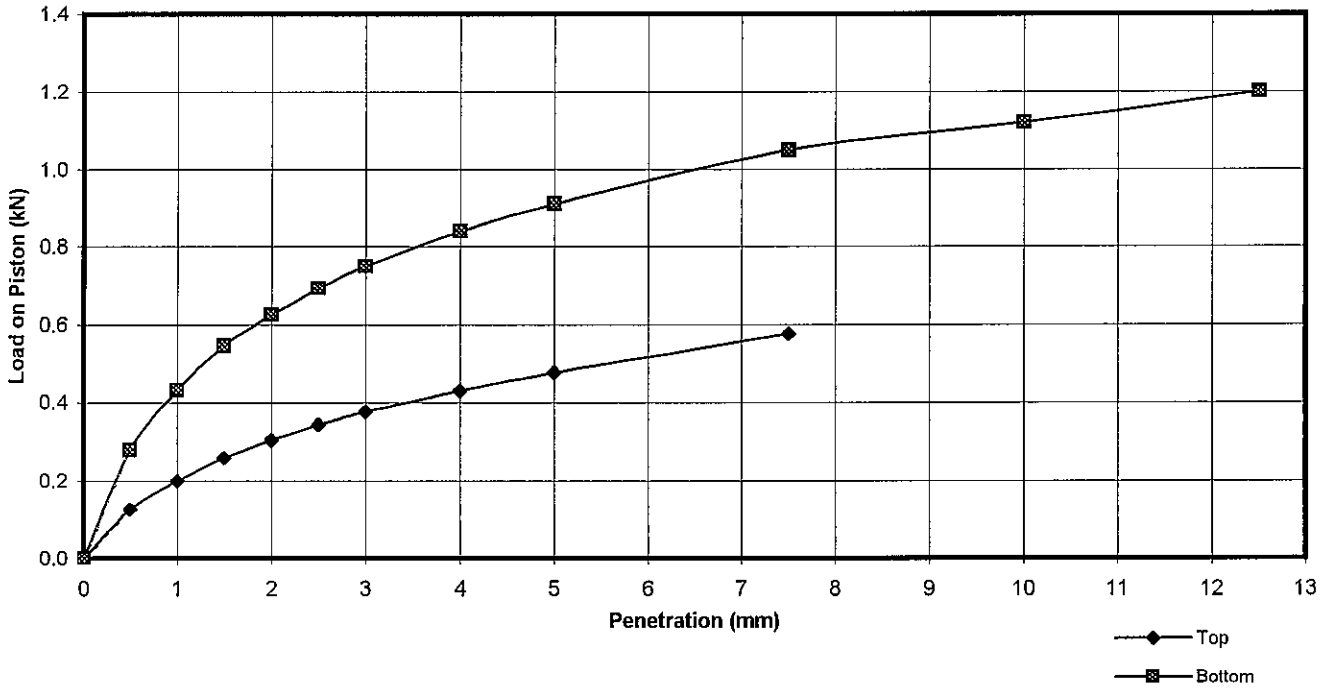
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 C
Project :	URBAN RENEWAL PROJECT	**Report Date :**	24/09/08
		Date Sampled :	18/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	19/09/08
Test Location :	TP 1		
Depth / Layer :	0.5-0.7m	**Page:**	1 of 1



Description: SILTY CLAY - Stiff to very stiff, light grey & red brown silty clay with a trace of ironstone gravel

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 101% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 2.2%
MOISTURE RATIO: 99% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		24.7	1.60
After soaking		27.1	1.56
After test	Top 30mm of sample	28.4	-
	Remainder of sample	25.2	-
Field values		25.3	-
Standard Compaction		24.9	1.58

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**2.5**
	5.0 mm	**2.5**
BOTTOM	**2.5 mm**	**5**
	5.0 mm	**4.5**

