Douglas Partners
Geotechnics • Environment • Groundwater

Integrated Practical Solutions

REPORT
on
LIMITED STAGE 2 CONTAMINATION ASSESSMENT

MARRICKVILLE METRO SHOPPING CENTRE
34 VICTORIA ROAD & 13-55 EDINBURGH ROAD
MARRICKVILLE

Prepared for
AMP CAPITAL INVESTORS LIMITED

Project 71645 Rev 1
November 2010

Douglas Partners
Geotechnics • Environment • Groundwater

REPORT
on
LIMITED STAGE 2 CONTAMINATION ASSESSMENT

MARRICKVILLE METRO SHOPPING CENTRE
34 VICTORIA ROAD & 13-55 EDINBURGH ROAD
MARRICKVILLE

Prepared for
AMP CAPITAL INVESTORS LIMITED

Project 71645 Rev 1
November 2010

Douglas Partners Pty Ltd
ABN 75 053 980 117

96 Hermitage Road
West Ryde NSW 2114
Australia

PO Box 472
West Ryde NSW 1685

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

ACEA
The Association of Consulting Engineers Australia

EXECUTIVE SUMMARY

This report details the methodology and results of a Stage 2 Contamination Assessment undertaken by Douglas Partners Pty Ltd (DP) for the proposed redevelopment of the Marrickville Metro Shopping Centre located at 34 Victoria Road, Marrickville (refer to Drawing 1, Appendix A). The land at 13-55 Edinburgh Road which is located to the south of Smidmore Street is also included in the proposed development, and is bounded by Edinburgh Road and Murray Street. This site is currently used as a warehouse with associated ground level car parking.

This report forms part of a Preferred Project Report (PPR) prepared on behalf of AMP Capital Investors (AMPCI) in respect to the Concept Plan Application under Part 3A of the NSW Environmental Planning and Assessment Act 1979 for the proposed redevelopment of the Marrickville Metro Shopping Centre. This report has been prepared in response to the letter from the Department of Planning (DOP) dated 14 October 2010 requesting that a Preferred Project Report (PPR) be prepared. The letter requests that the proponent respond to the issues raised by the submissions and for the PPR to identify how the issues raised by the submissions including those of the DOP have been addressed and how the PPR minimises the environmental impacts of the proposal.

AMPCI proposes to upgrade and expand Marrickville Metro Shopping Centre to accommodate additional retail floor space, improved facilities and services, as well as enhance convenience and accessibility for the community.

The objective of the current investigation is to provide preliminary information on the contamination status of soil and groundwater at the site based on intrusive sampling conducted in conjunction with a geotechnical investigation completed concurrently by DP in March 2010. The design of the intrusive sampling and analytical programme was based on the findings of the Stage 1 report as far as site access permitted.

The scope of the investigation involves the drilling of nine boreholes through the underlying filling and natural soils. Soil sampling was undertaken at the time of drilling for chemical analysis. Additionally, three boreholes were extended into the shale bedrock to intercept with the groundwater table and converted into groundwater monitoring wells. The wells

were developed and purged prior to sampling. Other boreholes were also extended into the shale bedrock for geotechnical purposes.

Free groundwater was encountered within the residual clay / shale bedrock interface at two locations during the intrusive investigation. Based on the measured standing water levels obtained at the time of groundwater sampling, the inferred groundwater flow direction is to the south towards the Alexandra Canal. It is noted that the presence of an underground stormwater channel passing beneath the site may have an influence on the groundwater flow direction.

Low levels of heavy metals were detected in most of the soil samples analysed but concentrations were below their respective SACs. The soil results indicate that widespread soil contamination is not present at the site. The presence of benzo(a)pyrene, PAH and TPH are generally detected within the filling which is likely to be removed during construction.

Three soil samples were analysed for acid sulphate soils (ASS) and the results indicated that ASS is present in the southern portion of the site, which is consistent with published mapping.

Based on the soil analytical results, four soil samples were selected for TCLP testing for preliminary waste classification purpose. The preliminary testing indicates that the filling and natural soils can be disposed of as General Solid Waste. It should be noted that soils of actual and potential ASS should be treated prior to disposal.

Low levels of PCE, TCE and DCE were detected in the groundwater sample collected from BH4 located adjacent to the dry cleaner. TCE and DCE are commonly associated with dry cleaning process. Concentrations of PCE, TCE and DCE were not reported in the other two boreholes sampled in this round of investigation. Furthermore, concentrations of TPH were reported in BH5 located adjacent to a disused fuel point, indicating that residual TPH may be present in the groundwater. It is noted that PAHs were not detected in the groundwater samples analysed as part of this assessment.

The proposed development will involve the construction of an additional level at the existing shopping centre footprint. The current rooftop car park will be replaced by retail outlets and the existing warehouse building in the southern portion of the site will be demolished for the construction of new retail outlets and car parking area. Based on the conceptual plan, it is not anticipated that bulk excavation will be carried out in both the existing shopping centre and the industrial land with the exception of the construction of foundations.

Although significant groundwater contamination was not encountered, contaminants of concerns have nevertheless been detected in the underlying groundwater and the presence of these chemicals is likely to be associated with the past and current uses of the site. The presence of TCE, DCE and PCE is of particular concern as these chemicals are DNAPLs which can be difficult to detect. Additional groundwater monitoring wells should be installed to verify the extent of these chemicals.

Based on the measured standing water levels, it is anticipated that dewatering will be required during foundation construction and the water will need to be regularly monitoring and be tested prior to disposal.

In conclusion, given that widespread soil and groundwater contamination was not encountered in this investigation, it is considered that the site can be made suitable for retail uses. It should be highlighted that a detailed contamination assessment could not be carried out due to site constraints and that further actions are recommended to be undertaken in the next phase of the project:

- Removal of the localised soil contamination in the filling recovered from BH1, located adjacent to the Mill House building in the northern portion of the site;
- Further investigation to be carried out in the previously identified AECs which were not accessible in this round of investigation. This may include additional intrusive sampling in areas likely to be exposed as part of the proposed development and an assessment of human health risk in others areas of the site;
- Further groundwater investigation be undertaken to confirm or otherwise potential widespread groundwater contamination associated with the dry cleaning operation and the possible historical leakage / spillage of petroleum products at the disused fuel point;

- Geophysical investigation be undertaken in the vicinity of the disused fuel point to determine whether there are other USTs present at the warehouse site, apart from those previously identified in the Stage 1 Contamination Assessment;
- Additional *ex situ* assessment of excavated soils to confirm or otherwise the preliminary waste classifications provided in this report;
- Further investigation to be undertaken to confirm the extent of the acid sulphate soil in the southern portion of the site; and
- Development of an Acid Sulphate Soils Management Plan, if required.

Douglas Partners
Geotechnics · Environment · Groundwater

TABLE OF CONTENTS

TABLE OF CONTENTS

CF:jlb
Project 71645 Rev 1
1 November 2010

REPORT ON
LIMITED STAGE 2 CONTAMINATION ASSESSMENT
MARRICKVILLE METRO SHOPPING CENTRE
34 VICTORIA ROAD AND 13 - 55 EDINBURGH ROAD, MARRICKVILLE

---

1. INTRODUCTION

This report details the methodology and results of a Stage 2 Contamination Assessment undertaken by Douglas Partners Pty Ltd (DP) for the proposed redevelopment of the Marrickville Metro Shopping Centre located at 34 Victoria Road, Marrickville (refer to Drawing 1, Appendix A). The land at 13-55 Edinburgh Road which is located to the south of Smidmore Street is also included in the proposed development, and is bounded by Edinburgh Road and Murray Street. This site is currently used as a warehouse with associated ground level car parking.

This report forms part of a Preferred Project Report (PPR) prepared on behalf of AMP Capital Investors (AMPCI) in respect to the Concept Plan Application under Part 3A of the NSW Environmental Planning and Assessment Act 1979 for the proposed redevelopment of the Marrickville Metro Shopping Centre. This report has been prepared in response to the letter from the Department of Planning (DOP) dated 14 October 2010 requesting that a Preferred Project Report (PPR) be prepared. The letter requests that the proponent respond to the issues raised by the submissions and for the PPR to identify how the issues raised by the submissions including those of the DOP have been addressed and how the PPR minimises the environmental impacts of the proposal.

AMPCI proposes to upgrade and expand Marrickville Metro Shopping Centre to accommodate additional retail floor space, improved facilities and services, as well as enhance convenience and accessibility for the community.

The site has been the subject of previous reports by both DP and other consultants. In this regard, DP has previously conducted a tank pit validation of two tank pits at 13-55 Edinburgh Road (previously identified as 2-28 Smidmore Street). The findings of the validation were presented in a report entitled *Report on Tank Pit Validation, 2-28 Smidmore Street, Marrickville*, dated 3 February 1997, reference number 24254. Additionally, DP has also conducted a separate Stage 1 contamination assessment as the first phase of the current Stage 2 assessment, presented in the report entitled *Report on Stage 1 Contamination Assessment, Marrickville Metro Shopping Centre, 34 Victoria Road and 13-55 Edinburgh Road, Marrickville*, reference 71645.00, dated 12 May 2010.

A Conservation Management Plan for the 'Mill House' at 34 Victoria Road, Marrickville prepared by Graham Brooks & Associates in July 2007 was provided by the client for review. The plan provided historical information presented in Section 5.4 of the Stage 1 Contamination Assessment report.

The objective of the current investigation is to provide preliminary information on the contamination status of soil and groundwater at the site based on intrusive sampling conducted in conjunction with a geotechnical investigation completed concurrently by DP in March 2010. The design of the intrusive sampling and analytical programme was based on the findings of the Stage 1 report as far as site access permitted.

2. PROPOSED DEVELOPMENT

The proposed development of the Marrickville Metro has two key elements:

- An extension of retail floor area at first floor level above the existing shopping centre building with further additional roof top parking above; and

- Redevelopment of the existing industrial land south of Smidmore Street (13-55 Edinburgh Road) to create a two level retail addition to the shopping centre with car parking above.

The additional retail floor area will primarily accommodate a discount department store, supermarket, mini major and specialty retail space. The development will incorporate additional car parking as well as improved vehicle access and loading facilities.

The proposal will create a new activated Smidmore Street and will be complimentary to an enhanced public space fronting Victoria Road. The proposal will include works to the public domain in order to improve the pedestrian, cycling and public transport connections to and from the site and enhance pedestrian and patron safety.

Owing to the scale of the project and the need to undertake the development whilst maintaining a safe and functional retail centre, it is proposed that construction will occur over at least two discrete stages.

Stage 1 will involve the redevelopment of the industrial site at 13-55 Edinburgh Road to accommodate the new two level retail centre including car parking above. This work will also incorporate the refurbishment of the existing shopping centre building fronting the northern side of Smidmore Street.

Stage 2 will involve the first floor level retail extension over the existing shopping centre building with the proposed additional car parking at roof top level.

3. SCOPE OF WORKS

The scope of works for the Stage 2 Contamination Assessment was as follows:

- Review of the Stage 1 Contamination Assessment report;
- Dial-before-you-dig (DBYD) services were contacted to obtain services drawings for the proposed borehole locations;
- Field location of underground services prior to drilling;
- Drilling at a nine locations within the site targeting specific areas of environmental concern identified during the Stage 1 Contamination Assessment and providing a broad site coverage (restricted by accessibility) as indicated on Drawing 4, Appendix A. A number of boreholes were positioned in the footpath, garden or road corridors outside of the actual site boundaries where access within the site was not possible. The information obtained from these boreholes is, therefore, considered to be indicative only;
- Boreholes were augered through fill materials, terminating within apparently clean natural soils and extended to bedrock for geotechnical purposes;
- Samples (including 10% field replicates for QA/QC purposes) were collected at intervals based on field observations, change in geological profile, and/or at signs of contamination;
- Screening of all recovered samples using a field portable photo-ionisation detector (PID);
- Dispatch of selected samples to a NATA accredited laboratory for quantitative analysis for the following potential contaminants:
    - Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) – 30 samples including QA/QC;
    - Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene – BTEX);
    - Total Petroleum Hydrocarbons (TPH);
    - Polycyclic aromatic hydrocarbons (PAHs);
    - Organochlorine Pesticides (OCP);

- Polychlorinated Biphenyls (PCB);
- Phenols;
- Volatile Organic Compounds (VOC);
- Asbestos;
- pH;
- Suspension Peroxide Oxidation Combined Acidity & Sulphur (SPOCAS); and
- Quality assurance and quality control samples (QA/QC) samples.

Additionally, Toxicity Characteristic Leaching Procedure (TCLP) tests were also carried out for preliminary waste classification purposes.

- Three boreholes (BH4, BH6 and BH7) were extended to depths of approximately 10 m for the installation of groundwater monitoring wells. The monitoring well locations were based on the potential areas of environmental concern as identified in the Stage 1 Contamination Assessment. The wells were developed, purged and sampled from each well for analysis (with the exception of BH4 due to access restrictions) including:
  - Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene);
  - Total Petroleum Hydrocarbons;
  - Polycyclic Aromatic Hydrocarbons;
  - Metals;
  - VOC;
  - Hardness; and
  - QA/QC samples.
- Store remaining soil samples not analysed for a period of one month pending the need for further analysis; and
- Preparation of this Limited Stage 2 Contamination Assessment report.

4. SITE DESCRIPTION

The site comprises the Marrickville Metro Shopping Centre, situated north of Smidmore Street, and industrial buildings to the south of Smidmore Street. The site is identified as Lot 100 in Deposited Plan 715231, Lot 1 in Deposited Plan 612551 and Lot 1 in Deposited Plan 316613. The Lot layout is shown Appendix C and a photographic plan of the site is shown in Drawing 1, Appendix A.

The shopping centre is located within an established residential and industrial precinct surrounded by small lot residential housing to the north and west, and predominantly industrial land comprising larger allotments and larger building scales to the south and east.

The existing shopping centre fronts Victoria Road to the north, Murray Street to the east and Smidmore Street to the south and is adjoined by single storey residential dwellings to the west. The shopping centre is predominantly a single level retail building which covers an area of approximately 22,000 m^2 and comprises major tenants Kmart, Woolworths and Aldi as well as a range of speciality stores. Car parking is located at roof top level with existing vehicle ramp access via Smidmore Street and Murray Street. The shopping centre, initially constructed in the late 1980s, has undergone a series of refurbishments. Located on the site adjoining the shopping centre is the “Mill House”, which is a listed heritage item. In addition, the “Old Vickers Mill” façade is located around parts of the perimeter of the site.

The shopping centre building is of 1980s style with loading docks on the northern, eastern and western sides of the building. The centre management office is located in the historical building, the Mill House, located to the north of the shopping complex. A dry cleaning shop is located adjacent to the Smidmore Street entrance. A detailed inspection could not be carried out at the time of inspection but it appears that the internal drainage is located in the western side of the shop.

An electricity sub-station is located at the south-eastern corner of the shopping centre. An oil/water separator is located to the south of the Mill House which is used by Kmart Oil. Kmart Oil is currently trading as an auto and tyre repair facility. Grease traps were also noted at the loading docks.

The southern portion of the site comprises two warehouse buildings, currently occupied by a food packaging warehouse. The products stored at the site include disposable plates, cutlery, cups, etc. The main parking area is located to the west of the buildings. The surface cover consists of concrete paving and concrete building slabs with landscaping around the site boundary. The paving appears to be in a good condition at the time of the site visit.

An old underground storage tank (UST) fill point was noted on the footpath of Murray Street. The fill point was filled with concrete and it appears that the fuel point was connected to an UST located inside the warehouse. There were no signs of the presence of a UST located inside the warehouse. The tank is likely to be decommissioned and either buried beneath the existing concrete floor or has been removed off site.

It is understood that a culvert is located beneath the warehouse building which extends to the Cooks River. The culvert runs in a diagonal direction from the north-eastern to the south-western corners of the site.

5. REGIONAL GEOLOGY, TOPOGRAPHY AND HYDROGEOLOGY

The Geological Map of Sydney (Scale 1:100,000) published by the Department of Mineral Resources indicates that the residual soils within the site are underlain by Triassic Age Shale of the Wianamatta Group, comprising black to dark grey shale and laminite. The south-western portion of the site may be underlain by Quaternary Age alluvial and estuarine sediments.

The Soil Landscape Map of Sydney (Scale 1:100,000) prepared by the Soil Conservation Service of NSW indicates that the site is predominantly located within the Blacktown landscape area which typically consists of highly plastic and relatively impermeable residual soils. The map also suggests that the south-western portion of the site may be underlain by deep podzolic alluvial soils.

The section south of Smidmore Street slopes gently down to the south and it appears that the level of the site may have been achieved by minor filling across the southern end of the site.

Observation of the local topography suggests that groundwater in the immediate vicinity of the site would be expected to flow in a south-easterly direction towards Alexandra Canal (Sheas Creek), which drains into the Cooks River and Botany Bay. It is noted that there are two current EPA (DECCW) CLM Act Notices issued for the Alexandra Canal.

6. ACID SULPHATE SOILS

A review of the Botany Bay *Acid Sulphate Soils Risk Map* (Edition 2, DLWC, 1997) indicated that the southern portion of the site is located in an area of 'disturbed terrain'. Disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development and soil investigations are required to assess these areas for acid sulphate potential. Therefore, there is low potential for Acid Sulphate Soils (ASS) to be present on the southern portion of the site.

7. STAGE 1 CONTAMINATION ASSESSMENT (DESKTOP STUDY)

The scope of work for the Stage 1 Contamination Assessment comprised a site walkover inspection, review of site history and groundwater bore search. The following is a summary of the findings of the Stage 1 Contamination Assessment.

A review of historical information indicated that the northern portion of the site was a tanning factory in the late 1800s and subsequently re-established as a wool scouring factory before the shopping centre was constructed in late 1980s. The southern portion of the site has been used for commercial / industrial purposes since early 1930s and included a saw mill, margarine production, cordial factory and warehouse.

A review of the Council's development application records revealed that some potentially contaminating industries are operating at the site, including the auto repair service provided by Kmart Oil in the eastern portion of the site and the dry cleaner located near to the Smidmore Street entrance. A film and film processing outlet previously operated at the shopping centre which may have involved solvents and other chemicals being stored at the site.

Based on the findings from the previous DP validation assessment, it is known that there were formerly three USTs present at the southern portion of the site. A disused fuel point was noted on the footpath of Murray Street during site inspection which indicates that a fourth UST may be present in the eastern portion of the warehouse. An electricity sub-station was also noted at the corner of Smidmore Street and Murray Street which was constructed in 2006. This part of the site was previously owned by Energy Australia and may have been used as an electricity sub-station site prior to 2006. On this basis, residual PCBs may be potentially present in this part of the site.

The main sources of potential contamination at the site are likely to be associated with the former and current contaminating activities identified in the Stage 1 assessment. In particular, the tannery, saw mill, the wool scour, the dry cleaners, the disused fuel point located in the footpath of Murray Street and the auto and tyre repair in the eastern portion of the shopping centre complex are potentially significant. Imported fill from unknown sources used to fill and level the site, also has the potential to be contaminated.

Based on the findings, it was recommended that an intrusive investigation be carried out to verify the status of the site with respect to contamination, including groundwater monitoring to obtain an understanding of the hydrogeological conditions and groundwater quality. Acid sulphate soil testing was also recommended as part of the investigation.

8. POTENTIAL CONTAMINANTS

The main sources of potential contamination at the site are likely to be associated with the former and current contaminating activities identified in this assessment. The potential

contaminants based on the sites previous use as ascertained in the Stage 1 Contamination Assessment report are summarised as follows:

Table 1 – Areas of Environmental Concern (AEC's)

Potential AEC[1]	Description of Potential Contaminating Activity	Chemicals of Concern
Tanning	The site history review indicated that the northern section of the site was used for industrial purposed including tanning	Heavy metals (chromium, manganese, aluminium); Ammonium sulfate; Ammonia; Ammonium nitrate; Arsenic Phenolics; Formaldehyde; Sulfide and Tannic acid.
Wool scouring	The site history review indicated that the northern section of the site was used for industrial purposes including wool scouring	Nutrients (e.g. phosphorous, nitrogen); Total dissolved solids (TDS); Oil and grease; Detergents; Pesticides; Bleaching agent (e.g. hydrogen peroxide).
Dry cleaning facility	An operational dry cleaners is located in the central south section of shopping centre on Smidmore Street	Trichlorethylene (TCE) and 1,1,1- trichloroethene (TCA); Carbon tetrachloride; Perchlorethylene (PCE).
Electricity Sub-station	Adjacent to the shopping centre, with the site history review indicating that the existing sub-station was built in 2006 however, an older station might be located at the site prior to that.	TPH, Polychlorinated biphenyl (PCB).
Underground storage tank	USTs were previously located in the southern portion of the site. A disused fuel point was noted in the footpath on Murray Street.	TPH, BTEX, PAH, phenols, lead.
Saw mill	The site history review indicated possible use of the southern section of the site as a saw mill	Heavy metals (arsenic, copper, chromium); Polycyclic aromatic hydrocarbons; Organochlorine pesticides, Ammonia.
Imported filling	May have been used for levelling purposes on site from unknown origins	Heavy metals, TPH, BTEX, PAH, PCB, OCP, asbestos.
Auto repair	Kmart Oil provides tyre repair service. Based on historical development application record, it appears that motor mechanic service was once provided as well.	TPH, BTEX, PAH, Phenols, solvents, heavy metals.
Film and photograph processing	A photograph processing outlet operated at the site between 1987 and 1990.	Photography Hydroquinone, Sodium carbonate, Sodium sulfite, Potassium bromide, Monomethyl para-aminophenol sulphate, Ferricyanide, Chromium, Silver, Thiocyanate, Ammonium compounds, Sulfur compounds, Phosphate, Phenylene diamine, Ethyl alcohol and Thiosulfates, formaldehyde.

AEC: Area of Environmental Concern

9. FIELD WORK AND ANALYSES

9.1. Data Quality Objectives and Project Quality Procedures

The data qualitative objectives (DQO) are qualitative and quantitative statements that specify the quality of the data required for the assessment, as stipulated in the NSW Department of Environment, Climate Change and Water (DECCW) reporting guidelines. The DQO must ensure that the data obtained are sufficient to achieve the objectives of the assessment.

The DQO were developed for this Limited Stage 2 Contamination Assessment in accordance with the Australian Standards "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds*" (AS4482.1-2005) and "*Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile substances*" (AS4482.2-1999).

The seven step DQO process is as follows:

a) State the Problem

b) Identify the Decision

c) Identify Inputs to the Decision

d) Define the Boundary of the Assessment

e) Develop a Decision Rule

f) Specify Acceptable Limits on Decision Errors

g) Optimise the Design for Obtaining Data.

(a) Stating the Problem

The site is proposed to be redeveloped for continued commercial/retail usage. The problems to be addressed by the Limited Stage 2 Contamination Assessment are to identify issues of potential environmental concern/development constraints and areas of elevated potential contamination risks/uncertainties; to evaluate the likely suitability of the site for the proposed redevelopment, and to identify the steps to verify its suitability and/or required to render it suitable for the proposed redevelopment.

(b) Identifying the Decisions

The decisions to be made in completing the Limited Stage 2 Contamination Assessment are as follows:

- Is there likely to be any signs of or elevated potential for soil contamination within the site?
- Does the site, or is the site likely to, present a risk of harm to human health or the environment under the existing or proposed land use?
- Is there likely to be any significant contamination issues that would pose restrictions on the proposed redevelopment?
- Is there any potential for groundwater contamination?
- Are there any off-site migration issues to be considered?
- Does the site require further investigation, remediation and/or validation to ensure suitability for the proposed redevelopment?

(c) Identify Inputs to the Decision

The inputs into the decision process are as follows:

- Historical information regarding past land uses and features (from Stage 1 Contamination Assessment);
- Site operations and observation details;
- Soil and groundwater sampling;
- Soil profile information obtained through the sampling phase;
- *In situ* screening results;
- Chemical test data on analysed soil and groundwater samples; and
- Assessment of test data against applicable soil and groundwater assessment criteria.

(d) Define the Boundary of the Assessment

The boundary of the assessment is the boundary of the proposed commercial redevelopment, as shown on Drawings 1 and 2, Appendix A.

(e) Develop a Decision Rule

The information obtained through this assessment will be used to make a preliminary assessment regarding the contamination issues likely to impact on the proposed redevelopment. The decision rule in conducting this assessment is as follows:

- Sampling locations were distributed accounting for access limitations with several targeted locations such as the potential location of a UST and an operational drycleaners;
- Laboratory test results will be assessed individually, not statistically, given the small sample numbers;
- The site assessment criteria (SAC) are developed and/or endorsed by NSW DECCW, or for analytes where there are no DECCW endorsed criteria, other relevant Australian or internationally recognised standards have been referred to as screening thresholds;
- The soil and groundwater test results will provide an indication of the likely potential for contamination of the site and/or target areas on a broad scale;
- Relevant site information, observations and exceedances of the SAC or Groundwater Investigation Level (GIL) will be used as a basis for the identification of target locations and/or contaminants for further investigation; and
- Further detailed investigation will be recommended, if required.

Laboratory test results will be accepted and considered useable for this assessment under the following conditions:

- All laboratories used are accredited by National Association of Testing Authorities (NATA) for the analyses undertaken;
- All practical quantitation limits (PQL) set by the laboratories fall below the assessment criteria adopted;

- The reported concentrations of analytes in the replicate sample pairs are within accepted limits; and
- The quality assurance/quality control (QA/QC) protocols and results reported by the laboratories comply with the requirements of the National Environment Protection Measure (NEPM) 1999 "*Guideline on Laboratory Analysis of Potentially Contaminated Soils*" and Australian and New Zealand Environment and Conservation Council (ANZECC) 1996 "*Guidelines for the Laboratory Analysis of Contaminated Soils*".

