coffey geotechnics
SPECIALISTS MANAGING THE EARTH

ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT

Bovis Lend Lease
Corner of Olympic Boulevard and Herb Elliott Avenue, Sydney Olympic Park, Homebush Bay

GEOTLCOV23048AB-AF
30 May 2007

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
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coffey geotechnics
SPECIALISTS MANAGING THE EARTH

30 May 2007

Bovis Lend Lease
The Bond
30 Hickson Road
Millers Point NSW 2000

Attention: Fleur Mellor

Dear Fleur,

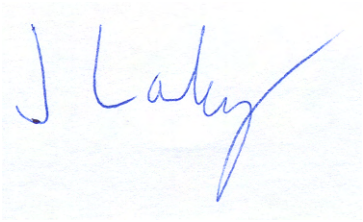
RE: Additional Environmental Site Assessment - Corner of Olympic Boulevard and Herb Elliott Avenue, Sydney Olympic Park, Homebush Bay

Coffey Geotechnics Pty Ltd (Coffey) is pleased to provide our Additional Environmental Site Assessment for the above site.

We draw your attention to the attached sheet titled 'Important Information about your Coffey Environmental Report'. This sheet should be read in conjunction with this report.

We trust that our report meets with your requirements. If you require any further information regarding our report, please do not hesitate to contact of the undersigned.

For and on behalf of Coffey Geotechnics Pty Ltd



JOSHUA LASKY

Associate Environmental Engineer

Distribution:

Original copy held by Coffey Geotechnics Pty Ltd
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2 copies to Bovis Lend Lease

EXECUTIVE SUMMARY

Introduction

This report presents the findings of an Additional Environmental Site Assessment (ESA) carried out by Coffey Geotechnics Pty Ltd (Coffey) for the proposed commercial building to be developed at the corner of Olympic Boulevard and Herb Elliot Avenue, Homebush Bay (Site 4B).

It is understood that BLL propose to construct a seven storey commercial office building with five basement levels on the L-shaped site which covers an area of about 5,000 m^2. The majority of the site is occupied by an asphalt-covered carpark and a small portion of the site along the northern and western site boundaries is landscaped and includes a row of mature trees and a public walkway. The site is located within the Sydney Olympic Park precinct.

Previous environmental and geotechnical investigations were undertaken at the site by Coffey Geotechnics in 2006. A further geotechnical investigation was also carried out concurrently with the additional environmental investigations. This report outlines the findings of the environmental component of the two rounds of investigations at the site undertaken by Coffey.

Objectives and Scope of Work

The objectives of the additional ESA were to:

- Provide further data to reduce uncertainty relating to the potential contamination status of the site;
- Provide further data to reduce uncertainty relating to the depth of fill at the site;
- Provide a preliminary assessment of the waste classification of the soils at the site; and
- Make a preliminary assessment of the contamination status of groundwater at the site.

The scope of work included:

- Excavation of ten test pits to visually observe the constituents of fill within the site and collect samples for chemical testing;
- Collection of two groundwater samples from two monitoring wells installed in boreholes drilled at the site for geotechnical purposes;
- Laboratory testing; and
- Data assessment and reporting.

Previous Investigation Scope and Findings

The previous investigation included a review of site history, which identified the potential presence of fill material across the site. Potential contaminants of concern associated with the fill included heavy metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and asbestos.

A field investigation comprising soil sampling from thirteen boreholes across the site was undertaken in August 2006. Selected soil samples collected from the boreholes were subjected to laboratory analysis for the above chemicals of concern. Selected samples were also analysed for Toxicity Characteristic Leachate Procedure (TCLP) testing for metals and PAHs to assess off-site disposal options for soils encountered at the site.

Concentrations of contaminants tested for were detected below the human health investigation levels (HILs) for commercial / industrial landuse and were below or equal to the inert waste criteria indicating that the site was likely to be suitable, with respect to contamination, for the proposed commercial /

industrial landuse. In addition, the results suggested the majority of fill materials which required excavation and offsite disposal for construction of the basement levels were likely to classify as inert waste in accordance with NSW EPA (1999) while the majority of underlying natural residual soils and shale would be likely to classify as VENM.

It was considered prudent to undertake further environmental investigations at the site to provide further information regarding the possible presence of asbestos containing materials in fill and an assessment of groundwater at the site.

Findings of Additional Investigation

The additional investigations encountered fill across the site, ranging in thickness from 0.1m to 1.2m and comprising silt, sand and clay, with a surface deposit of roadbase observed under asphalt covered areas. The fill deposits were noted to be thinnest in the centre and north-east of the site and were deeper in the western areas, in the vicinity of the garden beds. The fill was found to overlie residual clay deposits and weathered shale bedrock. This was generally consistent with the findings of the previous investigations.

Laboratory analysis was undertaken on a representative selection of soil samples for contaminants of concern (comprising asbestos, heavy metals and PAHs). All contaminants tested for in soil were detected at concentrations below the HIL for commercial or industrial land-use or were below the laboratory limit of reporting. The results of the analysis also indicated that fill materials at the site meet the criteria for classification as inert waste for off-site disposal and natural materials requiring excavation would classify as VENM. Laboratory testing of groundwater samples detected concentrations of copper, zinc, PAHs and TPH in excess of the respective guidelines. It is considered that a second round of groundwater monitoring should be undertaken to further assess the presence of contamination in groundwater at the site and the potential source of any such contamination. Given the heavy metal concentrations exceeding the ANZECC (2000) GILs and the presence of PAHs and TPH within groundwater at the site, groundwater disposal options would need to be assessed if basement dewatering were to be required. Dewatered groundwater would be unlikely to be able to be disposed directly into the stormwater system without treatment.

Based on the combined results of the investigations undertaken at the site, it is considered that there is a low likelihood of significant soil contamination exceeding the commercial/ industrial landuse criteria being present on the site and it is considered that the site is suitable with respect to soil contamination for the proposed commercial landuse. Further investigations are considered necessary to assess the contamination status of groundwater at the site.

It is important to note that the nature of contaminated site investigation is such that the degree of variability in site conditions cannot be known completely and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site and the waste classification and usability of soils. Consequently, the possible presence of as yet unidentified contaminants cannot be precluded. This is particularly the case when assessing fill material where conditions can change significantly over small distances. Furthermore, while no evidence of asbestos has been identified in the fill, it is common for asbestos containing materials such as fibre cement sheeting fragments to be present within fill material in Sydney, and if present this would result in a higher waste classification (minimum solid waste) as well as extra health and safety requirements. For this reason, in the event that any potentially asbestos containing materials, or other potentially contaminated materials, are encountered during the excavation works, the works should temporarily cease and Coffey should be contacted to further assess the classification of that material.

This report should be read in conjunction with the attached information sheet ‘Important Information about your Coffey Environmental Report’.

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LIST OF ATTACHEMENTS

1 INTRODUCTION

1.1 General

Coffey Geotechnics Pty Limited (Coffey Geotechnics) were commissioned by Bovis Lend Lease (BLL) to undertake additional environmental investigations at a site located at the corner of Olympic Boulevard and Herb Elliot Avenue (known as Site 4B) in Sydney Olympic Park. It is understood that BLL intend to construct a seven storey office building on the site with five basement levels, covering an area of approximately 5000m^2.

Coffey Geotechnics have previously undertaken environmental and geotechnical investigations at the site. Further environmental investigations were required by BLL to further assess the potential contamination status of fill at the site, further assess the depth of fill, further assess the waste classification of soil at the site and assess the contamination status of groundwater beneath the site.

The report presents the preliminary findings of the additional environmental investigations undertaken at the site. Additional geotechnical investigations, which were undertaken concurrently, have been reported separately (reference GEOTLCOV23048AB-AG).

1.2 Previous Investigations

Coffey Geotechnics previously undertook environmental and geotechnical investigations at the site in August 2006. The findings of the previous environmental investigations were reported in January 2007 in an Environmental Site Assessment report (reference GEOTLCOV23048AA-AG). The previous investigations comprised:

- A review of site history;
- Field investigations, comprising drilling of thirteen boreholes to depths of between 1.3m and 2.2m below ground level and collection of soil samples;
- Laboratory testing of a representative selection of soil samples for contaminants of concern identified during the site history review, including heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylene (BTEX), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and asbestos; and
- Data assessment and reporting.

The previous environmental boreholes encountered a surface covering of asphalt or topsoil and mulch in garden areas, overlying silty and gravelly clay fill to a maximum depth of 0.8m. Occasional traces of black gravel, possibly containing slag and brick fragments was noted within the fill. Natural soil underlying the fill was observed to comprise residual clay and weathered shale.

Laboratory analysis was undertaken on twenty-six soil samples and all contaminants were detected below the soil investigation levels for commercial or industrial land-use.

The results indicated that the site was likely to be suitable, with respect to contamination, for the proposed commercial / industrial land-use. In addition, the results suggested that fill material requiring off-site disposal for construction of the proposed basement levels, were likely to classify as inert waste and natural soils were likely to classify as Virgin Excavated Natural Materials (VENM).

The previous investigations also identified a previous Coffey environmental site assessment (ESA) for an area adjacent to the site. This area is known as Site 4A and is now an active construction site. The findings of this investigation are discussed in more detail in section 3 of this report.

1.3 Objectives and Scope of Work

The objectives of the additional environmental investigations were to:

- Further assess the contamination status of fill material at the site;
- Further assess the depth of fill at the site;
- Further assess the waste classification of the fill material at the site; and
- Make a preliminary assessment of the contamination status of groundwater at the site.

The scope of work to address these objectives comprised:

- Excavation of ten test pits to visually observe the fill at selected locations within the site and collect samples for chemical testing;
- Collection of groundwater samples from two monitoring wells installed in boreholes drilled at the site for geotechnical purposes;
- Laboratory testing of soil samples for primary potential contaminants of concern, identified from the previous investigations and experience in the site area to be heavy metals, PAHs and asbestos;
- Toxicity Characteristic Leaching Procedure (TCLP) testing of selected soil samples for heavy metals and PAHs for waste classification purposes;
- Laboratory testing of groundwater samples for potential contaminants of concern, identified from the previous investigations and experience on the site area to be heavy metals, PAHs, TPH, nutrients and volatile organic compounds (VOCs); and
- Data assessment and reporting.

2 LOCATION AND SITE FEATURES

2.1 Site Identification and Features

The site is located at the corner of Olympic Boulevard and Herb Elliot Avenue, Homebush Bay and is part of the Sydney Olympic Park precinct (see Figure 1). The site is currently identified as development site 4B and cadastral information indicates the site is comprised of a large portion of Lot 60 of DP786296 and also includes a small portion of Lot 50 of DP 1045522 along the western site boundary.