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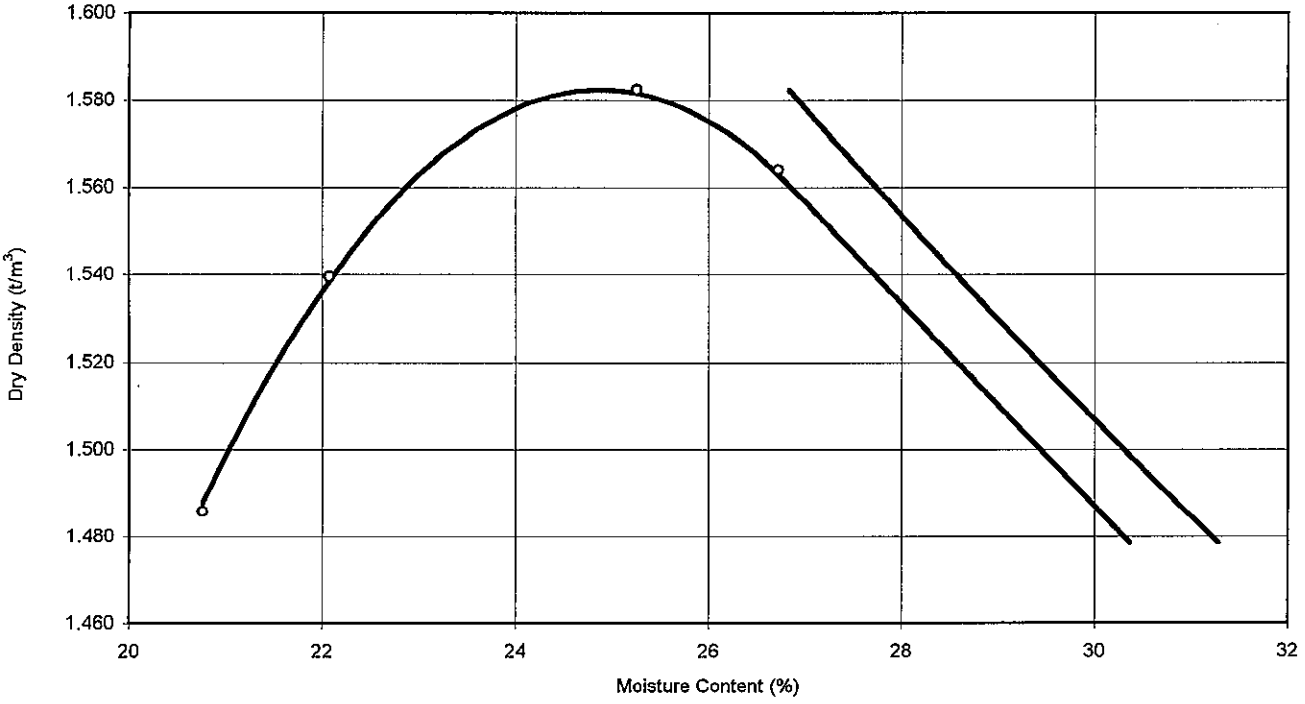
RESULTS OF COMPACTION TEST

Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 C
Project :	URBAN RENEWAL PROJECT	**Report Date :**	19/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	19/09/08
		Page:	1 of 1



Sample Details **Location:** TP1
Depth: 0.5-0.7m

Particles > 19mm: 0%

Description: SILTY CLAY - Stiff to very stiff, light grey and red brown silty clay with a trace of ironstone gravel

Maximum Dry Density:	**1.58 t/m^3**
Optimum Moisture Content:	**25.0 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS1289.2.1.1-2005