(f) Specify Acceptable Limits on Decision Errors

The limits on decision errors for this assessment are as follows:

- It is accepted that only nine sampling locations are adopted for this assessment and there are areas not sampled and may not be represented by the adopted sampling locations. The purpose of the current assessment is, therefore, to obtain a preliminary indication of the potential for contamination of the site, rather than for "site characterisation";
- The analyte selection is based on the potential for contamination discussed in Section 8 of this report;
- The SAC adopted from the guidelines stated in Section 11 have risk probabilities already incorporated;
- The acceptable limits for replicate comparisons are outlined in Appendix D;
- The acceptance limits for laboratory QA/QC parameters are based on the laboratory reported acceptance limits and those stated in the NEPM 1999 "*Guideline on Laboratory Analysis of Potentially Contaminated Soils*" and ANZECC 1996 "*Guidelines for the Laboratory Analysis of Contaminated Soils*".

(g) Optimise the Design for Obtaining Data

In order to collect data which are reasonably representative of the overall site conditions, sampling locations were distributed across the site where access was permitted. It is noted, however, that access was restricted and that the sampling numbers do not comply with the NSW EPA (now DECCW) publication, *Sampling Design Guidelines* (1995). The sampling

locations are presented in Drawing 4, Appendix A. Procedures for the collection of environmental samples, as described in Sections 9.7 and 9.8, were developed prior to undertaking the contamination assessment phase of works. These are in line with NSW DECCW guidelines and current industry practice. DP employs NATA accredited analytical laboratories to conduct sample analysis.

9.2. Data Quality Indicators

The performance of the assessment in achieving the DQO will be assessed through the application of Data Quality Indicators (DQI), defined as follows:

- **Precision**: A quantitative measure of the variability (or reproducibility) of data;
- **Accuracy**: A quantitative measure of the closeness of reported data to the "true" value;
- **Representativeness**: The confidence (expressed qualitatively) that data are representative of each media present on the site;
- **Completeness**: A measure of the amount of useable data from a data collection activity;
- **Comparability**: The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

An evaluation of the DQI is presented in Section 10 of this report.

9.3. Drilling Methods

A total of nine (9) boreholes (BH1 to BH9) were augered using a truck-mounted drilling rig to depths ranging from 2.5 m to 4.0 m below existing ground level. BH4, BH6 and BH7 were extended by means of rotary drilling and/or coring for the purpose of well installation and groundwater sampling and analysis. Other boreholes were also extended into the bedrock for geotechnical purposes and are reported in the geotechnical investigation report under a

separate cover. The final depths of the boreholes ranged between 9.4 m and 14.8 m below existing ground level.

The locations are shown in Drawing 4 of Appendix A.

9.4. Field Quality Assurance and Quality Control

The field QC procedures for sampling were as prescribed in Douglas Partners' *Field Procedures Manual.*

Field replicates were recovered and analysed for a suite of contaminants by means of both inter- and intra-laboratory analysis. Furthermore, trip spike and trip blank samples were analysed. This is in accordance with standard industry practice and guidelines. The comparative results are outlined in Appendix D.

9.5. Laboratory QA/QC

The analytical laboratory, accredited by NATA, 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 C.

The results of the DP assessment of laboratory QA/QC are shown in Appendix D, with the full laboratory reports included in Appendix C.

9.6. Sample Location and Rationale

Soil / filling samples were collected from nine bores spaced at accessible locations over the four hectares site. The sampling locations were set out to provide a broad, but limited, site coverage, targeting areas of environmental concern (AECs) identified from the Stage 1 Contamination Assessment. However, it should be noted that given the northern part of the

site is an operational shopping centre and the southern part being a warehouse, site access restrictions became a major issue and therefore not all of the identified AECs were investigated in this investigation.

Boreholes BH1-BH4 were located around the perimeter of the shopping centre. A tannery, wool scouring and photo and film processing retail outlet were known to have operated in this part of the site, but given the access restriction these AECs could not be investigated in this round of investigation. The Kmart Oil auto and tyre repair outlet could not be investigated due to insufficient working space.

BH4 was located in the vicinity of the dry cleaning outlet. Potential contaminants associated with dry cleaning outlet include of cis-1,2-dichloroethene, trichloroethene and tetrachloroethene (DCE, TCE and PCE) which are known Dense Non-Aqueous Phase Liquid (DNAPL). DNAPLs are heavier than water and generally sink to the bottom of an impermeable geological stratum. It is understood that in the past some dry cleaning operators used to dispose the used solvents into sewers. As solvents are corrosive, cracks may appear over time and the solvents could then be leaking out of the sewer and entering into the groundwater system. It is not known whether such practice has been carried out at the site. Given the site is an operational shopping centre and surrounded by residential and commercial properties, additional boreholes could not be sunk in the vicinity of the sewerage system at the time of investigation.

Boreholes BH5, BH6, BH7 and BH9 were located around the perimeter of the warehouse located in the southern portion of the site. BH8 was located in the car parking area to the west of the warehouse building. Previous contamination activities associated in this part of the site included a saw mill, margarine and cordial factory. BH6 was located to target a disused fill point located in the footpath of Murray Street but undertaking intrusive investigation within the warehouse building footprint was not permitted at the time of investigation.

Soil samples were collected at intervals based on field observations, including changes in strata and signs of contamination.

Three groundwater monitoring wells (converted from Boreholes 4, 6 and 7) were positioned adjacent to a possible underground storage tank (UST) (BH6), an operational drycleaners (BH4) and the third, BH7, to triangulate the dataset in order to ascertain the direction and flow and, hence, the potential migration patterns. All three wells were developed and purged prior to recovering samples for chemical analysis.

It is known that a stormwater channel is running beneath the shopping centre and warehouse building which can potentially be a preferential pathway to transport potential contaminants of concern in and out of the site. Again, intrusive investigation in the vicinity of the stormwater channel could not be undertaken during this round of investigation.

9.7. Soil Sampling Procedure

All sample locations were cleared for services and underground pipes by a services locator and review of DBYD plans.

All sampling data was recorded on DP borehole logs with essential information included in the chain-of-custody sheets. The general sampling procedure adopted for the collection of environmental samples is summarised below:

- collect soil samples directly from the test bore using disposable sampling equipment;
- transfer samples into laboratory-prepared glass jars, completely filled to ensure the headspace within the sample jar is minimised, and capping immediately to minimise loss of volatiles;
- 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.

Envirolab Services (NATA accreditation number: 2901) and Labmark Pty Ltd were employed to conduct the primary environmental sample analysis. The laboratory is required to carry out routine in-house QC procedures.

9.8. Installation of Groundwater Wells and Groundwater Sampling Procedure

Piezometers were installed in BH4, BH6 and BH7 to depths of 11 m, 10 m and 12 m respectively, below ground level (bgl). Following completion of drilling, 50 mm diameter, acid washed, class 18, PVC casing and machine slotted well screen was installed. The well was completed with a gravel pack over the screening section, sealed using a bentonite plug of 1 m thickness. As no signs of free groundwater were noted in BH6 and BH7 due to the use of drilling fluid at the time of installation of the groundwater piezometers, the actual level of groundwater table was not known at the time. Free groundwater was observed at 8.5 m bgl in BH4 during augering. Details of well designs are outlined below in Table 2.

Table 2 - Well Construction Details

	BH4	BH6	BH7
Location			
	Liquor Land loading dock – adjacent to operational drycleaners	Murray St – adjacent to possible UST	Edinburgh Rd
Construction			
PVC Casing	Ground Level-5.0	Ground Level-4.0	Ground Level-6.0
Slotted Well Screen	5.0-11.0	4-10.0	6-12.0
Target Strata	Residual Clay / Shale	Residual Clay / Shale	Residual Clay / Shale
Gravel Pack	4.5-11.0	3.5-10.0	5.5-12.0
Bentonite	3.5-4.5	2.5-3.5	4.5-5.5

Note: All measurements in meters below ground level (m bgl).

Following installation, the wells were checked (and confirmed to have groundwater) and developed on 26 March 2010 using a mini-twister pump to remove three well volumes of water from each well. As the wells are situated in a semi-confined aquifer (ie, under pressure), the wells could not practically be purged dry. The wells were then left to recharge for three days prior to sampling, with the exception of BH4. BH4 was developed only prior to sampling due to site access restrictions as the borehole is located inside one of the loading docks. Sampling was undertaken on 30 and 31 March 2010, using a low flow sampling pump (Geo-pump). Field parameters were recorded and allowed to equilibrate prior to sampling.

Reduced levels at sampling points and the groundwater levels prior to sampling were as follows:

Table 3 – Groundwater Levels

Bore ID	Reduced Level (surface, m AHD)	Water Level (m bgl)	Water Level (m AHD)
BH4	5.60	3.2	2.60
BH6	4.46	2.4	2.06
BH7	4.91	3.2	1.71

From the groundwater levels observed prior to sampling, groundwater levels are falling approximately in a southerly direction, towards Alexandra Canal which discharges to the Cooks River prior which it turn exits into Botany Bay. It is noted that the presence of an underground stormwater channel passing beneath the site may have an influence on the groundwater flow direction.

Sample handling and transport procedures were conducted as set out below:

- Samples were collected directly from the Geo-pump and placed in laboratory prepared sample containers by an environmental scientist;
- Labelling of sample containers with individual and unique identification, including project number and sample location;
- Placements of samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Chain-of-Custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

9.9. Analytical Rationale

The analytical scheme was designed to obtain a preliminary indication of the potential presence and possible distribution of common contaminants that may be attributable to past and present activities within the site, as discussed in Section 8.

The site area is understood to be approximately four hectares. According to the NSW EPA publication, *Sampling Design Guidelines* (1995), a minimum of 50 systematic sampling locations would be required to fully characterise the site. Given the preliminary nature of this assessment, it was considered that a reduced sampling regime comprising nine sampling locations (approximately 20% of the sampling density) is appropriate to provide an indication of the potential for contamination within the site in general.

Some areas of possible environmental concern were noted in Section 7 from the review of the previous site usage and also based on site observations, noting particularly the potential presence of an UST on Murray Street and an operational dry cleaning facility on Smidmore Street, as well as filling in several locations within the site. However, it should be noted that not all the identified AECs could be investigated during this round of investigation due to site access restrictions as detailed in Section 8.6 of this report.

Laboratory analytical methods as stated by Envirolab, are provided in the laboratory reports Appendix C and are summarised in the QA/QC in Appendix D.

The soil and groundwater analytical schemes adopted are presented in Tables 4 and 5.

Table 4 – Analytical Scheme for Soils

Sample ID (Location – Depth)	Soil Type	Heavy Metals	TPH/ BTEX	PAH	VOC	OCP	PCB	Phenols	SPOCAS	Asbestos
BH1/0.3-0.5	Fill	✓	✓	✓		✓	✓	✓		✓
BH1/0.8-1.0	Fill	✓	✓	✓		✓	✓	✓		✓
BH2/0.4-0.5	Fill	✓	✓	✓		✓	✓	✓		✓
BH2/1.8-2.0	Natural	✓	✓	✓		✓	✓	✓		
BH3/0.5	Fill	✓	✓	✓		✓	✓	✓		✓
BH3/2.0	Natural								✓	
BH3/3.0	Natural	✓	✓	✓		✓	✓	✓		
BH4/0.5	Fill	✓	✓	✓	✓	✓	✓	✓		✓
BH4/4.3-4.5	Natural								✓	
BH4/5.8-6.0	Natural	✓	✓	✓	✓	✓	✓	✓		
BH5/0.05-0.1	Fill	✓	✓	✓		✓	✓	✓		✓
BH5/2.3-2.5	Natural	✓	✓	✓		✓	✓	✓		
BH6/0.15-0.3	Fill	✓	✓	✓		✓	✓	✓		✓
BH6/1.9-2.0	Natural	✓	✓	✓		✓	✓	✓		
BH7/0.4-0.5	Fill	✓	✓	✓		✓	✓	✓		✓
BH7/2.8-3.0	Natural	✓	✓	✓		✓	✓	✓		
BH8/0.4-0.5	Fill	✓	✓	✓		✓	✓	✓		✓
BH8/3.0-3.2	Natural	✓	✓	✓		✓	✓	✓	✓	
BH9/0.2-0.3	Fill	✓	✓	✓		✓	✓	✓		✓
BH9/2.4-2.5	Natural	✓	✓	✓		✓	✓	✓		

Table 5 – Analytical Scheme for Groundwater

Sample ID	Heavy Metals	TPH/ BTEX	PAH	VOC	Hardness
BH4	✓	✓	✓	✓	✓
BH6	✓	✓	✓	✓	✓
BH7	✓	✓	✓	✓	✓

10. QA/QC DATA EVALUATION

The following table provides a list of the data quality indicators (refer to Section 9.2) adopted for this Limited Stage 2 Contamination Assessment and the methods adopted in ensuring that the data quality indicators were met. Reference should be made to all previous report sections and referenced Appendices for specific details.

Table 6 - QA/QC Evaluation

DATA QUALITY INDICATOR	METHOD(S) OF ACHIEVEMENT
Data Precision and Accuracy	Use of trained and qualified field staff; for sampling and investigation Appropriate sampling method used, minimising the opportunity for cross-contamination. Use of analytical laboratory (Envirolab) experienced in the analyses undertaken, with appropriate NATA accreditation. NATA accreditation requires use of adequately trained and experienced analytical staff. Appropriate and validated laboratory test methods used. Adequate laboratory performance based on results of the blank samples, matrix spike samples, control samples, duplicates and surrogate spike samples.
Data Representativeness	Sampling coverage limited, but intended to be only preliminary in nature Coverage of potential contaminants, based on history, site activities and site features. Adequate laboratory internal quality control and quality assurance methods, complying with the NEPM.
Documentation Completeness	Preparation of bore logs, sample location plan and chain of custody records Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody NATA accredited laboratory results certificates provided
Data Completeness	Review of documented information pertaining to site history Analysis for potential contaminants of concern.
Data Comparability	Using appropriate techniques for sample recovery Experienced sampler used Using appropriate sample storage and transportation methods Use of NATA accredited laboratory Test methods consistent for each sample

Based on the above, it is considered that the quality assurance and quality control data quality indicators have been generally complied with. As such, it is concluded that the laboratory test data obtained are reliable and useable for this preliminary assessment.

11. SITE ASSESSMENT CRITERIA

11.1. Soils

The subject site will continue to be used for commercial purposes. The analytical results are therefore assessed against the following:

- the health-based investigation levels (HIL) for commercial/industrial development (Appendix II, HIL Column 4) published in the NSW EPA *Contaminated Sites Guidelines for the NSW Site Auditor Scheme*, 2nd Edition, 2006, for all soils. The current zoning at the site is for commercial and industrial uses;
- TPH and BTEX threshold concentrations (in soil) for sensitive land use from NSW EPA's *Guidelines for Assessing Service Station Sites,* 1994, typically used for sensitive land use. Recommended in the *Guidelines for the NSW Site Auditor Scheme* for soils for all land uses.
- There are currently no NSW DECCW produced or endorsed guidelines for the assessment of asbestos in soils. However, it is understood that the pending revision to the NEPM will be incorporating an asbestos assessment process mirroring the current approach adopted by the WA Department of Health in their publication *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2009). The guidelines suggest the following SAC for commercial/industrial land use (with minimal soil access):
  - No visible asbestos pieces in the top 100 mm of the soil profile;
  - 0.001% asbestos fines (AF) or fibrous asbestos (FA) by weight; and
  - 0.04% asbestos cement materials (ACM) by weight.

AF and FC are defined as materials passing through a 7 mm x 7 mm sieve, whilst ACM are retained on the same sieve.

The SAC for asbestos outlined above will be adopted for the assessment of asbestos in the site.

The adopted SAC for the analytes to be included in the assessment are shown on Table 7.

Table 7 - Site Assessment Criteria

Contaminant	Adopted Criteria (SAC)	Source
TPH		NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils. [Note that the NEPM health-based criteria must not be applied unless laboratory differentiation of aromatic and aliphatic compounds has been conducted (*Guidelines for the NSW Site Auditor Scheme*, 2nd ed., 2006)]
$C_6 – C_9$	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 EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for commercial or industrial developments (Appendix II, HIL Column 4).
arsenic (total)	500 mg/kg	
cadmium	100 mg/kg	
chromium	600000 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 visible asbestos present in soil at the surface 0.001% asbestos fibres by weight 0.05% asbestos cement by weight	WA Department of Health *Guidelines for the Assessment, Remediation, and Management of Asbestos Contaminated Sites in Western Australia*, May 2009

NOTE: NSW EPA is now part of the NSW DECCW.

11.2. Acid Sulphate Soils

Acid sulphate soils are naturally occurring sediments containing iron sulphides. When acid sulphate soils are exposed to air the oxygen reacts with iron sulphides in the sediment producing sulphuric acid. This acid can sometimes be produced in large quantities and drain

into waterways causing severe short and long term socio-economic and environmental impacts.

ASS can either be classified as 'actual acid sulphate soils' (AASS) which are soils that have already reacted with oxygen to produce acid, or 'potential acid sulphate soil' (PASS) which are soils that contain iron sulphide, but have not been exposed to oxygen (e.g. soils below the water table) and therefore have not produced sulphuric acid (although they have the potential to do so).

In NSW, development occurring in ASS affected areas is governed and managed by Local Environmental Plans, the Acid Sulphate Soils Management Advisory Committee Planning Guidelines and the *Acid Sulphate Soils Manual* developed by the Acid Sulphate Soils Management Advisory Committee (ASSMAC).

Based on site observations, the ASS material is likely to be comprised fine texture materials, defined as medium to heavy clays and silty clays in the ASS Manual (ASSMAC, 1996).

Table 8 – Threshold Criteria for ASS for Fine Texture Material

Action Criteria		Threshold[1]
Disturbance of 1 – 1000 tonnes of material		
Acid Trail (mol H^+/tonne)	TPA	62
	TSA	62
Sulphur trail (%)	Spos	0.1
Disturbance of greater than 1000 tonnes of material		
Acid Trail (mol H^+/tonne)	TPA	18
	TSA	18
Sulphur trail (%)	Spos	0.03

Notes:

1. Extract from ASSMAC ASS Manual, 1996 for fine texture material, defined as medium to heavy clays and silty clays.
2. TPA Total Potential Acidity
3. TSA Total Sulphidic Acidity (TPA -TAA)
4. S_{POS} Peroxide oxidisable sulphur

11.3. Groundwater

The levels of contaminants in groundwater were assessed against Groundwater Investigation Levels (GILs) adopted from applicable guidelines, specifically, the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Based on the measured standing water levels obtained during groundwater monitoring, the inferred groundwater flow direction is to the south towards Alexandra Canal. Alexandra Canal is a tidal waterway, and therefore, the trigger values for the protection of 95% of marine species, as stipulated in the ANZECC (2000) were adopted. The ANZECC 2000 Guidelines and their source documents are detailed in Table 9.

Table 9 – Groundwater Investigation Levels for the Protection of a Marine Ecosystem (ANZECC)[a]

Compound	Groundwater Investigation Levels (GILs) (µg/L)
Arsenic	2.3 [c]
Cadmium	5.5 [c]
Chromium(III)	4.4 [c]
Copper	1.3 [c]
Lead	4.4 [c]
Mercury(Total)	0.4 [c]
Nickel	70 [c]
Zinc	15 [c]
TPH: C_6-C_9	150 [d]
TPH: C_{10}-C_{36}	600 [d]
Benzene	700 [c]
Toluene	300 [e]
Ethyl benzene	140 [e]
Xylene	380[e]
PAH-total	not available
Naphthalene	71 [c]
Cis-1,2-dichloroethene	370 [f]
Tricholoroethene	330 [b]
Tetrachloroethene	70 [b]

Notes for Table 9:

a. Australian and New Zealand Environment and Conservation Council '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality – October 2000'.*
b. Trigger Values for a 95% Level of Protection of Species in Fresh Water (Table 3.4.1) adopted in the absence of trigger values for marine species
c. Trigger Values for a 95% Level of Protection of Species in Marine Water (Table 3.4.1).
d. ANZECC threshold not available. It is noted there is a 'low reliability' Interim Working Value (Section 8.3.7) final chronic value of 7 µg/L for petroleum hydrocarbon but that commercial laboratories are not generally able to achieve the necessary detection limits to demonstrate compliance. For reference purposes, DP has referred to other available Australian guidelines for TPH *viz. Airport (Environment Protection) Regulations* (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination. It should be noted however that these have not been endorsed by DECCW and are used as 'screening levels' only.
e. 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 and ethyl benzene in marine water.
f. Reference value obtained from USEPA Regional Screening Levels – Safe Drinking Water Act, maximum contaminant level (MCL).

12. RESULTS

12.1. Field Observations

Details of the sub-surface conditions encountered during the course of the investigation are included in the borehole logs (BH1 to 9) in Appendix E. The bore locations are shown on Drawing 4, Appendix A.

In summary, the borehole investigations indicate that the site is underlain by filling, stiff to very stiff clay and hard shaly clay to depths between 6.0 and 10.0 m below existing site level overlying shale, siltstone and laminite to the maximum depth of investigation at 14.8 m below existing site level.

No indicators of potential contamination were noted in any of the bores. Alluvial gravels and clays were noted in BH3, BH4, BH7 and BH8 above the groundwater table and selected samples were submitted for SPOCAS analysis, with the exception at BH7. At the time of investigation, a 'sizzling' noise was noted when adding water into the borehole to assist drilling, which indicates the presence of acid sulphate soil at that borehole location. Alluvial materials were not observed in other boreholes during the investigation.

Groundwater or seepage water was recorded during the augering of BH4 at 8.5 m bgl. As previously noted, some time after drilling, the water level rose to 3.0 m bgl (recorded 30 March 2010). The drilling of all other bores involved the use of drilling fluids in rotary drilling of coring to/through bedrock and, as such, prevented the detection of groundwater or seepage water during drilling.

Table 10 below summarises the subsurface profile encountered during the environmental and investigations.

Table 10 – Subsurface Profile

Sampling Location	Asphalt / Concrete (m)	Filling* (m)	Silty Clay (m)	Stiff Clay (m)	Shaly Clay (m)	Bedrock (m)	Completion Depth (m)
BH1	-	0-0.6	0.6-1.0	1.0-5.0	5.0-5.91	5.91	14.5
BH2	0-0.18	0.18-0.6	0.6-1.0	1.0-7.1	7.1-9.9	9.9	14.15
BH3	-	0-1.3	1.3-4.4	4.4-8.8	-	8.8	14.8
BH4	0-0.16	0.6-1.1	-	1.1-8.7	-	8.7	11.0
BH5	0-0.05	0.05-1.2	-	1.2-6.7	6.7-10.05	10.05	10.2
BH6	0-0.15	0.15-0.4	-	0.4-6.5	6.5-8.5	8.5	10.0
BH7	-	0-2.8	-	2.8-9.0	9.0-11.0	11.0	14.5
BH8	0-0.14	0.14-1.25	1.25-2.0	2.0-8.5	8.5	-	9.4
BH9	-	0-0.4	0.4-1.4	1.4-5.0	5.0-7.2	7.2	12.0

Note: * constitutes topsoil / filling

12.2. Analytical Results

12.2.1. Soils

The analytical results for the recovered soil samples are presented on the test results certificates in Appendix C. The results are also summarised in the following Table 11, together with the SAC and the adopted waste classification criteria.

12.2.2. Acid Sulphate Soils

The analytical results for the recovered soil samples subject to SPOCAS analysis are presented on the test results certificates in Appendix C. The results are also summarised in the following Table 12.

12.2.3. Groundwater

The analytical results for the recovered soil samples are presented on the test results certificates in Appendix D. The results are also summarised in the following Table 13, together with the GIL criteria adopted.