The site is L-shaped with an area of about 5,000 m^2. The majority of the site is occupied by an asphalt carpark used by private motor vehicles. Minor oil staining from vehicles was observed on the asphalt in some areas and some portions of the asphalt in the centre of the carpark appeared to be newer than in other areas. A small portion of the site along the northern and western site boundaries is landscaped and includes a row of mature trees, garden beds, grassed park and public walkway. No visible signs of plant stress were observed in the landscaped areas.

The site slopes very gently to the north-west. The ground surface level at the row of trees along the western boundary is about 1m lower than the ground surface level of the carpark.

2.2 Surrounding Landuse

Surrounding landuse in the vicinity of the site is predominantly recreational open space areas and public amenities associated with sporting facilities at Sydney Olympic Park.

An active construction site was present to the north-west of the site. This area was documented as a small triangular grassed park known as Site 4A during the previous investigations. Commercial buildings are located to the south and east, Sydney Olympic Park Aquatic and Athletic Centre are located to the west, Telstra Stadium is located to the north-west and Sydney Showground and associated facilities are located to the north of the site.

2.3 Local Geology and Hydrogeology

The Sydney Geological Sheet 9130 (Edition 1983, 1:100,000 scale) indicates that Ashfield Shale underlies the site. The shale is described as black to dark grey shale and laminite.

Topographically the investigation area is located within a relatively flat, low lying area.

Fill material is present overlying residual soils and shale bedrock at the investigation area.

It is anticipated that the regional groundwater table is likely to be present within the shale bedrock, however, perched seepage water may be present at the bedrock and overlying residual soil interface.

2.4 Acid Sulfate Soil Potential

A review of the Acid Sulfate Soil Risk Map for Prospect/Parramatta River (2nd Edition, 1997) indicated the site is located in an area of no known occurrences of acid sulfate soil materials.

3 SUMMARY OF SITE HISTORY

The site history study undertaken by Coffey during the previous investigations included:

- A site visit by a Coffey Environmental Engineer on 10 August 2006;
- Review of environmental reports undertaken on nearby sites by Coffey;
- Review of aerial photography of the site area;
- Review of WorkCover records of the site area;
- Review of historical site ownership.

The information obtained from the site history review and site walkover can be summarised as follows:

- The site is currently occupied by an asphalt carpark with some landscaping including a row of trees and public walkway along the northern and western site boundaries;
- The site is comprised of two lots, Lot 60 of DP786296 occupying most of the site and also Lot 50 of DP 1045522 occupying a small portion of the site along the western boundary;
- Historical title information indicates both lots of the site were owned by The Minister for Public Works of the Shire of New South Wales from 1910 to 1929;

- The site was owned by the Metropolitan Meat Industry Board and The Metropolitan Meat Industry Commissioner from 1929 until 1987 when it came under the proprietorship of the Homebush Abattoir Corporation;
- In 1993, Lot 60 of DP786296 came under the proprietorship of the Olympic Co-Ordination Authority and then the Sydney Olympic Park Authority in 2002;
- In 2002, Lot 50 of DP 1045522 came under the proprietorship of the Sydney Olympic Park Authority;
- Both lots are currently under the proprietorship of the Sydney Olympic Park Authority;
- Aerial photographs from the early 1950s until the late 1980s indicate the site was part of a cleared triangular block with a line of trees running along the northern and western site boundary. The site appears to have been used as parkland. The portion of the site in Lot 50 of DP 1045522 along the western site boundary appears to have been part of a road during this period;
- An aerial photograph from 1986 indicates a number of small tracks located on the site area and a number of vehicles were parked on the cleared block a small distance to the south of the site. It is possible that the site area was also used for the parking or storage of vehicles during this period;
- An aerial photograph from 1999 indicated the site had been redeveloped to its current condition since the previous photograph in 1986 as part of the Sydney Olympic Park project. It is possible that the trees located along the western boundary are remnants of the original site layout as observed in photographs prior to 1999;
- An aerial photograph from 2006 indicates the site has been unchanged since 1999;
- Workcover did not locate any records regarding dangerous goods licensing on the site;
- A review of a previous Coffey environmental investigation at a small park known as site 4A (now an active construction site) to the immediate north-west of the site from November 2005 revealed:
- Sites located approximately 150m to the south-west of the current investigation area including the Athletics and Aquatics Centre contain contaminated soil beneath a cap (i.e. concrete and other similar impermeable pavement materials) and were former landfill areas;
- It is considered that there is a low likelihood that site 4B has been used in the operation of the abattoir;
- Filling is known to have formerly occurred in the site area as part of the redevelopment of the area prior to the Sydney 2000 Olympics, however, the timing of the filling, quantity of fill imported and contamination status of the imported fill material is unknown. It is considered that there is a high likelihood that site 4B was subject to filling as part of the Sydney Olympic Park project;
- Laboratory analysis of selected soil samples at site 4A identified the presence low level PAHs in some compounds. The PAHs were considered to be attributable to the presence of traces of ash material observed in some fill layers. It is possible that fill material present at site 4B could also be impacted by PAHs.

4 POTENTIAL AREAS OF ENVIRONMENTAL CONCERN (AEC) AND CHEMICALS OF CONCERN (COC)

Based on the findings of the previous investigations, it is considered that the main potentially contaminating activity that had occurred on the site is the placement of fill in an uncontrolled manner. Typical potential chemicals of concern associated with fill material include heavy metals, TPH, BTEX, PAH, OCPs, PCBs and Asbestos.

While the previous investigations did not detect contaminants of concern at concentrations exceeding the human health based soil investigations levels (HILs) for commercial or industrial land-use, further assessment of the contamination status of fill material, particularly with respect to asbestos, heavy metals and PAHs, and a preliminary investigation of groundwater at the site was considered prudent.

5 INVESTIGATION CRITERIA

5.1 Soil

The investigation criteria for soil investigation were established based on the following references:

- NSW DEC (2006) Guidelines for the NSW Auditor Scheme (Second Edition);
- NSW EPA (1994) Guidelines for Assessing Service Station Sites; and
- NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM).

Other references were used to supplement the above references where appropriate.

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme and the NEPM present health based investigation levels for different landuses (eg. industrial / commercial, residential, recreational etc.) as well as provisional phytotoxicity based investigation levels.

The site is proposed to be developed as an office building which is considered to be consistent with a commercial / industrial landuse setting.

For commercial / industrial sites the health-based investigation levels (HILs) for commercial and industrial use (Column 4 of Appendix II in the NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (Second Edition)) may be used as investigation levels. NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme does not require an assessment against the phytotoxicity-based investigation levels for commercial / industrial sites.

NSW EPA (2006) Guidelines do not provide threshold levels for volatile petroleum hydrocarbon compounds. NSW EPA (1994) Guidelines for Assessing Service Station Sites provide an indication of acceptable cleanup levels for petroleum hydrocarbons compounds at service station sites to be reused for sensitive land-uses. The EPA has advised that these guidelines should also be used for less sensitive land-uses. For semi-volatile petroleum hydrocarbons (C16 – C35 and >C35) investigation levels are provided in the NSW EPA (2006) Guidelines, however, these are based on the NEPM health-based criteria, which require the laboratory analysis to unequivocally differentiate between aromatic and aliphatic compounds. If this cannot be done, the C10 – C40 criteria in the service station guidelines should be applied.

There are currently no national or DEC-endorsed guidelines relating to human health of environmental investigation of material containing asbestos on sites. NSW DEC (2006) advice that until such guidelines become available, auditors must exercise their professional judgement when assessing if a site is suitable for a specific use in the light of evidence that asbestos may be a contaminant of concern. NSW DEC (2006) states that NSW Health will provide advice to auditors on a case-by-case basis where appropriate. The NSW DEC previously provided interim advice that "no asbestos in the soil at the surface is permitted". Enhealth (2005) 'Guidelines for Asbestos in the Non-Occupational Environment', provides some guidance on assessing and managing asbestos in soil although does not provide a threshold concentration or investigation level for asbestos. For this site we have adopted non-detect as an investigation level for asbestos.

The adopted soil investigation levels are included in table LR1.

5.2 Waste Classification Procedure

The procedures for classifying waste are detailed in the NSW DEC Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes (2004).

For the purposes of waste classification, virgin excavated natural material (VENM) includes clay, gravel, sand, soil and rock that have not been mixed with other waste and that:

- have been excavated from areas that are not contaminated, as a result of industrial, commercial, mining or agricultural activities, with manufactured chemicals and that does not contain sulphidic ores or soils; or
- consist of excavated natural materials that meet such criteria as may be approved by the EPA.

Non-virgin excavated material and material that has been excavated from a contaminated area must be classified using the procedures in Technical Appendix 1 of the guidelines. Excavated material is classified by comparing analytical results from the material to threshold criteria provided in the guidelines. The guidelines provide threshold concentrations for three different non-liquid waste categories, namely; inert waste; solid waste; and industrial waste. The wastes which fail to meet the criteria for industrial waste classify as hazardous waste. The guidelines classify various non-liquid wastes into these categories by virtue of being a particular waste type. For those wastes which are not classified into a waste category, the guidelines provide threshold values for total soil concentrations and leachable concentrations based on TCLP test. Threshold levels are given for about 50 contaminants and groups of contaminants. For a waste to be classified under a given category, both total and leachable concentrations of the waste should meet the respective threshold concentrations. The waste may be classified solely based on total concentrations (i.e. without undertaking leachability testing), but the applicable threshold concentrations when leachability testing is not undertaken are substantially lower (i.e. more stringent) than would apply when leachability testing is undertaken.

Any soil containing asbestos classifies as asbestos waste and must be disposed of to a solid waste landfill licensed to accept asbestos containing soil.

The waste classification criteria are included within table LR1.

5.3 Groundwater

For assessing groundwater quality, it is first necessary to assess the beneficial uses of groundwater down gradient of the investigation area being assessed.

Given the proximity of the site to Homebush Bay it is considered that groundwater will not be used before discharging to the bay. Therefore it is considered that there are no potential beneficial uses of the groundwater prior to discharge to Homebush Bay. Homebush Bay sustains marine aquatic ecosystems and is also used for recreational purposes.

The threshold concentrations presented in the ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality are considered applicable for the protection of aquatic ecosystems of the receiving waters. As these guidelines apply to receiving waters, it is generally conservative to apply these to groundwater discharging to receiving waters.