Sampling Methods: AS 1289.1.1-2001,AS 1289.1.2.1-1998

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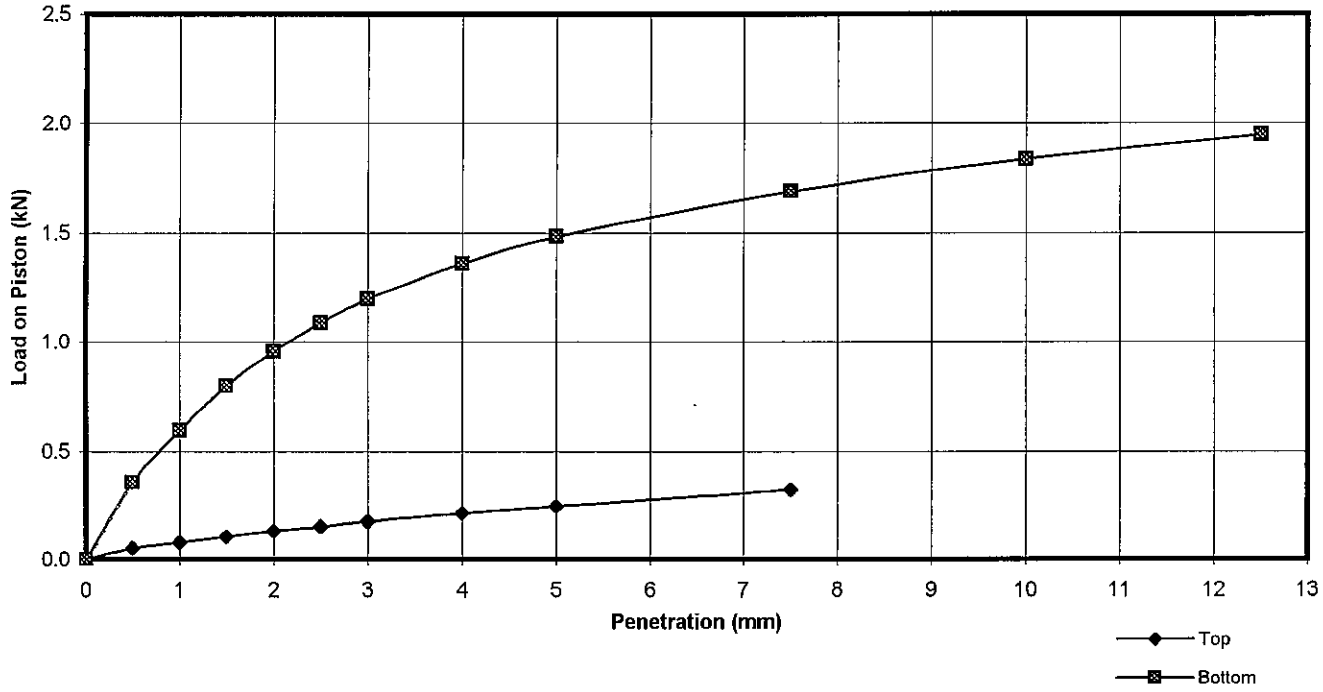
RESULT OF CALIFORNIA BEARING RATIO TEST

Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 D
Project :	URBAN RENEWAL PROJECT	**Report Date :**	24/09/08
		Date Sampled :	18/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	19/09/08
Test Location :	TP 8		
Depth / Layer :	1.0-1.2m	**Page:**	1 of 1



Description: SILTY CLAY - Very stiff, light grey and red brown silty clay with a trace of ironstone gravel

Test Method(s): AS 1289.6.1.1-1998, AS 1289.2.1.1-2005

Sampling Method(s): AS 1289.1.2.1-1998, AS 1289.1.1-2001 **Percentage > 19mm:** 0.0%

LEVEL OF COMPACTION: 99% of STD MDD **SURCHARGE:** 4.5 kg **SWELL:** 4.0%
MOISTURE RATIO: 99% of STD OMC **SOAKING PERIOD:** 4 days

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		16.3	1.75
After soaking		20.8	1.68
After test	Top 30mm of sample	24.6	-
	Remainder of sample	19.1	-
Field values		20.9	-
Standard Compaction		16.4	1.77