Table 11 - Results of Soil Analysis (All results in mg/kg unless otherwise stated)

Sample ID	Sampling Date	Soil Type	Heavy Metals									Polycyclic Aromatic Hydrocarbons (PAH)				Total Petroleum Hydrocarbons (TPH)		Monocyclic Aromatic Hydrocarbons (BTEX)				VOC	Asbestos	Total Polychlorinated Biphenyls (PCB)	Organochlorine Pesticides (OCP)2	Phenols
			Arsenic	Cadmium	Chromium[1]	Copper	Lead		Mercury	Nickel	Zinc	Benzo(a)pyrene		PAH		C6-C9	C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylene					
							SSC#	TCLP##				SSC#	TCLP##	SSC#	TCLP##											
71645.00 - Marrickville Metro, Marrickville																										
BH1/0.3-0.5	12/03/2010	Fill	<4	<0.5	23	27	84	-	0.3	5	40	5.8	<0.001	44.3	<0.001	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH1/0.8-1.0	12/03/2010	Natural	4	<0.5	22	5	27	-	<0.1	2	10	0.1	-	1.2	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH2/0.4-0.5	18/03/2010	Fill	35	<0.5	35	28	48	-	0.1	38	64	0.5	-	5.4	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH2/1.8-2.0	18/03/2010	Natural	<4	<0.5	16	13	13	-	<0.1	2	2	<0.05	-	<0.1	-	<25	<250	<0.5	<0.5	<1.0	<3.0		-	-	-	<5.0
BH3/0.5	23/03/2010	Fill	<4	<0.5	15	10	47	-	0.1	3	47	0.2	-	2.2	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH3/3.0	23/03/2010	Natural	<4	<0.5	14	6	8	-	<0.1	4	3	<0.05	-	<0.1	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	<5.0
BH4/0.5	23/03/2010	Fill	6	<0.5	29	24	38	-	0.2	10	48	0.2	-	1.6	-	<25	<250	<0.5	<0.5	<1.0	<3.0	<1	NAD	<0.1	<0.1	<5.0
BH4/5.8-6.0	23/03/2010	Natural	<4	<0.5	5	10	9	-	<0.1	1	3	<0.05	-	<1	-	<25	<250	<0.5	<0.5	<1.0	<3.0	<1	-	-	-	<5.0
BH5/0.05-0.1	17/03/2010	Fill	<4	<0.5	3	260	8	-	<0.1	8	49	<0.05	-	<0.1	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH5/2.3-2.5	17/03/2010	Natural	<4	<0.5	21	20	17	-	<0.1	11	16	0.1	-	0.5	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	<5.0
BH6/0.15-0.3	16/03/2010	Fill	5	0.7	18	70	28	-	<0.1	33	62	1.2	<0.001	7.1	<0.001	<25	640	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH6/1.9-2.0	16/03/2010	Natural	<4	<0.5	20	14	17	-	<0.1	5	7	<0.05	-	<0.1	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	<5.0
BH7/0.4-0.5	23/03/2010	Fill	6	<0.5	16	28	72	-	0.2	5	74	5	<0.001	57.9		<25	170	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH7/2.8-3.0	23/03/2010	Natural	14	<0.5	17	28	110	-	0.2	5	100	2.4	-	27.4	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	-	<0.1	<5.0
BH8/0.4-0.5	24/03/2010	Fill	6	0.5	12	61	510	1.1	0.3	9	410	3.6	-	32.6	-	<25	310	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	1.2	<5.0
BH8/3.0-3.2	24/03/2010	Natural	<4	<0.5	14	9	35	-	<0.1	3	22	0.09	-	0.69	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	<5.0
BH9/0.2-0.3	22/03/2010	Fill	<4	<0.5	8	62	57	-	<0.1	7	200	0.1	-	0.5	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	NAD	<0.1	<0.1	<5.0
BH9/2.4-2.5	22/03/2010	Natural	<4	<0.5	19	8	16	-	<0.1	2	15	<0.05	-	<0.1	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	<5.0
BD1/17032010	17/03/2010		<4	<0.5	3	250	9	-	<0.1	8	51	-	-	-	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	-
BD1/18032010	18/03/2010		37	<0.5	46	33	53	-	0.1	40	74	-	-	-	-	<25	<250	<0.5	<0.5	<1.0	<3.0	-	-	-	-	-
BD1/18032010(interlab)	18/03/2010		39	0.2	47	27	71	-	0.18	35	75	-	-	-	-	<10	<250	<0.2	<0.5	<0.5	<1.5	-	-	-	-	-
TS1	17/03/2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98%	98%	98%	97%	-	-	-	-	-
TB1	17/03/2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<1.0	<3.0	-	-	-	-	-
TS2	24/03/2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98%	97%	98%	98%	-	-	-	-	-
TB2	24/03/2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<1.0	<3.0	-	-	-	-	-
Site Assessment Criteria																										
SAC*			500	100	60%	5000	1500	-	75	3000	35000	5	-	100	-	65	1000	1	130	50	25	1-20	NAG	50	50/250/1000/50	42500
PPIL			20	3	400%	100	600	-	1	60	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Classification Threshold Criteria (Without TCLP)[3]																										
General Soild Waste (CT1)			100	20	100	ND	100	-	4	40	ND	0.8	NA	-	NA	-	-	10	288	600	1000		NAD	NA	<50	288
Restricted Solid Waste (CT2)			400	80	400	ND	400	-	16	160	ND	3.2	NA	-	NA	-	-	40	1152	2400	4000		NAD	NA	<50	1152
Waste Classification Threshold Criteria (With TCLP)[4]																										
General Solid Waste			500	100	1900	ND	1500	5	50	1050	ND	10	0.04	200	NA	650	10000	18	518	1080	1800		NAD	<50	<50	518
Restricted Solid Waste			2000	400	7600	ND	6000	20	200	4200	ND	23	0.16	800	NA	2600	40000	72	2073	4320	7200		NAD	<50	<50	2073
Background Ranges			0.2-30	0.3-2.0	0.5-110	1-190	<2-200	-	0.001-0.1	2-400	10-300	<0.05	-	0.95-5.0	-	650	<250	0.05-1.0	0.1-1	<0.1	<0.3	-	NAD	0.02-0.1	<0.001-0.05	<5

Notes

*	NSW EPA Contaminated Sites: Guidelines for the NSW Site Auditors Scheme, 2006. Health-based guidelines for commercial/industrial (Column 4)
1	All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment
2	Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
3	NSW DECC (2008) Waste Classification Guidelines Table 1: Contaminant Threshold Values for Waste by Chemical Assessment without the Leaching (TCLP) test.
4	NSW DECC (2008) Waste Classification Guidelines Table 2: Leachable Concentration (TCLP) and specific contaminant concentration (SCC) Values for Classifying Waste by Chemical Assessment
#	Specific Contaminant Concentration (Total Concentration)
##	Toxicity Characteristic Leaching Procedure (TCLP)
-	Not Tested
NAD	No Asbestos Detected
NAG	No Asbestos in Ground
BD1/17032010	Field Intra Lab Duplicate of sample BH5/0.05-0.1
BD1/18032010	Field Intra Lab Duplicate of sample BH2/0.4-0.5
BOLD	Exceedance of the General Solid Waste Thresholds
BOLD	Exceedence of the Site Assessment Criteria
BOLD	Exceedence of the Provisional Phtoxicity-Based Investigation Levels

Table 12 - Results of SPOCAS Analysis

Sample	Sampling date	pH kcl	TAA pH 6.5	pH Ox	TPA pH 6.5	TSA pH 6.5	SPOS	a-SPOS	a-Net Acidity	Liming Rate
		pH units	moles H+/ tonne	pH units	moles H+/ tonne	moles H+/ tonne	%w/w	moles H+/ tonne	moles H+/ tonne	kg/tonne
71645.00 - Marrickville Metro, Marrickville										
BH3/2.0	23/03/2010	3.8	87	3.6	110	22	0.16	10	100	7.5
BH4/4.3-4.5	23/03/2010	3.8	25	3.8	103	77	0.025	15	43	3.2
BH8/3-3.2	24/03/2010	4.1	55	3.9	50	<5	0.02	12	68	5.1
ASSMAC Action Criteria for 1 to 1000 tonnes of of disturbed material*										
		-	-	-	62	62	0.1	-	-	
ASSMAC Action Criteria for greater than 1000 tonnes of of disturbed material*										
		-	-	-	18	18	0.03	-	-	

Notes:

Bold	exceed ASSMAC Action Criteria
pH_{KCl}	Non-oxidised pH
pH_{ox}	Oxidised pH
S_{POS}	Peroxide oxidisable sulphur
TAA	Total Actual Acidity
TPA	Total Potential Acidity
TSA	Total Sulphidic Acidity (TPA-TAA)
*	Action Criteria based on 'Fine texture' medium to heavy clays and slity clays

Table 13 - Results of Water Analysis (All results in µg/L unless otherwise stated)

Sample ID	Heavy Metals								PAH [2]					TPH		BTEX				VOC [2]																		Hardness (mg CaCO3/L)
	As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	Naphthalene	Anthracene	Phenanthrene	Fluoranthene	Benzo(a)pyrene	C6-C9	C10-C36	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Chloroform	1,2-Dichloroethane	1,1,1-Trichloroethane	cis-1,2-dichloroethene	Tricholoroethene	Tetrachloroethene	Carbon Tetrachloride	1,2-Dichloropropane	cis-1,3-Dichloropropene	tans-1,3-Dichloropropene	1,1,2-Trichloroethane	1,3-Dichloropropane	1,1,2,2-Tetrachloroethane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,2,3-Trichlorobenzene	
71645.00 - Marrickville Metro, Marrickville																																					
BH4	<1	0.1	1	7	<1	<0.5	19	82	<1	<1	<1	<1	<1	<10	<250	<1	<1	<1	<3	<1	<1	<1	4.5	1.4	1.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	160
BH6	<1	<0.1	2	33	3	<0.5	3	100	<1	<1	<1	<1	<1	<10	420	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	13
BH7	<1	<0.1	<1	<1	<1	<0.5	1	18	<1	<1	<1	<1	<1	<10	<250	<1	<1	<1	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	690
BD1 Intra	<1	<0.1	<1	<1	<1	<0.5	1	18	<1	<1	<1	<1	<1	<10	<250	<1	<1	<1	<3	-	-	-				-	-	-	-	-	-	-	-	-	-	-	690
Groundwater Investigation Levels (GIL) [3]																																					
Fresh water [4]	13.0	0.2	3.3-1*	1.4	3.4	0.60	11	8	16	0.01*	0.6*	1*	0.1*	-	-	950	180*	80*	625*	370*	1900*	270*	-	330	70	240*	900*	0.1*	0.1*	6500	1100*	400*	260	60	160	3	-
Marine water [5]	2.3	5.5	4.4	1.3	4.4	0.4	70	15	70	0.01*	0.6*	1*	0.1*	-	-	700	180*	5*	625*	370*	1900*	270*	-	-	-	240*	900*	0.8*	0.8*	1900	1100*	400*	260*	60*	160*	3*	-
Reference Values [6]																																					
														150	600								370														

Notes:

1	All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment
2	only those compounds for which GILs have been determined are included in the list
3	ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (unless otherwise stated)
4	Fresh water trigger values for slightly to moderately disturbed ecosystems - 95% species protection
5	Marine water trigger values for slightly to moderately disturbed ecosystems - 95% species protection
6	Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination.
	DCE reference value obtained from USEPA.
*	insufficient data for reliable trigger value. Interim working value or low reliability value used for screening purposes
-	not defined/ not analysed/ not applicable
Bold	exceeds GIL

13. INTERPRETATION AND DISCUSSION OF LABORATORY RESULTS

13.1. Chemical Contaminants in Soil

A total of 18 soil samples were assessed for a suite of potential contaminants of concern including heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), PAH, TPH, BTEX, VOC, PCB, OCP, phenols and asbestos, with three selected samples also being subject to a SPOCAS test for acid sulphate soils.

The laboratory results (Table 11) indicated that all contaminant concentrations in the soil samples analysed were within the adopted SAC, with the exception of the soil sample from the filling at BH1, which showed a slight exceedance of the SAC for benzo(a)pyrene [B(a)P].

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. According to this criteria, the location of BH1 is not a 'hotspot' having a concentration of 5.8 mg/kg, which is less than 2.5 times the SAC for industrial/commercial land use of 5.0 mg/kg.

Given the small number of soil results obtained from this investigation, it is considered that there are insufficient data for statistical analysis. The presence of benzo(a)pyrene is likely to be attributable to the filling material.

Low levels of benzo(a)pyrene and PAHs were reported in most of the soil samples collected from the filling. Furthermore, low levels of TPH were detected in the filling at BH6, BH7 and BH8, which may be caused by the presence of PAH in the filling. The source of the PAH is likely to be from the unknown source of the filling.

BTEX, PCB, OCP and phenol concentrations were reported below the laboratory limit of reporting in all soil samples analysed. VOC was also analysed in the soil samples collected from BH4, located in the vicinity of the dry cleaner. The reported VOC concentrations were also below the limit of reporting.

Low levels of heavy metals were detected in the filling and natural soils across the site but concentrations were all below their respective SACs.

No asbestos fibres were detected in the analysed samples and no asbestos-based materials were sighted.

13.2. Acid Sulphate Soils

Based on site observations, SPOCAS analysis was carried out on samples BH3/2.0, BH4/4.3-4.5 and BH8/3-3.2. It should be noted that all three samples were from above the water table. The results shown in Table 12 indicate that:

- Total Potential Acidity (TPA) and Total Sulphidic Acidity (TSA) exceeded the action criteria in two soil samples collected from BH3 and BH4; and
- Peroxide Oxidisable Sulphur (S_{pos}) levels were low and well within the action criteria in samples BH4/4.3-4.5 and BH8/3-3.2 but exceeded the action criteria in sample BH3/2.0.

The findings confirm that the soil at three borehole locations should be regarded as ASS. This is in agreement with the acid sulphate soil maps of the site. ASS was encountered at similar depths between 2.0 m and 4.5 m beneath the filling and the residual clay. It is noted that organic matter was noted at depths between 2.8 m and 6.0 m in BH7 during rotary drilling however soil samples could not be retrieved for SPOCAS analysis. Soils of an ASS nature were not noted in other boreholes at the time of drilling.

On this basis, it is considered that further ASS testing should be carried out to confirm the extent and status of the presence of ASS and develop an acid sulphate soil management plan for the proposed development.

13.3. Chemical Contaminants in Groundwater

Groundwater samples were taken from wells BH4, BH6 and BH7. Groundwater monitoring wells were installed to reflect both up-gradient and down-gradient conditions, with a view to target

areas of environmental concern including the potential UST location and the operational drycleaners.

Groundwater samples were analysed for hardness, heavy metals, TPH, BTEX, VOC and PAH. Water quality parameters such as pH and conductivity were measured during sampling. The pH ranged from 4.3 to 5.8, exhibiting slightly acidic characteristics. The measured electrical conductivities were variable, ranging from -0.1 to +384 μS/cm. Odours were not detected in the groundwater at the time of sampling.

Calculated hardness values of groundwater samples in BH4, BH6 and BH7 ranged from 13 μg/L (BH6) to 690 μg/L ($CaCO_3$) (BH7). According to Table 3.4.4, Volume 1 in ANZECC (2000), the groundwater samples from BH6 are classified as soft, samples from BH4 are classified as hard and BH7 as extremely hard. On this basis, the hardness modified trigger levels with respect to heavy metal concentrations in groundwater were not adopted given the variable hardness of groundwater across the site.

BTEX, TPH C_6-C_9 and PAH concentrations were below the laboratory limit of reporting in all three groundwater samples analysed. Low concentrations of TPH C_{10}-C_{36} were reported in the groundwater sample collected from BH6, located adjacent to an UST fuel point on the footpath of Murray Street. The presence of the TPH may be attributable to leakage from the former UST pipework and/or UST. It should be noted that the reported concentrations have not exceeded the adopted GIL.

Low level of cis-1,2-dichloroethene, trichloroethene and tetrachloroethene (DCE, TCE and PCE) were reported in groundwater sample collected from BH4. Although these concentrations do not exceed the GIL, it is notable that BH4 is located adjacent to the operational dry cleaners on Smidmore Street and that these chemicals are commonly used for dry cleaning. It is recommended that further groundwater investigation be carried out around the dry cleaner shop to obtain a better understanding of the presence of DCE and TCE in the underlying groundwater.

All other samples analysed for VOC recorded concentrations below laboratory detection limits and thus below the GIL.

Concentrations of copper were reported above the GIL in groundwater samples collected from BH4 and BH6 and concentrations of zinc were detected above the GIL in all three monitoring wells sampled. Nickel concentrations were also reported above the GIL in BH4. Concentrations of other heavy metals are reported below their respective GILs or laboratory limit of reporting. A stormwater channel is running beneath the southern portion of the site which may have some influence on localised groundwater quality. Furthermore, it is noted that the site is approximately 1 km away from the Alexandra Canal which is on the NSW DECCW contamination record of notices. It is considered that the presence of the heavy metals is attributed to the regional groundwater quality, rather than a groundwater quality issue associated with the current and past activities at the site.

13.4. Preliminary Waste Classification

The preliminary waste classification was generally conducted in accordance with the six step process as set out in the NSW DECC *Waste Classification Guidelines*, 2008 as set out in Table 14 below.

Table 14 - Six Step Classification

Step	Comments	Rationale
1. Is it special waste?	No	Waste not considered to have clinical, asbestos containing material or tyre waste
2. Is it liquid waste?	No	Waste composed of soil
3. Is the waste "pre-classified"?	No	Filling material does not fall into one of the pre-classified categories
4. Does the Waste have hazardous waste characteristics	No	Waste not observed to/ or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances, substances liable to spontaneous combustion
5. Chemical Assessment	Conducted	Refer to Table 11
6. Is the Waste Putrescible?	No	All observed components of filling composed of materials pre-classified as non-putrescible (i.e. soil and gravel)

The concentrations of TPH, BTEX, PCB, OCP, Phenols and VOC were below the limit of reporting and were within the threshold criteria for General Solid Waste (non-putrescible) without toxicity characteristic leaching procedure (TCLP) (SCC1).

Whilst the majority of heavy metals and PAHs were recorded at low levels, the detected concentration of lead and benzo(a)pyrene in samples:

- Benzo(a)pyrene in BH1/0.3-0.5, BH6/0.15-0.3, BH7/0.4-0.5, BH7/2.8-3.0 and BH8/0.4-0.5 exceeded the threshold criteria (0.8 mg/kg) for General Solid Waste (non-putrescible) without TCLP (SCC1); and
- Lead in BH7/2.8-3.0 and BH8/0.4-0.5 exceeded the threshold criteria (100 mg/kg) for General Solid Waste (non-putrescible) without TCLP (SCC1).

In view of the detected exceedances, TCLP tests were carried out on samples BH1/0.3-0.5, BH6/0.15-0.3 and BH7/0.4-0.5 to verify the leachable concentrations of PAH and BH8/0.4-0.5 to verify the leachable concentrations of lead. The results of all TCLP tests showed that the leachable concentration of analytes was within the threshold criteria for General Solid Waste (non-putrescible).

Based on the site observations and analytical results, and with reference to the NSW DECC 2008 *Waste Classification Guidelines* (updated 2009), the preliminary classification for the filling and natural materials at the site is **General Solid Waste (non-putrescible)**. If asbestos-based materials are found in the fill during excavation, the waste classification would need to re-assessed and would probably be reclassified as Special Waste (Asbestos).

The preliminary waste classification is subject to *ex situ* confirmation. It should be noted that ASS were detected in some of the boreholes, however, the extent of the ASS should be further investigated in the detailed design stage. Soils of ASS potential should be treated in accordance with the ASSMAP prior to disposal.

14. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This investigation was undertaken as a Limited Stage 2 Contamination Assessment given the preliminary nature of the proposed development, the ongoing operation of the site (i.e. shopping centre and warehouse) and the subsequent access constraints. As such, the adopted sampling regime did not meet the sampling density recommended in the NSW EPA *Sampling Design Guidelines* for the characterisation of a site of four hectares.

The sampling locations were set out to provide a broad, but limited, site coverage, targeting areas of environmental concern (AEC) identified from the Stage 1 Contamination Assessment. However, it should be noted that given the northern part of the site is an operational shopping centre and the southern part being a warehouse, site access restrictions became a major issue and therefore not all of the identified AEC were investigated in this investigation.

The scope of the investigation involved the drilling of nine boreholes through the underlying filling and natural soils. Soil sampling was undertaken at the time of drilling for chemical analysis. Additionally, three boreholes were extended into the shale bedrock to intercept with the groundwater table which converted into groundwater monitoring wells. The wells were developed and purged prior to sampling. Other boreholes were also extended into the shale bedrock for geotechnical purposes.

Free groundwater was encountered within the residual clay / shale bedrock interface at two locations during the intrusive investigation. Based on the measured standing water levels obtained at the time of groundwater sampling, the inferred groundwater flow direction is to the south towards Alexandra Canal.

Elevated concentrations of benzo(a)pyrene were reported above the adopted SAC in the filling sample at BH1. Low levels of TPH, benzo(a)pyrene and total PAH were generally detected in the samples collected from the filling. The presence of these contaminants is likely to be attributable to the source of filling, which is unknown, used at the time the site was first developed. BTEX, VOCs, phenols, PCBs and OCPs were not detected in the soil samples analysed. It is recommended that this localised impact to be removed prior to the development works.

Low levels of heavy metals were detected in most of the soil samples analysed but concentrations were below their respective SAC. The soil results indicate that widespread soil contamination is not likely to be present at the site. The presence of benzo(a)pyrene, PAH and TPH are generally detected within the filling.

Three soil samples were analysed for acid sulphate soils and the results indicated that ASS is present in the southern portion of the site, which is consistent with published mapping.

Based on the soil analytical results, four soil samples were selected for TCLP testing for preliminary waste classification purpose. The preliminary testing indicates that the filling and natural soils can be disposed of as General Solid Waste. Natural soils, not affected by ASS or contamination, if present, can be considered to virgin excavated natural material. It should be noted that soils of actual and potential ASS should be lime treated prior to disposal and disposed of as General Solid Waste.

Low levels of PCE, TCE and DCE were detected in the groundwater sample collected from BH4 located adjacent to the dry cleaner. PCE is commonly associated with dry cleaning process and TCE and DCE are degradation by-products of PCE. Concentrations of PCE, TCE and DCE were not reported in the groundwater in the other two bores sampled in this round of investigation. It was common for waste PCE to have been disposed of via the sewer system and the sewer may be a migration pathway for this contaminant.

Concentrations of TPH were reported in the groundwater at BH6 located adjacent to a disused fuel point, indicating that residual TPH may be present in the groundwater.

PAHs were not detected in the groundwater samples analysed as part of this assessment. Concentrations of copper, nickel and zinc were identified in the groundwater samples at all three wells. This is considered likely to be representative of the regional groundwater quality.

The proposed development will involve the construction of an additional level at the existing shopping centre footprint. The current rooftop car park will be replaced by retail outlets and the existing warehouse building in the southern portion of the site will be demolished for the construction of new retail outlets and car parking area. Based on the conceptual plan, it is not anticipated that bulk excavation will be carried out in both the existing shopping centre and the industrial land with the exception of the construction of foundations.

Although significant groundwater contamination was not encountered, contaminants of concern have nevertheless been detected in the underlying groundwater and the presence of these chemicals is likely to be associated with the past and current uses of the site. The presence of PCE, TCE and DCE and is of particular concern and additional groundwater monitoring wells should be installed to verify the extent of these chemicals, particularly along or near the sewer draining the dry cleaning shop.

Based on the measured standing water levels, it is anticipated that dewatering will be required during foundation construction and the groundwater will need to be regularly monitoring and be tested and possibly treated prior to disposal.

In conclusion, given that widespread soil and groundwater contamination was not encountered in this investigation, it is considered that the site can be made suitable for retail uses. It should be highlighted that a detailed contamination assessment could not be carried out due to site constraints and that further actions are recommended to be undertaken in the next phase of the project:

- Removal of the localised soil contamination in the filling recovered from BH1, located adjacent to the Mill House building in the northern portion of the site;
- Further investigation to be carried out in the previously identified AECs which were not accessible in this round of investigation. This may include additional intrusive sampling in areas likely to be exposed as part of the proposed development;
- Further groundwater investigation be undertaken to confirm or otherwise groundwater contamination associated with the dry cleaning operation and the possible historical leakage / spillage of petroleum products at the disused fuel point;
- Geophysical investigation be undertaken in the vicinity of the disused fuel point to determine whether there are other USTs present at the warehouse, apart from those previously identified in the Stage 1 Contamination Assessment;
- Additional *ex situ* assessment of excavated soils to confirm or otherwise the preliminary waste classifications provided in this report;
- Further investigation to be undertaken to confirm the extent of the acid sulphate soil in the southern portion of the site, the extent of which to be determined based on the final proposed construction detail; and
- Development of an Acid Sulphate Soils Management Plan, if required.

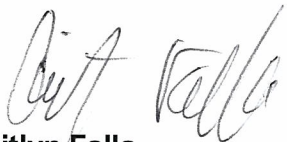
15. LIMITATIONS OF THIS REPORT

Douglas Partners (DP) has prepared this report for this project at 34 Victoria Road and 13-55 Edinburgh Road, Marrickville NSW in accordance with DP's proposal dated 19 February 2010 and acceptance received from Mr Derrick Burrows of Bovis Lend Lease on behalf of AMPCI dated 25 February 2010. This report is provided for the exclusive use of the Bovis Lend Lease and AMPCI for the specific project and purpose as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party.

The results provided in the report are considered to be indicative of the sub-surface conditions on the site only to the depths investigated at the specific sampling and/or testing locations, and only at the time the work was carried out. DP's advice may be based on observations, measurements, tests or derived interpretations. The accuracy of the advice provided by DP in this report is limited by unobserved features and variations in ground conditions across the site in areas between test locations and beyond the site boundaries or by variations with time. The advice may be limited by restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints. Actual ground conditions and materials behaviour observed or inferred at the test locations may differ from those which may be encountered elsewhere on the site. Should variations in subsurface conditions be encountered, then additional advice should be sought from DP and, if required, amendments made.

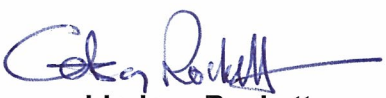
This report must be read in conjunction with the attached "Notes Relating to This Report" and any other attached explanatory notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions from review by others of this report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this report. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

DOUGLAS PARTNERS PTY LTD



Caitlyn Falla
Environmental Engineer

Reviewed by:



Lindsay Rockett
Senior Associate

APPENDIX A
Drawings

Site Boundary

Client: Bovis Lend Lease		**Project No: 71645_Rev 1**	Douglas Partners Geotechnics • Environment • Groundwater	Brisbane • Cairns • Canberra • Darwin • Gold Coast Gold Coast • Melbourne • Minto • Newcastle Perth • Sunshine Coast • Sydney • Townsville • Wollongong • Wyong
		Date: Nov 2010		
Drawn by: FW	**Scale: NTS**	**Office: Sydney**		
Approved by: LR		**Drawing No.1**	**Title**	**Site Layout Plan** **Limited Stage 2 Contamination Assessmemt** **Marrickville Metro Shopping Centre**

Drawing provided by Bovis Lend Lease. Drawing No SK_028, Option 4 - Indicative Plan - Ground Level, Marrickville Metro

Client: Bovis Lend Lease		**Project No: 71645_Rev 1**	Douglas Partners Geotechnics • Environment • Groundwater	Brisbane • Cairns • Canberra • Darwin • Gold Coast Gold Coast • Melbourne • Minto • Newcastle Perth • Sunshine Coast • Sydney • Townsville • Wollongong • Wyong
		Date: Nov 2010		
Drawn by: FW	**Scale: NTS**	**Office: Sydney**		
Approved by: LR		**Drawing No. 2**	**Title**	**Proposed Development Layout** **Limited Stage 2 Contamination Assessmemt** **Marrickville Metro Shopping Centre**

Client: Bovis Lend Lease		**Project No: 71645-Rev 1**	Douglas Partners Geotechnics • Environment • Groundwater	Brisbane • Cairns • Canberra • Darwin • Gold Coast Gold Coast • Melbourne • Minto • Newcastle Perth • Sunshine Coast • Sydney • Townsville • Wollongong • Wyong
		Date: Nov 2010		
Drawn by: FW	**Scale: NTS**	**Office: Sydney**		
Approved by: LR		**Drawing No.3**	**Title**	**Site Features Plan** **Limited Stage 2 Contamination Assessmemt** **Marrickville Metro Shopping Centre**

NOTES:

ARE SHOWN THUS +55.55.