ANZECC (2000) advocates a site-specific approach to developing guideline trigger values based on such factors as local biological affects data, the current level of disturbance of the ecosystem etc. The guidelines present "low risk guidelines trigger values" which are defined as concentrations of key performance parameters below which there is a low risk that adverse biological effects will occur. It is important to note that these are not threshold values at which an environmental problem is likely to occur if exceeded. Rather, if the trigger values are exceeded, then further action is required which may include either further site-specific investigations to assess whether or not there is an actual problem, or management/remedial action.

Low risk trigger values are provided for the protection of 80-99% of species in marine waters (presented in Table 3.4.1 of the guidelines), with the trigger value depending on the health of the receiving waters.

It is considered that the marine water trigger values are applicable for investigating chemical concentrations in groundwater at the site, as the receiving body is a marine water body.

It is understood that the NSW DEC's policy is that the trigger values for the protection of 95% of aquatic ecosystems should be used except where contaminants are potentially bioaccumulative in which case the trigger values for protection of 99% of species should be used. Therefore, we have selected trigger values for protection of 95% of marine water species for the majority of contaminants, and 99% of marine water species for bioaccumulative contaminants for initial comparison purposes.

ANZECC (2000) states that there is currently insufficient data to derive high reliability trigger values for various contaminants. For these contaminants, low reliability trigger values have been adopted when necessary.

ANZECC (2000) state that there is currently insufficient data to derive a high reliability trigger value for total petroleum hydrocarbons (TPH) but propose a low reliability trigger value for TPH of 7μg/L. This guideline is generally considered by industry to be overly conservative and is also well below the TPH detection limit that most laboratories can achieve. Another commonly used international guideline for TPH is contained in Dutch (1994), which present a target, and intervention values for mineral oils. The average of the target and intervention values (325μg/L) is commonly used as an intervention level for TPH and will be adopted as investigation criteria for this site.

Guidelines for the recreational water use are also presented in the ANZECC (2000) (Table 5.2.3 of the guidelines). These guidelines are generally less sensitive than the aquatic ecosystem guidelines.

The adopted guideline concentrations are presented in Table LR2.

6 FIELD AND LABORATORY INVESTIGATIONS

6.1 Soil

Field investigations for the additional site assessment were undertaken at the site for environmental purposes on 23 and 24 April 2007 by Sam Levi, a Coffey Environments Environmental Scientist. Geotechnical ground investigations, including the installation of groundwater monitoring wells, were undertaken on 30 and 31 April 2007, the results of which have been reported separately (reference GEOTLCOV23048AB-AH).

The environmental field investigations comprised the excavation of ten test pits to the base of fill materials using a backhoe. The test pits were excavated to a maximum depth of 1.5m. A number of test pits were excavated into the natural soils to check the base of fill materials had been reached, as fill materials and natural residual soils in the area were found to be very similar. The location of the test pits were selected by BLL and it is understood that they were distributed as evenly as possible across the site to assess the nature of materials likely to be excavated during basement construction of the proposed through-site public domain link.

Fill materials were carefully logged checking for the presence of potential asbestos containing materials and other anthropogenic materials. Samples were collected from each layer of fill encountered in the test pits. The samples were collected from the centre of the backhoe bucket using a clean pair of disposable gloves for each sample, to minimise the possibility of cross contamination.

Each sample was sub-divided into two samples. One sub-sample was collected into a laboratory supplied acid-rinsed jar and labelled with the job number, date, test pit identifier and depth of the sample and was stored in an ice-chilled cooler box prior to transport to the laboratory. The second sub-sample was collected into a plastic zip-lock bag, also labelled with the job number, date, test pit identifier and depth of the sample for asbestos screening. As volatile contaminants were not identified as potential contaminants of concern, no PID field screening of samples was undertaken.

Test pits and borehole logs from the recent investigations are provided in Appendix A. Approximate borehole and test pits locations are shown on Figure 2. Borehole logs from the previous investigations are included in Appendix B.

6.2 Groundwater

Groundwater monitoring wells were installed in two boreholes drilled at the site for geotechnical purposes on 30 and 31 April 2007. The wells were constructed from 50mm diameter slotted screen and solid PVC casing. Groundwater was not encountered above bedrock in any of the boreholes drilled at the site. Furthermore, an excavation to a depth of 12m to the immediate north-west of the site did not encounter groundwater. As coring of the bedrock used water as a drilling fluid, the level of groundwater within bedrock at the site could not accurately be assessed during the drilling. The slotted screen was therefore installed in one borehole (BH3) in the bottom 6m of the well (from 12m to 18m depth) and in borehole BH2 from below the surface of bedrock (from 2m to 17.7m depth) to target groundwater within the bedrock. Following installation of the wells, the boreholes were backfilled with a sand pack to approximately 0.5m above the slotted screen, approximately 0.5m of bentonite and the remaining length with soil cuttings from the boreholes. Each well was secured with a plastic stopper and a lockable steel cover, flush to the ground. The wells were developed following installation by removing approximately 6 well volumes of water or until the well was dry using a Teflon bailer for each well.

The wells were purged prior to sampling by removing at least three well volumes of water or until the well was dry and were sampled by a Coffey Environmental Scientist on 9 May 2007.

The wells were purged and sampled using dedicated disposable Teflon bailers. Groundwater field parameters, including pH, temperature and electrical conductivity (EC) were recorded during the purging.

The samples were collected into laboratory supplied sample containers labelled with the job number date and borehole number and were stored in an ice chilled cooler box prior to transport to the laboratory.

6.3 Field Quality Assurance/Quality Control

Sampling activities were generally based on procedures and protocols outlined in Coffey's Environmental Field Manual (QP15/5-E, June 1995, revised September 1997), which is based on industry accepted standard practice. The same procedures and protocols were used during the previous investigations.

The soil samples were placed into a laboratory-supplied, acid-rinsed 250mL glass jars and placed in an ice-chilled cooler box. Groundwater samples were collected into appropriate laboratory supplied sample containers.

One intra-laboratory duplicate soil sample (DUP4, a duplicate of sample TP1 0.3 – 0.4)), one inter-laboratory duplicate soil sample (DUP2, a duplicate of sample TP5 0.1 – 0.2) and one intra-laboratory groundwater sample (DUP1, a duplicate of sample BH2) were analysed. In addition, the previous investigations included three intra- laboratory duplicate soil samples (identified as DUP1 duplicate of BH3 0.05-0.1m, DUP 2 duplicate of BH11:0.2-0.6m and DUP3 duplicate of BH13:0.3-0.7m). The duplicates were used to check whether the sampling and laboratory procedures adequately reproduced results.

A rinsate sample was not collected during the recent investigations as soil samples were collected using a clean pair of disposable gloves for each sample and groundwater samples were collected using dedicated disposable bailers for each sample. A rinsate sample from the previous investigations (identified as WB1 11/08/06) was collected from the SPT sampler by pouring rinsate water onto the SPT. Runoff from the SPT was collected and put into appropriate sampling bottles for analysis. The wash blank was collected to assess the efficacy of field decontamination procedures.

Trip spike and trip blank samples were not included in the recent soil investigation as volatile contaminants were not identified as potential contaminants of concern in soil. A trip spike and a trip blank sample were analysed with the groundwater samples to assess the potential loss or gain of volatile contaminants as a result of sample handling and transportation procedures. Trip spike and trip blank samples identified as TS 100806 / TB 100806 and TS110806 / TB110806 were also taken into the field during the previous soil investigation for each day of soil sampling and analysed to assess potential loss or gain of volatiles as a result of sampling and handling procedures.

A QA/QC assessment is included in Appendix E.

6.4 Laboratory Analysis

Laboratory analysis for the recent investigations was undertaken by SGS, a NATA accredited laboratory for the analysis requested. Inter-laboratory duplicate soil samples were analysed by ALS, also a NATA accredited laboratory for the analysis requested.

Laboratory testing was undertaken on selected soil samples for heavy metals, PAHs and asbestos, which were identified as contaminants of concern, based on the results of the previous investigations. Generally, two samples from each test pit were selected for analysis. In four test pits fill was found to be very shallow and only one sample from these test pits was submitted for analysis.

The laboratory results for soil are presented in table LR1.

Laboratory testing was undertaken on groundwater samples from two groundwater monitoring wells for heavy metals, PAHs, TPH and volatile organic compounds (VOCs).

The laboratory results for groundwater are presented in table LR2.

During the previous investigations, samples were submitted to ALS for laboratory testing.

A summary of the laboratory schedules for the combined investigations for soil is provided in Table 1.

Table 1: Summary of Laboratory Analysis Schedule for Soil

CoC	Number of samples submitted for analysis (Previous investigations)	Number of samples submitted for analysis (Recent investigations)	Total
Heavy metals	26	15	41
PAHs	26	15	41
TPH	26	0	26
OCPs	8	0	8
PCBs	8	0	8
Asbestos	26	15	41

7 RESULTS

7.1 Subsurface Conditions

7.1.1 Soil

The results of the combined investigations indicate that the subsurface profile at the borehole and test pit locations comprises topsoil / fill overlying residual soils and shale bedrock.

Based on the information obtained from the boreholes and test pits, a summary of subsurface conditions has been prepared and is presented below in Table 2. For a detailed description of the subsurface conditions encountered at the borehole locations, refer to the borehole and test pit logs in Appendix A and B, together with Explanation Sheets describing the terms and symbols used in their preparation.

Table 2: Summary of Subsurface Conditions at Borehole Locations

Unit	Description	Depth to Base Of Unit (m)	Thickness Of Unit (m)
1. Fill	Near surface fill typically: • Asphalt and road base (encountered in BH1-BH8 and TP2, TP7 and TP9-TP12 only); • Topsoil/Woodchip (encountered in BH9-BH13 and TP1 and TP3 – TP5 only);	0.1 to 0.5	0.1 to 0.5
	Deeper fill typically: • Silty Clay or sandy silt with some gravel, rootlets and decayed wood fragments	0.2 to 1.2	0.2 – 0.95
2. Residual Soil	Typically: • Silty CLAY; • Medium and high plasticity; • Some ironstone gravels; • Very Stiff to Hard consistency.	0.6 to 2.2*	0.45 to 1.7*

Note:

* *The base of the unit was not encountered in all environmental boreholes and therefore the depth to the base of the unit and the thickness of the unit is not known at all environmental sampling locations.*

Extremely weathered shale was encountered underlying residual clay at four borehole and five test pit locations at depths of between 0.45 and 1.7m below ground surface.

Minor visual evidence of material that was considered potentially contaminating was observed in two boreholes during the previous investigations (BH6 and BH9), comprising black gravel, possibly containing slag, and a layer of gravely sand with a green/grey colour.

