Douglas Partners
Geotechnics • Environment • Groundwater

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REPORT
on
PHASE 1 CONTAMINATION ASSESSMENT

PROPOSED ARC DEVELOPMENT
UNIVERSITY OF SYDNEY

Prepared for
JONES LANG LaSALLE

Project 44914
July 2007

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EXECUTIVE SUMMARY

This report presents the findings of a Phase 1 (Preliminary) Contamination Investigation conducted by Douglas Partners Pty Ltd (DP) at the University of Sydney on the parcel of land located between the University, Royal Prince Alfred Hospital and St John's College. It is understood that the proposed development involves the construction of a Medical Research Complex featuring a series of four and five storey buildings with one level of underground parking.

The investigation was commissioned by Jones Lang LaSalle as part of a Project Feasibility Study and was conducted in conjunction with the geotechnical investigation which is reported separately.

The aims of the assessment were to investigate the potential for on-site soil and groundwater contamination and also to provide an indication on the level of contamination at site and whether additional assessment is required.

The current assessment comprised drilling of four test bores (B1, B2, B5 and B11) for environmental purposes. Installation of two groundwater wells (P2 and P3) for geotechnical purposes. Groundwater sampling was also undertaken from piezometer P2 for environmental purposes. The depth of filling varies from a minimum of 0.6 m in Test Bore B1, to depths in excess of 6 m in Test Bore B11. The natural material underlying the fill sequence generally comprised silty clay, clay, shaly clay and shale. Topography of the site suggests possible filling operations at the northern part of the site.

Filling material generally comprised silty clayey sand and sandy silty clay filling with some ash, slag, gravel, bricks and ironstone. Fibre cement fragments were also visually observed in drill returns of Bore 5 within the top 0.3 – 0.5 m of the filling.

Free groundwater was observed during auger drilling in B2 at a depth of 4.8m below ground level. As per the scope of works, only one groundwater sample was collected from P2. Based on the measured groundwater levels, the hydraulic gradient appears to be consistent with the general topography of the area, which falls towards the south, southeast.

The assessment comprised soil, groundwater, acid sulphate soils and provisional in-situ waste classification. The soil samples were analysed for heavy metals, Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OCP), Polychlorinated Biphenyls (PCB), Phenols, Asbestos, Volatile Organic Compounds (VOCs), Suspension Peroxide Oxidation Acidity and Sulphate (SPOCAS) and Toxicity Characteristic Leaching Procedure (TCLP).

The groundwater sample was analysed for heavy metals, PAH, TPH, BTEX, VOCs, OCP, PCB, Phenols, Hardness, faecal coliform, pH, conductivity, anions and cations.

The adopted site assessment criteria includes:-

- NSW DEC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Commercial and Industrial sites (HIL Column 4).
- NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils.
- *ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species (*Hardness Modified Trigger Values (HMTV) may also be applied to trigger values for heavy metals depending on water hardness);
- NSW *Acid Sulphate Soil Management Advisory Committee Manual (1998)* [ASSMAC].
- NSW EPA *Environmental Guidelines: Assessment Classification and Management of Liquid and Non- Liquid Wastes* (1999)

Soil Contamination

Analytical results for soils were generally within the assessment criteria with the exception of lead and B(a)P exceedance registered in Bore B2/2.8-3.0. As the concentration of lead at this location is in excess of 2.5 times of the adopted site assessment criteria, this location is categorised as a 'hotspot'. A review of the test bore logs indicated the presence of black silty clay with ash and slag. It is possible that the detected level of lead and B(a)P is related to the ash and slag observed within the filling.

Furthermore, whilst asbestos fibres were not identified within the soil matrix in the four samples analysed, a fibre cement fragment was visually identified to be buried within the filling material from Bore 5/0.3-0.5. Given the variability of filling material and the deep depth of filling encountered at the site, the potential for presence of asbestos contamination in the filling cannot be discounted.

Given the limited scope of the current assessment, the extent of the lead, B(a)P and asbestos contamination has not been determined.

Groundwater Contamination

The groundwater sample from piezometer P2 was analysed for benzo(a)pyrene, TPH, BTEX, VOCs, OCP, PCB, Phenols, anions, cations, faecal coliforms, pH and conductivity. The results indicated that concentrations of these contaminants were below the limit of detection and hence within GILs for groundwater.

Heavy metals in groundwater recorded concentrations to be generally within the hardness modified trigger values with the exception of zinc which recorded marginal exceedance (23 μg/L vs 20 μg/L). The reported levels of zinc are not wholly unexpected and could be typical of urbanised areas and could also be the indicative of the regional background levels.

On the basis of soil and groundwater results, it is considered that the exceedances recorded in heavy metals for groundwater are not likely to represent unacceptable impact.

Acid Sulphate Soils

The two samples analysed for SPOCAS comprised material from below the regional water table (B11/5.8 - 6.0 and B2/3.8 - 4.0). The assessment indicates that potential for Acid Sulphate Soils exists in the silty clays/clays at depths below the regional water table.

Given the proposed basement construction, it is considered that if excavations extend into the water or that disturbance to acid sulphate soils are anticipated, an Acid Sulphate Soil Management Plan would have to be developed to manage the soils during construction. Furthermore, any concrete structures which are expected to be constructed in acid sulphate soils should be constructed of sulphate resistant concrete.

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

Provisional In-Situ Waste Classification Assessment

Whilst the total concentration of lead and B(a)P detected in filling sample B5/2.8-3.0 exceeded EPA threshold limits for Inert Waste, it is considered that the detected levels are attributable to the presence of traces of ash and slag in the filling. This is further supported by the low lead leachability which because of its low leachability results (not withstanding the elevated total concentration). It has been well recognised that heavy metals in ash/slag are typically through the high temperature combustion process in which they are generated. In this regard, under the NSW EPA General Approval for immobilisation of slag in waste (Approval Number 1999/07) applies, which specified that only the leachability results for these contaminants need to be taken into consideration when classifying waste material.

In addition to the lead and B(a)P contamination detected in selected filling sample, asbestos cement fragments were also found B5/0.3-0.5.

As all material should be classified according to their highest waste classification, it is, thus considered that the filling material is classified as:-

- Solid Waste with respect to chemical contaminants; and
- Asbestos Contaminated Waste (but can be disposed of at a Solid Waste Landfill).

However, given the variability of the filling material encountered at the site, it is considered prudent to conduct additional ex-situ soil sampling at the time of site development to verify the waste classification.

Please note that the current report had been prepared to provide an indication of the level of contamination at the subject site and is not devised for submission to Council or any other relevant authorities for development consent. It should be noted that a more comprehensive scope of environmental investigation works including site history search and a more extensive soil and groundwater sampling regime would be required if the environmental report were to be submitted to relevant authorities for development application.

It should be noted that if the site is to be redeveloped for more sensitive uses (e.g. residential), then a detailed contamination assessment with sampling locations meeting the requirements of the NSW EPA Sampling Design Guidelines (1996) should be conducted.

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PHASE 1 CONTAMINATION ASSESSMENT
PROPOSED ARC PROJECT
UNIVERSITY OF SYDNEY

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1. INTRODUCTION

This report presents the findings of a Phase 1 (Preliminary) Contamination Investigation conducted by Douglas Partners Pty Ltd (DP) at the University of Sydney on a parcel of land located between the University, Royal Prince Alfred Hospital and St John's College. It is understood that the site is the subject of a proposed development which involves the construction of a Medical Research Complex featuring a series of four and five storey buildings with one level of underground parking.

The investigation was commissioned by Jones Lang LaSalle as part of a Project Feasibility Study and was conducted in conjunction with a geotechnical investigation which is reported separately.

The aims of the assessment were to:-

- investigate the potential for on-site soil and groundwater contamination; and
- provide an indication on the level of contamination at the site and whether additional assessment is required.

2. SCOPE OF WORKS

As outlined in the scope of works, no site history searches such as title deeds or Council records were undertaken. The scope of work comprised:-

- Review of readily available historical information;
- Conduct one day of drilling at the site. Drill four test bores to a depth of approximately 6 - 8 m or prior refusal for both geotechnical and environmental sampling purposes. Two groundwater piezometers (P2 and P3) were installed for geotechnical purposes of monitoring groundwater fluctuations. Groundwater sampling was also undertaken from piezometer P2 for environmental purposes;
- Collect soil samples for contamination assessment at regular depth intervals and upon signs of contamination. Collection of 10% field replicate samples for QA/QC purposes;
- Screen all soil contamination samples using a calibrated photoionisation detector to provide an indication of the likely presence of volatile organic compounds;
- Collect a groundwater sample from one groundwater well (P2).
- Conduct screening tests on samples collected for acid sulphate soil testing to identify those samples likely to contain ASS;
- Analyse 4 soil samples at a NATA accredited laboratory for the following potential contaminants:
  - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Total Petroleum Hydrocarbons (TPH);
  - Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethyl Benzene and Total Xylenes – BTEX);
  - Total Phenols;
  - Polychlorinated Biphenyls (PCB);
  - Organochlorine Pesticides (OCP);
  - Organophosphates (OPP);
  - VOC;
  - Asbestos.

In addition, the following tests were conducted on selected soil samples:

- Toxicity Characteristic Leaching Procedure (TCLP) tests (2 samples), (heavy metals and PAH) for waste classification purposes; and
- Suspension Peroxide Oxidation Combined Acidity and Sulphate (SPOCAS) (2 samples) for acid sulphate soils assessment;

Analysis for QA/QC purposes of:

- 1 field replicate sample (heavy metals);
- 1 trip blank (for heavy metals);

- Analysis of the groundwater sample at a NATA accredited laboratory for the following potential contaminants:
  - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Total Recoverable Hydrocarbons (TRH);
  - Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethyl Benzene and Total Xylenes – BTEX);
  - Total Phenols;
  - Polychlorinated Biphenyls (PCB);
  - Organochlorine Pesticides (OCP);
  - Organophosphates (OPP);
  - VOC and
  - Faecal Coliforms.
- Provision of a Phase 1 Contamination Assessment Report with comments on the potential for contamination in the subsoils and groundwater, and the potential for ASS to be present on-site. A provisional in-situ waste classification assessment was also undertaken.

3. SITE DESCRIPTION AND A REVIEW OF AVAILABLE HISTORICAL RECORDS

The site is located on the northern and eastern sides of St John's Oval, and south of the Veterinary Faculty, close to Parramatta Road, Camperdown. The site is bounded by Royal Prince Alfred Hospital to the south.

The site is largely located on the edge of St John Oval which is relatively level and grassed with a some trees near the boundary between the oval and Veterinary faculty. The southern part of the site is occupied by an unsealed car parking which slopes upwards to the south-west.

It is understood that Orphan School Creek once occupied a portion of the site being investigated but has been backfilled to create a level surface for the oval. In addition, a review of the Ove Arup Pty Ltd (Arup), May 2007, Draft Stormwater Services Review indicates that a drainage line most probably run along the northern part of St John's Oval, from Parramatta Road towards H.K. Ward Gymnasium.