N

MGA

VICTORIA ROAD

BH1

A'

BH2

VICTORIA ROAD

STREET

MURRAY

BH3

100
D. P. 715231

D. P. 6021

DP 6021

MARRICKVILLE METRO SHOPPING CENTRE

25
24
23
22
21
D. P. 5988

151
D. P. 613713

152
D. P. 613713

D. P. 1027787

BH4

SMIDMORE STREET

BH5

SMIDMORE STREET

BH9

BH8

EDINBURGH ROAD

1
D. P. 612551

1
D. P. 612551

STREET

1
D. P. 607677

BH6

MURRAY

BH7

A

EDINBURGH ROAD

78
D. P. 4991

D. P. 1099760

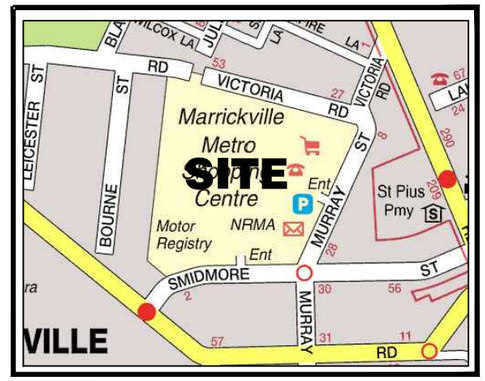
81 80 79
D. P. 4991

D. P. 483124

71 70

67 68 69
D. P. 4991

SCALE
0 50 100m
1:1500



LOCALITY PLAN

LEGEND

- CORED BORE
- AUGERED BORE

Douglas Partners
Geotechnics • Environment • Groundwater

CLIENT: Bovis Lend Lease			TITLE: **Borehole Location Plan**	PROJECT No: 71645.00
DRAWN BY: PSCH	SCALE: 1:1500@A3	OFFICE: Sydney	**Limited Stage 2 Contamination Assessment**	DRAWING No: 4
APPROVED BY:		DATE: 1.4.2010	**Marrickville Metro Shopping Centre, MARRICKVILLE**	REVISION: A

APPENDIX B
Site Photographs

Photo 1: Mill House (now Shopping Centre Management Office)

Photo 2: Marrickville Metro, facing west

Stage 2 Contamination Assessment Marrickville Metro Shopping Centre	Project 71645.00	April 2010	Plate 1

Photo 3: Drycleaner located adjacent to Smidmore Street Entrace

Photo 4: Electricity Sub-station located at the corner of Murray Street and Edinburgh Road

Stage 2 Contamination Assessment Marrickville Metro Shopping Centre	Project 71645.00	April 2010	Plate 2

Photo 5: Old Fill Point located on Murray Street Footprint, adjacent to the Warehouse Building

Photo 6: Warehouse Building located on the Southern Portion of the Site

Stage 2 Contamination Assessment Marrickville Metro Shopping Centre	Project 71645.00	April 2010	Plate 3

Photo 7: Car Parking Area for the Warehouse

Phot 8: Loading Dock located adjacent to Smidmore Street Entrance

APPENDIX C
Results of Laboratory Tests and Chain of Custody Records

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

CERTIFICATE OF ANALYSIS 39246-A

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	Additional Testing on 2 Soils
Date samples received:	24/03/10
Date completed instructions received:	31/03/10

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

Report Details:

Date results requested by:	6/04/10
Date of Preliminary Report:	Not Issued
Issue Date:	6/04/10

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

Results Approved By:

Jacinta Hurst
Operations Manager

Envirolab Reference: 39246-A
Revision No: R 00

ACCREDITED FOR TECHNICAL COMPETENCE

Metals in TCLP USEPA1311 Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	39246-A-7 BH7 0.4-0.5 23/03/2010 Soil	39246-A-9 BH8 0.45-0.5 24/03/2010 Soil
Date extracted	-	06/04/10	06/04/10
Date analysed	-	[NA]	06/04/10
pH of soil for fluid# determ.	pH units	8.70	9.10
pH of soil for fluid # determ. (acid)	pH units	1.70	1.70
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.10	5.40
Lead in TCLP	mg/L	[NA]	1.1

PAHs in TCLP (USEPA 1311) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-A-7 BH7 0.4-0.5 23/03/2010 Soil
Date extracted	-	06/04/2010
Date analysed	-	06/04/2010
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Surrogate p-Terphenyl-d_{14}	%	106

Method ID	Methodology Summary
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
GC.12 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC.12	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/04/10	[NT]	[NT]	LCS-W1	06/04/10
Date analysed	-			06/04/10	[NT]	[NT]	LCS-W1	06/04/10
Lead in TCLP	mg/L	0.03	Metals.20 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	101%

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	-			06/04/2010	[NT]	[NT]	LCS-W1	06/04/201
Date analysed	-			06/04/2010	[NT]	[NT]	LCS-W1	06/04/201
Naphthalene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	91%
Acenaphthylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	97%
Phenanthrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	92%
Anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	90%
Pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	93%
Benzo(a)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	90%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	GC.12 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	100%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		GC.12	126	[NT]	[NT]	LCS-W1	106%

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater th
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 39246

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	14 Soils
Date samples received:	24/03/10
Date completed instructions received:	24/03/10

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

Report Details:

Date results requested by:	31/03/10
Date of Preliminary Report:	Not Issued
Issue Date:	31/03/10

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

Results Approved By:

Rhian Morgan
Metals Supervisor

Jacinta Hurst
Operations Manager

M. Mansfield
Matt Mansfield
Chemist

Envirolab Reference: 39246
Revision No: R 00

ACCREDITED FOR TECHNICAL COMPETENCE

VOCs in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 Soil
Date extracted	-	26/3/10	26/3/10
Date analysed	-	27/3/10	27/3/10
Dichlorodifluoromethane	mg/kg	<1.0	<1.0
Chloromethane	mg/kg	<1.0	<1.0
Vinyl Chloride	mg/kg	<1.0	<1.0
Bromomethane	mg/kg	<1.0	<1.0
Chloroethane	mg/kg	<1.0	<1.0
Trichlorofluoromethane	mg/kg	<1.0	<1.0
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
Cyclohexane	mg/kg	<1.0	<1.0
carbon tetrachloride	mg/kg	<1.0	<1.0
Benzene	mg/kg	<0.5	<0.5
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	<0.5	<0.5
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

VOCs in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 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
hexachlorobutadiene	mg/kg	<1.0	<1.0
1,2,3-trichlorobenzene	mg/kg	<1.0	<1.0
Surrogate Dibromofluorometha	%	137	108
Surrogate aaa-Trifluorotoluene	%	79	85
Surrogate Toluene-d$_8$	%	95	101
Surrogate 4-Bromofluorobenzene	%	107	104

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-3 BH3 3.0 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil
Date extracted	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	28/3/10	28/3/10	28/3/10	28/3/10	28/3/10
vTPH C6 - C9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<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	%	92	90	79	85	85

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil	39246-10 BH8 3-3.2 24/03/2010 Soil	39246-11 BH9 0.2-0.3 23/03/2010 Soil	39246-12 BH9 2.4-2.5 23/03/2010 Soil
Date extracted	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	28/3/10	28/3/10	28/3/10	28/3/10	28/3/10
vTPH C6 - C9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<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	%	74	92	99	101	79

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-13 Trip Blank 23/03/2010 Soil	39246-14 Trip Spike 23/03/2010 Soil
Date extracted	-	26/3/10	26/3/10
Date analysed	-	28/3/10	28/3/10
Benzene	mg/kg	<0.5	98%
Toluene	mg/kg	<0.5	97%
Ethylbenzene	mg/kg	<1.0	98%
m+p-xylene	mg/kg	<2.0	97%
o-Xylene	mg/kg	<1.0	98%
Surrogate aaa-Trifluorotoluene	%	102	72

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	39246-1	39246-3	39246-4	39246-6	39246-7
Your Reference	----------	BH3 0.5	BH3 3.0	BH4 0.5	BH4 5.8-6.0	BH7 0.4-0.5
Date Sampled	----------	23/03/2010	23/03/2010	23/03/2010	23/03/2010	23/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	170
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	123	112	114	112	129

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	39246-8	39246-9	39246-10	39246-11	39246-12
Your Reference	----------	BH7 2.8-3.0	BH8 0.45-0.5	BH8 3-3.2	BH9 0.2-0.3	BH9 2.4-2.5
Date Sampled	----------	23/03/2010	24/03/2010	24/03/2010	23/03/2010	23/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	180	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	130	<100	<100	<100
Surrogate o-Terphenyl	%	118	123	116	111	109

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-3 BH3 3.0 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil
Date extracted	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Date analysed	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Phenanthrene	mg/kg	0.3	<0.1	0.2	<0.1	8.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.9
Fluoranthene	mg/kg	0.4	<0.1	0.3	<0.1	11
Pyrene	mg/kg	0.4	<0.1	0.3	<0.1	9.5
Benzo(a)anthracene	mg/kg	0.2	<0.1	0.1	<0.1	4.5
Chrysene	mg/kg	0.2	<0.1	0.2	<0.1	4.0
Benzo(b+k)fluoranthene	mg/kg	0.3	<0.2	0.3	<0.2	6.6
Benzo(a)pyrene	mg/kg	0.2	<0.05	0.2	<0.05	5.0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.1	<0.1	2.6
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.1	<0.1	2.6
Surrogate p-Terphenyl-d_{14}	%	92	91	93	90	92

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil	39246-10 BH8 3-3.2 24/03/2010 Soil	39246-11 BH9 0.2-0.3 23/03/2010 Soil	39246-12 BH9 2.4-2.5 23/03/2010 Soil
Date extracted	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Date analysed	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Naphthalene	mg/kg	0.1	0.2	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.5	0.5	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.4	0.2	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	3.5	2.6	0.1	<0.1	<0.1
Anthracene	mg/kg	0.8	0.8	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	5.0	5.1	0.2	0.1	<0.1
Pyrene	mg/kg	4.6	4.9	0.2	0.2	<0.1
Benzo(a)anthracene	mg/kg	2.2	3.0	0.1	<0.1	<0.1
Chrysene	mg/kg	2.1	2.6	0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	3.2	4.8	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	2.4	3.6	0.09	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	1.2	1.9	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.3	0.5	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	1.1	1.9	<0.1	0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	93	88	87	86	89

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil
Date extracted	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Date analysed	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	1.2
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	0.2
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	86	95	89	99

Organochlorine Pesticides in soil		
Our Reference:	UNITS	39246-11
Your Reference	----------	BH9 0.2-0.3
Date Sampled	----------	23/03/2010
Type of sample		Soil
Date extracted	-	26/03/2010
Date analysed	-	26/03/2010
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Surrogate TCLMX	%	106

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil
Date extracted	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Date analysed	-	26/03/2010	26/03/2010	26/03/2010	26/03/2010	26/03/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	86	95	89	99

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-11 BH9 0.2-0.3 23/03/2010 Soil
Date extracted	-	26/03/2010
Date analysed	-	26/03/2010
Arochlor 1016	mg/kg	<0.1
Arochlor 1221*	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Surrogate TCLMX	%	106

Total Phenolics in Soil						
Our Reference:	UNITS	39246-1	39246-3	39246-4	39246-6	39246-7
Your Reference	----------	BH3 0.5	BH3 3.0	BH4 0.5	BH4 5.8-6.0	BH7 0.4-0.5
Date Sampled	----------	23/03/2010	23/03/2010	23/03/2010	23/03/2010	23/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/3/10	29/3/10	29/3/10	29/3/10	29/3/10
Date analysed	-	30/3/10	30/3/10	30/3/10	30/3/10	30/3/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Total Phenolics in Soil						
Our Reference:	UNITS	39246-8	39246-9	39246-10	39246-11	39246-12
Your Reference	----------	BH7 2.8-3.0	BH8 0.45-0.5	BH8 3-3.2	BH9 0.2-0.3	BH9 2.4-2.5
Date Sampled	----------	23/03/2010	24/03/2010	24/03/2010	23/03/2010	23/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/3/10	29/3/10	29/3/10	29/3/10	29/3/10
Date analysed	-	30/3/10	30/3/10	30/3/10	30/3/10	30/3/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-3 BH3 3.0 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil
Date digested	-	26/03/10	26/03/10	26/03/10	26/03/10	26/03/10
Date analysed	-	26/03/10	26/03/10	26/03/10	26/03/10	26/03/10
Arsenic	mg/kg	<4	<4	6	<4	6
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	15	14	29	5	16
Copper	mg/kg	10	6	24	10	28
Lead	mg/kg	47	8	38	9	72
Mercury	mg/kg	0.1	<0.1	0.2	<0.1	0.2
Nickel	mg/kg	3	4	10	1	5
Zinc	mg/kg	47	3	48	3	74

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil	39246-10 BH8 3-3.2 24/03/2010 Soil	39246-11 BH9 0.2-0.3 23/03/2010 Soil	39246-12 BH9 2.4-2.5 23/03/2010 Soil
Date digested	-	26/03/10	26/03/10	26/03/10	26/03/10	26/03/10
Date analysed	-	26/03/10	26/03/10	26/03/10	26/03/10	26/03/10
Arsenic	mg/kg	14	6	<4	<4	<4
Cadmium	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	17	12	14	8	19
Copper	mg/kg	28	61	9	62	8
Lead	mg/kg	110	510	35	57	16
Mercury	mg/kg	0.2	0.3	<0.1	<0.1	<0.1
Nickel	mg/kg	5	9	3	7	2
Zinc	mg/kg	100	410	22	200	15

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-3 BH3 3.0 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-6 BH4 5.8-6.0 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil
Date prepared	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Moisture	%	11	18	25	17	17

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil	39246-10 BH8 3-3.2 24/03/2010 Soil	39246-11 BH9 0.2-0.3 23/03/2010 Soil	39246-12 BH9 2.4-2.5 23/03/2010 Soil
Date prepared	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Date analysed	-	26/3/10	26/3/10	26/3/10	26/3/10	26/3/10
Moisture	%	18	18	17	4.0	14

Asbestos ID - soils Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-1 BH3 0.5 23/03/2010 Soil	39246-4 BH4 0.5 23/03/2010 Soil	39246-7 BH7 0.4-0.5 23/03/2010 Soil	39246-8 BH7 2.8-3.0 23/03/2010 Soil	39246-9 BH8 0.45-0.5 24/03/2010 Soil
Date analysed	-	29/3/10	29/3/10	29/3/10	29/3/10	29/3/10
Sample Description	-	Approx 40g Sandy Soil	Approx 25g Clay & Rocks	Approx 25g Clay Soil	Approx 25g Clay	Approx 40g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Asbestos ID - soils Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-11 BH9 0.2-0.3 23/03/2010 Soil
Date analysed	-	29/3/10
Sample Description	-	Approx 40g Sandy Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected

sPOCAS Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39246-2 BH3 2.0 23/03/2010 Soil	39246-5 BH4 4.3-4.5 23/03/2010 Soil	39246-10 BH8 3-3.2 24/03/2010 Soil
Date prepared	-	25/3/10	25/3/10	25/3/10
Date analysed	-	25/3/10	25/3/10	25/3/10
pH $_{kcl}$	pH units	3.8	3.8	4.1
TAA pH 6.5	moles H^+/t	87	25	55
s-TAA pH 6.5	%w/w S	0.14	0.040	0.088
pH $_{Ox}$	pH units	3.6	3.8	3.9
TPA pH 6.5	moles H^+/t	110	103	50
s-TPA pH 6.5	%w/w S	0.18	0.16	0.080
TSA pH 6.5	moles H^+/t	22	77	<5.0
s-TSA pH 6.5	%w/w S	0.036	0.12	<0.01
ANCE	% $CaCO_3$	<0.05	<0.05	<0.05
a-ANCE	moles H^+/t	<5	<5	<5
s-ANCE	%w/w S	<0.05	<0.05	<0.05
SKCl	%w/w S	0.066	0.060	0.028
SP	%w/w	0.082	0.085	0.048
SPOS	%w/w	0.016	0.025	0.020
a-SPOS	moles H^+/t	10	15	12
CaKCl	%w/w	0.039	0.006	0.037
CaP	%w/w	0.038	0.008	0.039
CaA	%w/w	<0.005	<0.005	<0.005
MgKCl	%w/w	0.037	0.030	0.034
MgP	%w/w	0.037	0.034	0.035
MgA	%w/w	<0.005	<0.005	<0.005
SRAS	%w/w	0.006	0.009	<0.005
SHCl	%w/w S	0.071	0.065	0.029
SNAS	%w/w S	0.005	0.005	<0.005
a-SNAS	moles H^+/t	<5	<5	<5
s-SNAS	%w/w S	<0.01	<0.01	<0.01
a-Net Acidity	moles H^+/t	100	43	68
Liming rate	kg $CaCO_3$/t	7.5	3.2	5.1
a-Net Acidity without ANCE	moles H^+/t	NA	NA	NA
Liming rate without ANCE	kg $CaCO_3$/t	NA	NA	NA

Method ID	Methodology Summary
GC.14	Soil samples are 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 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following 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	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.
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 VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/3/10	[NT]	[NT]	LCS-2	26/3/10
Date analysed	-			27/3/10	[NT]	[NT]	LCS-2	27/3/10
Dichlorodifluoromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Chloromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Bromomethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Chloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	mg/kg	1	GC.14	<1.0	[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-2	134%
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-2	113%
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-2	111%
1,1,1-trichloroethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS-2	104%
1,1-dichloropropene	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
Cyclohexane	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	0.5	GC.14	<0.5	[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-2	133%
bromodichloromethane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	LCS-2	80%
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	0.5	GC.14	<0.5	[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-2	75%
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-2	92%
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]

QUALITY CONTROL VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichloropropane	mg/kg	1	GC.14	<1.0	[NT]	[NT]	[NR]	[NR]
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]
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	105	[NT]	[NT]	LCS-2	118%
Surrogate aaa-Trifluorotoluene	%		GC.14	89	[NT]	[NT]	LCS-2	93%
Surrogate Toluene-d8	%		GC.14	102	[NT]	[NT]	LCS-2	100%
Surrogate 4-Bromofluorobenzene	%		GC.14	109	[NT]	[NT]	LCS-2	109%

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	-			26/3/10	39246-7	26/3/10 || 26/3/10	LCS-2	26/3/10
Date analysed	-			28/3/10	39246-7	28/3/10 || 28/3/10	LCS-2	28/3/10
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	39246-7	<25 || <25	LCS-2	84%
Benzene	mg/kg	0.5	GC.16	<0.5	39246-7	<0.5 || <0.5	LCS-2	104%
Toluene	mg/kg	0.5	GC.16	<0.5	39246-7	<0.5 || <0.5	LCS-2	70%
Ethylbenzene	mg/kg	1	GC.16	<1.0	39246-7	<1.0 || <1.0	LCS-2	80%
m+p-xylene	mg/kg	2	GC.16	<2.0	39246-7	<2.0 || <2.0	LCS-2	88%
o-Xylene	mg/kg	1	GC.16	<1.0	39246-7	<1.0 || <1.0	LCS-2	101%
Surrogate aaa-Trifluorotoluene	%		GC.16	103	39246-7	85 || 80 || RPD: 6	LCS-2	95%

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	-			26/3/10	39246-7	26/3/10 || 26/3/10	LCS-2	26/3/10
Date analysed	-			26/3/10	39246-7	26/3/10 || 26/3/10	LCS-2	26/3/10
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	39246-7	<50 || <50	LCS-2	113%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	39246-7	170 || 180 || RPD: 6	LCS-2	122%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	39246-7	<100 || <100	LCS-2	120%
Surrogate o-Terphenyl	%		GC.3	110	39246-7	129 || 127 || RPD: 2	LCS-2	116%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/03/2010	39246-7	26/03/2010 || 26/03/2010	LCS-2	26/03/2010
Date analysed	-			26/03/2010	39246-7	26/03/2010 || 26/03/2010	LCS-2	26/03/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	0.3 || 0.3 || RPD: 0	LCS-2	99%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	0.8 || 0.8 || RPD: 0	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	0.3 || 0.3 || RPD: 0	LCS-2	101%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	8.2 || 8.2 || RPD: 0	LCS-2	100%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	1.9 || 1.9 || RPD: 0	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	11 || 11 || RPD: 0	LCS-2	98%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	9.5 || 9.5 || RPD: 0	LCS-2	102%
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	4.5 || 4.6 || RPD: 2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	4.0 || 4.0 || RPD: 0	LCS-2	97%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	39246-7	6.6 || 6.6 || RPD: 0	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	39246-7	5.0 || 5.0 || RPD: 0	LCS-2	103%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	2.6 || 2.6 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	0.6 || 0.6 || RPD: 0	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	39246-7	2.6 || 2.6 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	85	39246-7	92 || 92 || RPD: 0	LCS-2	93%

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	-			26/03/2010	[NT]	[NT]	LCS-2	26/03/2010
Date analysed	-			26/03/2010	[NT]	[NT]	LCS-2	26/03/2010
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-2	126%
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-2	124%
Heptachlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-2	109%
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-2	123%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-2	124%
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-2	135%
Dieldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-2	116%
Endrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-2	115%
pp-DDD	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-2	130%
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-2	125%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	95	[NT]	[NT]	LCS-2	103%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/03/2010	[NT]	[NT]	LCS-2	26/03/2010
Date analysed	-			26/03/2010	[NT]	[NT]	LCS-2	26/03/2010
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	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-2	123%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-6	95	[NT]	[NT]	LCS-2	114%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/3/10	39246-1	29/3/10 || 29/3/10	LCS-1	29/3/10
Date analysed	-			30/3/10	39246-1	30/3/10 || 30/3/10	LCS-1	30/3/10
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	39246-1	<5.0 || <5.0	LCS-1	96%

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	-			26/03/10	39246-7	26/03/10 || 26/03/10	LCS-4	26/03/10
Date analysed	-			26/03/10	39246-7	26/03/10 || 26/03/10	LCS-4	26/03/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	39246-7	6 || 6 || RPD: 0	LCS-4	95%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	39246-7	<0.5 || <0.5	LCS-4	99%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	39246-7	16 || 16 || RPD: 0	LCS-4	104%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	39246-7	28 || 28 || RPD: 0	LCS-4	102%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	39246-7	72 || 80 || RPD: 11	LCS-4	97%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	39246-7	0.2 || 0.3 || RPD: 40	LCS-4	107%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	39246-7	5 || 5 || RPD: 0	LCS-4	103%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	39246-7	74 || 83 || RPD: 11	LCS-4	100%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			26/3/10
Date analysed	-			26/3/10
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			25/3/10	[NT]	[NT]	LCS	25/3/10
Date analysed	-			25/3/10	[NT]	[NT]	LCS	25/3/10
pH kcl	pH units		LAB.64	5.7	[NT]	[NT]	LCS	98%
TAA pH 6.5	moles H^+/t	5	LAB.64	<5	[NT]	[NT]	LCS	125%
s-TAA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	LCS	128%
pH ox	pH units		LAB.64	3.8	[NT]	[NT]	LCS	93%
TPA pH 6.5	moles H^+/t	5	LAB.64	<5.0	[NT]	[NT]	LCS	106%
s-TPA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	LCS	106%
TSA pH 6.5	moles H^+/t	5	LAB.64	<5.0	[NT]	[NT]	LCS	105%
s-TSA pH 6.5	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	LCS	106%
ANCe	% $CaCO_3$	0.05	LAB.64	<0.05	[NT]	[NT]	[NR]	[NR]
a-ANCe	moles H^+/t	5	LAB.64	<5	[NT]	[NT]	[NR]	[NR]
s-ANCe	%w/w S	0.05	LAB.64	<0.05	[NT]	[NT]	[NR]	[NR]
SKCl	%w/w S	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	115%
SP	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	96%
SPOS	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	92%
a-SPOS	moles H^+/t	5	LAB.64	<5.0	[NT]	[NT]	LCS	91%
CaKCl	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	108%
CaP	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	92%
CaA	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
MgKCl	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	105%
MgP	%w/w	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	92%
MgA	%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]