During the recent investigations, fill materials within the test pits was carefully logged for the presence of potentially asbestos containing materials or other anthropogenic materials. No visual or olfactory evidence of potential contamination was observed at any other sampling location. In addition, no black or grey/green gravel was noted during the recent investigations.

7.1.2 Groundwater

Groundwater was encountered at depths of 4.3m and 4.8m below ground surface in the two wells during the sampling event on 9 May 2007.

It was considered likely that at least some of this water may be potable water introduced to the boreholes during coring and may not be groundwater. After well installation the monitoring wells were developed by removing at least six well volumes of water or until the well was dry. During the sampling event, each well was purged until dry and a sample was collected from the recharge into the well to minimise the possibility of sampling water left over from the drilling activities.

It is considered likely that the true groundwater table in the area lies at a depth greater than 12m below the ground surface. An excavation adjacent to the site has been excavated to approximately 12m and it is understood that no groundwater has entered this excavation. Further of monitoring will be required to confirm this.

7.2 PID Results

Thirty-six samples were subjected to PID headspace screening during the previous investigation. PID readings ranged between 0ppm and 1.2ppm suggesting that volatile ionisable organic compounds that can be detected by a PID with a 10.6eV lamp were not present at significant concentrations in the samples collected. PID results and calibration details are presented in Appendix C.

Based on these results and laboratory results from the previous investigations, volatile contaminants were not considered to be contaminants of concern at the site and no PID screening was undertaken during the recent investigations.

7.3 Laboratory Results

7.3.1 Soil

No contaminants tested for were detected in soil samples at concentrations in excess of the human health based soil investigation levels (HILs) for commercial or industrial land use.

No contaminants were detected in soil samples at concentrations exceeding the guidelines for inert waste.

Asbestos was not detected in the twenty-six soil samples analysed during the previous assessment and the fifteen soil samples analysed during this assessment.

Soil sample analytical results are summarised in Table LR1. The laboratory analytical reports are presented in Appendix D.

7.3.2 Groundwater

Laboratory analysis of groundwater samples from each well detected copper, zinc at concentrations in excess of the groundwater investigations levels (GILs) for the protection of 95% of species in marine waters in both samples. Phenanthrene (a PAH compound) was detected in both wells at concentrations exceeding the ANZECC (2000) Low Reliability Trigger Values for Marine Water (protection for 99% of species) and TPH was detected in both wells at concentrations exceeding the Dutch (1994) target and intervention levels. The laboratory have indicated that the PAH and TPH detected in the groundwater is not from petroleum based oil.

The laboratory results for groundwater are presented in table LR2.

7.4 Quality Assurance / Quality Control (QA/QC) Results and Data Usability

Samples were received by the nominated laboratories within the recommended holding times. Copies of the Chain of Custody documentation are included in Appendix D.

A data validation report for all batches has been prepared for QA/QC purposes and is presented in Appendix D.

The QA/QC review indicates the data is likely to reasonably represent conditions at the sampling locations at the time of locations. The potential exception is TPH and PAH concentrations in groundwater wells which may have been affected by the use of drilling fluids in the coreholes used to install the wells.

8 CONCLUSION AND RECOMMENDATIONS

8.1 Soil

Based on the combined results of the two investigations undertaken by Coffey at the site, fill was encountered across the site, ranging in thickness from 0.1m to 1.2m. The fill deposits were noted to be thinnest in the centre and north-east of the site and were deeper in the western areas, in the vicinity of the garden beds. The fill was found to predominantly comprise of silt, sand and clay, with a surface deposit of roadbase observed under asphalt covered areas.

All contaminants tested for in soil during both investigations were detected at concentrations below the HIL for commercial or industrial land-use. On this basis, it is considered that there is a low likelihood of significant soil contamination exceeding the commercial/ industrial landuse criteria being present on the site and it is considered that the site is suitable with respect to soil contamination for the proposed commercial landuse.

The results of the analysis also indicate that fill materials at the site would classify as inert waste for off-site disposal and natural materials requiring excavation would classify as VENM.

Materials requiring offsite disposal classifying as inert waste or VENM should be disposed of as follows:

- Inert waste can either be disposed of to a landfill licensed to accept inert waste or alternatively can potentially be reused on other sites providing that the receival site receives no more than 20,000 tonne of inert waste (at any time and from all sites) and that the filling is incidental or ancillary to the land being used for a purpose other than a landfill site (for example, the construction

of buildings or roads or other similar types infrastructure development). Should reuse of the inert waste be proposed then further validation of the soil may be required.

- VENM can be re-used on or offsite subject to geotechnical considerations.

No potentially asbestos containing materials, or other anthropogenic materials, were observed within the fill materials in the test pits and asbestos was not detected in any of the forty-one samples submitted for laboratory analysis. While this indicates there is a low likelihood of asbestos being present, it should be noted that asbestos is common in fill materials in Sydney and the possibility that asbestos containing materials may be present within portions of the fill cannot be entirely precluded. In the event that any potentially asbestos containing materials, or other potentially contaminated materials, are encountered during the excavation works, the works should temporarily cease and Coffey should be contacted to further assess the classification of that material.

8.2 Groundwater

Groundwater was encountered within the shale bedrock in the two monitoring wells installed at the site. The laboratory testing detected concentrations of copper, zinc, PAHs and TPH in groundwater samples obtained from the wells.

It is considered likely that the heavy metals detected in groundwater are associated with background conditions in the shale in the area. It is considered unlikely that PAHs and TPH detected in the groundwater are associated with site activities as these contaminants were not detected in soil from the site, no visual or olfactory evidence of hydrocarbon contamination was observed during the soil or groundwater sampling and no potential sources of hydrocarbon contamination were identified during the site history. The laboratory have indicated that the TPH and PAH contamination is not attributable to petroleum based oils. It is considered that the TPH and PAH could potentially be attributable to:

- Natural shale oils that may be present within shale at the site;
- Introduction of contaminants through the drilling process, which included the use of drilling fluids and lubricants and drilling mud that may have accumulated around of the wells and may have impacted the groundwater samples;
- Onsite migration from an upgradient source (although this is considered less likely).

It is considered that a second round of groundwater monitoring should be undertaken to further assess the presence of contamination in groundwater at the site and the potential source of any such contamination. Given the heavy metal concentrations exceeding the ANZECC (2000) GILs and the presence of PAHs and TPH within groundwater at the site, groundwater disposal options would need to be assessed if basement dewatering were to be required. Dewatered groundwater would be unlikely to be able to be disposed directly into the stormwater system without treatment.

9 LIMITATIONS

This report should be read in conjunction with the attached ‘Important Information about your Coffey Environmental Report’.

The findings contained within this report are the result of discrete/specific sampling methodologies used in accordance with normal practices and standard. To the best of our knowledge, they represent a reasonable interpretation of the general condition of shallow soil at the investigation area. Under no

circumstances, however, can it be considered that these findings represent the actual state of the investigation area at all points.

It is important to note that the possibility of buried contaminated material, other than that identified, being present at the investigation area can not be precluded.

This report was prepared for Bovis Lend Lease Pty Ltd and cannot be relied upon by any other parties.

10 REFERENCES

Coffey Geotechnics (16 January 2007), Environmental Site Assessment, Corner of Olympic Boulevard and Herb Elliot Avenue, Sydney Olympic Park, Homebush Bay. Reference GEOTLCOV23048AA-AG

Coffey Geosciences (2005), Environmental Site Assessment, Proposed Sofitel Hotel, Corner of Olympic Boulevard and Herb Elliot Avenue, Homebush Bay. Reference: S22332/03-AI

NSW EPA (1997). Guidelines for Consultants Reporting on Contaminated Sites.

NSW DEC (2004) Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes.

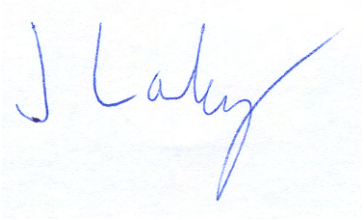
NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM).

NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme.

NSW EPA (1994) Guidelines for Assessing Service Station Sites.

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality

For and on behalf of Coffey Geotechnics Pty Ltd



JOSHUA LASKY

Senior Environmental Engineer

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

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Important information about your **Coffey** Environmental Report