A review of readily available historical aerial photographs indicated the presence of various rectangular buildings to the south-east of St John's College and along the northern and north-eastern boundary of St John's Oval from 1951 to at least 1970. The 1994 aerial photographs revealed the absence of these buildings, suggesting these buildings had been demolished some time between 1970 and 1994. These areas are now used as car parking.

4. GEOLOGY AND HYDROGROLOGY

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is generally underlain by Ashfield Shale from the Wianamatta group comprising black to dark grey shale and laminite of Triassic age.

A review of the Department of Land and Water Conservation (DLWC [now Department of Water and Energy, DWE]) 1:25000, Soils Risk Map, Edition Two, 1997, indicates that the site is located within an area of no known occurrences of Acid Sulphate Soils.

5. POTENTIAL FOR CONTAMINATION

It is considered that the potential contaminants on the subject site may include Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TPH, BTEX, PAH, PCB, OCP, Phenols and Asbestos materials in soil.

These contaminants may be present due to remnants from past demolitions, placement of imported filling to form and/or level the site or as a result of past and present site activities.

6. FIELD WORK

6.1 Sampling Procedures

6.1.1 Soil Sampling Procedures and Rationale

Field work was undertaken by Mr Jeff Davenport, an environmental scientist on 13 June 2007. Soil/ filling samples were collected from four of the test bores (B1, B2, B5 and B11). The sampling locations were placed over the accessible portion of the site to obtain preliminary contamination information on the subsoils. Sampling locations are indicated on Drawing 1, Appendix A.

Soil samples were collected at regular intervals and based on field observations, including changes in strata and signs of contamination. The samples considered most likely to contain elevated levels of contaminants, based on location, depth, source (filling or natural) and field observations (odours etc) were selected for analysis.

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

- Collect soil samples directly from the solid flight auger using disposable sampling equipment;
- transfer samples into laboratory-prepared glass jars, capping immediately and ensuring headspace within the sample jar is minimised;
- collect a split sub-sample at each location into a zip lock plastic bag;
- collect 10% replicate samples for QA/QC purposes;
- label sample containers with individual and unique identification, including project number, sample location and sample depth; and
- place the glass jars, with Teflon lined lid, into a cooled, insulated and sealed container for transport to the laboratory.

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

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

6.1.2 Piezometer Installation and Sampling Procedures

Two groundwater monitoring piezometers were installed in Bores P2 and P3 to depths of 8.0 m and 8.8 m respectively. The monitoring wells were drilled using solid flight augers attached to a bobcat drill rig.

Each piezometer was constructed using 50 mm diameter, acid washed, Class 18, PVC casing and machine-slotted well screens. Six metres of screens, followed by 2 m and 2.8 m of casing were installed in P2 and P3 respectively. Joints were screw-threaded,

thereby avoiding the use of glues and solvents which may contaminate the groundwater. The wells were completed with a gravel pack extending to at least 0.1 m above the well screen, a bentonite plug of at least 0.2 m thickness and backfilled with drill returns to the surface. All bores were finished with a road box on the ground surface.

Subsequent to installation, Bore P2 was developed by removing a minimum of three bore volumes of water, using a submersible pump followed by sampling on the same day. Samples were collected using disposable bailers in accordance with the methodology prescribed in the Standard DP *Field Procedures Manual*.

The groundwater sample was field filtered through a 0.45 μm membrane filter prior to laboratory analysis for heavy metals.

Sample handling and transport was performed as set out below:

- plastic/glass sample bottles were labelled with individual and unique identification, including project number and sample number;
- replicate samples were collected for QA/QC purposes at a rate of 10% of the sample cohort (minimum of one sample);
- samples were placed in insulated coolers and maintained at a temperature of approximately 4°C until transported to the analytical laboratory, and
- chain-of-custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

All samples were dispatched to Envirolab Services Pty Ltd (Envirolab), a National Association Testing Authorities (NATA) accredited laboratory for analysis.

6.1.3 pH and Peroxide pH Screening Procedure

Screening tests were carried out on all samples collected for acid sulphate soils assessment. This involves pH testing before and after the addition of hydrogen peroxide to enable forced oxidation of the sample. The following methodology was adopted for pH screening testing:

Field pH measurement procedure

- Place approximately 5 g of soil material in small glass container;
- Add 25 mL demineralised water and mix thoroughly; and
- Measure pH using a calibrated pH meter with a TPS WP80D Dual pH-mV and Temperature probe.

Peroxide pH measurement procedure

- Place approximately 5 g of soil material in small glass container;
- Add 2 mL of of pH-adjusted 30% hydrogen peroxide solution;
- Observe sample for effervescence, colour change and odour;
- Allow the sample to react for a minimum of 30 minutes;
- Add 18 mL distilled water, mix; and
- Measure pH using a pH meter with a TPS WP80D Dual pH-mV and Temperature probe.

Laboratory sampling equipment was rinsed and washed with distilled water between each sample.

Based on field observations and screening test results, two (2) samples were selected and dispatched to a NATA Accredited laboratory for quantitative analysis for Suspension Peroxide Oxidation Combined Acidity & Sulphate (SPOCAS).

6.2 Data Quality Objectives

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

The DQO process is outlined in the AS and defined by:

- Stating the Problem

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

The achievement of the above DQO process can typically be assessed via a number of Data Quality Indicators (DQI's). Table 1 summarises how the various DQI's are assessed.

Table 1 – DQI's and Evaluation Procedure

DQO	Achievement Evaluation Procedure
Documentation completeness	Completion of field and laboratory chain of custody documentation, completion of test bore report sheets *(Appendix C)*.
Data completeness	Sampling density comparison with Table A, NSW EPA's *Sampling Design Guidelines* 1996, and analysis of appropriate determinants based on site observation *(Section 6).*
Data comparability	Use of NATA certified laboratory, use of consistent sampling technique *(Section 6, Appendix C).*
Data representiveness	Sampling from a general grid pattern across the site in order to obtain samples representative of contamination present on site *(Section 6).*
Precision and accuracy for sampling and analysis	Achievement of 30% RPD for replicate analysis, acceptable levels for laboratory QC criteria *(Appendix D).*

Discussion of how the sampling and analysis programme met the DQOs is provided in Appendix D.

6.3 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 assessment. Field sampling comprised replicate sampling, at a rate of approximately one replicate sample for every ten samples. The comparative results of analysis are summarised in Appendix D.

6.3.1 Laboratory QA/QC

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 reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory reports in Appendix D.

7. SITE ASSESSMENT CRITERIA

As the subject site will be developed into a Medical Research Complex, the land use pattern will therefore resemble that of a commercial/industrial site (from a contamination exposure standpoint). The levels of contaminants in soil and groundwater were thus assessed against the corresponding assessment criteria for commercial/industrial land use. The Site Assessment Criteria (SAC) for soil/ filling and groundwater and their source/ adoption rationale are detailed in Tables 2 and 3.

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

- The concentration of the contaminant is more than 2.5 times the site assessment criteria (SAC). Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/ management.
- The calculated 95% Upper Confidence Limit average (excluding any 'hotspot' concentrations) of the data set for the contaminant exceeds the SAC.
- The standard deviation of the results is greater than 50% of the HIL.

Table 2 – Site Assessment Criteria and Rationale for Soil/ Filling

Contaminant	Adopted Criteria (SAC)	Rationale
TPH		NSW EPA[2] 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		NSW DEC Contaminated Sites *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Commercial and Industrial sites (HIL Column 4). These guidelines are also consistent with the National Environment Protection Measure (NEPM), *Assessment of Site Contamination, Schedule B(1) Health-Based Investigation Levels D for commercial/industrial sites*. For ease of reference, Column 4 HIL is used throughout this report.
Arsenic (total)	500 mg/kg	
Cadmium	100 mg/kg	
Chromium	60000 mg/kg	
Copper	5000 mg/kg	
Lead	1500 mg/kg	
Mercury	75 mg/kg	
Nickel	3000 mg/kg	
Zinc	35000 mg/kg	
Total Phenols	42500 mg/kg	
PAH		
Total	100 mg/kg	
Benzo(a)Pyrene	5 mg/kg	
PCB	50 mg/kg	
OCP		
aldrin + dieldrin	50 mg/kg	
chlordane	250 mg/kg	
DDT (including DDD, DDE, DDT)	1000 mg/kg	
Heptachlor	50 mg/kg	
Asbestos	No asbestos present in soil at the surface	Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors

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

Table 3 – Groundwater Investigation Levels (GIL) and Rationale

Contaminant	Adopted Criteria (GIL)	Rationale
TPH $C_6 – C_9$ $>C_9$	 150 µg/L 600 µg/L	Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination [adopted due to the absence of high reliability NSW EPA or ANZECC guidelines for TPH]*
BTEX Benzene Toluene Ethylbenzene Xylene	 950 µg/L 300 µg/L 140 µg/L 550 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species* NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) *Threshold concentrations for sensitive land use, Protection of Aquatic Ecosystem* is adopted in the absence of other comprehensive investigation levels for toluene or ethyl benzene in groundwater.
Metals Arsenic (V) Cadmium Chromium (VI) Copper Lead Mercury Nickel Zinc	 13 µg/L 0.2 µg/L 4.4 µg/L 1.4 µg/L 3.4 µg/L 0.6 µg/L 0.011 µg/L 0.008 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species* Hardness Modified Trigger Values (HMTV) may also be applied to trigger values for heavy metals depending on water hardness.
PAH Total Benzo(a)Pyrene Naphthalene	 Not specified Not specified 0.016 µg/L	*ANZECC (2000) Australian Water Quality Guidelines for the protection of 95% of freshwater species*
Phenol	320	*ANZECC (2000) Guidelines for Fresh and Marine Water Quality for the protection of 95% of freshwater species.*
PCB Aroclor 1242 Aroclor 1254	 0.03	*ANZECC (2000) Guidelines for Fresh and Marine Water Quality for the protection of 95% of freshwater species.*
OCP Chlordane DDT Endosulfan Endrin Heptachlor	 0.08 0.01 0.02 0.02 0.09	*ANZECC (2000) Guidelines for Fresh and Marine Water Quality for the protection of 95% of freshwater species.*
OPP Chlorpyrifos Fenitrothion	 0.01 0.2	*ANZECC (2000) Guidelines for Fresh and Marine Water Quality for the protection of 95% of freshwater species.*

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

With respect to Acid Sulphate Soils, the relevant assessment criteria would be NSW *Acid Sulphate Soil Management Advisory Committee Manual (1998)* [ASSMAC]. The action criteria vary according to the type of material and the amount of ASS soil to be disturbed in the project. As site materials were observed to comprise clays and silty clays at different depths, the action criteria adopted was for medium to heavy silty clays.

Preliminary Waste Classification Assessment of the soil is classified in accordance with the NSW EPA *Environmental Guidelines: Assessment Classification and Management of Liquid and Non- Liquid Wastes* (1999) for off-site disposal purposes.

8. RESULTS

8.1 Field Testing Results

Details of the sub-surface conditions encountered during the investigation are included in the Test Bore Report Sheets in Appendix B, together with notes describing the classification methods and descriptive terms.