Client Reference: 71645, Marrickville Metro

QUALITY CONTROL sPOCAS	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
S_{HCl}	%w/w S	0.005	LAB.64	<0.005	[NT]	[NT]	LCS	99%
S_{NAS}	%w/w S	0.005	LAB.64	<0.005	[NT]	[NT]	[NR]	[NR]
a-S_{NAS}	moles H^+/t	5	LAB.64	<5	[NT]	[NT]	[NR]	[NR]
s-S_{NAS}	%w/w S	0.01	LAB.64	<0.01	[NT]	[NT]	[NR]	[NR]
a-Net Acidity	moles H^+/t	10	LAB.64	<10	[NT]	[NT]	LCS	93%
Liming rate	kg $CaCO_3$/t	0.75	LAB.64	<0.75	[NT]	[NT]	LCS	93%
a-Net Acidity without ANCE	moles H^+/t	10	LAB.64	<10	[NT]	[NT]	[NR]	[NR]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	LAB.64	<0.75	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	39246-3	29/3/10
Date analysed	-	[NT]	[NT]	39246-3	30/3/10
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	39246-3	104%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample.
Envirolab recommends supplying 30-40g of sample in it's own container.
Asbestos was analysed by Approved Identifier: Matt Mansfield
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 38861

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645.01, Marrickville Metro**
No. of samples:	2 Soils
Date samples received:	15/03/10
Date completed instructions received:	15/03/10

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

Report Details:

Date results requested by:	22/03/10
Date of Preliminary Report:	Not Issued
Issue Date:	19/03/10

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

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Rhian Morgan
Metals Supervisor

Jacinta Hurst
Operations Manager

Matt Mansfield
Chemist

Envirolab Reference: 38861
Revision No: R 00

ACCREDITED FOR TECHNICAL COMPETENCE

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date extracted	-	16/3/10	16/3/10
Date analysed	-	17/3/10	17/3/10
vTPH C_6 - C_9	mg/kg	<25	<25
Benzene	mg/kg	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	94	94

sTPH in Soil (C10-C36) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date extracted	-	16/3/10	16/3/10
Date analysed	-	17/3/10	17/3/10
TPH C_{10} - C_{14}	mg/kg	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100
Surrogate o-Terphenyl	%	95	92

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date extracted	-	16/3/10	16/3/10
Date analysed	-	17/3/10	17/3/10
Naphthalene	mg/kg	0.3	<0.1
Acenaphthylene	mg/kg	0.6	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	1.5	<0.1
Anthracene	mg/kg	0.4	<0.1
Fluoranthene	mg/kg	6.6	0.2
Pyrene	mg/kg	6.6	0.2
Benzo(a)anthracene	mg/kg	4.6	0.1
Chrysene	mg/kg	3.9	0.2
Benzo(b+k)fluoranthene	mg/kg	7.8	0.2
Benzo(a)pyrene	mg/kg	5.8	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	3.2	0.1
Dibenzo(a,h)anthracene	mg/kg	0.4	<0.1
Benzo(g,h,i)perylene	mg/kg	2.5	0.1
Surrogate p-Terphenyl-d_{14}	%	109	108

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date extracted	-	16/3/10	16/3/10
Date analysed	-	16/3/10	16/3/10
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	110	95

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date extracted	-	16/3/10	16/3/10
Date analysed	-	16/3/10	16/3/10
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	110	95

Total Phenolics in Soil			
Our Reference:	UNITS	38861-1	38861-2
Your Reference	----------	BH 1/0.3-0.5	BH 1/0.8-1
Date Sampled	----------	12/03/2010	12/03/2010
Type of sample		Soil	Soil
Date extracted	-	17/3/10	17/3/10
Date analysed	-	17/3/10	17/3/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date digested	-	16/03/10	16/03/10
Date analysed	-	16/03/10	16/03/10
Arsenic	mg/kg	<4	4
Cadmium	mg/kg	<0.5	<0.5
Chromium	mg/kg	23	22
Copper	mg/kg	27	5
Lead	mg/kg	84	27
Mercury	mg/kg	0.3	<0.1
Nickel	mg/kg	5	2
Zinc	mg/kg	40	10

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date prepared	-	16/3/10	16/3/10
Date analysed	-	16/3/10	16/3/10
Moisture	%	6.6	16

Asbestos ID - soils Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38861-1 BH 1/0.3-0.5 12/03/2010 Soil	38861-2 BH 1/0.8-1 12/03/2010 Soil
Date analysed	-	17/3/10	17/3/10
Sample Description	-	Approx 35g Soil	Approx 35g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following disitillation.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
ASB.1	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/3/10	38861-1	16/3/10 || 16/3/10	LCS-5	16/3/10
Date analysed	-			17/3/10	38861-1	17/3/10 || 17/3/10	LCS-5	17/3/10
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	38861-1	<25 || <25	LCS-5	99%
Benzene	mg/kg	0.5	GC.16	<0.5	38861-1	<0.5 || <0.5	LCS-5	85%
Toluene	mg/kg	0.5	GC.16	<0.5	38861-1	<0.5 || <0.5	LCS-5	94%
Ethylbenzene	mg/kg	1	GC.16	<1.0	38861-1	<1.0 || <1.0	LCS-5	104%
m+p-xylene	mg/kg	2	GC.16	<2.0	38861-1	<2.0 || <2.0	LCS-5	105%
o-Xylene	mg/kg	1	GC.16	<1.0	38861-1	<1.0 || <1.0	LCS-5	110%
Surrogate aaa-Trifluorotoluene	%		GC.16	99	38861-1	94 || 97 || RPD: 3	LCS-5	100%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/3/10	38861-1	16/3/10 || 16/3/10	LCS-5	16/3/10
Date analysed	-			17/3/10	38861-1	17/3/10 || 17/3/10	LCS-5	17/3/10
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	38861-1	<50 || <50	LCS-5	89%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	38861-1	<100 || <100	LCS-5	97%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	38861-1	<100 || 110	LCS-5	97%
Surrogate o-Terphenyl	%		GC.3	87	38861-1	95 || 98 || RPD: 3	LCS-5	94%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/3/10	38861-1	16/3/10 || 16/3/10	LCS-3	16/3/10
Date analysed	-			17/3/10	38861-1	17/3/10 || 17/3/10	LCS-3	17/3/10
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	0.3 || <0.1	LCS-3	98%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	0.6 || 0.3 || RPD: 67	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	0.1 || <0.1	LCS-3	98%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	1.5 || 2.7 || RPD: 57	LCS-3	100%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	0.4 || 0.6 || RPD: 40	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	6.6 || 6.3 || RPD: 5	LCS-3	93%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	6.6 || 5.8 || RPD: 13	LCS-3	98%
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	4.6 || 3.3 || RPD: 33	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	3.9 || 2.6 || RPD: 40	LCS-3	92%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	38861-1	7.8 || 4.8 || RPD: 48	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	38861-1	5.8 || 3.4 || RPD: 52	LCS-3	101%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	3.2 || 2.1 || RPD: 42	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	0.4 || 0.2 || RPD: 67	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	38861-1	2.5 || 1.8 || RPD: 33	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	116	38861-1	109 || 111 || RPD: 2	LCS-3	108%

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	-			16/3/10	[NT]	[NT]	LCS-4	16/3/10
Date analysed	-			16/3/10	[NT]	[NT]	LCS-4	16/3/10
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-4	97%
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-4	86%
Heptachlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-4	77%
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-4	92%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-4	102%
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-4	96%
Dieldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-4	90%
Endrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-4	84%
pp-DDD	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-4	109%
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-4	95%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	96	[NT]	[NT]	LCS-4	114%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/3/10	[NT]	[NT]	LCS-4	16/3/10
Date analysed	-			16/3/10	[NT]	[NT]	LCS-4	16/3/10
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	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-4	125%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-6	96	[NT]	[NT]	LCS-4	118%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/3/10	38861-1	17/3/10 || 17/3/10	LCS-1	17/3/10
Date analysed	-			17/3/10	38861-1	17/3/10 || 17/3/10	LCS-1	17/3/10
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	38861-1	<5.0 || <5.0	LCS-1	114%

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	-			16/03/10	38861-1	16/03/10 || 16/03/10	LCS-1	16/03/10
Date analysed	-			16/03/10	38861-1	16/03/10 || 16/03/10	LCS-1	16/03/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	38861-1	<4 || 4	LCS-1	99%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	38861-1	<0.5 || 0.8	LCS-1	102%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	38861-1	23 || 25 || RPD: 8	LCS-1	102%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	38861-1	27 || 30 || RPD: 11	LCS-1	99%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	38861-1	84 || 85 || RPD: 1	LCS-1	103%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	38861-1	0.3 || 0.3 || RPD: 0	LCS-1	103%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	38861-1	5 || 5 || RPD: 0	LCS-1	96%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	38861-1	40 || 43 || RPD: 7	LCS-1	102%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			16/3/10
Date analysed	-			16/3/10
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	38861-2	17/3/10
Date analysed	-	[NT]	[NT]	38861-2	17/3/10
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	38861-2	93%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample.
Envirolab recommends supplying 30-40g of sample in it's own container.
Asbestos was analysed by Approved Identifier: Matt Mansfield
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 39498

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	4 Waters
Date samples received:	31/03/10
Date completed instructions received:	31/03/10

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

Report Details:

Date results requested by:	6/04/10
Date of Preliminary Report:	Not Issued
Issue Date:	6/04/10

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

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Jacinta Hurst
Operations Manager

Envirolab Reference: 39498
Revision No: R 00

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39498-1 BH4 30/03/2010 Water	39498-2 BH6 31/03/2010 Water	39498-3 BH7 31/03/2010 Water
Date extracted	-	6/4/10	6/4/10	6/4/10
Date analysed	-	6/4/10	6/4/10	6/4/10
Dichlorodifluoromethane	µg/L	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0
Trans-1,2-dichloroethene	µg/L	<1.0	<1.0	<1.0
1,1-dichloroethane	µg/L	<1.0	<1.0	<1.0
Cis-1,2-dichloroethene	µg/L	4.5	<1.0	<1.0
Bromochloromethane	µg/L	<1.0	<1.0	<1.0
Chloroform	µg/L	<1.0	<1.0	<1.0
2,2-dichloropropane	µg/L	<1.0	<1.0	<1.0
1,2-dichloroethane	µg/L	<1.0	<1.0	<1.0
1,1,1-trichloroethane	µg/L	<1.0	<1.0	<1.0
1,1-dichloropropene	µg/L	<1.0	<1.0	<1.0
Cyclohexane	µg/L	<1.0	<1.0	<1.0
Carbon tetrachloride	µg/L	<1.0	<1.0	<1.0
Benzene	µg/L	<1.0	<1.0	<1.0
Dibromomethane	µg/L	<1.0	<1.0	<1.0
1,2-dichloropropane	µg/L	<1.0	<1.0	<1.0
Trichloroethene	µg/L	1.4	<1.0	<1.0
Bromodichloromethane	µg/L	<1.0	<1.0	<1.0
trans-1,3-dichloropropene	µg/L	<1.0	<1.0	<1.0
cis-1,3-dichloropropene	µg/L	<1.0	<1.0	<1.0
1,1,2-trichloroethane	µg/L	<1.0	<1.0	<1.0
Toluene	µg/L	<1.0	<1.0	<1.0
1,3-dichloropropane	µg/L	<1.0	<1.0	<1.0
Dibromochloromethane	µg/L	<1.0	<1.0	<1.0
1,2-dibromoethane	µg/L	<1.0	<1.0	<1.0
Tetrachloroethene	µg/L	1.5	<1.0	<1.0
1,1,1,2-tetrachloroethane	µg/L	<1.0	<1.0	<1.0
Chlorobenzene	µg/L	<1.0	<1.0	<1.0
Ethylbenzene	µg/L	<1.0	<1.0	<1.0
Bromoform	µg/L	<1.0	<1.0	<1.0
m+p-xylene	µg/L	<2.0	<2.0	<2.0
Styrene	µg/L	<1.0	<1.0	<1.0
1,1,2,2-tetrachloroethane	µg/L	<1.0	<1.0	<1.0

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39498-1 BH4 30/03/2010 Water	39498-2 BH6 31/03/2010 Water	39498-3 BH7 31/03/2010 Water
o-xylene	µg/L	<1.0	<1.0	<1.0
1,2,3-trichloropropane	µg/L	<1.0	<1.0	<1.0
Isopropylbenzene	µg/L	<1.0	<1.0	<1.0
Bromobenzene	µg/L	<1.0	<1.0	<1.0
n-propyl benzene	µg/L	<1.0	<1.0	<1.0
2-chlorotoluene	µg/L	<1.0	<1.0	<1.0
4-chlorotoluene	µg/L	<1.0	<1.0	<1.0
1,3,5-trimethyl benzene	µg/L	<1.0	<1.0	<1.0
Tert-butyl benzene	µg/L	<1.0	<1.0	<1.0
1,2,4-trimethyl benzene	µg/L	<1.0	<1.0	<1.0
1,3-dichlorobenzene	µg/L	<1.0	<1.0	<1.0
Sec-butyl benzene	µg/L	<1.0	<1.0	<1.0
1,4-dichlorobenzene	µg/L	<1.0	<1.0	<1.0
4-isopropyl toluene	µg/L	<1.0	<1.0	<1.0
1,2-dichlorobenzene	µg/L	<1.0	<1.0	<1.0
n-butyl benzene	µg/L	<1.0	<1.0	<1.0
1,2-dibromo-3-chloropropane	µg/L	<1.0	<1.0	<1.0
1,2,4-trichlorobenzene	µg/L	<1.0	<1.0	<1.0
Hexachlorobutadiene	µg/L	<1.0	<1.0	<1.0
1,2,3-trichlorobenzene	µg/L	<1.0	<1.0	<1.0
Surrogate Dibromofluoromethane	%	127	73	122
Surrogate toluene-d8	%	93	94	92
Surrogate 4-BFB	%	108	109	104

vTPH & BTEX in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39498-1 BH4 30/03/2010 Water	39498-2 BH6 31/03/2010 Water	39498-3 BH7 31/03/2010 Water	39498-4 BD1/3103201 0 31/03/2010 Water
Date extracted	-	3/4/10	3/4/10	3/4/10	3/4/10
Date analysed	-	3/4/10	3/4/10	3/4/10	3/4/10
TPH C_6 - C_9	µg/L	<10	<10	<10	<10
Benzene	µg/L	<1.0	<1.0	<1.0	<1.0
Toluene	µg/L	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	µg/L	<1.0	<1.0	<1.0	<1.0
m+p-xylene	µg/L	<2.0	<2.0	<2.0	<2.0
o-xylene	µg/L	<1.0	<1.0	<1.0	<1.0
Surrogate Dibromofluoromethane	%	127	73	122	90
Surrogate toluene-d8	%	93	94	92	100
Surrogate 4-BFB	%	108	109	104	103

sTPH in Water (C10-C36) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39498-1 BH4 30/03/2010 Water	39498-2 BH6 31/03/2010 Water	39498-3 BH7 31/03/2010 Water	39498-4 BD1/31032010 31/03/2010 Water
Date extracted	-	1/4/10	1/4/10	1/4/10	1/4/10
Date analysed	-	1/4/10	1/4/10	1/4/10	1/4/10
TPH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TPH C_{15} - C_{28}	µg/L	<100	420	<100	<100
TPH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Surrogate o-Terphenyl	%	134	127	130	131

PAHs in Water Our Reference: Your Reference	UNITS ----------	39498-1 BH4	39498-2 BH6	39498-3 BH7	39498-4 BD1/31032010
Date Sampled	----------	30/03/2010	31/03/2010	31/03/2010	31/03/2010
Type of sample		Water	Water	Water	Water
Date extracted	-	1/4/10	1/4/10	1/4/10	1/4/10
Date analysed	-	1/4/10	1/4/10	1/4/10	1/4/10
Naphthalene	µg/L	<1	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1	<1
Fluorene	µg/L	<1	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1	<1
Anthracene	µg/L	<1	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1	<1
Pyrene	µg/L	<1	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1	<1
Chrysene	µg/L	<1	<1	<1	<1
Benzo(b+k)fluoranthene	µg/L	<2	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1	<1
Surrogate p-Terphenyl-d_{14}	%	114	110	116	139

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39498-1 BH4 30/03/2010 Water	39498-2 BH6 31/03/2010 Water	39498-3 BH7 31/03/2010 Water	39498-4 BD1/31032010 31/03/2010 Water
Date prepared	-	6/4/10	6/4/10	6/4/10	6/4/10
Date analysed	-	6/4/10	6/4/10	6/4/10	6/4/10
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	1	2	<1	<1
Copper-Dissolved	µg/L	7	33	<1	<1
Lead-Dissolved	µg/L	<1	3	<1	<1
Mercury-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5
Nickel-Dissolved	µg/L	19	3	1	1
Zinc-Dissolved	µg/L	82	100	18	18

Miscellaneous Inorganics Our Reference: Your Reference	UNITS ----------	39498-1 BH4	39498-2 BH6	39498-3 BH7	39498-4 BD1/31032010
Date Sampled	----------	30/03/2010	31/03/2010	31/03/2010	31/03/2010
Type of sample		Water	Water	Water	Water
Date prepared	-	01/04/10	01/04/10	01/04/10	01/04/10
Date analysed	-	03/04/10	03/04/10	03/04/10	03/04/10
Calcium - Dissolved	mg/L	5.8	2.9	62	62
Magnesium - Dissolved	mg/L	36	1.5	130	130
Hardness by calculation	mgCaCO3 /L	160	13	690	690

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 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Metals.22 ICP-MS	Determination of various metals by ICP-MS.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			6/4/10	[NT]	[NT]	LCS-W1	6/4/10
Date analysed	-			6/4/10	[NT]	[NT]	LCS-W1	6/4/10
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-W1	93%
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-W1	97%
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-W1	86%
1,1,1-trichloroethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS-W1	100%
1,1-dichloropropene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
Cyclohexane	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-W1	104%
Bromodichloromethane	µg/L	1	GC.13	<1.0	[NT]	[NT]	LCS-W1	109%
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-W1	114%
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-W1	119%
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]

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
o-xylene	µg/L	1	GC.13	<1.0	[NT]	[NT]	[NR]	[NR]
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]
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	98	[NT]	[NT]	LCS-W1	98%
Surrogate toluene-d8	%		GC.13	97	[NT]	[NT]	LCS-W1	99%
Surrogate 4-BFB	%		GC.13	105	[NT]	[NT]	LCS-W1	100%

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	-			3/4/10	[NT]	[NT]	LCS-W1	3/4/10
Date analysed	-			3/4/10	[NT]	[NT]	LCS-W1	3/4/10
TPH C_6 - C_9	µg/L	10	GC.16	<10	[NT]	[NT]	LCS-W1	102%
Benzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	110%
Toluene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	103%
Ethylbenzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	99%
m+p-xylene	µg/L	2	GC.16	<2.0	[NT]	[NT]	LCS-W1	99%
o-xylene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	100%
Surrogate Dibromofluoromethane	%		GC.16	98	[NT]	[NT]	LCS-W1	113%
Surrogate toluene-d8	%		GC.16	97	[NT]	[NT]	LCS-W1	106%
Surrogate 4-BFB	%		GC.16	105	[NT]	[NT]	LCS-W1	99%

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	-			1/4/10	[NT]	[NT]	LCS-W1	1/4/10
Date analysed	-			1/4/10	[NT]	[NT]	LCS-W1	1/4/10
TPH C_{10} - C_{14}	µg/L	50	GC.3	<50	[NT]	[NT]	LCS-W1	92%
TPH C_{15} - C_{28}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	133%
TPH C_{29} - C_{36}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	104%
Surrogate o-Terphenyl	%		GC.3	115	[NT]	[NT]	LCS-W1	126%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			1/4/10	[NT]	[NT]	LCS-W1	1/4/10
Date analysed	-			1/4/10	[NT]	[NT]	LCS-W1	1/4/10
Naphthalene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	82%
Acenaphthylene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	105%
Phenanthrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	101%
Anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	96%
Pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	102%
Benzo(a)anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	99%
Benzo(b+k)fluoranthene	µg/L	2	GC.12 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	LCS-W1	107%
Indeno(1,2,3-c,d)pyrene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	GC.12 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	126	[NT]	[NT]	LCS-W1	122%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			6/4/10	39498-1	6/4/10 || 6/4/10	LCS-W1	6/4/10
Date analysed	-			6/4/10	39498-1	6/4/10 || 6/4/10	LCS-W1	6/4/10
Arsenic-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	<1 || <1	LCS-W1	106%
Cadmium-Dissolved	µg/L	0.1	Metals.22 ICP-MS	<0.1	39498-1	0.1 || 0.1 || RPD: 0	LCS-W1	109%
Chromium-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	1 || 2 || RPD: 67	LCS-W1	106%
Copper-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	7 || 7 || RPD: 0	LCS-W1	104%
Lead-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	<1 || <1	LCS-W1	103%
Mercury-Dissolved	µg/L	0.5	Metals.21 CV-AAS	<0.5	39498-1	<0.5 || <0.5	LCS-W1	107%
Nickel-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	19 || 19 || RPD: 0	LCS-W1	103%
Zinc-Dissolved	µg/L	1	Metals.22 ICP-MS	<1	39498-1	82 || 80 || RPD: 2	LCS-W1	105%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			01/04/10	39498-1	01/04/10 || 01/04/10	LCS-W1	01/04/10
Date analysed	-			03/04/10	39498-1	03/04/10 || 03/04/10	LCS-W1	03/04/10
Calcium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	39498-1	5.8 || 5.6 || RPD: 4	LCS-W1	103%
Magnesium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	39498-1	36 || 36 || RPD: 0	LCS-W1	99%
Hardness by calculation	mgCaCO3/L	1	Metals.20 ICP-AES	<1	39498-1	160 || 160 || RPD: 0	[NR]	[NR]

QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	39498-2	6/4/10
Date analysed	-	[NT]	[NT]	39498-2	6/4/10
Arsenic-Dissolved	µg/L	[NT]	[NT]	39498-2	120%
Cadmium-Dissolved	µg/L	[NT]	[NT]	39498-2	108%
Chromium-Dissolved	µg/L	[NT]	[NT]	39498-2	120%
Copper-Dissolved	µg/L	[NT]	[NT]	39498-2	112%
Lead-Dissolved	µg/L	[NT]	[NT]	39498-2	108%
Mercury-Dissolved	µg/L	[NT]	[NT]	39498-2	102%
Nickel-Dissolved	µg/L	[NT]	[NT]	39498-2	112%
Zinc-Dissolved	µg/L	[NT]	[NT]	39498-2	114%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	39498-2	01/04/10
Date analysed	-	[NT]	[NT]	39498-2	03/04/10
Calcium - Dissolved	mg/L	[NT]	[NT]	39498-2	106%
Magnesium - Dissolved	mg/L	[NT]	[NT]	39498-2	103%
Hardness by calculation	mgCaCO3/L	[NT]	[NT]	[NR]	[NR]

Report Comments:

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 39074

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	3 Soils
Date samples received:	19/03/10
Date completed instructions received:	19/03/10

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

Report Details:

Date results requested by:	26/03/10
Date of Preliminary Report:	Not issued
Issue Date:	25/03/10

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

Results Approved By:

Rhian Morgan
Metals Supervisor

Jacinta Hurst
Operations Manager

Matt Mansfield
Chemist

Envirolab Reference: 39074
Revision No: R 00

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39074-1 BH2/0.4-0.5 18/03/2010 Soil	39074-2 BH2/1.8-2 18/03/2010 Soil	39074-3 BD1/18032010 18/03/2010 Soil
Date extracted	-	23/3/10	23/3/10	23/3/10
Date analysed	-	24/3/10	24/3/10	24/3/10
vTPH C_6 - C_9	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	116	106	117

sTPH in Soil (C10-C36) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39074-1 BH2/0.4-0.5 18/03/2010 Soil	39074-2 BH2/1.8-2 18/03/2010 Soil	39074-3 BD1/18032010 18/03/2010 Soil
Date extracted	-	23/03/2010	23/03/2010	23/03/2010
Date analysed	-	23/03/2010	23/03/2010	23/03/2010
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100
Surrogate o-Terphenyl	%	95	94	95

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39074-1 BH2/0.4-0.5 18/03/2010 Soil	39074-2 BH2/1.8-2 18/03/2010 Soil
Date extracted	-	22/03/2010	22/03/2010
Date analysed	-	23/03/2010	23/03/2010
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.4	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.9	<0.1
Pyrene	mg/kg	1.0	<0.1
Benzo(a)anthracene	mg/kg	0.4	<0.1
Chrysene	mg/kg	0.6	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.9	<0.2
Benzo(a)pyrene	mg/kg	0.5	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	<0.1
Surrogate p-Terphenyl-d_{14}	%	91	91

Organochlorine Pesticides in soil		
Our Reference:	UNITS	39074-1
Your Reference	----------	BH2/0.4-0.5
Date Sampled	----------	18/03/2010
Type of sample		Soil
Date extracted	-	23/3/10
Date analysed	-	23/3/10
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Surrogate TCLMX	%	95

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	39074-1 BH2/0.4-0.5 18/03/2010 Soil
Date extracted	-	23/3/10
Date analysed	-	23/3/10
Arochlor 1016	mg/kg	<0.1
Arochlor 1221*	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Surrogate TCLMX	%	95

Total Phenolics in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39074-1 BH2/0.4-0.5 18/03/2010 Soil	39074-2 BH2/1.8-2 18/03/2010 Soil
Date extracted	-	24/03/2010	24/03/2010
Date analysed	-	24/03/2010	24/03/2010
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	39074-1 BH2/0.4-0.5 18/03/2010 Soil	39074-2 BH2/1.8-2 18/03/2010 Soil	39074-3 BD1/18032010 18/03/2010 Soil
Date digested	-	24/03/10	24/03/10	24/03/10
Date analysed	-	24/03/10	24/03/10	24/03/10
Arsenic	mg/kg	34	<4	37
Cadmium	mg/kg	<0.5	<0.5	<0.5
Chromium	mg/kg	35	16	46
Copper	mg/kg	28	13	33
Lead	mg/kg	48	13	53
Mercury	mg/kg	0.1	<0.1	0.1
Nickel	mg/kg	38	2	40
Zinc	mg/kg	64	2	74

Moisture Our Reference: Your Reference	UNITS ----------	39074-1 BH2/0.4-0.5	39074-2 BH2/1.8-2	39074-3 BD1/18032010
Date Sampled	----------	18/03/2010	18/03/2010	18/03/2010
Type of sample		Soil	Soil	Soil
Date prepared	-	23/03/2010	23/03/2010	23/03/2010
Date analysed	-	23/03/2010	23/03/2010	23/03/2010
Moisture	%	7.5	18	7.8

Asbestos ID - soils		
Our Reference:	UNITS	39074-1
Your Reference	----------	BH2/0.4-0.5
Date Sampled	----------	18/03/2010
Type of sample		Soil
Date analysed	-	24/3/10
Sample Description	-	Approx 35g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following 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	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques. Note it is a NATA requirement to include the presence of Synthetic Mineral Fibres (SMF) and/or Organic Fibres of detected in a sample.