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

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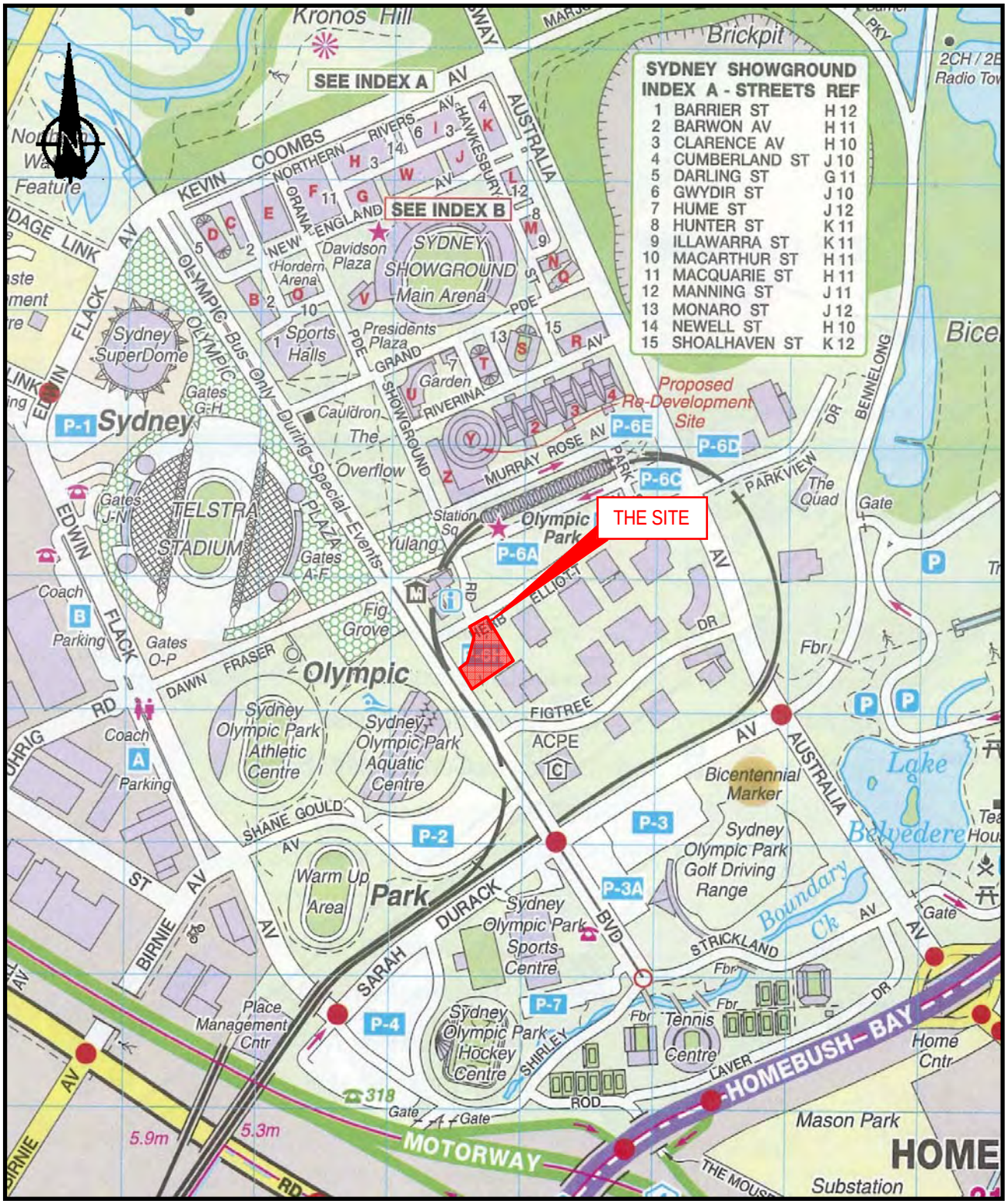
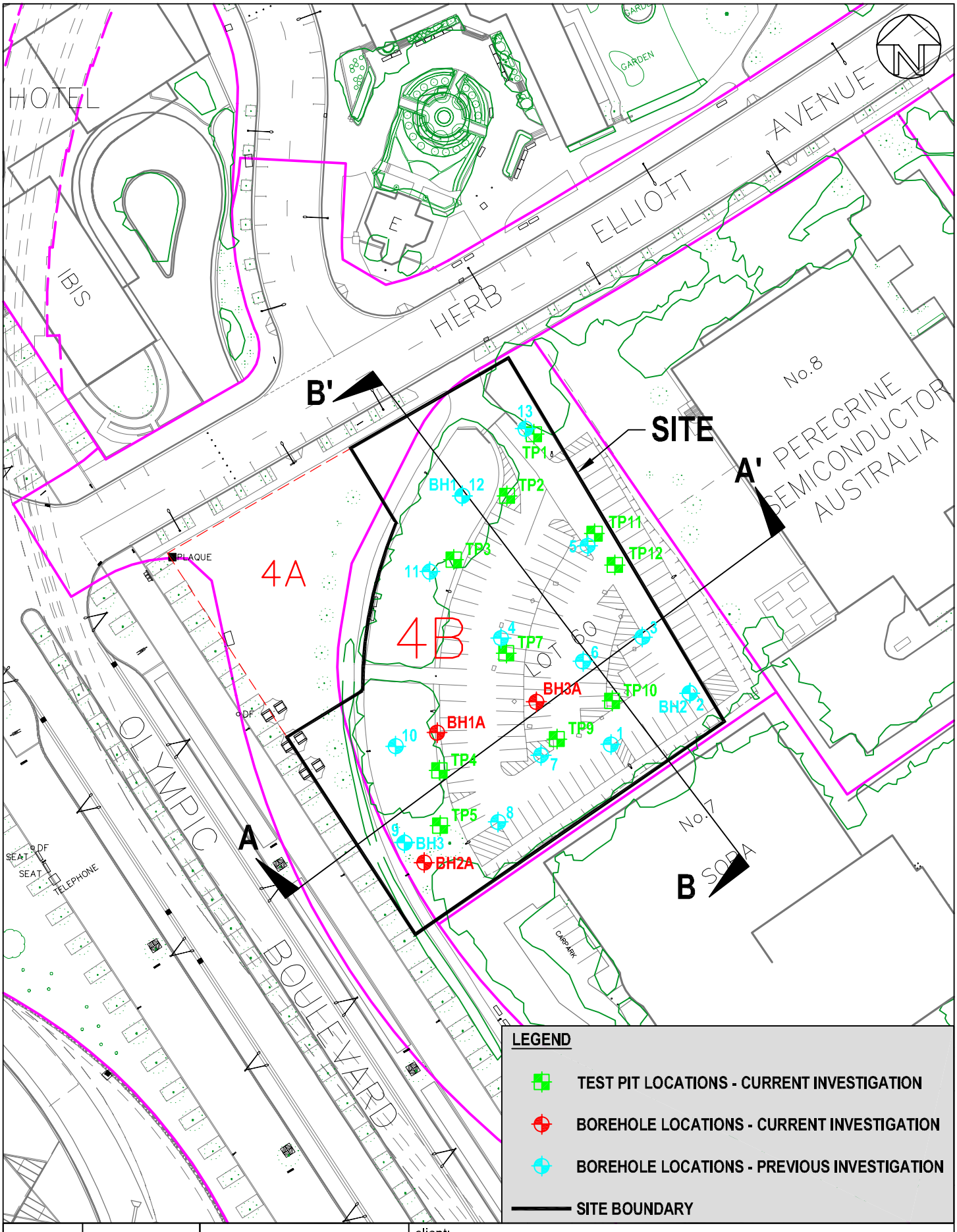
Figures



drawn	SH/AW	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	BOVIS LEND LEASE
approved	SD		project:	ADDITIONAL ENVIRONMENTAL INVESTIGATIONS PROPOSED COMMERCIAL DEVELOPMENT – CORNER OF OLYMPIC BOULEVARD & HERB ELLIOTT AVENUE (SITE 4B), SYDNEY OLYMPIC PARK
date	23/5/07		title:	SITE LOCATION PLAN
scale	AS SHOWN		project no: GEOTLCOV23048AB	figure no: FIGURE 1
original size	A4			



drawn	SD/AW
approved	SD
date	28/05/07
scale	1:1000
original size	A4

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

client: BOVIS LEND LEASE

project: ADDITIONAL ENVIRONMENTAL INVESTIGATIONS PROPOSED COMMERCIAL DEVELOPMENT - CORNER OF OLYMPIC BOULEVARD & HERB ELLIOTT AVENUE (SITE 4B), SYDNEY OLYMPIC PARK

title: BOREHOLE AND TEST PIT LOCATION PLAN

project no: GEOTLCOV23048AB

figure no: FIGURE 2

Tables

GEOTLCOV23048AB
30/05/2007

TABLE LR1
SUMMARY OF LABORATORY RESULTS - SOIL
All results in mg/kg unless otherwise stated

Sample Location	THRESHOLD						BH01	BH01	BH02	BH02	BH03	BH03	BH04	BH04	BH05
Depth	CONCENTRATION	WASTE CLASSIFICATION CRITERIA					0.03-0.10	1.1-1.2	0.1-0.2	0.9-1.0	0.05-0.10	0.5-0.6	0.05-0.10	0.5-0.7	0.05-0.10
Date of Sampling	Commercial	INERT		SOLID		INDUSTRIAL	10-Aug-06	10-Aug-06	10-Aug-06	10-Aug-06	10-Aug-06	10-Aug-06	10-Aug-06	10-Aug-06	11-Aug-06
Geological Origin							Fill	Residual	Fill	Residual	Fill	Residual	Fill	Fill	Fill
HEAVY METALS															
Arsenic	500 [1]	500	[6]	500	[8]	2000	[10]	7	<5	<5	9	<5	<5	<5	12	<5
Cadmium	100 [1]	100	[6]	100	[8]	400	[10]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium		1900	[6]	1900	[8]	7600	[10]	14	3	24	12	10	<2	15	28	11
Copper	5000 [1]							23	13	162	52	16	15	23	9	16
Lead	1500 [1]	1500	[6]	1500	[8]	6000	[10]	24	7	29	10	18	8	28	19	45
Mercury	75 [1]	50	[6]	50	[8]	200	[10]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1
Nickel	3000 [1]	1050	[6]	1050	[8]	4200	[10]	9	<2	28	6	<2	<2	11	3	10
Zinc	1500 [1]							27	<5	103	48	12	<5	43	8	57
TOTAL PETROLEUM HYDROCARBONS															
C6 - C9 Fraction	65 [2]	650	[6]	650	[8]	2600	[10]	<2	<2	<2	<2	<2	<2	<2	<2	<2
C10 - C14 Fraction								<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction								<100	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction								<100	<100	<100	<100	<100	<100	<100	<100	<100
Total C10-C36	1000 [2]	5000	[6]	10000	[8]	40000	[10]	ND	ND	ND	ND	ND	ND	ND	ND	ND
BTEX															
Benzene	1 [2]	1	[3]	10	[4]	40	[5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	130 [2]	28.8	[3]	288	[4]	1152	[5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	50 [2]	60	[3]	600	[4]	2400	[5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Xylene	25 [2]	100	[3]	1000	[4]	4000	[5]	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
POLY AROMATIC HYDROCARBONS (PAH)															
Naphthalene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)anthracene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	5 [1]	1	[6]	10	[8]	23	[10]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzo(a,h)anthracene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAH	100 [1]	200	[6]	200	[8]	800	[10]	ND	ND	ND	ND	ND	ND	ND	ND	ND
POLYCHLORINATED BIPHENYLS (PCB)															
Total PCBs	50 [1]							-	-	-	-	-	<0.10	-	-	<0.10
ORGANICHLORINE PESTICIDES (OCP)															
ALL OCPs								-	-	-	-	-	<0.2	-	-	<0.2
ASBESTOS								ND	ND	ND	ND	ND	ND	ND	ND	ND
TCLP - HEAVY METALS (mg/L)															
Arsenic		0.50	[7]	5.0	[9]	20	[11]	<0.1	-	-	-	-	-	-	-	-
Cadmium		0.10	[7]	1.0	[9]	4	[11]	<0.05	-	-	-	-	-	-	-	-
Chromium		0.50	[7]	5.0	[9]	20	[11]	<0.1	-	-	-	-	-	-	-	-
Copper								<0.1	-	-	-	-	-	-	-	-
Lead		0.50	[7]	5.0	[9]	20	[11]	<0.1	-	-	-	-	-	-	-	-
Mercury		0.02	[7]	0.2	[9]	0.8	[11]	<0.0010	-	-	-	-	-	-	-	-
Nickel		0.20	[7]	2.0	[9]	8	[11]	<0.1	-	-	-	-	-	-	-	-
Zinc								<0.1	-	-	-	-	-	-	-	-
TCLP - POLY AROMATIC HYDROCARBONS (PAH) (ug/L)															
Benzo(a)pyrene		4	[7]	40	[9]	160	[11]	<0.5	-	-	-	-	-	-	-	-
Other PAHs								<1.0	-	-	-	-	-	-	-	-