The conditions encountered in the four test bores generally indicated deep filling in the northern portion of the site in Bores 5 and 11. The depth of filling reduces towards the south-east in Bores 1 and 2. The findings were in general agreement with the observed topography of the site which suggests possible filling operations at the northern part of the site.

Filling material generally comprised silty clayey sand and sandy silty clay filling with some ash, slag, gravel, bricks and ironstone. Fibre cement fragments were also visually observed in drill returns of Bore 5, within the top 0.3 – 0.5 m of the filling.

The depth of filling varies from a minimum of 0.6 m in Test Bore B1, to depths in excess of 6 m in Test Bore B11. The natural material underlying the fill sequence generally comprised silty clay, clay, shaly clay and shale.

Free groundwater was observed during auger drilling in B2 at a depth of 4.8 m below ground level. Moist soils were noted at approximately 5m below ground level in Bore B11. Groundwater sample collected from P2 was noted to be brown and silty.

Groundwater levels were recorded prior to well development and sampling approximately a week after well installation. Based on the measured groundwater levels, the hydraulic

gradient appears to be consistent with the general topography of the area, which falls towards the south and southeast. Measured groundwater levels are presented in Table 4.

Table 4 – Groundwater Levels

Piezometer	Groundwater Levels Recorded While Augering			Groundwater Levels Measured in Piezometer		
	Date of Drilling	Water Level		Date of Measurement	Water Level	
P2	13/6/07	4.8m bgl	16.9AHD	18/06/07	3.1m bgl	18.6AHD
P3	13/6/07	nfgwo	-	18/06/07	3.2m bgl	18.8AHD

Notes: nfgwo no free groundwater observed whilst augering
bgl below ground level

8.2 Laboratory Results

The results of laboratory analysis of the soil samples are summarised in Tables 5 and 9, with laboratory reports provided in Appendix C.

Table 5 – Results of Laboratory Analysis for Total Concentrations in Soil (mg/kg unless otherwise stated)

Test Bore/Depth	Heavy Metals								PAH		TPH		Benzene	Toluene	Ethyl-Benzene	Xylene	PCB[4]	OCP[4]	Phenols	VOC	Asbestos
	As	Cd	Cr[3]	Cu	Pb	Hg[5]	Ni	Zn	B(a)P	Total PAH[4]	C_6-C_9	C_{10}-C_{36}									
B1/ 0.3-0.5	6.5	<1	14	18	45	<0.1	5.4	27	0.08	0.68	<25	<100	<1.0	<1.0	<1.0	<2.0	<0.1	<0.1	<0.5	<2.0	ND
B2/ 0.3-0.5	9.8	<1	8.9	18	180	0.67	16	97	0.4	4.9	<25	<100	-	-	-	-	<0.1	<0.1	<0.5	-	ND
B5/ 2.8-3.0	11	3.3	28	500	**4400**	2	77	2200	8.0	78.6	<25	590	<1.0	<1.0	<1.0	<2.0	<0.1	<0.1	<0.5	<2.0	ND
B11/ 5.8-6.0	7.2	<1	21	5.5	23	<0.1	3.6	5.2	2.1	34.6	<25	<100	-	-	-	-	<0.1	<0.1	<0.5	-	ND
BD2[2]	7.5	<1	19	5.7	20	<0.1	3.2	4.9	0.08	0.98	<25	<100	-	-	-	-	<0.1	<0.1	<0.5	-	-
Site Assessment Criteria[1]																					
Commercial/ Industrial	500	100	60%	5000	1500	75	3000	35000	5	100	65	1000	1	1.4	3.1	14	50	50/250/1000/ 50	42500	ND	Nil

Notes:

1 refer to Table 1.
2 field replicate of sample listed directly above (ie. B11/5.8-6.0).
3 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment.
4 OCP given in order Aldrin+DIeldrin/ Chlordane/ DDD+DDE+DDT/ Heptachlor
5 Total Mercury
- not analysed/ not defined/ not applicable
ND Not defined
Shading Denotes exceedances of the adopted SAC
BOLD denotes 2.5 times the adopted SAC (ie. hotspot)

Table 6 - Results of Laboratory Analysis for Waste Classification (Heavy Metals and PAH) with TCLP

Sample ID	As		Cd		Cr~		Cu	Pb		Hg		Ni		Zn	B(a)P		PAH	
	SCC[#] (mg/kg)	TCLP[##] (mg/L)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	SCC (mg/kg)	TCLP (mg/L)	SCC (mg/kg)	TCLP (mg/L)
B2/0.3-0.5	9.8	<0.05	<1	<0.01	8.9	<0.01	18	180	0.55	0.67	<0.0005	16	0.02	97	0.4	<0.001	4.9	<0.002
B5/2.8-3.0	11	<0.05	3.3	<0.01	28	<0.01	500	4400	3.4	2	<0.0005	77	0.68	2200	8.0	<0.001	78.6	<0.002
Waste Classification Threshold Criteria (with TCLP)[2]																		
Inert Waste	500	0.5	100	0.1	1900	0.5	ND	1500	0.5	50	0.02	1050	0.2	ND	1	0.004	200	ND
Solid Waste	500	5.0	100	1.0	1900	5	ND	1500	5.0	50	0.2	1050	2.0	ND	10	0.04	200	ND
Industrial Waste	2000	20	400	4	7600	20	ND	6000	20	200	0.8	4200	8	ND	23	0.16	800	ND

Notes:

~ Total Chromium was assessed against Chromium (VI) due absence of guidelines for Chromium with other valence states.

Specific Contaminant Concentration (Total Concentration)

Toxicity Characteristics Leaching Procedure

ND Not defined

NA Not Analysed

1. NSW EPA (1999) *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes*. Table A3: Contaminant Threshold Values for Waste Classification of Non-Liquid wastes without doing the Leaching Test
2. NSW EPA (1999) *Environmental Guidelines*: *Assessment, Classification and Management of Liquid and Non-Liquid Wastes*. Table A4: Leachable Concentration (TCLP) and Total Concentration (SCC) Values for Non-Liquid Waste Classification

Shading Denotes exceedances of the Inert waste classification

Table 7 - Results of Acid Sulphate Soil Screening

Sample ID/Depth	Sample Description	Screening Results			
		pH^			Strength of reaction
		pH_f	pH_{fox}	Change	
B5/0.3-0.5	Filling – brown clay filling with gravel and fibre cement fragment	7.8	6.5	1.3	1
B5/0.9-1.0	Filling – brown grey clay filling with trace ironstone	8.0	6.4	1.6	1
B5/2.0-2.2	Filling – black silty sandy clay filling with ash and slag	8.1	7.3	0.8	1
B5/2.8-3.0		8.5	7.5	1.0	2
B5/3.8-4.0	Filling – dark brown silty clay filling with some slag and ash	8.1	7.5	0.6	1
B11/0.3-0.5	Filling – light grey sandy clay filling with crushed sandstone	8.3	6.8	1.5	1
B11/0.8-1.0		7.8	6.4	1.4	1
B11/1.8-2.0	Filling – light grey sandy clay filling with some ironstone gravel	5.1	4.8	0.3	1
B11/2.8-3.0		5.1	5.4	0.3	1
B11/3.8-4.0	Filling – brown sandy silty clay filling, trace gravel and slag	6.1	5.4	0.7	1
B11/4.8-5.0		5.7	4.2	1.5	1
B11/5.8-6.0	Filling – soft, brown clay with traces of gravel, moist, organic odour	7	3.7	3.3	2
B1/0.3-0.5	Filling – brown silty clay filling (topsoil)	6.5	5.9	0.55	1
B1/0.8-1.0	Clay – light brown mottled red clay	6.7	7.6	0.9	
B1/1.4-1.5	Clay – mottled grey red clay	6.4	4.4	2.0	1
B1/1.9-2.0	Clay – mottled grey red clay, trace ironstone	6.0	5.3	0.7	1
B1/2.4-2.5	Clay – red mottled grey silty clay with ironstone	6.2	4.7	1.5	1
B1/3.4-3.5	Silty clay – grey brown silty clay	6.3	4.6	1.7	1
B1/4.4-4.5	Shaly clay – grey shaly clay with shale fragments	6.2	4.5	1.7	1
B1/5.4-5.5	Silty clay – brown silty clay with traces of shale fragments	7.8	5.4	2.4	1
B2/0-0.2	Filling – brown sandy silty clay filling with ash, slag, gravel and bricks	9.1	8.2	0.9	1
B2/0.3-0.5	Filling – brown/grey silty clayey sand filling with some gravel, slag, brick and ironstone	9.1	8.7	0.5	1
B2/1.8-2.0		11.6	11.4	0.3	2
B2/2.8-3.0		8.9	7.1	1.8	1
B2/3.8-4.0	Silty Clay – mottled red orange/grey silty clay, trace ironstone	6.8	4.7	2.1	1
B2/4.8-5.0	Silty Clay – red brown silty clay with traces of ironstone	5.5	4.4	1.1	1
B2/5.8-6.0	Shale – extremely weathered grey shale	6.6	6.3	0.3	2

Notes:

Change $pH_{fox} - pH_f$

1 - denotes no or slight reaction 2 - denotes moderate reaction 3 - denotes vigorous reaction

4 - denotes 'volcanic' reaction F - denotes bubbling/ frothy reaction indicative of organics

Shading donates high change in pH; samples selected for SPOCAS

Table 8 - Results of SPOCAS (Suspension Peroxide Oxidation Combined Acidity and Sulphate) Analysis

Sample	pH_{kcl} pH units	pH_{Ox} pH units	TAA pH 6.5 moles H^+/ tonne	TPA pH 6.5 moles H^+/ tonne	TSA pH 6.5 moles H^+/ tonne	S_{POS} %w/w
B11/5.8-6.0	4.7	4.2	**49**	**75**	**26**	**0.075**
B2/3.8-4.0	4.6	3.9	**64**	**42**	<5.0	0.008
ASSMAC Action Criteria*	4	3	18	18	18	0.03

*- ASSMAC Action Criteria for disturbance of medium to heavy silty clays: *more than 1000 tonnes disturbed*.