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	-			23/3/10	[NT]	[NT]	LCS-6	23/3/10
Date analysed	-			24/3/10	[NT]	[NT]	LCS-6	24/3/10
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	[NT]	[NT]	LCS-6	109%
Benzene	mg/kg	0.5	GC.16	<0.5	[NT]	[NT]	LCS-6	75%
Toluene	mg/kg	0.5	GC.16	<0.5	[NT]	[NT]	LCS-6	92%
Ethylbenzene	mg/kg	1	GC.16	<1.0	[NT]	[NT]	LCS-6	122%
m+p-xylene	mg/kg	2	GC.16	<2.0	[NT]	[NT]	LCS-6	127%
o-Xylene	mg/kg	1	GC.16	<1.0	[NT]	[NT]	LCS-6	132%
Surrogate aaa-Trifluorotoluene	%		GC.16	119	[NT]	[NT]	LCS-6	95%

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	-			23/03/2010	[NT]	[NT]	LCS-6	23/03/2010
Date analysed	-			23/03/2010	[NT]	[NT]	LCS-6	23/03/2010
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	[NT]	[NT]	LCS-6	88%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	[NT]	[NT]	LCS-6	101%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	[NT]	[NT]	LCS-6	86%
Surrogate o-Terphenyl	%		GC.3	92	[NT]	[NT]	LCS-6	93%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			22/03/2010	[NT]	[NT]	LCS-6	23/03/2010
Date analysed	-			23/03/2010	[NT]	[NT]	LCS-6	23/03/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	96%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	94%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	98%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	92%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	97%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-6	97%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	[NT]	[NT]	LCS-6	96%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	92	[NT]	[NT]	LCS-6	84%

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	-			23/3/10	[NT]	[NT]	LCS-6	23/3/10
Date analysed	-			23/3/10	[NT]	[NT]	LCS-6	23/3/10
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-6	138%
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-6	127%
Heptachlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-6	115%
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-6	134%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-6	133%
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-6	121%
Dieldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-6	129%
Endrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-6	127%
pp-DDD	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-6	136%
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-6	115%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	100	[NT]	[NT]	LCS-6	99%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			23/3/10	[NT]	[NT]	LCS-6	23/3/10
Date analysed	-			23/3/10	[NT]	[NT]	LCS-6	23/3/10
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	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-6	120%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-6	100	[NT]	[NT]	LCS-6	97%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/03/2010	39074-1	24/03/2010 || 24/03/2010	LCS-1	24/03/2010
Date analysed	-			24/03/2010	39074-1	24/03/2010 || 24/03/2010	LCS-1	24/03/2010
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	39074-1	<5.0 || <5.0	LCS-1	109%

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	-			24/03/10	[NT]	[NT]	LCS-4	24/03/10
Date analysed	-			24/03/10	[NT]	[NT]	LCS-4	24/03/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	[NT]	[NT]	LCS-4	94%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	[NT]	[NT]	LCS-4	96%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-4	97%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-4	97%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-4	94%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	[NT]	[NT]	LCS-4	97%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-4	98%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-4	95%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			23/03/2010
Date analysed	-			23/03/2010
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	39074-2	24/03/2010
Date analysed	-	[NT]	[NT]	39074-2	24/03/2010
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	39074-2	103%

Report Comments:

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 38861-A

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645.01, Marrickville Metro**
No. of samples:	Additional Testing on 1 Soil
Date samples received:	15/03/10
Date completed instructions received:	30/03/10

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

Report Details:

Date results requested by:	7/04/10
Date of Preliminary Report:	Not Issued
Issue Date:	1/04/10

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

Results Approved By:

Jacinta Hurst
Operations Manager

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

PAHs in TCLP (USEPA 1311) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38861-A-1 BH 1/0.3-0.5 12/03/2010 Soil
pH of soil for fluid# determ.	pH units	9.30
pH of soil for fluid # determ. (acid)	pH units	1.60
Extraction fluid used	-	1
pH of final Leachate	pH units	5.30
Date extracted	-	31/3/10
Date analysed	-	31/3/10
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Surrogate p-Terphenyl-d_{14}	%	117

Method ID	Methodology Summary
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
GC.12 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC.12	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

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	-			31/3/10	[NT]	[NT]	LCS-W1	31/3/10
Date analysed	-			31/3/10	[NT]	[NT]	LCS-W1	31/3/10
Naphthalene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	89%
Acenaphthylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Phenanthrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	94%
Pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Benzo(a)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	92%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	GC.12 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	110%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	115	[NT]	[NT]	LCS-W1	122%

Report Comments:

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 38986-A

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	Additional Testing on 1 Soil
Date samples received:	17/03/10
Date completed instructions received:	30/03/10

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

Report Details:

Date results requested by:	7/04/10
Date of Preliminary Report:	Not Issued
Issue Date:	1/04/10

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

Results Approved By:

Jacinta Hurst
Operations Manager

PAHs in TCLP (USEPA 1311) Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38986-A-3 BH6 0.5-0.3 16/03/2010 Soil
pH of soil for fluid# determ.	pH units	7.90
pH of soil for fluid # determ. (acid)	pH units	1.60
Extraction fluid used	-	1
pH of final Leachate	pH units	4.90
Date extracted	-	31/3/10
Date analysed	-	31/3/10
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Surrogate p-Terphenyl-d_{14}	%	114

Method ID	Methodology Summary
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
GC.12 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC.12	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

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	-			31/3/10	[NT]	[NT]	LCS-W1	31/3/10
Date analysed	-			31/3/10	[NT]	[NT]	LCS-W1	31/3/10
Naphthalene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	89%
Acenaphthylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Phenanthrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	94%
Pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	98%
Benzo(a)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	92%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	GC.12 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	110%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	115	[NT]	[NT]	LCS-W1	122%

Report Comments:

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

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

CERTIFICATE OF ANALYSIS 38986

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Caitlyn Falla

Sample log in details:

Your Reference:	**71645, Marrickville Metro**
No. of samples:	7 Soils
Date samples received:	17/03/10
Date completed instructions received:	17/03/10

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

Report Details:

Date results requested by:	24/03/10
Date of Preliminary Report:	Not Issued
Issue Date:	23/03/10

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

Results Approved By:

Rhian Morgan
Rhian Morgan
Metals Supervisor

Jacinta Hurst
Operations Manager

M. Mansfield
Matt Mansfield
Chemist

Envirolab Reference: 38986
Revision No: R 00

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-2 BH5 2.3-2.5 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil	38986-4 BH6 1.9-2 16/03/2010 Soil	38986-5 BD1/17032010 17/03/2010 Soil
Date extracted	-	18/03/2010	18/03/2010	18/03/2010	18/03/2010	18/03/2010
Date analysed	-	18/03/2010	18/03/2010	18/03/2010	19/03/2010	19/03/2010
vTPH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	92	93	92	92	94

vTPH & BTEX in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- ----------	38986-6 Trip Blank 17/03/2010 Soil	38986-7 Trip Spike 17/03/2010 Soil
Date extracted	-	18/03/2010	18/03/2010
Date analysed	-	19/03/2010	19/03/2010
Benzene	mg/kg	<0.5	98%
Toluene	mg/kg	<0.5	98%
Ethylbenzene	mg/kg	<1.0	98%
m+p-xylene	mg/kg	<2.0	97%
o-Xylene	mg/kg	<1.0	97%
Surrogate aaa-Trifluorotoluene	%	110	98

sTPH in Soil (C10-C36) Our Reference: Your Reference	UNITS ----------	38986-1 BH5 0.05-0.1	38986-2 BH5 2.3-2.5	38986-3 BH6 0.5-0.3	38986-4 BH6 1.9-2	38986-5 BD1/17032010
Date Sampled	----------	17/03/2010	17/03/2010	16/03/2010	16/03/2010	17/03/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/3/10	18/3/10	18/3/10	18/3/10	18/3/10
Date analysed	-	18/3/10	18/3/10	18/3/10	18/3/10	18/3/10
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	200	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	440	<100	<100
Surrogate o-Terphenyl	%	92	91	99	95	97

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-2 BH5 2.3-2.5 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil	38986-4 BH6 1.9-2 16/03/2010 Soil
Date extracted	-	18/03/2010	18/03/2010	18/03/2010	18/03/2010
Date analysed	-	18/03/2010	18/03/2010	18/03/2010	18/03/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.1	0.8	<0.1
Pyrene	mg/kg	<0.1	0.2	1.2	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.6	<0.1
Chrysene	mg/kg	<0.1	0.1	0.8	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	1.5	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.1	1.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.7	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.7	<0.1
Surrogate p-Terphenyl-d14	%	111	116	115	116

Organochlorine Pesticides in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil
Date extracted	-	18/3/10	18/3/10
Date analysed	-	18/3/10	18/3/10
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	96	97

PCBs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil
Date extracted	-	18/3/10	18/3/10
Date analysed	-	18/3/10	18/3/10
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	96	97

Total Phenolics in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-2 BH5 2.3-2.5 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil	38986-4 BH6 1.9-2 16/03/2010 Soil
Date extracted	-	18/3/10	18/3/10	18/3/10	18/3/10
Date analysed	-	18/3/10	18/3/10	18/3/10	18/3/10
Total Phenolics (as Phenol)	mg/kg	<5.0	<5.0	<5.0	<5.0

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-2 BH5 2.3-2.5 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil	38986-4 BH6 1.9-2 16/03/2010 Soil	38986-5 BD1/17032010 17/03/2010 Soil
Date digested	-	18/03/10	18/03/10	18/03/10	18/03/10	18/03/10
Date analysed	-	18/03/10	18/03/10	18/03/10	18/03/10	18/03/10
Arsenic	mg/kg	<4	<4	5	<4	<4
Cadmium	mg/kg	<0.5	<0.5	0.7	<0.5	<0.5
Chromium	mg/kg	3	21	18	20	3
Copper	mg/kg	260	20	70	14	250
Lead	mg/kg	8	17	28	17	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	11	33	5	8
Zinc	mg/kg	49	16	62	7	51

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-2 BH5 2.3-2.5 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil	38986-4 BH6 1.9-2 16/03/2010 Soil	38986-5 BD1/17032010 17/03/2010 Soil
Date prepared	-	18/3/10	18/3/10	18/3/10	18/3/10	18/3/10
Date analysed	-	18/3/10	18/3/10	18/3/10	18/3/10	18/3/10
Moisture	%	3.6	12	4.5	17	5.5

Moisture Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	38986-6 Trip Blank 17/03/2010 Soil
Date prepared	-	18/3/10
Date analysed	-	18/3/10
Moisture	%	0.10

Asbestos ID - soils Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	38986-1 BH5 0.05-0.1 17/03/2010 Soil	38986-3 BH6 0.5-0.3 16/03/2010 Soil
Date analysed	-	23/3/10	23/3/10
Sample Description	-	Approx 40g Soil & Rocks	Approx 40g Soil & Rocks
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
LAB.30	Total Phenolics - determined colorimetrically following disitillation.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
ASB.1	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/03/2010	38986-3	18/03/2010 || 18/03/2010	LCS-1	18/03/2010
Date analysed	-			18/03/2010	38986-3	18/03/2010 || 18/03/2010	LCS-1	18/03/2010
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	38986-3	<25 || <25	LCS-1	95%
Benzene	mg/kg	0.5	GC.16	<0.5	38986-3	<0.5 || <0.5	LCS-1	80%
Toluene	mg/kg	0.5	GC.16	<0.5	38986-3	<0.5 || <0.5	LCS-1	91%
Ethylbenzene	mg/kg	1	GC.16	<1.0	38986-3	<1.0 || <1.0	LCS-1	101%
m+p-xylene	mg/kg	2	GC.16	<2.0	38986-3	<2.0 || <2.0	LCS-1	102%
o-Xylene	mg/kg	1	GC.16	<1.0	38986-3	<1.0 || <1.0	LCS-1	107%
Surrogate aaa-Trifluorotoluene	%		GC.16	93	38986-3	92 || 111 || RPD: 19	LCS-1	94%

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	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
Date analysed	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	38986-3	<50 || <50	LCS-1	98%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	38986-3	200 || 170 || RPD: 16	LCS-1	106%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	38986-3	440 || 340 || RPD: 26	LCS-1	103%
Surrogate o-Terphenyl	%		GC.3	113	38986-3	99 || 96 || RPD: 3	LCS-1	104%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/03/2010	38986-3	18/03/2010 || 18/03/2010	LCS-1	18/03/2010
Date analysed	-			18/03/2010	38986-3	18/03/2010 || 18/03/2010	LCS-1	18/03/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	<0.1 || <0.1	LCS-1	95%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.1 || 0.2 || RPD: 67	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	<0.1 || <0.1	LCS-1	97%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.2 || 0.5 || RPD: 86	LCS-1	98%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.1 || 0.3 || RPD: 100	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.8 || 2.0 || RPD: 86	LCS-1	91%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	1.2 || 2.7 || RPD: 77	LCS-1	101%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.6 || 1.5 || RPD: 86	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.8 || 1.6 || RPD: 67	LCS-1	95%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	38986-3	1.5 || 3.1 || RPD: 70	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	38986-3	1.2 || 2.4 || RPD: 67	LCS-1	93%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.7 || 1.1 || RPD: 44	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.1 || 0.2 || RPD: 67	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	38986-3	0.7 || 1.2 || RPD: 53	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	131	38986-3	115 || 114 || RPD: 1	LCS-1	116%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
Date analysed	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
HCB	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	122%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	93%
Heptachlor	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	68%
delta-BHC	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	113%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	120%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	104%
Dieldrin	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	106%
Endrin	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	86%
pp-DDD	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	104%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	LCS-1	102%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	92	38986-3	97 || 98 || RPD: 1	LCS-1	92%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
Date analysed	-			18/3/10	38986-3	18/3/10 || 18/3/10	LCS-1	18/3/10
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	LCS-1	94%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	38986-3	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	92	38986-3	97 || 98 || RPD: 1	LCS-1	92%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/3/10	38986-1	18/3/10 || 18/3/10	LCS-1	18/3/10
Date analysed	-			18/3/10	38986-1	18/3/10 || 18/3/10	LCS-1	18/3/10
Total Phenolics (as Phenol)	mg/kg	5	LAB.30	<5.0	38986-1	<5.0 || <5.0	LCS-1	96%

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	-			18/03/10	38986-3	18/03/10 || 18/03/10	LCS-2	18/03/10
Date analysed	-			18/03/10	38986-3	18/03/10 || 18/03/10	LCS-2	18/03/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	38986-3	5 || 6 || RPD: 18	LCS-2	111%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	38986-3	0.7 || 1.1 || RPD: 44	LCS-2	112%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	38986-3	18 || 20 || RPD: 11	LCS-2	110%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	38986-3	70 || 73 || RPD: 4	LCS-2	113%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	38986-3	28 || 29 || RPD: 4	LCS-2	111%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	38986-3	<0.1 || <0.1	LCS-2	96%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	38986-3	33 || 34 || RPD: 3	LCS-2	113%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	38986-3	62 || 63 || RPD: 2	LCS-2	115%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			18/3/10
Date analysed	-			18/3/10
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	38986-2	18/3/10
Date analysed	-	[NT]	[NT]	38986-2	18/3/10
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	38986-2	101%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample.
Envirolab recommends supplying 30-40g of sample in it's own container.
Asbestos was analysed by Approved Identifier: Matt Mansfield
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

LabMark
ENVIRONMENTAL LABORATORIES

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

ilac-MRA
NATA
Accreditation No. 1645

Accredited for compliance with ISO/IEC 17025. The results of tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the APLAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

AQIS
AUSTRALIAN QUARANTINE AND INSPECTION SERVICE
SYDNEY License No. N0356.

Quarantine Approved Premises criteria 5.1 for quarantine containment level 1 (QC1) facilities. Class five criteria cover premises utilised for research, analysis and testing of biological material, soil, animal, plant and human products.

FINAL CERTIFICATE OF ANALYSIS - ENVIRONMENTAL DIVISION

Laboratory Report No:	E047399	Cover Page 1 of 3 plus Sample Results
Client Name:	Douglas Partners	
Client Reference:	Marrickville Metro	
Contact Name:	Caitlyn Falla	
Chain of Custody No:	na	Date Received: 19/03/2010
Sample Matrix:	SOIL	Date Reported: 29/03/2010

This Final Certificate of Analysis consists of sample results, DQI's, method descriptions, laboratory definitions, and internationally recognised NATA accreditation and endorsement. The DQO compliance relates specifically to QA/QC results as performed as part of the sample analysis, and may provide an indication of sample result quality. Transfer of report ownership from Labmark to the client shall only occur once full & final payment has been settled and verified. All report copies may be retracted where full payment has not occured within the agreed settlement period.

QUALITY ASSURANCE CRITERIA

Accuracy:	matrix spike:	1 in first 5-20, then 1 every 20 samples
	lcs, crm, method:	1 per analytical batch
	surrogate spike:	addition per target organic method
Precision:	laboratory duplicate:	1 in first 5-10, then 1 every 10 samples
	laboratory triplicate:	re-extracted & reported when duplicate RPD values exceed acceptance criteria
Holding Times:	soils, waters:	Refer to LabMark Preservation & THT table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil Metals 6 months general elements Mercury 28 days
Confirmation:	target organic analysis:	GC/MS, or confirmatory column
Sensitivity:	EQL:	Typically 2-5 x Method Detection Limit (MDL)

QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)

Accuracy:	spike, lcs, crm surrogate:	general analytes 70% - 130% recovery phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery
	anion/cation bal:	+/- 10% (0-3 meq/l), +/- 5% (>3 meq/l)
Precision:	method blank:	not detected >95% of the reported EQL
	duplicate lab RPD (metals):	0-30% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)
	duplicate lab RPD:	0-50% (>10xEQL), 0-75% (5-10xEQL) 0-100% (<5xEQL)

QUALITY CONTROL ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC)

Accuracy:	spike, lcs, crm surrogate:	analyte specific recovery data <3xsd of historical mean
Uncertainty:	spike, lcs:	measurement calculated from historical analyte specific control charts

RESULT ANNOTATION

Data Quality Objective	s:	matrix spike recovery	p:	pending	bcs: batch specific lcs
Data Quality Indicator	d:	laboratory duplicate	lcs:	laboratory control sample	bmb: batch specific mb
Estimated Quantitation Limit	t:	laboratory triplicate	crm:	certified reference material	
not applicable	r:	RPD relative % difference	mb:	method blank	

Simon Mills
Quality Control (Report signatory)
simon.mills@labmark.com.au

Geoff Weir
Authorising Chemist (NATA signatory)
geoff.weir@labmark.com.au

Jeremy Truong
Authorising Chemist (NATA signatory)
jeremy.truong@labmark.com.au

NEPC GUIDELINE COMPLIANCE - DQO

1. GENERAL

A. Results relate specifically to samples as received. Sample results are not corrected for matrix spike, lcs, or surrogate recovery data.

B. EQL's are matrix dependant and may be increased due to sample dilution or matrix interference.

C. Laboratory QA/QC samples are specific to this project.

D. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at www.nata.asn.au.

E. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to extraction.

F. Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). If recovery data <20%, then the relevant results for that compound are considered not reliable.

G. Recovery data (ms, surrogate, crm, lcs) outside ASAC limits shall initiate an investigative action. Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations.

H. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date.

I. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

2. CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

A. SRN issued to client upon sample receipt & login verification.

B. Preservation & sampling date details specified on COC and SRN, unless noted.

C. Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

3. NATA ACCREDITED METHODS

A. NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer to subcontracted test reports for NATA accreditation status).

B. NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA documents. Corporate Accreditation No. 13542.

C. Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments.

Laboratory Report: E047399

Cover Page 3 of 3

4. QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix: **SOIL**

Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	BTEX by P&T	1	0	0%	0	0	0%
1	Volatile TPH by P&T (vTPH)	1	0	0%	0	0	0%
2	Petroleum Hydrocarbons (TPH)	1	0	0%	0	0	0%
3	Acid extractable metals (M7)	1	0	0%	0	0	0%
4	Acid extractable metals - mercury	1	0	0%	0	0	0%
5	Moisture	1	--	--	--	--	--

GLOSSARY:

#d	number of discrete duplicate extractions/analyses performed.
%d-ratio	NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%).
#t	number of triplicate extractions/analyses performed.
#s	number of spiked samples analysed.
%s-ratio	USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

5. ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, unless indicated below.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E047399
Client Name: Douglas Partners
Contact Name: Caitlyn Falla
Client Reference: Marrickville Metro 71645

Date: 29/03/10
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		255062	lcs	mb							
Sample Identification		BD1/18032010	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/3/10	--	--							
Laboratory Extraction (Preparation) Date		24/3/10	24/3/10	24/3/10							
Laboratory Analysis Date		26/3/10	24/3/10	24/3/10							
Method : E029.2/E016.2											
BTEX by P&T	**EQL**										
Benzene	0.2	<0.2	86%	<0.2							
Toluene	0.5	<0.5	100%	<0.5							
Ethylbenzene	0.5	<0.5	99%	<0.5							
meta- and para-Xylene	1	<1	102%	<1							
ortho-Xylene	0.5	<0.5	101%	<0.5							
Total Xylene	--	--	--	--							
CDFB (Surr @ 4 mg/kg)	--	*109%*	*100%*	*102%*							
Method : E029.2/E016.2											
Volatile TPH by P&T (vTPH)	**EQL**										
C6 - C9 Fraction	10	<10	99%	<10							

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E029.2/E016.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/FID/MSD.
E029.2/E016.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/MSD.

Laboratory Identification		255062	lcs	mb							
Sample Identification		BD1/18032010	QC	QC							
Depth (m)		--	--	--							
Sampling Date recorded on COC		18/3/10	--	--							
Laboratory Extraction (Preparation) Date		24/3/10	24/3/10	24/3/10							
Laboratory Analysis Date		25/3/10	25/3/10	25/3/10							
Method : E006.2											
Petroleum Hydrocarbons (TPH)	**EQL**										
C10 - C14 Fraction	50	<50	--	<50							
C15 - C28 Fraction	100	<100	100%	<100							
C29 - C36 Fraction	100	<100	--	<100							
Sum of TPH C10 - C36	--	--	--	--							

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E006.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/FID.

Laboratory Identification		255062	crm	lcs	mb						
Sample Identification		BD1/18032010	QC	QC	QC						
Depth (m)		--	--	--	--						
Sampling Date recorded on COC		18/3/10	--	--	--						
Laboratory Extraction (Preparation) Date		24/3/10	24/3/10	24/3/10	24/3/10						
Laboratory Analysis Date		25/3/10	25/3/10	25/3/10	25/3/10						
Method : E022.2											
Acid extractable metals (M7)	**EQL**										
Arsenic	1	39	120%	103%	<1						
Cadmium	0.1	0.2	93%	118%	<0.1						
Chromium	1	47	114%	111%	<1						
Copper	2	27	115%	95%	<2						
Nickel	1	35	102%	100%	<1						
Lead	2	71	101%	110%	<2						
Zinc	5	75	113%	91%	<5						

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification		255062	crm	lcs	mb						
Sample Identification		BD1/18032010	QC	QC	QC						
Depth (m)		--	--	--	--						
Sampling Date recorded on COC		18/3/10	--	--	--						
Laboratory Extraction (Preparation) Date		24/3/10	24/3/10	24/3/10	24/3/10						
Laboratory Analysis Date		25/3/10	24/3/10	24/3/10	24/3/10						
Method : E026.2											
Acid extractable metals - mercury	**EQL**										
Mercury	0.05	0.18	85%	90%	<0.05						

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E047399
Client Name: Douglas Partners
Contact Name: Caitlyn Falla
Client Reference: Marrickville Metro 71645

Date: 29/03/10
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		255062
Sample Identification		BD1/18032010
Depth (m)		--
Sampling Date recorded on COC		18/3/10
Laboratory Extraction (Preparation) Date		24/3/10
Laboratory Analysis Date		25/3/10
Method : E005.2		
Moisture	**EQL**	
Moisture	--	6

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Report Date : 22/03/2010
Report Time : 2:22:38PM

LabMark
ENVIRONMENTAL LABORATORIES

Quality, Service, Support

Sample Receipt Notice (SRN) for E047399

Client Details		Laboratory Reference Information	
		Please have this information ready when contacting Labmark.	
Client Name:	Douglas Partners	**Laboratory Report:**	**E047399**
Client Phone:	02 9809 0666	**Quotation Number:**	- Not provided, standard prices apply
Client Fax:	02 98094095	**Laboratory Address:**	Unit 1, 8 Leighton Pl. Asquith NSW 2077
Contact Name:	Caitlyn Falla		
Contact Email:	Caitlyn.falla@douglaspartners.com.au	**Phone:**	61 2 9476 6533
Client Address:	96 Hermitage Road West Ryde NSW 2114	**Fax:**	61 2 9476 8219
		Sample Receipt Contact:	Ros Schacht
Project Name:	Marrickville Metro	**Email:**	Ros.Schacht@labmark.com.au
Project Number:	71645	**Reporting Contact:**	Leanne Boag
CoC Serial Number:	- Not provided -	**Email:**	leanne.boag@labmark.com.au
Purchase Order:	- Not provided -		
Surcharge:	No surcharge applied (results by 6:30pm on due date)		
Sample Matrix:	SOIL		
Date Sampled (earliest date):	18/03/2010	**NATA Accreditation:**	13542
Date Samples Received:	19/03/2010	**TGA GMP License:**	185-336 (Sydney)
Date Sample Receipt Notice issued:	22/03/2010	**APVMA License:**	6105 (Sydney)
Date Preliminary Report Due:	29/03/2010	**AQIS Approval:**	NO356 (Sydney)
Client TAT Request Date:	29/03/2010	**AQIS Entry Permit:**	200521534 (Sydney)

Reporting Requirements: Electronic Data Download required: No

Invoice Number: 10EA8714

Sample Condition: COC received with samples. Report number and lab ID's defined on COC.
Samples received in good order .
Samples received with cooling media: Ice bricks .
Samples received chilled.
Security seals not used .
Sample container & chemical preservation suitable .