Notes:

Concentration exceeds the commercial based threshold concentration
Concentration exceeds the respective Inert Waste Criteria
Concentration exceeds the respective Solid Waste Criteria
Concentration exceeds the respective Industrial Waste Criteria

[1] Based on the Health Based Soil Investigation Level in Column 4 of the NSW Site Auditor Scheme (2006)
[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
[3] Based on the Inert Waste Criteria (CT1) in Table A3 of NSW EPA (1999)
[4] Based on the Solid Waste Criteria (CT2) in Table A3 of NSW EPA (1999)
[5] Based on the Industrial Waste Criteria (CT3) in Table A3 of NSW EPA (1999)
[6] Based on the Inert Waste Criteria (SCC1) in Table A4 of NSW EPA (1999)
[7] Based on the Inert Waste Criteria (TCLP1) in Table A4 of NSW EPA (1999)
[8] Based on the Solid Waste Criteria (SCC2) in Table A4 of NSW EPA (1999)
[9] Based on the Solid Waste Criteria (TCLP2) in Table A4 of NSW EPA (1999)
[10] Based on the Industrial Waste Criteria (SCC3) in Table A4 of NSW EPA (1999)
[11] Based on the Industrial Waste Criteria (TCLP3) in Table A4 of NSW EPA (1999)
ND Not Detected
- Not Analysed

GEOTLCOV23048AB
30/05/2007

TABLE LR1
SUMMARY OF LABORATORY RESULTS - SOIL
All results in mg/kg unless otherwise stated

Sample Location	THRESHOLD						BH05	BH06	BH06	BH07	BH07	BH08	BH08	BH09	BH09
Depth	CONCENTRATION	WASTE CLASSIFICATION CRITERIA					0.5-0.7	0.25-0.4	1.0-1.1	0.05-0.10	0.2-0.4	0.2-0.4	1.0-1.3	0.2-0.3	0.35-0.45
Date of Sampling	Commercial	INERT		SOLID		INDUSTRIAL	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06
Geological Origin							Residual	Residual	Residual	Fill	Residual	Residual	Residual	Fill	Fill
HEAVY METALS															
Arsenic	500 [1]	500	[6]	500	[8]	2000 [10]	16	8	9	<5	8	10	<5	<5	<5
Cadmium	100 [1]	100	[6]	100	[8]	400 [10]	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium		1900	[6]	1900	[8]	7600 [10]	13	14	5	14	10	26	4	8	13
Copper	5000 [1]						13	10	21	29	13	10	12	19	59
Lead	1500 [1]	1500	[6]	1500	[8]	6000 [10]	30	13	18	35	42	22	10	14	5
Mercury	75 [1]	50	[6]	50	[8]	200 [10]	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	3000 [1]	1050	[6]	1050	[8]	4200 [10]	<2	<2	4	11	<2	3	<2	8	160
Zinc	1500 [1]						<5	<5	18	47	<5	8	5	22	47
TOTAL PETROLEUM HYDROCARBONS															
C6 - C9 Fraction	65 [2]	650	[6]	650	[8]	2600 [10]	<2	<2	<2	<2	<2	<2	<2	<2	<2
C10 - C14 Fraction							<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction							<100	<100	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction							<100	<100	<100	<100	<100	<100	<100	<100	<100
Total C10-C36	1000 [2]	5000	[6]	10000	[8]	40000 [10]	ND	ND	ND	ND	ND	ND	ND	ND	ND
BTEX															
Benzene	1 [2]	1	[3]	10	[4]	40 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	130 [2]	28.8	[3]	288	[4]	1152 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	50 [2]	60	[3]	600	[4]	2400 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Xylene	25 [2]	100	[3]	1000	[4]	4000 [5]	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
POLY AROMATIC HYDROCARBONS (PAH)															
Naphthalene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)anthracene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	5 [1]	1	[6]	10	[8]	23 [10]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzo(a,h)anthracene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAH	100 [1]	200	[6]	200	[8]	800 [10]	ND	ND	ND	ND	ND	ND	ND	ND	ND
POLYCHLORINATED BIPHENYLS (PCB)															
Total PCBs	50 [1]						-	<0.10	-	<0.10	-	-	-	-	<0.10
ORGANICHLORINE PESTICIDES (OCP)															
ALL OCPs							-	<0.2	-	<0.2	-	-	-	-	<0.2
ASBESTOS							ND	ND	ND	ND	ND	ND	ND	ND	ND
TCLP - HEAVY METALS (mg/L)															
Arsenic		0.50	[7]	5.0	[9]	20 [11]	-	-	-	<0.1	-	-	-	-	-
Cadmium		0.10	[7]	1.0	[9]	4 [11]	-	-	-	<0.05	-	-	-	-	-
Chromium		0.50	[7]	5.0	[9]	20 [11]	-	-	-	<0.1	-	-	-	-	-
Copper							-	-	-	<0.1	-	-	-	-	-
Lead		0.50	[7]	5.0	[9]	20 [11]	-	-	-	<0.1	-	-	-	-	-
Mercury		0.02	[7]	0.2	[9]	0.8 [11]	-	-	-	<0.0010	-	-	-	-	-
Nickel		0.20	[7]	2.0	[9]	8 [11]	-	-	-	<0.1	-	-	-	-	-
Zinc							-	-	-	0.8	-	-	-	-	-
TCLP - POLY AROMATIC HYDROCARBONS (PAH) (ug/L)															
Benzo(a)pyrene		4	[7]	40	[9]	160 [11]	-	-	-	<0.5	-	-	-	-	-
Other PAHs							-	-	-	<1.0	-	-	-	-	-

Notes:

Concentration exceeds the commercial based threshold concentration
Concentration exceeds the respective Inert Waste Criteria
Concentration exceeds the respective Solid Waste Criteria
Concentration exceeds the respective Industrial Waste Criteria

[1] Based on the Health Based Soil Investigation Level in Column 4 of the NSW Site Auditor Scheme (2006)
[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
[3] Based on the Inert Waste Criteria (CT1) in Table A3 of NSW EPA (1999)
[4] Based on the Solid Waste Criteria (CT2) in Table A3 of NSW EPA (1999)
[5] Based on the Industrial Waste Criteria (CT3) in Table A3 of NSW EPA (1999)
[6] Based on the Inert Waste Criteria (SCC1) in Table A4 of NSW EPA (1999)
[7] Based on the Inert Waste Criteria (TCLP1) in Table A4 of NSW EPA (1999)
[8] Based on the Solid Waste Criteria (SCC2) in Table A4 of NSW EPA (1999)
[9] Based on the Solid Waste Criteria (TCLP2) in Table A4 of NSW EPA (1999)
[10] Based on the Industrial Waste Criteria (SCC3) in Table A4 of NSW EPA (1999)
[11] Based on the Industrial Waste Criteria (TCLP3) in Table A4 of NSW EPA (1999)
ND Not Detected
- Not Analysed

GEOTLCOV23048AB
30/05/2007

TABLE LR1
SUMMARY OF LABORATORY RESULTS - SOIL
All results in mg/kg unless otherwise stated

Sample Location	THRESHOLD						BH09	BH10	BH11	BH11	BH12	BH12	BH13	BH13	TP1	TP1	TP2
Depth	CONCENTRATION	WASTE CLASSIFICATION CRITERIA					0.5-0.7	0.5-0.95	0.0-0.05	0.2-0.6	0.05-0.1	0.3-0.6	0.1-0.2	0.3-0.7	0.0-0.1	0.3-0.4	0.1-0.2
Date of Sampling	Commercial	INERT		SOLID		INDUSTRIAL	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	11-Aug-06	24-Apr-07	24-Apr-07	24-Apr-07
Geological Origin							Fill	Residual	Fill	Fill	Fill	Fill	Fill	Residual	Fill	Fill	Fill
HEAVY METALS																	
Arsenic	500 [1]	500	[6]	500	[8]	2000 [10]	12	10	5	10	13	10	8	10	6	8	4
Cadmium	100 [1]	100	[6]	100	[8]	400 [10]	<1	<1	<1	<1	<1	<1	<1	<1	0.2	0.5	0.2
Chromium		1900	[6]	1900	[8]	7600 [10]	19	22	10	28	29	29	24	25	9.4	23	13
Copper	5000 [1]						13	10	22	11	10	8	9	11	11	13	13
Lead	1500 [1]	1500	[6]	1500	[8]	6000 [10]	14	14	24	25	41	19	20	16	14	15	28
Mercury	75 [1]	50	[6]	50	[8]	200 [10]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05
Nickel	3000 [1]	1050	[6]	1050	[8]	4200 [10]	8	<2	8	4	4	<2	3	<2	8.3	2.4	5.2
Zinc	1500 [1]						9	<5	49	7	34	7	22	<5	54	8.3	41
TOTAL PETROLEUM HYDROCARBONS																	
C6 - C9 Fraction	65 [2]	650	[6]	650	[8]	2600 [10]	<2	<2	<2	<2	<2	<2	<2	<2	-	-	-
C10 - C14 Fraction							<50	<50	<50	<50	<50	<50	<50	<50	-	-	-
C15 - C28 Fraction							<100	<100	<100	<100	<100	<100	<100	<100	-	-	-
C29 - C36 Fraction							<100	<100	<100	<100	<100	<100	<100	<100	-	-	-
Total C10-C36	1000 [2]	5000	[6]	10000	[8]	40000 [10]	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-
BTEX																	
Benzene	1 [2]	1	[3]	10	[4]	40 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-
Toluene	130 [2]	28.8	[3]	288	[4]	1152 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-
Ethylbenzene	50 [2]	60	[3]	600	[4]	2400 [5]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-
Total Xylene	25 [2]	100	[3]	1000	[4]	4000 [5]	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	-	-	-
POLY AROMATIC HYDROCARBONS (PAH)																	
Naphthalene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Acenaphthylene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Acenaphthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Fluorene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Phenanthrene							<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Anthracene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Fluoranthene							<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	0.2	<0.1	0.2
Pyrene							<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	0.2	<0.1	0.2
Benzo(a)anthracene							<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.1	<0.1	0.1
Chrysene							<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Benzo(b)fluoranthene							<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Benzo(k)fluoranthene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Benzo(a)pyrene	5 [1]	1	[6]	10	[8]	23 [10]	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	0.08	0.07	0.12
Indeno(1,2,3-c,d)pyrene							<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene							<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
Total PAH	100 [1]	200	[6]	200	[8]	800 [10]	ND	ND	ND	ND	9.3	ND	ND	ND	0.48	0.07	0.62
POLYCHLORINATED BIPHENYLS (PCB)																	
Total PCBs	50 [1]						<0.10	-	-	-	<0.10	-	-	<0.10	-	-	-
ORGANICHLORINE PESTICIDES (OCP)																	
ALL OCPs							<0.2	-	-	-	<0.2	-	-	<0.2	-	-	-
ASBESTOS							ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCLP - HEAVY METALS (mg/L)																	
Arsenic		0.50	[7]	5.0	[9]	20 [11]	<0.1	-	-	-	-	-	-	<0.1	-	-	<0.05
Cadmium		0.10	[7]	1.0	[9]	4 [11]	<0.05	-	-	-	-	-	-	<0.05	-	-	<0.002
Chromium		0.50	[7]	5.0	[9]	20 [11]	<0.1	-	-	-	-	-	-	<0.1	-	-	<0.005
Copper							<0.1	-	-	-	-	-	-	<0.1	-	-	<0.01
Lead		0.50	[7]	5.0	[9]	20 [11]	<0.1	-	-	-	-	-	-	<0.1	-	-	<0.02
Mercury		0.02	[7]	0.2	[9]	0.8 [11]	<0.0010	-	-	-	-	-	-	<0.0010	-	-	<0.0005
Nickel		0.20	[7]	2.0	[9]	8 [11]	<0.1	-	-	-	-	-	-	<0.1	-	-	<0.009
Zinc							<0.1	-	-	-	-	-	-	<0.1	-	-	0.021
TCLP - POLY AROMATIC HYDROCARBONS (PAH) (ug/L)																	
Benzo(a)pyrene		4	[7]	40	[9]	160 [11]	<0.5	-	-	-	-	-	-	<0.5	-	<0.5	<0.5
Other PAHs							<1.0	-	-	-	-	-	-	<1.0	-	<8	<8