Sample ID	Hardness (mg/CaCO3/L)	Heavy Metals (µg/L)								PAH (µg/L)			TPH (µg/L)		Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylene (µg/L)
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	B(a)P	Napthalene	Total +ve PAH	C6-C9	C10-C36				
P2	81	<1	<0.1	<1	<1	1.5	<0.5	1.4	23	<1	2.3	17.3	<10	<250	<1	<1	<1	<3
TB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<3
TS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105%	105%	105%	103%
GIL[1]		13	0.2	1	1.4	3.4	0.6	11	8	NS	-	3 [2]	150 [3]	600 [3]	950	300 [2]	140 [2]	550
Hardness Adjusted GIL[4]	moderate	13	0.54	2.5	3.5	13.6	0.6	27.5	20	NS	-	3 [2]	150 [3]	600 [3]	950	300 [2]	140 [2]	550

Sample ID	OCP (µg/L)	PCB (µg/L)	Total Phenolics (mg/L)	Sulphate (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Carbonate Alkalinity as CaCO3 (mg/L)	Bicarbonate Alkalinity as CaCO3 (mg/L)	Faecal Coliforms (CFU/100mL)	pH	Electrical Conductivity (µS/cm)
P2	<0.2	<2	<0.05	66	<20	16	2.5	10	23	0	80	<20	5.9	380
TB	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GIL[1]	-	0.03	0.32	-	-	-	-	-	-	-	-	1000	-	-
Hardness Adjusted GIL[4]	-	0.03	0.32	-	-	-	-	-	-	-	-	-	-	-

Notes:

	Indicates exceedance of GIL
GIL	Groundwater Investigation Levels include:-
1	*ANZECC (2000) Guidelines for Fresh and Marine Water Quality* for the protection of 95% of freshwater species
	NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites, Threshold Concentrations –Water, protection of aquatic ecosystems* adapted by
2	NSW EPA, 1994
3	Airports (Environmental Protection) Regulations 1997, Schedule 2

9. DISCUSSIONS

Soil Contamination

The analytical results (presented in Table 5) indicated that the majority of the soil samples recorded contaminant concentrations within the adopted site assessment criteria for commercial/industrial sites with the exception of the exceedance associated with lead and benzo(a)pyrene noted in:-

- Sample B5/2.8 - 3.0 collected from Test Bore 5 at a depth of 2.8 – 3.0m below ground level which registered lead concentration of 4400 mg/kg and B(a)P of 8.0mg/kg.

As the concentration of lead at this location is in excess of 2.5 times of the adopted site assessment criteria, this location is categorised as a 'hotspot'.

A review of the test bore logs indicated the presence of black silty clay with ash and slag. It is possible that the detected level of lead and B(a)P is related to the ash and slag observed within the filling. Given the limited scope of the current assessment, the extent of the contamination has not been determined. Ash and slag inclusions were, however, also noted in Bore 2. In addition, a fibre cement fragment was also noted in Bore 5 whereas brick fragments were noted in Bore 2. Whilst asbestos was not positively identified in the 4 soil samples analysed, the potential for presence of asbestos contamination in the filling cannot be discounted.

Groundwater Contamination

The groundwater sample from piezometer P2 was analysed for benzo(a)pyrene, TPH, BTEX, VOCs, OCP, PCB, Phenols, anions, cations, faecal coliforms, pH and conductivity. The results indicated that concentrations of these contaminants were below the limit of detection and hence within GILs for groundwater.

Whilst naphthalene was identified in the groundwater sample, the concentration was within the GILs (2.3 μg/L vs 16 μg/L).

The recorded hardness value suggests that the groundwater is 'moderately hard'. Therefore, the heavy metal levels in groundwater were assessed against the relevant hardness modified trigger values based on hardness of water.

Generally, the concentrations of heavy metals, as presented in Table 9, were below the trigger values with the exception of zinc which marginally exceeded the hardness modified trigger values (23 μg/L vs 20 μg/L).

Although zinc concentration in the groundwater sample exceeded the adopted modified trigger values, elevated levels of heavy metals, in particular, zinc is not uncommon in the groundwater in urban areas. It should also be noted that many of the 95% level of protection trigger values specified in ANZECC (2000) for heavy metals are lower than the corresponding heavy metal concentrations commonly found in domestic water supply provided by reticulated services and, as such, the reported levels for zinc are not wholly unexpected and are typical of urbanised areas and could be indicative of the regional background levels.

For reference purposes, the detected zinc level was within the zinc threshold (0.05 mg/L) as specified in the Australian Drinking Water Guideline (ADWG 1996).

On the basis of soil and groundwater results, it is considered that the exceedances recorded in heavy metals for groundwater are not likely to represent unacceptable impact.

Acid Sulphate Soils

In summary, the two samples analysed comprised material from below the regional water table. The assessment indicates that potential for ASS and PASS exists in the silty clays/clays at depths below the regional water table.

On this basis, it is considered that the clayey material below the regional groundwater table should be classified as ASS/PASS. Given the proposed basement construction, it is considered that if excavations extend into the water or that disturbance to acid sulphate soils are anticipated, an Acid Sulphate Soil Management Plan will have to be developed to manage the soils during construction. Furthermore, any concrete structures which are expected to be constructed in acid sulphate soils should be constructed of sulphate resistant concrete.

Provisional In-Situ Waste Classification Assessment

All materials removed from the site must be classified for waste disposal. A preliminary in-situ waste classification assessment has been conducted concurrently with the assessment, and results are presented in Table 6.

Based on the available sampling and analytical results, i.e. the total concentration and TCLP leachability tests, the filling material would have been given a preliminary in-situ waste classification of Industrial Waste with respect to chemical contaminants.

However, upon review of the bore logs, it is considered that the elevated levels of lead and PAH are attributable to the slag inclusions. Whilst the total concentration of lead in Sample B5/2.8-3.0 exceeded the NSW EPA threshold limits for Solid Waste, the material may, however, be classified as Inert Waste on the following basis:-

- In a gazette notice, the NSW EPA has authorised a general approval (Number 1999/07) for waste which contains slag contaminated excavated natural materials. The general approval states that:-

  "The total concentration (SCC) limits for Chromium (VI), Lead, Nickel, PAHs and BaP listed in Table A4 of the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (Waste Guidelines – 1999) do not apply to the assessment of metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials. With respect to Chromium (VI), Lead, Nickel, PAHs and BaP, metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials can be classified according to their leachable concentration (TCLP) values alone"

On the basis of the above considerations, the obtained results and material observations, it is considered likely that the lead and Benzo(a)pyrene contamination can be attributed to slag material. In this regard, under the NSW EPA general approvals, only the TCLP results for these contaminants need to be taken into consideration when classifying the waste material. Accordingly, the filling material can provisionally be classified as Solid Waste.

It is noted that fibre cement fragments were visually identified as asbestos fragments within the filling in Bore B5/0.3 - 0.5 and the asbestos containing material is classified as Asbestos Contaminated Waste. As all wastes should be allocated the highest waste classification, asbestos contaminated filling should be classified as Asbestos Contaminated Wastes. The EPA waste classification guidelines indicated that Asbestos Contaminated Waste can be disposed of in a DECC licenced Solid Waste facility.

However, given the variability of the filling material encountered at the site, it is considered prudent to conduct additional ex-situ soil sampling at the time of site development to verify the waste classification.

10. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the site observations and analytical results, it is considered that further assessment is required to be conducted at the subject site following the identification of lead hotspot in Bore B2/2.8-3.0 and the exceedance of B(a)P in the same sample.

Furthermore, given the large site aessential that further soil and groundwater assessment be conducted to characterise the degree and extent of contamination at the subject site.

The current report had been prepared to provide an indication of the level of contamination at the subject site and is not suitable for submission to Council or any other relevant authorities for development consent. It should be noted that a more comprehensive scope of environmental investigation works including site history search and a more extensive soil and groundwater sampling regime would be required if the environmental report is to be submitted to relevant authorities with a development application.

If the site is to be redeveloped for more sensitive uses (e.g. residential), then a detailed contamination assessment with sampling locations meeting the requirements of the NSW EPA Sampling Design Guidelines (1996) should be conducted.

11. LIMITATIONS OF THIS REPORT

The scope of the site assessment activities and consulting services undertaken by DP were limited to those presented in the proposal dated 8 May 2007 and accepted by Jones Lang LaSalle.

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

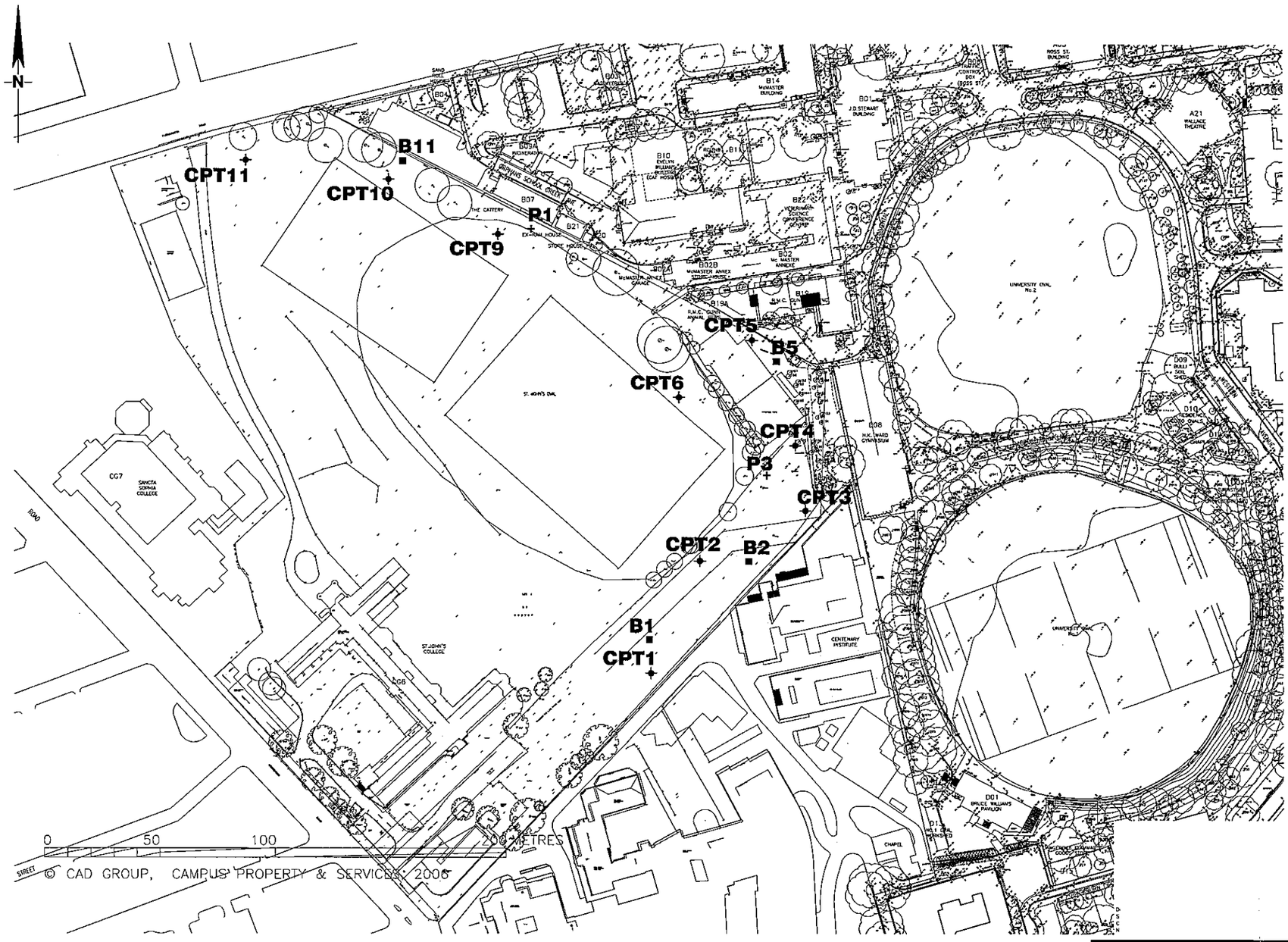
Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change over time due to activities such as spillages of 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 Jones Lang LaSalle and the University of Sydney. Any reliance assumed by third parties on this report shall be at such parties' own risk.