Comments:

Holding Times: Date received allows for sufficient time to meet Technical Holding Times.

Preservation: Chemical preservation of samples satisfactory for requested analytes.

Important Notes:
LabMark shall responsibly dispose of spent customer soil and water samples which includes the disintegration of the sample label. A sample disposal fee of $1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples shall be 31 days (water) and 3 months (soil, HN03 preserved samples) after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur $5.00/ sample/ 3 months. Additional refrigerated storage shall incur $30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Analysis comments:

Subcontracted Analyses:

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Quality, Service, Support

Report Date : 22/03/2010
Report Time : 2:22:38PM

Sample Receipt Notice (SRN) for E047399

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

GRID REVIEW TABLE

No.	Date	Depth	Client Sample ID	Requested Analysis: BTEX by P&T	Acid extractable metals - mercury	Acid extractable metals (M7)	Moisture	PREP Not Reported	Petroleum Hydrocarbons (TPH)	Volatile TPH by P&T (vTPH)
255062	18/03		BD1/18032010	●	●	●	●	●	●	●
			Totals:	1	1	1	1	1	1	1

'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

LabMark
ENVIRONMENTAL LABORATORIES

Quality, Service, Support

Report Date : 22/03/2010
Report Time : 2:22:38PM

Sample **Receipt** Notice (SRN) for **E047399**

No.	Date	Depth	Client Sample ID	Requested Analysis: M8 - M7-T_S
255062	18/03		BD1/18032010	●
			Totals:	1

Thank you for choosing Labmark to analyse your project samples.
Additional information on www.labmark.com.au

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: MARRICKVILLE METRO
Project No: 71645 Sampler: ...CF
Project Mgr: BOK/FW...Mob. Phone: 0409 242 497
Email: Caitlyn.falla@douglaspartners.com.au
Date Required: Standard Lab Quote No.

TO: LABMARK SERVICES PTY LTD
UNIT 1, 8 LEIGHTON PLACE
ASQUITH NSW 2077

ATTN: GEOFF WEIR

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W - water	Container type	Analytes: As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/TPH	OCPs/OPPs	PCBs	PAH	Phenols	VOCs	Other	Notes
BD1/KS032010			8/3	S	G	X	X	X	X	X	X	X	X	X							255062

Lab Report No.
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114 Phone: (02) 9809 0666 Fax: (02) 9809 4095
Relinquished by: Caitlyn Falla Signed: Date & Time: 18/3 10AM Received By: Date & Time: 19/3/10 1715
Relinquished by: Signed: Date & Time: Received By: Date & Time:

E047399

Form COC Rev0/November 2006

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: MARRICKVILLE METRO
Project No: 71645 Sampler: ...CF
Project Mgr: BOK/FW...Mob. Phone: 0409 242 497
Email: Caitlyn.falla@douglaspartners.com.au
Date Required: Standard... Lab Quote No.

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

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W - water	Container Type	Analytes: As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/TPH	OCPs/[redacted]	PCBs	PAH	Phenols	VOCs	Other Asbestos	Notes
BH5	0.05-0.1	1	17/3	S	G	X	X	X	X	X	X	X	X	X	X	X	X	X		X	Job No: 38986
BH5	2.3-2.5	2	17/3																		Date received: 17/3/10
BH6	0.15-0.3	3	16/3												X	X				X	Time received: 3pm
BH6	1.9-2	4	16/3														↓	↓			Received by: Z.L.
BD1/[redacted]0820104		5	17/3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓							Temp: Cool/Ambient
Trip Blank		6												BTEX							Esky/Icepack
Trip Spike		7		↓	↓									BTEX							Security: Intact/Broken/None
																					BTEX only
																					BTEX only

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

Lab Report No. 38986

Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Caitlyn Falla Signed: Date & Time: 1230pm 17/3 Received By: Z.L. Date & Time: 17/3/10 3pm

Relinquished by: Signed: Date & Time: Received By: Date & Time:

Form COC Rev0/November 2006

APPENDIX D
Quality Assurance / Quality Control Results

QA/QC PROCEDURES AND RESULTS

Q1 - FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field quality control (QC) procedures for sampling as prescribed in Douglas Partners *Field Procedures Manual* were followed at all times during the assessment.

Q1.1 Sampling Team

Field sampling was undertaken by DP Engineers Caitlyn Falla, Fiona Wong and Brendan O'Kane from 12 to the 31 March 2010. Sampling was undertaken predominately during fine weather conditions.

Q1.2 Sample Collection and Dispatch

Sample collection procedures and dispatch for soil are reported in Section 8.7, Soil Sampling Procedure.

Q1.3 Logs

Logs for each sampling location were recorded in the field. The location of individual samples were recorded on the field logs along with location, depth, initials of sampler, replicate locations, replicate type, site observations and weather conditions. Logs are presented in Appendix F.

Q1.4 Chain-of-Custody (COC)

Analysis to be performed on each sample was recorded on the COC which accompanied samples to the analytical laboratory. Signed copies of COCs are presented in Appendix D, following the laboratory reports.

Q1.5 Sample Splitting Techniques

Replicate samples were collected in the field as a measure of accuracy, precision and repeatability of the results. Field replicate samples for soil were collected from the same location and at an identical depth to the primary sample. Equal portions of the recovered sample were placed into the sampling jars and sealed. The sample was not homogenised

in a bowl and then split, as this process can lead to loss of volatiles from the soil should they be present.

Field replicate samples for groundwater were collected from the sample well as the primary sample. No mixing was carried out.

Replicate samples were labelled with a DP identification number, recorded on DP bore logs, so as to conceal their relationship to their primary sample from the analysing laboratory.

Q1.6 Field Instrument Calibration

The groundwater parameters were measured with a 90FL-T water quality meter. The water quality meter was calibrated at ThermoFisher Scientific on 04/02/2010 and the pH meter was calibrated prior to use in the field with pH buffer solutions of 4 and 10.

All soil samples were screened for the presence of total photo-ionisable compounds (TOPIC) using a calibrated photo-ionisation detector (PID).

Q1.7 Decontamination Procedures

Soil samples were recovered directly from the auger with rubber disposable gloves. Disposable tubing was used to sample each groundwater well.

Q1.8 Trip Spikes

According to the NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites* (1997), laboratory prepared trip spikes are to be taken into the field, subjected to the same preservation methods as the field samples, then analysed, for the purposes of determining the losses in volatile organics incurred prior to reaching the laboratory.

The laboratory prepared soil trip spikes which were preserved in the standard manner and taken into the field unopened. The volatile organic recovery rates are shown below. At this stage, the laboratory has no standard acceptance limits in recovery rates as results from in-house laboratory controls often vary. Results (Table Q1) indicate that overall the percentage loss for BTEX during the sample transport was minimal and therefore it is considered that appropriate preservation techniques were employed. The results also indicate that any potential loss of volatiles from the recovered samples that might have

occurred would only be minimal and would therefore not affect the outcome/conclusions of the assessment.

Table Q1 – Trip Spike Results

Sample ID	Matrix	Recovery (%)				
		Benzene	Toluene	Ethyl Benzene	m+p xylene	o xylene
TS 1 17/03/2010 (38986-7)	soil	98%	98%	98%	97%	97%
TS2 - 24/03/2010 (39246-14)	soil	98%	97%	98%	97%	98%

Q1.9 Trip Blanks

Laboratory prepared water trip blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed for the purposes of determining the transfer of contaminants into the blank sample incurred prior to reaching the laboratory. The result of the laboratory analysis for the trip blanks is shown in Table Q2.

Table Q2 Trip Blank Results

Sample ID	Matrix	BTEX				
		Benzene	Toluene	Ethyl Benzene	m+p xylene	o xylene
TB1 - 17/03/2010 (38986-6)	soil	<1.0	<1.0	<1.0	<2.0	<1.0
TB2 - 24/03/2010 (39246-13)	soil	<1.0	<1.0	<1.0	<2.0	<1.0

The concentrations of analytes were all below practical quantitation limits indicating that cross contamination had not occurred during the course of the round trip from the site to the laboratory.

Q1.10 Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for duplicate samples. A RPD of ± 30% is generally considered acceptable for inorganic analytes by the DECC, although in general a wider RPD range may be acceptable for organic analytes (up to 50%).

Q1.10.1 Intra-Laboratory Analysis

Intra-laboratory replicates were conducted as an internal check of the reproductively within the primary laboratory (Envirolab Services Pty Ltd) and as a measure of consistency of sampling techniques. Replicate samples were collected at a rate of approximately one replicate sample for every ten original samples collected and also analysed at a rate of 10% of primary samples analysed. Chemicals of concern were analysed at a higher frequency to other chemicals of secondary concern. In total one sample and the replicate pair were analysed for heavy metals, TPH C_6-C_9 and BTEX. Water samples were analysed for the full analyte suite. BH2/0.4-0.5 and BH5/0.05-0.1 were the samples chosen to be duplicated for the sample cohort at the time of the investigation. BH7 was the groundwater sampled chosen to be duplicated.

The comparative results of analysis between original and replicate samples are summarised in the tables below.

Table Q3 – Intra-laboratory Results for Heavy Metals and TPH/BTEX

Sample Description	Heavy Metals							
	As	**Cd**	**Cr**	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**
BH2/0.4-0.5	35	<0.5	35	28	48	0.1	38	65
BD1/18032010	37	<0.5	46	33	53	0.1	40	74
Difference	2	0	11	5	5	0	2	10
RPD(%)	6	0	27	16	10	0	5	13
BH5/0.05-0.1	<4	<0.5	3	260	8	<0.1	8	49
BD1/17032010	<4	<0.5	3	250	9	<0.1	8	51
Difference	0	0	0	10	1	0	0	2
RPD(%)	0	0	0	4	12	0	0	4
BH7	<1	<0.1	<1	<1	<1	<0.5	1	18
BD1/31032010	<1	<0.1	<1	<1	<1	<0.5	1	18
Difference	0	0	0	0	0	0	0	0
RPD(%)	0	0	0	0	0	0	0	0

Sample Description	TPH		BTEX			
	C6-C9	C10-C36	Benzene	Tolene	Ethylbenzene	Total Xylene
BH2/0.4-0.5	<25	<250	<0.5	<0.5	<1.0	<3.0
BD1/18032010	<25	<250	<0.5	<0.5	<1.0	<3.0
Difference	0	0	0	0	0	0
RPD(%)	0	0	0	0	0	0
BH5/0.05-0.1	<25	<250	<0.5	<0.5	<1.0	<3.0
BD1/17032010	<25	<250	<0.5	<0.5	<1.0	<3.0
Difference	0	0	0	0	0	0
RPD(%)	0	0	0	0	0	0
BH7	<10	<250	<1	<1	<1	<3
BD1/31032010	<10	<250	<1	<1	<1	<3
Difference	0	0	0	0	0	0
RPD(%)	0	0	0	0	0	0

The calculated RPD values for heavy metals, TPH C_6-C_9 and BTEX were all within the acceptable range of $\pm$ 30 for the samples and their replicates. 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.

Q1.10.2 Inter-Laboratory Analysis

Inter-laboratory replicates were conducted as a check of the reproductivity within the primary laboratory (Envirolab Services Pty Ltd) and a secondary laboratory (Labmark) and as a measure of consistency of sampling techniques. One sample was taken as an inter-laboratory sample per round of sampling in addition to intra-laboratory samples. Chemicals of concern were analysed at a higher frequency to other chemicals of secondary concern. Soil was analysed for heavy metals, TPH C_6-C_9 and BTEX. BH2/0.4-0.5 was the sample that was chosen to be duplicated for the sample cohort at the time of the investigation.

The comparative results of analysis between original and replicate samples are summarised in the tables below.

Table Q4 - Soil – Labmark inter-laboratory sample for Heavy Metals and TPH/BTEX

Duplicate analysed by	Sample Description	Heavy Metals							
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
LabMark	BH2/0.4-0.5	35	<0.5	35	28	48	0.1	38	65
	BD1/18032010	39	0.2	47	27	71	0.18	35	75
	Difference	4	0	12	1	23	0.08	3	10
	RPD(%)	11	0	29	4	39	57	8	14

Duplicate analysed by	Sample Description	TPH		BTEX			
		C6-C9	C10-C36	Benzene	Toluene	Ethyl-benzene	Total Xylene
LabMark	BH2/0.4-0.5	<25	<250	<0.5	<0.5	<1.0	<3.0
	BD1/18032010	<10	<250	<0.2	<0.5	<0.5	<1.5
	Difference	0	0	0	0	0	0
	RPD(%)	0	0	0	0	0	0

The calculated RPD values for heavy metals, TPH C_6-C_9 and BTEX were all within the acceptable range of $\pm$ 30 for the samples and their replicates, with the exception of lead and mercury. This is likely to be attributable to the heterogeneous nature of the filling present in the samples. It is 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.

Q2 - LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Q2.1 Laboratory Accreditation

Only laboratories accredited by the National Association of Testing Authorities (NATA) for the chemical analyses undertaken were used for analysis of samples recovered as part of this assessment. Samples were submitted to Envirolab Services Pty Ltd (Chatswood) for analysis.

Envirolab are NATA accredited for the analyses undertaken. Envirolab's accreditation number is 2901 and they are accredited for compliance with ISO/IEC 17025. In-house procedures are employed by Envirolab in the absence of documented standards. This is performed yearly and is reviewed by NATA.

Envirolab participate in all common Proficiency Rounds including NARL (NMI) for organics and metals, PTA (NATA for organics, inorganics, asbestos and metals, QLD Govt for SPOCAS and National Residue Survey for metals). Envirolab also participate in non-accredited rounds conducted by the University of Wollongong.

Labmark were used as the inter-laboratory for this investigation and are also NATA accredited for the analyses undertaken.

Q2.2 Chain-of-Custody

Chain-of-custody information was recorded on the DP standard chain-of-custody (COC) sheets, which accompanied samples to the analytical laboratories. COCs contained sampling date, receipt date and time and the identity of samples. Copies of COCs, signed by the analytical laboratories, are presented in Appendix D, following the laboratory reports.

Q2.3 Batch Numbers and Holding Times

The following table lists the laboratory batch numbers applicable to this assessment, together with the corresponding sampling, sample receipt and COC receipt dates.

Table Q5 – Batch Details

Laboratory	Batch No.	Sampling Date	Sample Receipt	COC Receipt
Envirolab	38861	12/03/2010	15/03/2010	15/03/2010
Envirolab	38986	16-17/03/2010	17/03/2010	17/03/2010
Envirolab	39074	18/03/2010	19/03/2010	19/03/2010
Envirolab	39246	22-24/03/2010	24/03/2010	24/03/2010
Envirolab	39498	30-31/03/2010	31/03/2010	31/03/2010

Schedule B(3) of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 (NEPM) prepared by the National Environment Protection Council (NEPC), details recommended maximum holding times for samples for various analytes.

A review of the laboratory report sheets and chain-of-custody documentation indicated that holding times were met by both laboratories, as summarised in the table below.

Table Q6 - Holding Times

Matrix	Analyte	Recommended Maximum Holding Time	Holding Time Met
Soil	Heavy Metals: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn	6 months	yes
	TPH C_6-C_9	14 days	yes
	TPH C_{10}-C_{36}	14 days	yes
	BTEX	14 days	yes
	PAH	14 days	yes
	OCP	14 days	yes
	OPP	14 days	yes
	PCB	14 days	yes
	Phenols	14 days	yes
	VOCs	14 days	yes
	pH	7 days	yes
	Asbestos	Nil	yes
Water	Metals	6 months	yes
	TPH C_6-C_9	14 days	yes
	TPH C_{10}-C_{36}	7 days	yes
	BTEX	14 days	yes
	PAH	7 days	yes
	OCP	7 days	yes
	OPP	7 days	yes

Matrix	Analyte	Recommended Maximum Holding Time	Holding Time Met
	PCB	7 days	yes
	Speciated phenols	7 days	yes
	VOCs	14 days	yes
	pH	6 hours	yes
	hardness	28 days	yes

Q2.4 Analytical Methods

The laboratory analytical methods are provided on the laboratory certificates in Appendix D and summarised below in Table Q7.

The test methods used by the laboratories generally comply with those listed in the NEPM and the Australian and New Zealand Environment and Conservation Council (ANZECC)-1996 "*Guidelines for the Laboratory Analysis of Contaminated Soils*". Alternate methods used by the laboratories (i.e. not identified in the NEPM and ANZECC guidelines) have been validated by the laboratories, as recommended in the NEPM and ANZECC guidelines, and endorsed by NATA.

Table Q7 - Soil Analysis

Analyte	PQL / LOR [1] (mg/kg) Envirolab / Labmark	Envirolab Reference Method	Labmark Reference Method
Heavy Metals Cd, Cr, Cu, Pb, Ni, Zn	1.0 / 0.1-5.0	ICP-AES (Metals.20)	E022.2 digested in nitric/hydrochloric acid, analysis by ICP-MS
Arsenic (As)	4.0 / 1.0	ICP-AES (Metals.20)	E022.2 digested in nitric/hydrochloric acid, analysis by ICP-MS
Mercury (Hg)	0.10 / 0.05	CV-AAS (Metals.21)	E026.2 digested in nitric/hydrochloric acid, analysis by CV-ICP-MS or FIMS
TPH C_6-C_9	25 / 10	P&T/GC/MS (GC.16)	E029.2/E016.2 methanol extraction, analysis by P&T/GC/FID/MSD
TPH C_{10}-C_{36}	250 / 250	GC/FID (GC.3)	E006.2 DCM/Acetone/Hexane (10:45:45) extraction, analysis by GC/FID
BTEX	0.5-2 / 0.2-1.0	P&T/GC/MS (GC.14)	E002.2 methanol extraction, analysis by P&T/GC/PID/MSD
OCP	0.1 / 0.05	GC/ECD (GC.5)	E013.2 DCM/Acetone/Hexane (10:45:45) extraction, analysis by GC/dual ECD
PCB	0.1 / 0.5	GC/ECD (GC.6)	E013.2 DCM/Acetone/Hexane (10:45:45) extraction, analysis by GC/dual ECD
PAH	0.05-0.1 / 0.5-1.0	GC/MS (GC.12 subset)	E007.2 DCM/Acetone/Hexane (10:45:45) extraction, analysis by GC/MS
Phenols	1-10 / 0.5-1.0	GC/MS (GC.12)	E008.2 DCM/Acetone/Hexane (10:45:45) extraction, analysis by GC/MS
Asbestos	qualitative identification	AS4964-2004, qualitative identification using Polarised Light Microscopy and Dispersion Staining Techniques.	Not analysed

1: Practical Quantitation Limit / Limit of Reporting

Q2.5 Practical Quantitation Limits - PQLs

The PQL (also referred to by some laboratories as the limit of reporting) is the lowest quantity of an analyte which can be detected by the adopted analysis.

A review of the laboratory results indicated that all PQLs were below the site assessment criteria.

Q2.6 Surrogate Spike

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis of each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis. The following Table Q8 summarises the reported recoveries and the acceptance criteria adopted by Envirolab.

Table Q8 – Surrogate Spike Recoveries

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab	72-137% -	60-140% organics 10-140% SVOC and speciated phenols

The reported recoveries are within acceptance limits, indicating that the extraction technique was effective.

Q2.7 Laboratory Control Sample (LCS)

This sample comprises spiking either a standard reference material or a control matrix (such as a blank of sand or water) with a known concentration of specific analytes. The control sample is analysed with the sample batch and the recorded concentrations reported as a percentage recovery of the known or expected concentration, in order to determine how the laboratory has performed with regard to sample preparation and analytical procedure. LCS are analysed at a frequency of 1 in 20, with a minimum of one analysed per batch.

The following Table Q9 summarises the reported recoveries and the acceptance criteria adopted by Envirolab.

Table Q9 – Laboratory Control Samples

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab	94-115% 68-138%	70-130% inorganics / metals 60-140% organics 10-140% SVOC and speciated phenols

The results are within acceptance limits as specified by Envirolab, indicating that the extraction and analytical techniques were effective.

Q2.8 Laboratory Duplicate Results

The laboratory prepares duplicate samples from the supplied samples (original samples) and/or laboratory spiked samples, and carries out preparation and testing in the same manner as the original sample. The duplicate sample provides an indication of laboratory precision and reproducibility. The comparisons between the laboratory duplicates and original samples are reported on the laboratory test results certificates as Relative Percentage Difference (RPD).

The following Table Q10 summarises the reported RPD and the acceptance criteria adopted by Envirolab.

Table Q10 – Laboratory Duplicate Samples

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab	0-100 %	>5xPQL : 0-50% RPD <5xPQL : any RPD

The reported RPD for Envirolab were within the acceptance criteria adopted.

Q2.9 Laboratory Blank Results

The laboratory blank, sometimes referred to as the method blank or reagent blank is the sample prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, it can be determined by processing solvents and reagents in exactly the same manner as for samples. Laboratory blanks are analysed at a frequency of 1 in 20, with a minimum of one per batch.

The laboratory results for blanks indicated concentrations of all analytes to be below PQL therefore the results were considered to be acceptable.

Q2.10 Matrix Spike

The purpose of matrix spikes is to monitor the performance of the analytical methods used and to determine whether matrix interferences exist. Samples and replicates are spiked with identical concentrations of the target analyte before extraction or digestion. The results are reported as percentage recoveries of the known spike concentration.

The following Table Q11 summarises the reported RPD and the acceptance criteria adopted by each of the laboratories.

Table Q11 – Matrix Spike Samples

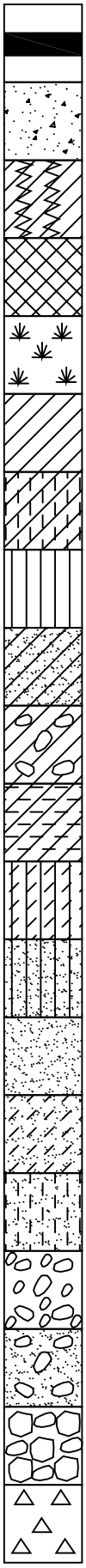
Laboratory	Reported Recoveries	Acceptance Limits
Envirolab	94-115% 93-104% -	70-130% inorganics / metals 60-140% organics 10-140% SVOC and speciated phenols

The matrix spike data presented fall within the acceptance limits of the laboratory.