Notes:

Concentration exceeds the commercial based threshold concentration
Concentration exceeds the respective Inert Waste Criteria
Concentration exceeds the respective Solid Waste Criteria
Concentration exceeds the respective Industrial Waste Criteria

[1] Based on the Health Based Soil Investigation Level in Column 4 of the NSW Site Auditor Scheme (2006)
[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
[3] Based on the Inert Waste Criteria (CT1) in Table A3 of NSW EPA (1999)
[4] Based on the Solid Waste Criteria (CT2) in Table A3 of NSW EPA (1999)
[5] Based on the Industrial Waste Criteria (CT3) in Table A3 of NSW EPA (1999)
[6] Based on the Inert Waste Criteria (SCC1) in Table A4 of NSW EPA (1999)
[7] Based on the Inert Waste Criteria (TCLP1) in Table A4 of NSW EPA (1999)
[8] Based on the Solid Waste Criteria (SCC2) in Table A4 of NSW EPA (1999)
[9] Based on the Solid Waste Criteria (TCLP2) in Table A4 of NSW EPA (1999)
[10] Based on the Industrial Waste Criteria (SCC3) in Table A4 of NSW EPA (1999)
[11] Based on the Industrial Waste Criteria (TCLP3) in Table A4 of NSW EPA (1999)
ND Not Detected
- Not Analysed

GEOTLCOV23048AB
30/05/2007

TABLE LR1
SUMMARY OF LABORATORY RESULTS - SOIL
All results in mg/kg unless otherwise stated

Sample Location	THRESHOLD						TP3	TP3	TP4	TP4	TP5	TP5	TP7	TP7	TP9	TP10	TP11
Depth	CONCENTRATION	WASTE CLASSIFICATION CRITERIA					0.0-0.1	0.3-0.4	0.0-0.1	0.2-0.3	0.1-0.2	0.3-0.4	0.1-0.2	0.4-0.5	0.2-0.3	0.2-0.3	0.2-0.3
Date of Sampling	Commercial	INERT		SOLID		INDUSTRIAL	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07	24-Apr-07
Geological Origin							Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Residual	Residual	Residual
HEAVY METALS																	
Arsenic	500 [1]	500	[6]	500	[8]	2000 [10]	10	12	4	10	<3	<3	4	10	7	7	10
Cadmium	100 [1]	100	[6]	100	[8]	400 [10]	0.6	0.9	0.2	0.5	<0.1	0.3	0.2	0.4	0.3	0.5	0.6
Chromium		1900	[6]	1900	[8]	7600 [10]	20	26	10	19	3	11	12	21	12	16	23
Copper	5000 [1]						12	9.4	18	9.4	1.9	27	18	17	11	12	21
Lead	1500 [1]	1500	[6]	1500	[8]	6000 [10]	27	27	17	18	4	9.2	52	16	13	17	20
Mercury	75 [1]	50	[6]	50	[8]	200 [10]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.25	<0.05	<0.05	<0.05	<0.05
Nickel	3000 [1]	1050	[6]	1050	[8]	4200 [10]	5.6	3.6	15	3.9	1.3	54	7.7	2.5	0.8	0.6	2.4
Zinc	1500 [1]						40	25	47	17	5.4	35	52	10	5.2	5.5	17
TOTAL PETROLEUM HYDROCARBONS																	
C6 - C9 Fraction	65 [2]	650	[6]	650	[8]	2600 [10]	-	-	-	-	-	-	-	-	-	-	-
C10 - C14 Fraction							-	-	-	-	-	-	-	-	-	-	-
C15 - C28 Fraction							-	-	-	-	-	-	-	-	-	-	-
C29 - C36 Fraction							-	-	-	-	-	-	-	-	-	-	-
Total C10-C36	1000 [2]	5000	[6]	10000	[8]	40000 [10]	-	-	-	-	-	-	-	-	-	-	-
BTEX																	
Benzene	1 [2]	1	[3]	10	[4]	40 [5]	-	-	-	-	-	-	-	-	-	-	-
Toluene	130 [2]	28.8	[3]	288	[4]	1152 [5]	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	50 [2]	60	[3]	600	[4]	2400 [6]	-	-	-	-	-	-	-	-	-	-	-
Total Xylene	25 [2]	100	[3]	1000	[4]	4000 [5]	-	-	-	-	-	-	-	-	-	-	-
POLY AROMATIC HYDROCARBONS (PAH)																	
Naphthalene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene							0.4	<0.1	0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1
Anthracene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene							1	0.2	0.2	0.2	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene							1	0.2	0.2	0.3	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene							0.4	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene							0.5	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene							1	0.3	0.2	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene							<0.1	<0.3	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	5 [1]	1	[6]	10	[8]	23 [10]	0.6	0.16	0.14	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene							0.4	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene							0.5	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAH	100 [1]	200	[6]	200	[8]	800 [10]	5.8	1.16	1.14	1.38	ND	ND	0.6	ND	ND	ND	ND
POLYCHLORINATED BIPHENYLS (PCB)																	
Total PCBs	50 [1]						-	-	-	-	-	-	-	-	-	-	-
ORGANICHLORINE PESTICIDES (OCP)																	
ALL OCPs							-	-	-	-	-	-	-	-	-	-	-
ASBESTOS							ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCLP - HEAVY METALS (mg/L)																	
Arsenic		0.50	[7]	5.0	[9]	20 [11]	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	<0.05
Cadmium		0.10	[7]	1.0	[9]	4 [11]	-	<0.002	-	-	-	<0.002	<0.002	-	-	-	<0.002
Chromium		0.50	[7]	5.0	[9]	20 [11]	-	<0.005	-	-	-	<0.005	<0.005	-	-	-	<0.005
Copper							-	<0.01	-	-	-	<0.01	0.01	-	-	-	<0.01
Lead		0.50	[7]	5.0	[9]	20 [11]	-	<0.02	-	-	-	<0.02	<0.02	-	-	-	<0.02
Mercury		0.02	[7]	0.2	[9]	0.8 [11]	-	<0.0005	-	-	-	<0.0005	<0.0005	-	-	-	<0.0005
Nickel		0.20	[7]	2.0	[9]	8 [11]	-	<0.009	-	-	-	0.023	<0.009	-	-	-	<0.009
Zinc							-	0.016	-	-	-	0.031	0.072	-	-	-	0.007
TCLP - POLY AROMATIC HYDROCARBONS (PAH) (ug/L)																	
Benzo(a)pyrene		4	[7]	40	[9]	160 [11]	<0.5	<0.5	-	<0.5	-	-	-	-	-	-	-
Other PAHs							<8	<8	-	<8	-	-	-	-	-	-	-

Notes:

Concentration exceeds the commercial based threshold concentration
Concentration exceeds the respective Inert Waste Criteria
Concentration exceeds the respective Solid Waste Criteria
Concentration exceeds the respective Industrial Waste Criteria

[1] Based on the Health Based Soil Investigation Level in Column 4 of the NSW Site Auditor Scheme (2006)
[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
[3] Based on the Inert Waste Criteria (CT1) in Table A3 of NSW EPA (1999)
[4] Based on the Solid Waste Criteria (CT2) in Table A3 of NSW EPA (1999)
[5] Based on the Industrial Waste Criteria (CT3) in Table A3 of NSW EPA (1999)
[6] Based on the Inert Waste Criteria (SCC1) in Table A4 of NSW EPA (1999)
[7] Based on the Inert Waste Criteria (TCLP1) in Table A4 of NSW EPA (1999)
[8] Based on the Solid Waste Criteria (SCC2) in Table A4 of NSW EPA (1999)
[9] Based on the Solid Waste Criteria (TCLP2) in Table A4 of NSW EPA (1999)
[10] Based on the Industrial Waste Criteria (SCC3) in Table A4 of NSW EPA (1999)
[11] Based on the Industrial Waste Criteria (TCLP3) in Table A4 of NSW EPA (1999)
ND Not Detected
- Not Analysed

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TABLE LR1
SUMMARY OF LABORATORY RESULTS - SOIL
All results in mg/kg unless otherwise stated