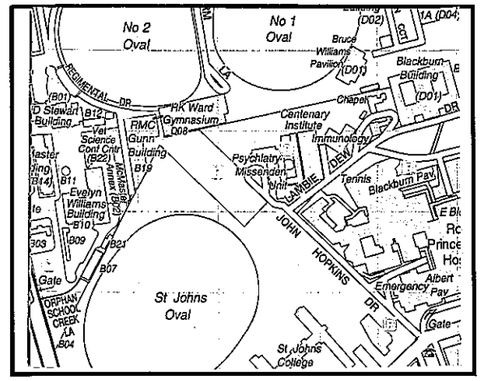
DOUGLAS PARTNERS PTY LTD Reviewed by:

Polo Foo
Environmental Engineer

Michael J Thom
Principal

APPENDIX A
Site Location and Locality Plan





LOCALITY PLAN

LEGEND

- ■ CONTAMINATION BORE
- ✦ CONE PENETRATION TEST LOCATION
- \+ PIEZOMETER

Douglas Partners
Geotechnics, Environment, Groundwater

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

TITLE:

Location of Tests
ARC Development
SYDNEY UNIVESRITY

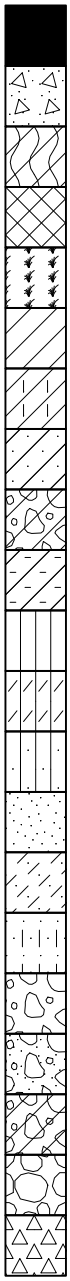
CLIENT: Jones Lang LaSalle			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 44914	OFFICE: SYDNEY
APPROVED BY: RC		DATE: 19.7.2007	DRAWING No: 1

P:\44914 UNIVERSITY OF SYDNEY, ARC DEVELOPMENT MJT\Drawings\44914-1.dwg, 7/23/2007 10:30:02 AM

APPENDIX B
Test Bore Logs and Notes Relating to 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

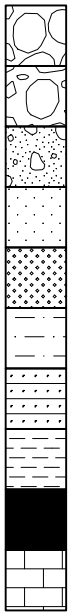
SANDY GRAVEL

CLAYEY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

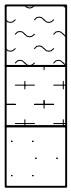
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

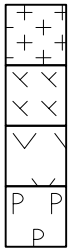


SLATE, PHYLITTE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

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BOREHOLE LOG

CLIENT: Jones Lang Lasalle
PROJECT: ARC Developments
LOCATION: Sydney University

SURFACE LEVEL: 23.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: B1
PROJECT No: 44914
DATE: 13 Jun 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
23.5	0.1	FILLING - roadbase gravel and sand filling							
		FILLING - brown silty clay filling (topsoil)		A	0.3 0.5				
	0.6	CLAY - firm, light brown mottled red clay		A	0.8 1.0				
22.5	1								1
	1.2	CLAY - firm to stiff, mottled grey red clay, trace ironstone		A	1.4 1.5				
21.5	2			A	1.9 2.0				2
	2.1	CLAY - red mottled grey silty clay with ironstone		A	2.4 2.5				
20.5	3								3
	3.1	SILTY CLAY - grey brown silty clay		A	3.4 3.5				
19.5	4								4
	4.0	SHALY CLAY - grey shaly clay with shale fragments		A	4.4 4.5				
18.5	5								5
	5.0	SILTY CLAY - brown silty clay, with traces of shale fragments		A	5.4 5.5				
	5.7	Bore discontinued at 5.7m - refusal							
17.5	6								6
16.5	7								7
15.5	8								8
14.5	9								9

RIG: Bobcat **DRILLER:** E Grima **LOGGED:** JED **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_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: PF
Date: 26/7

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BOREHOLE LOG

CLIENT: Jones Lang Lasalle
PROJECT: ARC Developments
LOCATION: Sydney University

SURFACE LEVEL: 21.5 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: B11
PROJECT No: 44914
DATE: 13 Jun 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
21.5	0.01	TOPSOIL							
		FILLING - light grey sandy clay filling with crushed sandstone		A	0.3				
					0.5				
				A	0.8				
20.5	1				1.0				1
	1.5	FILLING - light grey sandy clay filling, some ironstone gravel		A	1.8				
19.5	2				2.0				2
				A	2.8				
18.5	3				3.0				3
	3.0	FILLING - brown sandy silty clay filling, trace gravel and slag		A	3.8				
17.5	4				4.0				4
				A	4.8				
16.5	5				5.0				5
	5.0	FILLING - soft, brown clay with traces of gravel, moist, organic odour (possibly natural)		A*	5.8				
15.5	6				6.0				6
	6.0	Bore discontinued at 6.0m - target depth reached							
14.5	7								7
13.5	8								8
12.5	9								9

RIG: Bobcat **DRILLER:** E Grima **LOGGED:** JED **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes BD2 130607 collected

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: PF
Date: 26/7

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Jones Lang Lasalle
PROJECT: ARC Developments
LOCATION: Sydney University

SURFACE LEVEL: 22.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: B2
PROJECT No: 44914
DATE: 13 Jun 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
22.3	0.2	FILLING - brown sandy silty clay filling with ash, slag, gravel and trace brick		A	0.0				
				A	0.2				
		FILLING - brown/grey silty clayey sand filling with some gravel, slag, brick and ironstone			0.3				
21.3	1				0.5				1
				A	1.8				
20.3	2				2.0				2
				A	2.8				
19.3	3				3.0				3
	3.5	SILTY CLAY - mottled red orange/grey silty clay filling, trace ironstone							
				A	3.8				
18.3	4				4.0				4
	4.8	SILTY CLAY - red brown grey silty clay, with traces of ironstone		A	4.8				
17.3	5				5.0				5
	5.5	SHALE - extremely weathered, grey shale							
				A	5.8				
16.3	6				6.0				6
	6.0	Bore discontinued at 6.0m - target depth reached							
15.3	7								7
14.3	8								8
13.3	9								9

RIG: Bobcat **DRILLER:** E Grima **LOGGED:** JED **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_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: RF
Date: 26/7

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BOREHOLE LOG

CLIENT: Jones Lang Lasalle
PROJECT: ARC Developments
LOCATION: Sydney University

SURFACE LEVEL: 21.8 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: B5
PROJECT No: 44914
DATE: 13 Jun 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
21.8	0.05	TOPSOIL							
		FILLING - brown clay filling, with gravel and fibre cement fragment		A	0.3 0.5				
	0.8	FILLING - brown grey clay filling with trace ironstone		A	0.9 1.0				
20.8	1								1
	1.9	FILLING - black silty sandy clay filling with slag and ash		A	2.0 2.2				
19.8	2								2
				A	2.8 3.0				
18.8	3								3
	3.5	FILLING - dark brown silty clay filling with some slag and ash		A*	3.8 4.0				
17.8	4								4
	4.8	SANDSTONE - light grey sandstone (possibly filling)						▼ 13-06-07	
16.8	5								5
	5.0	Bore discontinued at 5.0m - target depth reached							
15.8	6								6
14.8	7								7
13.8	8								8
12.8	9								9

RIG: Bobcat **DRILLER:** E Grima **LOGGED:** JED **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 4.8m

REMARKS: *Denotes BDI 130607 collected

SAMPLING & IN SITU TESTING LEGEND

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

CHECKED
Initials: PF-
Date: 26/7

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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.

APPENDIX C
Laboratory Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
54 Frenchs Rd Willoughby NSW 2068
ph 02 9958 5801 fax 02 9958 5803
email: tnotaras@envirolabservices.com.au

CERTIFICATE OF ANALYSIS 11778

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Jeff Davenport

Sample log in details:

Your Reference:	**44914, Sydney University**
No. of samples:	6 Soils
Date samples received:	14/06/07
Date completed instructions received:	14/06/07

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:	21/06/07
Date of Preliminary Report:	Not Issued
Issue Date:	20/06/07

NATA accreditation number 2901. This document shall not be reproduced except in full.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Tania Notaras
Manager

Joshua Lim
Chemist

VOC's in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ---------- 	11778-1 B1 0.3-0.5 13/06/07 Soil	11778-3 B5 2.8-3.0 13/06/07 Soil
Date extracted	--	15/06/2007	15/06/2007
Date analysed	--	16/06/2007	16/06/2007
Dichlorodifluoromethane	mg/kg	<10	<10
Chloromethane	mg/kg	<10	<10
Vinyl Chloride	mg/kg	<10	<10
Bromomethane	mg/kg	<10	<10
Chloroethane	mg/kg	<10	<10
Trichlorofluoromethane	mg/kg	<10	<10
1,1-Dichloroethene	mg/kg	<1.0	<1.0
trans-1,2-dichloroethene	mg/kg	<1.0	<1.0
1,1-dichloroethane	mg/kg	<1.0	<1.0
cis-1,2-dichloroethene	mg/kg	<1.0	<1.0
bromochloromethane	mg/kg	<1.0	<1.0
chloroform	mg/kg	<1.0	<1.0
2,2-dichloropropane	mg/kg	<1.0	<1.0
1,2-dichloroethane	mg/kg	<1.0	<1.0
1,1,1-trichloroethane	mg/kg	<1.0	<1.0
1,1-dichloropropene	mg/kg	<1.0	<1.0
carbon tetrachloride	mg/kg	<1.0	<1.0
Benzene	mg/kg	<1.0	<1.0
dibromomethane	mg/kg	<1.0	<1.0
1,2-dichloropropane	mg/kg	<1.0	<1.0
trichloroethene	mg/kg	<1.0	<1.0
bromodichloromethane	mg/kg	<1.0	<1.0
trans-1,3-dichloropropene	mg/kg	<1.0	<1.0
cis-1,3-dichloropropene	mg/kg	<1.0	<1.0
1,1,2-trichloroethane	mg/kg	<1.0	<1.0
Toluene	mg/kg	<1.0	<1.0
1,3-dichloropropane	mg/kg	<1.0	<1.0
dibromochloromethane	mg/kg	<1.0	<1.0
1,2-dibromoethane	mg/kg	<1.0	<1.0
tetrachloroethene	mg/kg	<1.0	<1.0
1,1,1,2-tetrachloroethane	mg/kg	<1.0	<1.0
chlorobenzene	mg/kg	<1.0	<1.0
Ethylbenzene	mg/kg	<1.0	<1.0
bromoform	mg/kg	<1.0	<1.0
m + p-Xylene	mg/kg	<2.0	<2.0
styrene	mg/kg	<1.0	<1.0
1,1,2,2-tetrachloroethane	mg/kg	<1.0	<1.0