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**2.5 mm**	**1.0**
	5.0 mm	**1.0**
BOTTOM	**2.5 mm**	**8**
	5.0 mm	**7**

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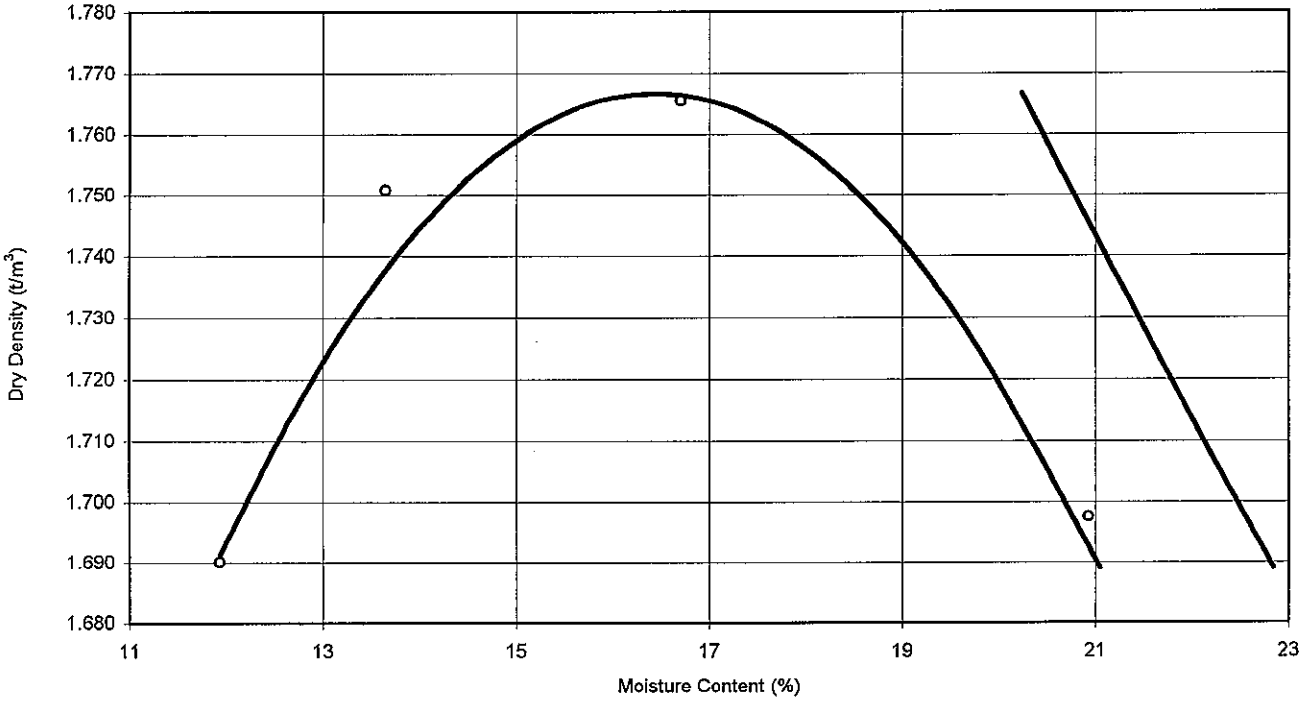
RESULTS OF COMPACTION TEST

Client :	HOUSING NSW	**Project No. :**	45789
		Report No. :	S08-213 D
Project :	URBAN RENEWAL PROJECT	**Report Date :**	19/09/08
Location :	KAMIRA COURT, VILLAWOOD	**Date of Test:**	19/09/08
		Page:	1 of 1



Sample Details **Location:** TP 8
Depth: 1.0-1.2m

Particles > 19mm: 0%

Description: SILTY CLAY - Very stiff, light grey and red brown silty clay with a trace of ironstone gravel