APPENDIX E
Bore Log Results and Notes Relating to this Report

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SILT

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

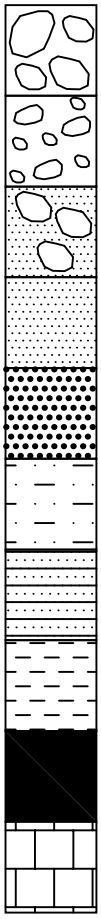
GRAVEL

SANDY GRAVEL

COBBLES/BOULDER

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

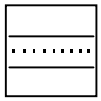
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

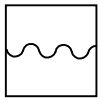
COAL

LIMESTONE

SEAMS

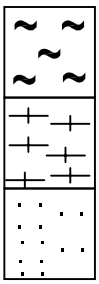


SEAM >10mm



SEAM <10mm

METAMORPHIC ROCK

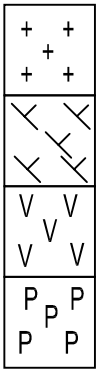


SLATE, PHYLLITE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

Douglas Partners

Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 8.4 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 71645
DATE: 12 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	FILLING - brown, sandy silt with some woodchips, rootlets filling		A/E*	0.0		PID=3.7ppm		
					0.1				
					0.3				
		FILLING - grey brown silt with some fine to medium grained sand and fine grained gravel filling		A/E	0.5		PID=2.3ppm		
	0.6								
		SILTY CLAY - dark grey to brown, silty clay, moist (possible filling)			0.8		pp = 360kPa		
	1.0			A/E	1.0		PID=2.6ppm		
		CLAY - stiff, mottled red brown and grey clay with a trace of ironstone gravel, moist		S			2,5,4 N = 9		
					1.45				
	2.0	CLAY - very stiff, mottled red and light grey clay, moist							
				A/E	2.3		PID=2.0ppm		
				S	2.5		3,7,11 N = 18		
					2.65				
				A/E	3.3		PID=2.1ppm		
					3.5				
	3.8	CLAY - very stiff to hard, red brown and light grey clay with ironstone bands, damp		E	3.8		PID=2.2ppm		
				S	4.0		4,15,25/130mm refusal		
					4.43				
	5.0	SHALY CLAY - hard, light grey, shaly clay, damp							
				S	5.5		10,18,25/110mm refusal		
	5.91	SILTSTONE - extremely low then very low strength, dark grey siltstone			5.91				
	7.1			S	7.0		25/100mm refusal		
		SILTSTONE/LAMINITE - extremely low then extremely low to very low strength, extremely to highly weathered, grey siltstone/laminite. Some low strength bands			7.1				
				C	7.25		pp = 310kPa		
					7.7				
					8.2		pp = 370kPa		
				C					
		9.6-10.72m: some fine grained sandstone laminations			9.6				
				C					

RIG: Bobcat **DRILLER:** SS **LOGGED:** CF/SI **CASING:** HW to 4.0m

TYPE OF BORING: Solid flight auger to 4.0m; Rotary to 7.1m; NMLC-Coring to 14.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate sample BD1/12032010 collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 8.4 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 71645
DATE: 12 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-2		SILTSTONE/LAMINITE - extremely low then extremely low to very low strength, extremely to highly weathered, grey siltstone/laminite. Some low strength bands *(continued)*		C	10.05 10.15		pp = 390kPa		
	10.72	SILTSTONE/LAMINITE - see previous page		C					
	11								11
-3	11.2	LAMINITE - very low to low strength, highly weathered, fragmented, light grey to grey laminite with approximately 30% fine grained sandstone laminations			11.2				
	12			C					12
-4	12.65	LAMINITE - medium strength, slightly weathered, fragmented to fractured, light grey to grey laminite with approximately 30% fine grained sandstone laminations. Very low to low strength bands from 13.33-13.48m			13.0 13.05		PL(A) = 0.8MPa		
-5	13								13
	13.5	LAMINITE - medium to high strength, fresh, slightly fractured, light grey to grey laminite with approximately 20% fine grained sandstone laminations		C	13.7		PL(A) = 0.9MPa		
	14								14
-6	14.5	Bore discontinued at 14.5m			14.4 14.5		PL(A) = 1.5MPa		
	15								15
-7									
	16								16
-8									
	17								17
-9									
	18								18
-10									
	19								19
-11									

RIG: Bobcat **DRILLER:** SS **LOGGED:** CF/SI **CASING:** HW to 4.0m

TYPE OF BORING: Solid flight auger to 4.0m; Rotary to 7.1m; NMLC-Coring to 14.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate sample BD1/12032010 collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 6.4 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 71645
DATE: 18 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.18	CONCRETE							
		FILLING - grey brown, silty clay and fine grained sand with some concrete gravel filling		A/E	0.2–0.3		PID=0.5ppm		
				A/E*	0.3–0.4		PID=1.4ppm		
	0.6	SILTY CLAY - orange brown to red brown, silty clay with trace of ironstone gravel, moist (possible filling)			0.4–0.5				
	1.0	CLAY - stiff, mottled orange brown and light grey clay with trace of ironstone gravel, moist		S	0.5–1.0		4,4,5 N = 9		
					1.0–1.45				
				A/E	1.8–2.0		PID=1.4ppm		
				E	2.4–2.5		PID=1.2ppm		
	2.65	CLAY - very stiff and hard, mottled red brown and light grey clay with some ironstone gravel, moist		S			3,5,6 N = 11		
				A/E	2.9–2.95		PID=1.3ppm		
				S	4.0–4.45		5,14,18 N = 32		
				S	5.5–5.95		5,13,16 N = 29		
	7.1	SHALY CLAY - very stiff to hard, mottled red brown and grey shaly clay, damp to moist		S	7.0–7.45		8,13,18 N = 31		
				S	8.5–8.95		8,12,16 N = 28		
	9.9								

RIG: DT 100 **DRILLER:** RKE **LOGGED:** CF/SI **CASING:** HW to 2.5m; HQ to 10.1m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 10.1m; NMLC-Coring to 14.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field duplicate/triplicate sample taken. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 6.4 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 71645
DATE: 18 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-4	10.1	SILTSTONE/LAMINITE - very low to low strength, red brown siltstone/laminite with ironstone band *(continued)*		S	10.0 10.1		20/100mm refusal		
		LAMINITE - low strength, highly to moderately and slightly weathered, fractured to slightly fractured, grey brown laminite. Some very low strength bands		C			PL(A) = 0.2MPa		
-5	11 11.0	LAMINITE - high strength, fresh stained, fractured to slightly fractured, light grey to grey laminite with approximately 40% fine grained sandstone laminations. Some very low and very low strength bands			11.0 11.4 11.55		PL(A) = 2.5MPa PL(A) = 1.4MPa		11
-6	12				12.25		PL(A) = 1.3MPa		12
-7	13			C	13.2		PL(A) = 2.3MPa		13
-8	14				14.0		PL(A) = 2.3MPa		14
	14.15	Bore discontinued at 14.15m			14.15				
-9	15								15
-10	16								16
-11	17								17
-12	18								18
-13	19								19

RIG: DT 100 **DRILLER:** RKE **LOGGED:** CF/SI **CASING:** HW to 2.5m; HQ to 10.1m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 10.1m; NMLC-Coring to 14.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field duplicate/triplicate sample taken. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.6 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 71645
DATE: 23 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - brown, silty sand filling with some roots		E	0.2		PID=0.5ppm		
	0.3	FILLING - light brown, sandy gravel filling (gravel is sandstone fragments 20-40mm)		E	0.5		PID=1.0ppm		
	0.7	FILLING - brown, gravelly sand filling (gravel is sandstone and basalt 4-20mm)		E*	1.0		PID=0.9ppm		
	1.3	SILTY CLAY - stiff, red brown mottled grey, silty clay with some fine grained ironstone gravel			1.5				
				S			4,5,8 N = 13		
				E	1.95 2.0		PID=0.7ppm		
		- grey from about 2.3m							
				E	3.0		PID=0.8ppm		
				S			4,5,7 N = 12		
		- some dark red brown staining from 3.4m			3.45				
	4.4	CLAY - very stiff, grey and red brown, slightly silty clay			4.5				
				S			5,8,14 N = 22		
					4.95				
					6.0				
				S			8,11,13 N = 24		
					6.45				
	7.1	CLAY - hard, grey clay with ironstone bands		E	7.5		PID=1.8ppm		
				S			7,12,18 N = 30		
					7.95				
	8.8	SILTSTONE - extremely low strength, extremely weathered, grey and yellow brown, siltstone with 10% fine grained grey sandstone laminae			9.0				
				S			11,30 refusal		
	9.3	LAMINITE - extremely to very low and very low to low strength, extremely and highly weathered, light grey to grey laminite with approximately 30% fine grained sandstone laminations. Some low strength bands			9.3 9.45				
				C			pp = 290kPa		

RIG: Multi-Drill **DRILLER:** Traccess **LOGGED:** BOK/SI **CASING:** NW to 9.0m

TYPE OF BORING: 110mm diameter solid flight auger with TC-bit to 9.0m; Rotary to 9.3m; NMLC-Coring to 14.8m

WATER OBSERVATIONS: Free groundwater observed at 4.1m

REMARKS: *Denotes field replicate sample BD(A) collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.6 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 71645
DATE: 23 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		LAMINITE - see next page			10.0				
		LAMINITE - extremely to very low and very low to low strength, extremely and highly weathered, light grey to grey laminite with approximately 30% fine grained sandstone laminations. Some low strength bands *(continued)*		C					
-5	11				11.2		pp = 360kPa PL(A) = 0.2MPa		11
					11.8				
-6	11.95	LAMINITE - medium to high strength, fresh, highly fractured to fractured, light grey to grey laminite with approximately 30% fine grained sandstone laminations			11.95		PL(A) = 0.4MPa		
-7	12			C					12
					12.8		PL(A) = 1.1MPa		
	13	13.0-13.15m: very low strength band							13
	13.3				13.26				
-8		LAMINITE - high strength, fresh, slightly fractured, light grey to grey laminite with approximately 20% fine grained sandstone laminations			13.45		PL(A) = 1.2MPa		
	14			C					14
-9					14.35		PL(A) = 2.1MPa		
	14.8				14.8				
	15	Bore discontinued at 14.8m - limit of investigation							15
-10									
	16								16
-11									
	17								17
-12									
	18								18
-13									
	19								19
-14									

RIG: Multi-Drill **DRILLER:** Traccess **LOGGED:** BOK/SI **CASING:** NW to 9.0m

TYPE OF BORING: 110mm diameter solid flight auger with TC-bit to 9.0m; Rotary to 9.3m; NMLC-Coring to 14.8m

WATER OBSERVATIONS: Free groundwater observed at 4.1m

REMARKS: *Denotes field replicate sample BD(A) collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.6 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 71645
DATE: 23 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							Gatic cover Cement
		FILLING - red brown and brown clay with some gravel filling		E	0.2 0.3		PID=0.5ppm PID=0.5ppm		
				E	0.4 0.5		BD(A) BD(B)		
	0.6	FILLING - dark grey to grey slightly silty clay filling		E	0.6 0.8		BD(C)		
	1.1	CLAY - firm, yellow and red brown clay			1.5				
				S	1.8		2,2,4 N = 6		
				E	1.95 2.0		PID=1.1ppm		Backfilled with gravel
	2.4	CLAY - very stiff, grey and yellow brown from about 2.8m			2.8				
				E	3.0		PID=1.0ppm		
				S	3.45		4,6,10 N = 16		
	3.7	CLAY - very stiff, grey and dark red brown clay with some ironstone gravel							Bentonite
				E	4.3		PID=1.0ppm		
				S	4.5 4.95		5,7,12 N = 19		
	5.3	CLAY - very stiff to hard, grey clay, some red brown staining							
				E	5.8		PID=0.5ppm		
				S	6.0 6.45		8,12,14 N = 26 (no sample)		Backfilled with gravel
				E	7.3		PID=0.7ppm		
				S	7.5 7.95		6,10,15 N = 25		Machine slotted PVC screen
	8.7	SILTSTONE - extremely weathered, extremely low strength, light grey and yellow brown siltstone						▼	
				E	8.8		PID=0.6ppm		
				S	9.0 9.45		8,19,21 N = 40		

RIG: Multi-Drill **DRILLER:** Traccess **LOGGED:** BOK **CASING:** Uncased

TYPE OF BORING: Diatube to 0.16m; 110mm diameter solid flight auger (TC-bit) to 11.0m

WATER OBSERVATIONS: Free groundwater observed at 8.8m

REMARKS: Piezometer installed to 11.0m; Screened 11.0 to 5.0m; Gravel from 4.5 to 11.0m; Bentonite from 3.5 to 4.5m

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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.6 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 71645
DATE: 23 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-5		SILTSTONE - extremely weathered, extremely low strength, light grey and yellow brown siltstone *(continued)*		E	10.0		PID=0.5ppm		
				E	10.8		PID=0.6ppm		
	11 11.0	Bore discontinued at 11.0m - limit of investigation			11.0				11 End cap
-6	12								12
-7	13								13
-8	14								14
-9	15								15
-10	16								16
-11	17								17
-12	18								18
-13	19								19
-14									

RIG: Multi-Drill **DRILLER:** Traccess **LOGGED:** BOK **CASING:** Uncased

TYPE OF BORING: Diatube to 0.16m; 110mm diameter solid flight auger (TC-bit) to 11.0m

WATER OBSERVATIONS: Free groundwater observed at 8.8m

REMARKS: Piezometer installed to 11.0m; Screened 11.0 to 5.0m; Gravel from 4.5 to 11.0m; Bentonite from 3.5 to 4.5m

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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.2 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 71645
DATE: 17 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	BITUMINOUS CONCRETE		A	0.05		PID=0.6ppm		
		FILLING - grey sandy gravel filling (gravel is basalt)			0.1				
				A/E	0.4		PID=0.7ppm		
					0.5				
	0.8	FILLING - grey, silty clay with trace of fine gravel filling, moist		A/E	0.8		PID=0.9ppm		
					1.0				
	1.2	CLAY - stiff, mottled orange, light grey clay with trace of silt and ironstone gravel, damp to moist		S			3,5,8 N = 13		
				A/E	1.45		PID=1.2ppm		
					1.5				
	1.8	CLAY - very stiff, light grey clay with trace of ironstone gravel, damp							
				A/E	2.3		PID=1.2ppm		
					2.5				
	2.7	CLAY - very stiff, red brown and grey clay with ironstone bands, moist		S			6,8,10 N = 18		
					2.95				
					3.5				
				A/E			PID=1.8ppm	▼	
				S	4.0		10,10,15 N = 25		
					4.45				
	5.1	CLAY - very stiff, light grey and red brown clay with some ironstone gravel, moist							
				S	5.5		9,13,15 N = 28		
					5.95				
	6.7	SHALY CLAY - very stiff to hard, light grey shaly clay, moist							
				S	7.0		7,11,22 N = 33		
					7.45				
				S	8.5		6,9,16 N = 25		
					8.95				

RIG: DT 100 **DRILLER:** RKE/GH **LOGGED:** CF **CASING:** HQ to 4.2m

TYPE OF BORING: Solid flight auger to 4.0m; Rotary to 10.2m

WATER OBSERVATIONS: Free groundwater observed at 3.8m whilst augering

REMARKS: *Denotes field replicate sample BD1/17032010 collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 5.2 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 71645
DATE: 17 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-5	10.05			S	10.0		24,10/50mm refusal		
	10.2	SHALE - extremely low to very low strength, light grey and red brown shale with ironstone bands			10.2				
		Bore discontinued at 10.2m							
-6	11								
-7	12								
-8	13								
-9	14								
-10	15								
-11	16								
-12	17								
-13	18								
-14	19								

RIG: DT 100 **DRILLER:** RKE/GH **LOGGED:** CF **CASING:** HQ to 4.2m

TYPE OF BORING: Solid flight auger to 4.0m; Rotary to 10.2m

WATER OBSERVATIONS: Free groundwater observed at 3.8m whilst augering

REMARKS: *Denotes field replicate sample BD1/17032010 collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.46 m AHD **BORE No:** BH6
EASTING: **PROJECT No:** 71645
NORTHING: **DATE:** 16 Mar 10
DIP/AZIMUTH: 90°/-- **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
	0.15	BITUMINOUS CONCRETE			0.15				Gatic cover Bitumen
	0.3	FILLING - grey sandy gravel (roadbase)		A/E	0.3		PID=1.7ppm		
	0.4	FILLING - dark grey brown silty clay filling, moist		A/E*	0.4 0.5		PID=1.8ppm		
	0.8	CLAY - light brown clay with trace of silt, moist		A/E	0.8		PID=2.3ppm		Bentonite
1		CLAY - stiff, mottled orange brown and light grey clay with some ironstone gravel, moist		S	1.0		4,4,6 N = 10		
					1.45				
				A/E	1.9		PID=2.6ppm		
2	2.0	CLAY - very stiff, mottled orange light grey clay, damp to moist			2.0				Backfilled with gravel
					2.5				
				S			5,7,9 N = 16		
				E	2.8				
3				E	2.95		PID=2.0ppm		Bentonite
					3.0				
4	4.0	CLAY - hard, red brown and light grey clay with some ironstone bands, moist		S	4.0		9,11,18 N = 29		
					4.45				
5									Backfilled with gravel
				S	5.5		12,14,20 N = 34		
6					5.95				
	6.5	SHALY CLAY - very stiff to hard, light grey mottled orange shaly clay with trace of ironstone gravel, moist							
7				S	7.0		6,13,17 N = 30		Machine slotted PVC screen
					7.45				
8									
	8.5	SHALE - extremely low strength, light grey and red brown shale with ironstone bands		S	8.5		13,24,20/100mm refusal		
9					8.85				
10	10.0								End cap

Bore discontinued at 10.0m

RIG: Bobcat **DRILLER:** SY/GH **LOGGED:** CF **CASING:** HW to 4.0m

TYPE OF BORING: Solid flight auger to 4.0m; Rotary to 10.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate sample BD1/16032010 collected. E = Environmental sample

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.91 m AHD **BORE No:** BH7
EASTING: **PROJECT No:** 71645
NORTHING: **DATE:** 23 Mar 10
DIP/AZIMUTH: 90°/-- **SHEET** 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - light grey to grey orange brown, clay filling with some ironstone gravel, shale fragments, moist		A/E	0.1				Gatic cover
				A	0.5				
	1.0			A	1.0				
		FILLING - grey brown, fine to medium grained, clayey sand filling, moist		S			1,2,0 N = 2		
	1.5				1.45				
		FILLING - light grey to grey orange brown, clay filling with some shale fragments and ironstone gravel, moist							Backfilled with gravel
					2.5				
	2.8			S			1,1,1 N = 2		
		CLAY - very stiff, mottled orange light grey to grey, clay with some carbonised organic matter and weak ironstone, moist			2.95				
					4.0				
				S			3,7,10 N = 17		
					4.45				
									Bentonite
					5.5				
				S			4,10,15 N = 25		
	6.0	CLAY - very stiff then very stiff to hard, mottled red brown and grey clay with ironstone bands, moist			5.95				Backfilled with gravel
					7.0				
				S			7,11,17 N = 28		
					7.45				
					8.5				
				S			10,14,16 N = 30		
	9.0	SHALY CLAY - hard, mottled red brown light grey shaly clay with ironstone bands, damp			8.95				Machine slotted PVC screen

RIG: DT 100 **DRILLER:** Steve Y **LOGGED:** SI/CF **CASING:** HW to 4.0m; HQ to 11.6m

TYPE OF BORING: Hand auger to 1.3m; Solid flight auger to 2.5m; Rotary to 11.6m; NMLC-Coring to 14.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: 100% water loss from 4.0m; Standpipe installed to 12.0m
*Denotes field replicate sample BD1/23032010 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_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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.91 m AHD **BORE No:** BH7
EASTING: **PROJECT No:** 71645
NORTHING: **DATE:** 23 Mar 10
DIP/AZIMUTH: 90°/-- **SHEET** 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-6	11	SHALY CLAY - hard, mottled red brown light grey shaly clay with ironstone bands, damp *(continued)*		S	10.0		9,14,20 N = 34		11
	11.0				10.45				
		SILTSTONE/LAMINITE - very low to low strength, grey brown siltstone/laminite with ironstone bands							
	11.6			S	11.5		25/100mm refusal		
		LAMINITE - medium strength, moderately weathered then fresh stained, fragmented to fractured, light grey brown to grey, laminite with approximately 40% fine grained sandstone laminations			11.6				
-7	12				11.95		PL(A) = 0.8MPa		12 End cap
				C	12.5		PL(A) = 0.6MPa		
	12.65								
-8	13	LAMINITE - high then medium strength, fresh, highly fractured to fractured and slightly fractured, light grey to grey, laminite with approximately 30% fine grained sandstone laminations			12.95		PL(A) = 1.3MPa		13
					13.5		PL(A) = 1.3MPa		
-9	14			C	13.55				14
					14.1		PL(A) = 0.5MPa		
	14.5	Bore discontinued at 14.5m			14.5				
-10	15								15
-11	16								16
-12	17								17
-13	18								18
-14	19								19
-15									

RIG: DT 100 **DRILLER:** Steve Y **LOGGED:** SI/CF **CASING:** HW to 4.0m; HQ to 11.6m

TYPE OF BORING: Hand auger to 1.3m; Solid flight auger to 2.5m; Rotary to 11.6m; NMLC-Coring to 14.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: 100% water loss from 4.0m; Standpipe installed to 12.0m
*Denotes field replicate sample BD1/23032010 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_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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.91 m AHD **BORE No:** BH7A
EASTING: **PROJECT No:** 71645
NORTHING: **DATE:** 22-24/03/2010
DIP/AZIMUTH: 90°/-- **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
		FILLING - light grey and orange brown, silty clay with some ironstone gravel filling		A/E	0.1				
				A/E	0.5				
	1.0			A/E	1.0				
		FILLING - light brown to orange brown, silty sand filling		S			1,2,0 N = 2		
	1.4				1.45				
		FILLING - brown clay filling		E	2.0				
	2.3				2.5				
		FILLING - crushed sandstone/concrete filling		S			1,1,1 N = 2		
	3.0			E	2.95				
		Bore discontinued at 3.0m - auger refused on crushed sandstone/concrete			3.0				

RIG: DT 100 **DRILLER:** Steve Y **LOGGED:** SI/CF **CASING:** Uncased

TYPE OF BORING: Hand auger to 1.3m; Solid flight auger to 3.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. No sample/refer to driller's log

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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.8 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH8
PROJECT No: 71645
DATE: 23-24/03/2010
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
	0.14	CONCRETE		A/E	0.15				
		FILLING - grey sandy gravel filling		A/E	0.2		PID=3.0ppm		
				A/E	0.3		PID=2.7ppm		
	0.6			A/E	0.4				
		FILLING - dark grey, sandy silty clay with some concrete gravel filling, moist		A/E	0.5				
				A/E	0.8		PID=2.1ppm		
				A/E	1.0				
	1.25	SILTY CLAY - firm, light brown silty clay, moist		S			1,2,2 N = 4		
				E	1.4		PID=1.6ppm		
				E	1.45				
					1.5				
	2.0	CLAY - stiff, grey clay with trace of silt and gravel, moist		E	2.4		PID=2.3ppm		
				E	2.5				
				S			4,4,7 N = 11		
	3.0				2.95				
		CLAY - very stiff, mottled orange brown and light grey clay with some ironstone gravel, moist		E	3.0		PID=2.5ppm		
					3.2				
				S	4.0		7,10,11 N = 21		
					4.45				
	5.0	CLAY - hard, mottled orange grey clay with some ironstone gravel, moist		S	5.5		8,13,22 N = 35		
					5.95				
				S	7.0		6,13,20 N = 33		
					7.45				
	8.5	CLAYEY GRAVEL - hard, red brown, clayey gravel (ironstone), damp		S	8.5		19,25/150mm refusal		
					8.8				
	9.4	Bore discontinued at 9.4m - refusal on possible weathered rock							

RIG: DT 100 **DRILLER:** Steve Y **LOGGED:** SI/CF **CASING:** HQ to 4.0m

TYPE OF BORING: Diatube to 0.14m; Solid flight auger to 4.0m; Rotary to 9.4m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: E = Environmental sample. *Denotes field replicate sample BD1 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_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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.5 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH9
PROJECT No: 71645
DATE: 22 Mar 10
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - grey brown, fine to medium grained sand with some concrete gravel filling		A	0.1				
				E	0.2		PID=2.4ppm		
	0.4	SILTY CLAY - grey brown silty clay with trace of fine grained sand, moist (possible filling)		A/E	0.3 0.4 0.5		PID=3.1ppm		
	0.8	SILTY CLAY - stiff, mottled orange brown and light grey silty clay with trace of ironstone gravel, moist		E E A S	0.8 0.9 1.0		PID=1.2ppm 5,8,7 N = 15		
	1.4	CLAY - stiff, mottled orange brown and light grey clay with some ironstone gravel, moist		A/E*	1.4 1.45 1.5		PID=2.4ppm		
				E	1.9		PID=0.2ppm		
				A/E	2.4 2.5		PID=3.8ppm		
	2.8	CLAY - very stiff, red brown and light grey clay with some ironstone bands, moist		S			5,6,7 N = 13		
					2.95				
				S	4.0		5,8,13 N = 21		
					4.45				
	5.0	SHALY CLAY - hard, light grey shaly clay, damp							
				S	5.5		8,15,20 N = 35		
					5.95				
				S	7.0		12,20,10/50mm refusal		
	7.2	SILTSTONE/LAMINITE - extremely low to very low strength, light grey siltstone/laminite			7.35				
	8.0	LAMINITE - low and low to medium strength, slightly weathered then fresh, fractured and slightly fractured, light grey brown and grey, laminite with approximately 30% fine grained sandstone laminations. Some very low strength bands			8.0 8.2		PL(A) = 0.3MPa		
					8.55		PL(A) = 0.2MPa		
	9.11			C					
					9.85		PL(A) = 0.3MPa		

RIG: DT 100 **DRILLER:** Rhett **LOGGED:** CF/SI **CASING:** HW to 2.6m; HQ to 8.0m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 8.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate sample BD1/220300 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_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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

BOREHOLE LOG

CLIENT: Bovis Lend Lease
PROJECT: Stage 2 Contamination Assessment
LOCATION: Marrickville Metro, Marrickville

SURFACE LEVEL: 4.5 m AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: BH9
PROJECT No: 71645
DATE: 22 Mar 10
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
-6	10.4	LAMINITE - see previous page			10.0				
	11	LAMINITE - medium strength, fresh, slightly fractured, light grey to grey laminite with approximately 20% fine grained, sandstone laminations. Some extremely and very low strength bands		C	10.75		PL(A) = 0.4MPa		11
-7					11.5		PL(A) = 0.6MPa		
	12 12.0	Bore discontinued at 12.0m			12.0				12
-8	13								13
-9	14								14
-10	15								15
-11	16								16
-12	17								17
-13	18								18
-14	19								19
-15									

RIG: DT 100 **DRILLER:** Rhett **LOGGED:** CF/SI **CASING:** HW to 2.6m; HQ to 8.0m

TYPE OF BORING: Solid flight auger to 2.5m; Rotary to 8.0m; NMLC-Coring to 12.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Denotes field replicate sample BD1/220300 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_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:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

Douglas Partners
Geotechnics • Environment • Groundwater

DESCRIPTION AND CLASSIFICATION OF ROCKS FOR ENGINEERING PURPOSES

DEGREE OF WEATHERING

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

ROCK STRENGTH

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

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

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

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

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

STRATIFICATION SPACING

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

DEGREE OF FRACTURING

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

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

ROCK QUALITY DESIGNATION (RQD)

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

SEDIMENTARY ROCK TYPES

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

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

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

Douglas Partners
Geotechnics · Environment · Groundwater

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.