VOC's in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	11778-1 B1 0.3-0.5 13/06/07 Soil	11778-3 B5 2.8-3.0 13/06/07 Soil
o-Xylene	mg/kg	<1.0	<1.0
1,2,3-trichloropropane*	mg/kg	<1.0	<1.0
isopropylbenzene	mg/kg	<1.0	<1.0
bromobenzene	mg/kg	<1.0	<1.0
n-propyl benzene	mg/kg	<1.0	<1.0
2-chlorotoluene	mg/kg	<1.0	<1.0
4-chlorotoluene	mg/kg	<1.0	<1.0
1,3,5-trimethyl benzene	mg/kg	<1.0	<1.0
tert-butyl benzene	mg/kg	<1.0	<1.0
1,2,4-trimethyl benzene	mg/kg	<1.0	<1.0
1,3-dichlorobenzene	mg/kg	<1.0	<1.0
sec-butyl benzene	mg/kg	<1.0	<1.0
1,4-dichlorobenzene	mg/kg	<1.0	<1.0
4-isopropyl toluene	mg/kg	<1.0	<1.0
1,2-dichlorobenzene	mg/kg	<1.0	<1.0
n-butyl benzene	mg/kg	<1.0	<1.0
1,2-dibromo-3-chloropropane	mg/kg	<1.0	<1.0
1,2,4-trichlorobenzene	mg/kg	<1.0	<1.0
napthalene	mg/kg	<1.0	<1.0
hexachlorobutadiene	mg/kg	<1.0	<1.0
1,2,3-trichlorobenzene	mg/kg	<1.0	<1.0
Surrogate Dibromofluorometha	%	110	95
Surrogate aaa-Trifluorotoluene	%	78	93
Surrogate Toluene-d8	%	85	94
Surrogate 4-Bromofluorobenzene	%	61	62

vTPH & BTEX in Soil						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
vTPH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m + p-Xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	87	101	93	96	103

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	320	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	270	<100	<100
Surrogate o-Terphenyl	%	99	98	109	101	96

PAHs in Soil						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	16/06/2007	16/06/2007	16/06/2007	16/06/2007	16/06/2007
Naphthalene	mg/kg	<0.1	<0.1	0.2	1.0	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	1.2	0.3	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	0.1	0.5	<0.1
Fluorene	mg/kg	<0.1	<0.1	0.5	1.0	<0.1
Phenanthrene	mg/kg	<0.1	0.5	7.0	6.9	0.3
Anthracene	mg/kg	<0.1	<0.1	2.0	1.8	<0.1
Fluoranthene	mg/kg	0.2	0.9	13	6.1	0.2
Pyrene	mg/kg	0.2	0.9	13	5.4	0.2
Benzo(a)anthracene	mg/kg	0.1	0.4	7.1	2.2	0.1
Chrysene	mg/kg	0.1	0.5	6.6	2.1	0.1
Benzo(b,k)fluoranthene	mg/kg	<0.2	0.7	11	3.0	<0.2
Benzo(a)pyrene	mg/kg	0.08	0.4	8.0	2.1	0.08
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.3	4.7	1.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.5	0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.3	3.7	0.9	<0.1
Surrogate p-Terphenyl-d_{14}	%	95	96	96	94	98

Organochlorine Pesticides in soil						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	16/06/2007	16/06/2007	16/06/2007	16/06/2007	16/06/2007
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	%	116	117	117	118	122

Organophosphorus Pesticides						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	16/06/2007	16/06/2007	16/06/2007	16/06/2007	16/06/2007
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	116	117	117	118	122

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ---------- 	11778-1 B1 0.3-0.5 13/06/07 Soil	11778-2 B2 0.3-0.5 13/06/07 Soil	11778-3 B5 2.8-3.0 13/06/07 Soil	11778-4 B11 5.8-6.0 13/06/07 Soil	11778-5 BD2 - 13/06/07 Soil
Date extracted	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	17/06/2007	17/06/2007	17/06/2007	17/06/2007	17/06/2007
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	%	116	117	117	118	122

Total Phenolics in Soil						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Acid Extractable metals in soil						
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4	11778-5
Your Reference	----------	B1	B2	B5	B11	BD2
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0	-
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Arsenic	mg/kg	6.5	9.8	11	7.2	7.5
Cadmium	mg/kg	<1.0	<1.0	3.3	<1.0	<1.0
Chromium	mg/kg	14	8.9	28	21	19
Copper	mg/kg	18	18	500	5.5	5.7
Lead	mg/kg	45	180	4,400	23	20
Mercury	mg/kg	<0.10	0.67	2.0	<0.10	<0.10
Nickel	mg/kg	5.4	16	77	3.6	3.2
Zinc	mg/kg	27	97	2,200	5.2	4.9

Moisture Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	11778-1 B1 0.3-0.5 13/06/07 Soil	11778-2 B2 0.3-0.5 13/06/07 Soil	11778-3 B5 2.8-3.0 13/06/07 Soil	11778-4 B11 5.8-6.0 13/06/07 Soil	11778-5 BD2 - 13/06/07 Soil
Date prepared	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Date analysed	--	15/06/2007	15/06/2007	15/06/2007	15/06/2007	15/06/2007
Moisture	%	23	8.8	32	22	23

Asbestos ID - soils					
Our Reference:	UNITS	11778-1	11778-2	11778-3	11778-4
Your Reference	----------	B1	B2	B5	B11
Depth	----------	0.3-0.5	0.3-0.5	2.8-3.0	5.8-6.0
Date Sampled		13/06/07	13/06/07	13/06/07	13/06/07
Type of sample		Soil	Soil	Soil	Soil
Sample Description	-	20g clay	20g sand	30g soil	20g clay
Asbestos ID in soil	--	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Trace Analysis	--	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Metals in TCLP Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	11778-2 B2 0.3-0.5 13/06/07 Soil	11778-3 B5 2.8-3.0 13/06/07 Soil
pH of soil for fluid# determ.	pH units	9.50	9.30
pH of soil for fluid # determ. (acid)	pH units	2.90	1.60
Extraction fluid used	-	1	1
pH of final Leachate	pH units	6.10	5.40
Arsenic in TCLP	mg/L	<0.05	<0.05
Cadmium in TCLP	mg/L	<0.01	0.02
Chromium in TCLP	mg/L	<0.01	<0.01
Copper in TCLP	mg/L	0.03	0.97
Lead in TCLP	mg/L	0.55	3.4
Mercury in TCLP	mg/L	<0.0005	<0.0005
Nickel in TCLP	mg/L	0.02	0.68
Zinc in TCLP	mg/L	0.66	19

PAHs in TCLP (USEPA 1311)			
Our Reference:	UNITS	11778-2	11778-3
Your Reference	----------	B2	B5
Depth	----------	0.3-0.5	2.8-3.0
Date Sampled		13/06/07	13/06/07
Type of sample		Soil	Soil
Date extracted	--	19/06/2007	19/06/2007
Date analysed	--	20/06/2007	20/06/2007
Naphthalene	mg/L	0.001	<0.001
Acenaphthylene	mg/L	<0.001	<0.001
Acenaphthene	mg/L	<0.001	<0.001
Fluorene	mg/L	<0.001	<0.001
Phenanthrene	mg/L	<0.001	<0.001
Anthracene	mg/L	<0.001	<0.001
Fluoranthene	mg/L	<0.001	<0.001
Pyrene	mg/L	<0.001	<0.001
Benzo(a)anthracene	mg/L	<0.001	<0.001
Chrysene	mg/L	<0.001	<0.001
Benzo(b,k)fluoranthene	mg/L	<0.002	<0.002
Benzo(a)pyrene	mg/L	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene	mg/L	<0.001	<0.001
Dibenzo(a,h)anthracene	mg/L	<0.001	<0.001
Benzo(g,h,i)perylene	mg/L	<0.001	<0.001
Surrogate p-Terphenyl-d_{14}	%	97	105

sPOCAS Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ---------- 	11778-4 B11 5.8-6.0 13/06/07 Soil	11778-6 B2 3.8-4.0 13/06/07 Soil
pH kcl	pH units	4.7	4.6
TAA pH 6.5	moles H^+/ tonne	49	64
s-TAA pH 6.5	%w/w S	0.078	0.10
pH ox	pH units	4.2	3.9
TPA pH 6.5	moles H^+/ tonne	75	42
s-TPA pH 6.5	%w/w S	0.12	0.068
TSA pH 6.5	moles H^+/ tonne	26	<5.0
s-TSA pH 6.5	%w/w S	0.042	<0.01
ANCE	% $CaCO_3$	<0.05	<0.05
a-ANCE	moles H^+/ tonne	<5	<5
s-ANCE	%w/w S	<0.05	<0.05
SKCl	%w/w	<0.005	0.037
SP	%w/w	0.076	0.046
SPOS	%w/w	0.075	0.008
a-SPOS	moles H^+/ tonne	47	5.0
CaKCl	%w/w	0.038	0.059
CaP	%w/w	0.048	0.054
CaA	%w/w	0.010	<0.005
MgKCl	%w/w	0.023	0.068
MgP	%w/w	0.025	0.067
MgA	%w/w	<0.005	<0.005
SRAS	%w/w	<0.005	<0.005
SHCl	%w/w	<0.005	0.053
SNAS	%w/w	<0.005	0.016
a-SNAS	moles H^+/ tonne	<5	7.5
a-SNAS	%w/w S	<0.01	0.012
a-Net Acidity	moles H^+/ tonne	95	69
Liming rate	kg $CaCO_3$/tonne	7.2	5.2

Method ID	Methodology Summary
GC.14	Soil samples extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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	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.8	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.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.64	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL VOC's in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Dichlorodifluoromethane	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	mg/kg	10	GC.14	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
trans-1,2-dichloroethene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	87%
cis-1,2-dichloroethene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
bromochloromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
chloroform	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	116%
2,2-dichloropropane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	101%
1,1,1-trichloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	95%
1,1-dichloropropene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
carbon tetrachloride	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
dibromomethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
trichloroethene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	67%
bromodichloromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	92%
trans-1,3-dichloropropene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Toluene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
dibromochloromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	98%
1,2-dibromoethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
tetrachloroethene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	82%
1,1,1,2-tetrachloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
chlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
bromoform	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
m + p-Xylene	mg/kg	2	GC.14	<2.0	[NT]	[NT]	[NR]	[NR]
styrene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
o-Xylene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,3-trichloropropane*	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOC's in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
isopropylbenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
bromobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
tert-butyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
sec-butyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
napthalene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
hexachlorobutadiene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluorometha	%		GC.14	[NT]	[NT]	[NT]	LCS	115%
Surrogate aaa-Trifluorotoluene	%		GC.14	[NT]	[NT]	[NT]	LCS	78%
Surrogate Toluene-d8	%		GC.14	[NT]	[NT]	[NT]	LCS	76%
Surrogate 4-Bromofluorobenzene	%		GC.14	[NT]	[NT]	[NT]	LCS	66%

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	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	[NT]	[NT]	LCS	102%
Benzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	111%
Toluene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	108%
Ethylbenzene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	94%
m + p-Xylene	mg/kg	2	GC.14	<2.0	[NT]	[NT]	LCS	100%
o-Xylene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS	99%
Surrogate aaa-Trifluorotoluene	%		GC.14	[NT]	[NT]	[NT]	LCS	104%
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	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	[NT]	[NT]	LCS	107%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	[NT]	[NT]	LCS	93%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	[NT]	[NT]	LCS	90%
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Naphthalene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	102%
Acenaphthylene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	108%
Phenanthrene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	102%
Anthracene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	121%
Pyrene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	120%
Benzo(a)anthracene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	LCS	125%
Benzo(b,k)fluoranthene	mg/kg	0.2	GC.12	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12	<0.05	[NT]	[NT]	LCS	130%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	[NT]	[NT]	[NT]	LCS	97%