Maximum Dry Density:	**1.77 t/m^3**
Optimum Moisture Content:	**16.5 %**

Remarks:

Test Methods: AS 1289.5.1.1-2003 (STD), AS1289.2.1.1-2005

Sampling Methods: AS 1289.1.1-2001,AS 1289.1.2.1-1998

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Approved Signatory:

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Checked:	NW

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APPENDIX G
Data Quality Objectives/Quality Assurance/ Quality Control Procedures and Results

DATA QUALITY OBJECTIVES

The data quality objectives (DQO) of the Contamination Assessment have been developed to define the type and quality of the data to achieve the project objectives and were based broadly in accordance with the seven step data quality objective process, as defined in Australian Standard (AS) *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds* (AS 4482.1 – 2005). The DQO process is outlined in the AS and defined by:

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

Data quality objectives have been established for the project and are summarised in Table G1.

Table G1 – Data Quality Objectives

Data Quality Objective	Report section where addressed
State the Problem	S1 Introduction S3 Site Description
Identify the Decision	S10 Site Assessment Criteria S12 Assessment of Laboratory Results S13 Conclusions and Recommendations
Identify Inputs to the Decision	S3 Site Description S4 Geology and Hydrogeology S7 Potential Contaminants S10 Site Assessment Criteria S11 Results of the Soil Investigation S12 Assessment of Laboratory Results
Define the Boundary of the Assessment	S3 Site Description, Appendix A
Develop a Decision Rule	S10 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	Appendix F
Optimise the Design for Obtaining Data.	S8 Field Work

QA/QC PROCEDURES AND RESULTS

Quality assurance and control formed an integral part of this assessment. The results of the QA/QC assessments are detailed below.

The Data Quality Indicators (DQI's) have been addressed within the report as follows in Table G2.

Table G2 – DQIs and Evaluation Procedures

DQI	Evaluation Procedure
Documentation completeness	Completion of field and laboratory documentation including chain of custody, test bore reports.
Data completeness	Sampling density appropriate for preliminary assessment, analysis of appropriate contaminants, analysis of appropriate soil horizons, analysis of appropriate QA samples etc
Data comparability	Use of NATA accredited analytical methods, use of consistent sampling technique, commitment to equipment decontamination, field sample storage techniques etc.
Data representativeness	Sampling from targeted areas and a broad grid pattern across the site 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.

As indicated above, the DQIs for sampling and analysis were achieved and the quality of the data satisfactorily meets the objectives of the current assessment.

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 validation assessment. Field sampling comprised one replicate sampling and one trip blank.

Relative Percentage Difference

Seven samples were selected for analytical analysis, including one duplicate sample. A measure of the consistency of results is derived by the calculation of relative percentage differences (RPDs) for the duplicate sample. A RPD of ± 30% is generally considered acceptable by the EPA, although some exceptions apply. The comparative results of analysis are included in Table G3.

Table G3 – Comparative Results of Duplicate Sample Analysis for Heavy Metals and PAH's

Sample ID	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	PAH	BaP
TP5/0.0-0.5	9	<0.5	10	34	18	<0.1	20	71	<PQL	<0.05
BD1	9	<0.5	9	31	16	<0.1	25	70	<PQL	<0.05
RPD %	0	0	11	9	12	0	22	1	0	0

Notes:
1 field replicate of sample above
Bold RPD greater than ± 30%

- All the RPD results for total PAH, BaP and heavy metals fall within the typical acceptable range (± 30%).

It is therefore considered that the results indicate an acceptable consistency between the sample and its duplicate and suitable field sampling methodology.

Laboratory QA/QC Procedures

The analytical laboratory is accredited by the National Association of Testing Authorities (NATA) and is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include the following:-

Reagent Blank

A reagent blank 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 analysis indicated that concentrations of all analytes were below respective laboratory practical quantitation (detection) limits. These results are included in the laboratory report 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 report 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.

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.

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.

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.