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	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
HCB	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	104%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	116%
Heptachlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	99%
delta-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	109%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	104%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	117%
Dieldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	106%
Endrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	84%
pp-DDD	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	114%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS	98%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	[NT]	[NT]	[NT]	LCS	114%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS	93%
Fenitrothion	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS	95%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS	85%
Surrogate TCLMX	%		GC.8	[NT]	[NT]	[NT]	LCS	118%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	LCS	117%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-6	[NT]	[NT]	[NT]	LCS	116%
QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	11778-1	<5.0 || <5.0	LCS	93%
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	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4.0	[NT]	[NT]	LCS	98%
Cadmium	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	99%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	99%
Copper	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	101%
Lead	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	98%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.10	[NT]	[NT]	LCS	84%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	99%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1.0	[NT]	[NT]	LCS	97%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	--			[NT]
Date analysed	--			[NT]
Moisture	%	0.1	LAB.8	<0.10

QUALITY CONTROL Metals in TCLP	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Arsenic in TCLP	mg/L	0.05	Metals.20 ICP-AES	<0.05	[NT]	[NT]	LCS	105%
Cadmium in TCLP	mg/L	0.01	Metals.20 ICP-AES	<0.01	[NT]	[NT]	LCS	98%
Chromium in TCLP	mg/L	0.01	Metals.20 ICP-AES	<0.01	[NT]	[NT]	LCS	98%
Copper in TCLP	mg/L	0.01	Metals.20 ICP-AES	<0.01	[NT]	[NT]	LCS	99%
Lead in TCLP	mg/L	0.03	Metals.20 ICP-AES	<0.03	[NT]	[NT]	LCS	96%
Mercury in TCLP	mg/L	0.0005	Metals.21 CV-AAS	<0.0005	[NT]	[NT]	LCS	103%
Nickel in TCLP	mg/L	0.02	Metals.20 ICP-AES	<0.02	[NT]	[NT]	LCS	97%
Zinc in TCLP	mg/L	0.02	Metals.20 ICP-AES	<0.02	[NT]	[NT]	LCS	99%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Naphthalene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	119%
Acenaphthylene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	120%
Phenanthrene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	120%
Anthracene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	135%
Pyrene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	137%
Benzo(a)anthracene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	140%
Benzo(b,k)fluoranthene	mg/L	0.002	GC.12	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	LCS	110%
Indeno(1,2,3-c,d)pyrene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/L	0.001	GC.12	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	[NT]	[NT]	[NT]	LCS	105%

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
pH_{kcl}	pH units		LAB.64	[NT]	[NT]	[NT]	LCS	101%
TAA pH 6.5	moles H^+/ tonne	5	LAB.64	<5	[NT]	[NT]	LCS	73%
s-TAA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	[NR]	[NR]
pH_{ox}	pH units		LAB.64	[NT]	[NT]	[NT]	LCS	105%
TPA pH 6.5	moles H^+/ tonne	5	LAB.64	<5.0	[NT]	[NT]	LCS	84%
s-TPA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	[NR]	[NR]
TSA pH 6.5	moles H^+/ tonne	5	LAB.64	<5.0	[NT]	[NT]	[NR]	[NR]
s-TSA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	[NR]	[NR]
ANCE	% $CaCO_3$	0.05	LAB.64	<0.05	[NT]	[NT]	[NR]	[NR]
a-ANCE	moles H^+/ tonne	5	LAB.64	<5	[NT]	[NT]	[NR]	[NR]
s-ANCE	%w/w S	0.05	LAB.64	<0.05	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
S_{KCl}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	109%
S_P	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	105%
S_{POS}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
a-S_{POS}	moles H^+/ tonne	5	LAB.64	<5.0	[NT]	[NT]	[NR]	[NR]
Ca_{KCl}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	112%
Ca_P	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	86%
Ca_A	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
Mg_{KCl}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	97%
Mg_P	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	78%
Mg_A	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
SRAS	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
S_{HCl}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	101%
S_{NAS}	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
a-S_{NAS}	moles H^+/ tonne	5	LAB.64	<5	[NT]	[NT]	[NR]	[NR]
a-S_{NAS}	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	[NR]	[NR]
a-Net Acidity	moles H^+/ tonne	10	LAB.64	<10	[NT]	[NT]	[NR]	[NR]
Liming rate	kg $CaCO_3$ /tonne	0.1	LAB.64	<0.1	[NT]	[NT]	[NR]	[NR]

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 sub-sample.
Envirolab recommends supplying 30-40g of sample in it's own container.
Asbestos analysed by: Joshua Lim

INS: Insufficient sample for this test	NT: Not tested	PQL: Practical Quanitation 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: Generally 60-140% is acceptable.

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CERTIFICATE OF ANALYSIS 11841

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Jeff Davenport

Sample log in details:

Your Reference:	**44914, Sydney University**
No. of samples:	3 Waters
Date samples received:	18/06/07
Date completed instructions received:	18/06/07

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:	29/06/07
Date of Preliminary Report:	25/06/07
Issue Date:	28/06/07

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

Results Approved By:

Jacinta Hurst
Operations Manager

VOC's in water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date extracted	--	21/06/2007
Date analysed	--	21/06/2007
Dichlorodifluoromethane	µg/L	<10
Chloromethane	µg/L	<10
Vinyl Chloride	µg/L	<10
Bromomethane	µg/L	<10
Chloroethane	µg/L	<10
Trichlorofluoromethane	µg/L	<10
1,1-Dichloroethene	µg/L	<1.0
Trans-1,2-dichloroethene	µg/L	<1.0
1,1-dichloroethane	µg/L	<1.0
Cis-1,2-dichloroethene	µg/L	<1.0
Bromochloromethane	µg/L	<1.0
Chloroform	µg/L	<1.0
2,2-dichloropropane	µg/L	<1.0
1,2-dichloroethane	µg/L	<1.0
1,1,1-trichloroethane	µg/L	<1.0
1,1-dichloropropene	µg/L	<1.0
Carbon tetrachloride	µg/L	<1.0
Benzene	µg/L	<1.0
Dibromomethane	µg/L	<1.0
1,2-dichloropropane	µg/L	<1.0
Trichloroethene	µg/L	<1.0
Bromodichloromethane	µg/L	<1.0
trans-1,3-dichloropropene	µg/L	<1.0
cis-1,3-dichloropropene	µg/L	<1.0
1,1,2-trichloroethane	µg/L	<1.0
Toluene	µg/L	<1.0
1,3-dichloropropane	µg/L	<1.0
Dibromochloromethane	µg/L	<1.0
1,2-dibromoethane	µg/L	<1.0
Tetrachloroethene	µg/L	<1.0
1,1,1,2-tetrachloroethane	µg/L	<1.0
Chlorobenzene	µg/L	<1.0
Ethylbenzene	µg/L	<1.0
Bromoform	µg/L	<1.0
m+p-xylene	µg/L	<2.0
Styrene	µg/L	<1.0
1,1,2,2-tetrachloroethane	µg/L	<1.0
o-xylene	µg/L	<1.0
1,2,3-trichloropropane*	µg/L	<1.0

VOC's in water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Isopropylbenzene	µg/L	<1.0
Bromobenzene	µg/L	<1.0
n-propyl benzene	µg/L	<1.0
2-chlorotoluene	µg/L	<1.0
4-chlorotoluene	µg/L	<1.0
1,3,5-trimethyl benzene	µg/L	<1.0
Tert-butyl benzene	µg/L	<1.0
1,2,4-trimethyl benzene	µg/L	<1.0
1,3-dichlorobenzene	µg/L	<1.0
Sec-butyl benzene	µg/L	<1.0
1,4-dichlorobenzene	µg/L	<1.0
4-isopropyl toluene	µg/L	<1.0
1,2-dichlorobenzene	µg/L	<1.0
n-butyl benzene	µg/L	<1.0
1,2-dibromo-3-chloropropane	µg/L	<1.0
1,2,4-trichlorobenzene	µg/L	<1.0
Naphthalene	µg/L	2.5
Hexachlorobutadiene	µg/L	<1.0
1,2,3-trichlorobenzene	µg/L	<1.0
Surrogate Dibromofluoromethane	%	100
Surrogate toluene-d8	%	96
Surrogate 1-bromo-4-fluorotoluene	%	103

vTPH & BTEX in Water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water	11841-2 TB Water	11841-3 TS Water
Date extracted	--	21/06/2007	21/06/2007	21/06/2007
Date analysed	--	21/06/2007	21/06/2007	21/06/2007
TPH C_6 - C_9	µg/L	<10	[NA]	[NA]
Benzene	µg/L	<1.0	<1.0	105%
Toluene	µg/L	<1.0	<1.0	105%
Ethylbenzene	µg/L	<1.0	<1.0	105%
m+p-xylene	µg/L	<2.0	<2.0	103%
o-xylene	µg/L	<1.0	<1.0	104%
Surrogate Dibromofluoromethane	%	100	100	95
Surrogate toluene-d8	%	96	100	96
Surrogate 1-bromo-4-fluorotoluene	%	103	88	101

sTPH in Water (C10-C36) Our Reference: Your Reference Type of sample	UNITS ---------- ----------	 11841-1 P2 Water
Date extracted	--	22/06/2007
Date analysed	--	22/06/2007
TPH C_{10} - C_{14}	µg/L	<50
TPH C_{15} - C_{28}	µg/L	<100
TPH C_{29} - C_{36}	µg/L	<100
Surrogate o-Terphenyl	%	106

PAHs in Water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date extracted	--	22/06/2007
Date analysed	--	22/06/2007
Naphthalene	µg/L	2.3
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	2.7
Fluorene	µg/L	3.4
Phenanthrene	µg/L	5.0
Anthracene	µg/L	1.2
Fluoranthene	µg/L	1.6
Pyrene	µg/L	1.1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Surrogate p-Terphenyl-d_{14}	%	119

Organochlorine Pesticides in water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date extracted	--	22/06/2007
Date analysed	--	22/06/2007
HCB	µg/L	<0.2
alpha-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
beta-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endosulfan II	µg/L	<0.2
DDT	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Surrogate TCLMX	%	103

OP Pesticides in water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date extracted	--	22/06/2007
Date analysed	--	22/06/2007
Diazinon	µg/L	<0.20
Dimethoate	µg/L	<0.2
Chlorpyriphos-methyl	µg/L	<0.2
Ronnel	µg/L	<0.2
Chlorpyriphos	µg/L	<0.2
Fenitrothion	µg/L	<0.2
Bromophos ethyl	µg/L	<0.2
Ethion	µg/L	<0.2
Surrogate TCLMX	%	103

PCBs in Water Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date extracted	--	22/06/2007
Date analysed	--	22/06/2007
Arochlor 1016	µg/L	<2
Arochlor 1232	µg/L	<2
Arochlor 1242	µg/L	<2
Arochlor 1248	µg/L	<2
Arochlor 1254	µg/L	<2
Arochlor 1260	µg/L	<2
Surrogate TCLMX	%	103

Total Phenolics in Water		
Our Reference:	UNITS	11841-1
Your Reference	----------	P2
Type of sample	----------	Water
Total Phenolics (as Phenol)	mg/L	<0.050

8 HM in water - dissolved Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Date prepared	--	20/06/2007
Date analysed	--	20/06/2007
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	1.5
Mercury-Dissolved	µg/L	<0.5
Nickel-Dissolved	µg/L	1.4
Zinc-Dissolved	µg/L	23

Ion Balance Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
Calcium	mg/L	16
Potassium	mg/L	2.5
Magnesium	mg/L	10
Sodium	mg/L	23
Carbonate Alkalinity as $CaCO_3$	mg/L	0.0
Bicarbonate Alkalinity as $CaCO_3$	mg/L	80
Sulphate, SO4	mg/L	66
Chloride (titration) - water	mg/L	<20

Miscellaneous Inorganics Our Reference: Your Reference Type of sample	UNITS ---------- ----------	11841-1 P2 Water
pH	pH Units	5.9
Electrical Conductivity	µS/cm	380
Hardness by calculation	mgCaCO3 /L	81

Microbiologocal Testing		
Our Reference:	UNITS	11841-1
Your Reference	----------	P2
Type of sample	----------	Water
Faecal Coliforms	CFU/100 mL	<20

Method ID	Methodology Summary
GC.13	Water samples are analysed directly by purge and trap GC-MS.
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	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.8	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.22 ICP-MS	Determination of various metals by ICP-MS.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
LAB.6	Alkalinity - determined titrimetrically in accordance with APHA 20th ED, 2320-B.
LAB.9	Sulphate determined turbidimetrically.
LAB.11	Chloride determined by argentometric titration.
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
LAB.2	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED and Rayment & Higginson.
Ext-008	Subcontracted to Barratt & Smith Pathlogy. NATA Accreditation No. 2178.

QUALITY CONTROL VOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Dichlorodifluoromethane	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	10	GC.13	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Trans-1,2-dichloroethene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	105%
Cis-1,2-dichloroethene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	129%
2,2-dichloropropane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	113%
1,1,1-trichloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	111%
1,1-dichloropropene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	100%
Bromodichloromethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	127%
trans-1,3-dichloropropene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Toluene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	125%
1,2-dibromoethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	114%
1,1,1,2-tetrachloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Bromoform	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
m+p-xylene	µg/L	2	GC.13	<2.0	[NT]	[NT]	[NR]	[NR]
Styrene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
o-xylene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichloropropane*	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Tert-butyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Sec-butyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		GC.13	[NT]	[NT]	[NT]	LCS	92%
Surrogate toluene-d8	%		GC.13	[NT]	[NT]	[NT]	LCS	79%
Surrogate 1-bromo-4-fluorotoluene	%		GC.13	[NT]	[NT]	[NT]	LCS	65%

QUALITY CONTROL vTPH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
TPH C_6 - C_9	µg/L	10	GC.16	<10	[NT]	[NT]	LCS	98%
Benzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	100%
Toluene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	95%
Ethylbenzene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	98%
m+p-xylene	µg/L	2	GC.13	<2.0	[NT]	[NT]	LCS	100%
o-xylene	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS	99%
Surrogate Dibromofluoromethane	%		GC.13	[NT]	[NT]	[NT]	LCS	102%
Surrogate toluene-d8	%		GC.13	[NT]	[NT]	[NT]	LCS	99%
Surrogate 1-bromo-4-fluorotoluene	%		GC.13	[NT]	[NT]	[NT]	LCS	101%
QUALITY CONTROL sTPH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
TPH C_{10} - C_{14}	µg/L	50	GC.3	<50	[NT]	[NT]	LCS	105%
TPH C_{15} - C_{28}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS	137%
TPH C_{29} - C_{36}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS	101%
Surrogate o-Terphenyl	%		GC.3	[NT]	[NT]	[NT]	LCS	110%
QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	117%
Acenaphthylene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	119%
Phenanthrene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	118%
Anthracene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	133%
Pyrene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	133%
Benzo(a)anthracene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	135%
Benzo(b,k)fluoranthene	µg/L	2	GC.12	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	GC.12	<1	[NT]	[NT]	LCS	112%
Indeno(1,2,3-c,d)pyrene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	GC.12	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	[NT]	[NT]	[NT]	LCS	111%

QUALITY CONTROL Organochlorine Pesticides in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
HCB	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	110%
gamma-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	117%
Heptachlor	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	111%
delta-BHC	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	114%
Heptachlor Epoxide	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	117%
gamma-Chlordane	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	119%
Dieldrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	121%
Endrin	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	109%
pp-DDD	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	121%
Endosulfan II	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
DDT	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	LCS	126%
Methoxychlor	µg/L	0.2	GC-5	<0.2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	[NT]	[NT]	[NT]	LCS	118%

QUALITY CONTROL OP Pesticides in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Diazinon	µg/L	0.2	GC.8	<0.20	[NT]	[NT]	[NR]	[NR]
Dimethoate	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	[NR]	[NR]
Ronnel	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	LCS	93%
Fenitrothion	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	LCS	99%
Bromophos ethyl	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	[NR]	[NR]
Ethion	µg/L	0.2	GC.8	<0.2	[NT]	[NT]	LCS	93%
Surrogate TCLMX	%		GC.8	[NT]	[NT]	[NT]	LCS	114%
QUALITY CONTROL PCBs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Arochlor 1016	µg/L	2	GC-6	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	µg/L	2	GC-6	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	µg/L	2	GC-6	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	µg/L	2	GC-6	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	µg/L	2	GC-6	<2	[NT]	[NT]	LCS	138%
Arochlor 1260	µg/L	2	GC-6	<2	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL Total Phenolics in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Total Phenolics (as Phenol)	mg/L	0.05	LAB.30	<0.050	[NT]	[NT]	LCS	91%
QUALITY CONTROL 8 HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	--			[NT]	[NT]	[NT]	[NR]	[NR]
Date analysed	--			[NT]	[NT]	[NT]	[NR]	[NR]
Arsenic-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	98%
Cadmium-Dissolved	µg/L	0.1	Metals.22 ICP-MS	<0.1	[NT]	[NT]	LCS	94%
Chromium-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	98%
Copper-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	93%
Lead-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	93%
Mercury-Dissolved	µg/L	0.5	Metals.21 CV-AAS	<0.5	[NT]	[NT]	LCS	96%

QUALITY CONTROL 8 HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Nickel-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	95%
Zinc-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	[NT]	[NT]	LCS	106%
QUALITY CONTROL Ion Balance	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Calcium	mg/L	0.03	Metals.20 ICP-AES	<0.030	[NT]	[NT]	LCS	95%
Potassium	mg/L	0.03	Metals.20 ICP-AES	<0.030	[NT]	[NT]	LCS	105%
Magnesium	mg/L	0.03	Metals.20 ICP-AES	<0.030	[NT]	[NT]	LCS	91%
Sodium	mg/L	0.03	Metals.20 ICP-AES	<0.030	[NT]	[NT]	LCS	108%
Sulphate, SO4	mg/L	5	LAB.9	<5.0	[NT]	[NT]	LCS	109%
Chloride (titration) - water	mg/L	20	LAB.11	<20	[NT]	[NT]	LCS	98%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Electrical Conductivity	µS/cm	1	LAB.2	<1.0	[NT]	[NT]	LCS	100%
Hardness by calculation	mgCaCO3/L	1	Metals.20 ICP-AES	<1	[NT]	[NT]	[NR]	[NR]
QUALITY CONTROL Microbiologocal Testing	UNITS	PQL	METHOD	Blank				
Faecal Coliforms	CFU/100 mL		Ext-008	[NT]				

Report Comments:

This sample had approx 25% colloids. The sample was decanted and the supernatant tested.
Asbestos analysed by: Not applicable for this job

INS: Insufficient sample for this test	NT: Not tested	PQL: Practical Quanitation 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: Generally 60-140% is acceptable.

APPENDIX D
QA/QC

QA/QC PROCEDURES AND RESULTS

FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field QC procedures for sampling as prescribed in Douglas Partners *Field Procedures Manual* were followed at all times during the validation assessment. Field sampling comprised replicate sampling, at a rate of approximately one replicate sample for every ten original samples.

Rinsate Sample

Equipment rinsate sample was not necessary due to the use of disposable sampling equipment.

Replicate Samples

The field QC comprised the collection of replicate samples during the course of sampling. Replicate sample BD2 and its original sample (B11/5.8-6.0) were submitted for analysis along with other selected soil samples. The soil replicates was analysed for heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), TPH and PAH. Comparative results of analysis are included in Table D1. Relative Percentage Differences (RPD) was calculated as an assessment of the result consistency.

RELATIVE PERCENTAGE DIFFERENCE

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for replicate samples. A RPD of ± 30% is generally considered acceptable for inorganic analytes by DECC, although in general a wider RPD range may be acceptable for organic and inorganic analytes.

The comparative results of analysis between original and replicates are summarised in the table below.

Table E1 - RPD Results for Heavy Metals, TPH and PAH

Sample ID	As	Cd	Cr III	Cu	Pb	Hg	Ni	Zn	C6-C9 TPH	C10-C36 TPH	B(a)P	PAH
B11/5.8-6.0	7.2	<1	21	5.5	23	<0.1	3.6	5.2	<25	<250	2.1	34.6
BD2	7.5	<1	19	5.7	20	<0.1	3.2	4.9	<25	<250	0.08	0.98
%RPD	4	0	10	4	14	0	12	6	0	0	**185**	**189**

The calculated RPD values for the samples and their replicates were generally within the acceptable range of ± 30% with the exception of B(a)P and PAH. The calculated RPDs exceeding the acceptability range are not, however, considered to be of significant concern due to the generally low levels of PAH detected (relative to the adopted guideline levels), the low actual differences in concentration and the overall good quality of the QA/QC data. Therefore, the findings are unlikely to affect the assessment results.

It is therefore considered that the results indicate an acceptable consistency between the samples and their replicates and indicate that suitable field sampling methodology was adopted and laboratory precision was achieved.

LABORATORY QA/QC PROCEDURES

Intra-laboratory Procedures

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

Reagent Blank

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

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 C. The spike recovery rates are compared with limits as specified in Envirolab Services Quality Control System, and any exceedances are highlighted in the report.

The spike recovery all fell within the acceptable range. On this basis, it is considered that the spike recovery results are acceptable and does not materially affect the assessment results.

Surrogate Recovery

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis to each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis.

The surrogate recovery rates are compared with limits as specified in Envirolab Services and any exceedances are highlighted in the report.

As no exceedances and no comments were noted on the report, it is considered that the results indicate that the analytical results are not significantly affected by matrix interference.

Duplicates

These are additional portions of a sample which are analysed in exactly the same manner as all other samples. Duplicate sample results were noted to be within the acceptable range. The duplicate sample results are included in the laboratory results in Appendix C.

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