Sample Location	THRESHOLD						TP12
Depth	CONCENTRATION	WASTE CLASSIFICATION CRITERIA					0.1-0.2
Date of Sampling	Commercial	INERT		SOLID		INDUSTRIAL	24-Apr-07
Geological Origin							Residual
HEAVY METALS							
Arsenic	500 [1]	500	[6]	500	[8]	2000 [10]	6
Cadmium	100 [1]	100	[6]	100	[8]	400 [10]	0.5
Chromium		1900	[6]	1900	[8]	7600 [10]	16
Copper	5000 [1]						23
Lead	1500 [1]	1500	[6]	1500	[8]	6000 [10]	19
Mercury	75 [1]	50	[6]	50	[8]	200 [10]	<0.05
Nickel	3000 [1]	1050	[6]	1050	[8]	4200 [10]	1.7
Zinc	1500 [1]						18
TOTAL PETROLEUM HYDROCARBONS							
C6 - C9 Fraction	65 [2]	650	[6]	650	[8]	2600 [10]	-
C10 - C14 Fraction							-
C15 - C28 Fraction							-
C29 - C36 Fraction							-
Total C10-C36	1000 [2]	5000	[6]	10000	[8]	40000 [10]	-
BTEX							
Benzene	1 [2]	1	[3]	10	[4]	40 [5]	-
Toluene	130 [2]	28.8	[3]	288	[4]	1152 [5]	-
Ethylbenzene	50 [2]	60	[3]	600	[4]	2400 [5]	-
Total Xylene	25 [2]	100	[3]	1000	[4]	4000 [5]	-
POLY AROMATIC HYDROCARBONS (PAH)							
Naphthalene							<0.1
Acenaphthylene							<0.1
Acenaphthene							<0.1
Fluorene							<0.1
Phenanthrene							<0.1
Anthracene							<0.1
Fluoranthene							<0.1
Pyrene							<0.1
Benzo(a)anthracene							<0.1
Chrysene							<0.1
Benzo(b)fluoranthene							<0.1
Benzo(k)fluoranthene							<0.1
Benzo(a)pyrene	5 [1]	1	[6]	10	[8]	23 [10]	<0.05
Indeno(1,2,3-c,d)pyrene							<0.1
Dibenzo(a,h)anthracene							<0.1
Benzo(g,h,i)perylene							<0.1
Total PAH	100 [1]	200	[6]	200	[8]	800 [10]	ND
POLYCHLORINATED BIPHENYLS (PCB)							
Total PCBs	50 [1]						-
ORGANICHLORINE PESTICIDES (OCP)							
ALL OCPs							-
ASBESTOS							ND
TCLP - HEAVY METALS (mg/L)							
Arsenic		0.50	[7]	5.0	[9]	20 [11]	-
Cadmium		0.10	[7]	1.0	[9]	4 [11]	-
Chromium		0.50	[7]	5.0	[9]	20 [11]	-
Copper							-
Lead		0.50	[7]	5.0	[9]	20 [11]	-
Mercury		0.02	[7]	0.2	[9]	0.8 [11]	-
Nickel		0.20	[7]	2.0	[9]	8 [11]	-
Zinc							-
TCLP - POLY AROMATIC HYDROCARBONS (PAH) (ug/L)							
Benzo(a)pyrene		4	[7]	40	[9]	160 [11]	-
Other PAHs							-

Notes:

Concentration exceeds the commercial based threshold concentration
Concentration exceeds the respective Inert Waste Criteria
Concentration exceeds the respective Solid Waste Criteria
Concentration exceeds the respective Industrial Waste Criteria

[1] Based on the Health Based Soil Investigation Level in Column 4 of the NSW Site Auditor Scheme (2006)
[2] Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
[3] Based on the Inert Waste Criteria (CT1) in Table A3 of NSW EPA (1999)
[4] Based on the Solid Waste Criteria (CT2) in Table A3 of NSW EPA (1999)
[5] Based on the Industrial Waste Criteria (CT3) in Table A3 of NSW EPA (1999)
[6] Based on the Inert Waste Criteria (SCC1) in Table A4 of NSW EPA (1999)
[7] Based on the Inert Waste Criteria (TCLP1) in Table A4 of NSW EPA (1999)
[8] Based on the Solid Waste Criteria (SCC2) in Table A4 of NSW EPA (1999)
[9] Based on the Solid Waste Criteria (TCLP2) in Table A4 of NSW EPA (1999)
[10] Based on the Industrial Waste Criteria (SCC3) in Table A4 of NSW EPA (1999)
[11] Based on the Industrial Waste Criteria (TCLP3) in Table A4 of NSW EPA (1999)
ND Not Detected
- Not Analysed

TABLE LR2
SUMMARY OF LABORATORY RESULTS - GROUNDWATER
All results in µg/L

Sample ID	THRESHOLD				BH2	BH3
Matrix	CONCENTRATION				water	water
Date of Sampling	Marine water		Recreational		22.3.07	22.3.07
HEAVY METALS ug/L						
Arsenic	50	2	50	7	1.6	1.7
Cadmium	5.5	1	5	7	<0.1	<0.1
Chromium	27.4	1	50	7	<1	1.6
Copper	1.3	1	1000	7	2.1	5.4
Lead	4.4	1	50	7	1.8	1
Mercury	0.4	1	1	7	<0.5	<0.5
Nickel	70	1	100	7	2	3.5
Zinc	15	1	5000	7	16	30
TOTAL PETROLEUM/RECOVERABLE HYDROCARBONS (mg/L)						
C6 - C9 Fraction					<0.4	<0.4
C10 - C14 Fraction					0.7	1.4
C15 - C28 Fraction					2.7	0.9
C29 - C36 Fraction					0.5	<0.2
Total C6-C36	0.325	4			3.9	2.3
BTEX						
Benzene	700	1	10	7	<50	<50
Toluene	800	5			<50	<50
Ethylbenzene	300	5			<50	<50
Total Xylene	550	5			ND	ND
POLYCYCLIC AROMATIC HYDROCARBONS ug/L						
Naphthalene	70	1			7.5	17
Acenaphthylene					<1.5	<1.5
Acenaphthene					<1.5	<1.5
Fluorene					<1.5	<1.5
Phenanthrene	0.6	3			2.6	2.4
Anthracene	0.01	3			<1.5	<1.5
Fluoranthene	1	3			<1.5	<1.5
Pyrene					<1.5	<1.5
Benzo[a]anthracene					<1.5	<1.5
Chrysene					<1.5	<1.5
Benzo[b,k]fluoranthene					<3.0	<3.0
Benzo[a]pyrene	0.1	3	0.01	7	<1.5	<1.5
Indeno[123-cd]pyrene					<1.5	<1.5
Dibenzo[ah]anthracene					<1.5	<1.5
Benzo[ghi]perylene					<1.5	<1.5
Total PAH's					10.1	19.4
VOC ug/L					ND	ND
Sulphate, SO4					70	140
Total Kjeldahl Nitrogen					19	39
Total Phosphorus as P					<0.1	<0.1

Concentration exceeds ANZECC (2000) 95% protection of species trigger value
Concentration exceeds ANZECC (2000) guideline for recreational water quality and aesthetics

1 Based on ANZECC (2000) Marine Guidelines for protection of 95% species
2 Based on ANZECC (2000) Marine Water Guidelines for protection of 99% species
3 Based on ANZECC (2000) Low Reliability Trigger Values for Marine Water (protection for 99% of species)
4 Based on Environmental Quality Standards in the Netherlands (1999)
5 Based on NSW EPA (1994) Guidelines for Assessing Service Station Sites
6 Based on the ANZECC (2000) Lowland River Default Trigger Values
7 Based on ANZECC (2000) guideline for recreational water quality and aesthetics
- Not Analysed
ND Not Detected

Appendix A

Test Pit and Borehole Logs (April 2007)

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Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit W_L less than 35%. • Modium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, I_S50 (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (Is50). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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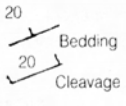
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

DEFECT SHAPE TERMS	
Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS	
Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS	
Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS	
Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH1A**

Sheet 1 of 4

Project No: **GEOTLCOV23048AB**

Client: **Bovis Lend Lease**

Date started: **2.5.2007**

Principal:

Date completed: **3.5.2007**

Project: **Additional Proposed Commercial Development**

Logged by: **SH**

Borehole Location: **Site 4B, Sydney Olympic Park**

Checked by: **PJW**

drill model and mounting: Mobil B80 Truck | Easting: 5355.26 | slope: -90° | R.L. Surface: 21.45

hole diameter: 100 mm | Northing 15514.17 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADV									**FILL:** Woodchip and topsoil.	<Wp			FILL
									FILL: SILTY CLAY: Low to medium plasticity, dark brown, black with some root fibres.	<Wp			
				SPT 2,3,5 N*=8	21	1		CL-CH	**FILL: SILTY CLAY:** Medium plasticity, dark brown, with trace of fine gravel.	=Wp	VSt-H		RESIDUAL
									SILTY CLAY: Medium to high plasticity. orange-brown mottled red-grey, with some fine shale gravel.				
					20								
ADT						2			**SHALE:** Extremely weathered, brown and grey, very low to low strength.				SHALE V bit refusal at 1.90m.
					19	3							
					18				**SHALE:** Highly weathered, brown and grey, low strength.				
						4							
					17								
						5							
					16								TC bit refusal at 6.10m.
						6			Borehole BH1A continued as cored hole				
					15								
						7							
					14								
						8							

BOREHOLE GEOTLCOV23048AB.GPJ COFFEY.GDT 5.30.07

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method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration 1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Cored Borehole

Borehole No.	***BH1A***
Sheet	2 of 4
Project No:	***GEOTLCOV23048AB***
Client:	***Bovis Lend Lease***
Date started:	***2.5.2007***
Principal:	
Date completed:	***3.5.2007***
Project:	***Additional Proposed Commercial Development***
Logged by:	***SH***
Borehole Location:	***Site 4B, Sydney Olympic Park***
Checked by:	***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5355.26 | slope: -90° | R.L. Surface: 21.45

hole diameter: 100 mm | Drilling fluid: | Northing: 15514.17 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness (particular / general)
			21	1								
			20	2								
			19	3								
			18	4								
			17	5								
			16	6		Continued from non-cored borehole						
NMLC			15	7		**SHALE:** Grey mottled brown, distinctly laminated at 0°.	MW		D 0.12 A 0.28	25		6.10m - Core starts
						SHALE: Dark grey, distinctly laminated at 0°.						-SM, 0°,PL,SO,CO,10mm clay,360pp.
						NO CORE: 0.07m core loss.	MW-SW					-SM, 0°,PL,SO,CO,20mm clay,290pp.
						SHALE: Dark grey, distinctly laminated at 0°.						-10mm fractured rock.
			14	8		**NO CORE:** 0.08m core loss.	MW					-10mm fractured rock.
						SHALE: Dark grey, distinctly laminated at 0°.	SW					-10mm fractured rock.
									D 0.02 A 0.78			-10mm fractured rock.
												-Start core loss.
												-End core loss.
												-SM,15°,PL,SO,CO,10mm clay.
												-20mm fractured rock.
												-10mm fractured rock.
												-Start core loss.

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH1A**

Sheet 3 of 4

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***2.5.2007***

Principal:

Date completed: ***3.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5355.26 | slope: -90° | R.L. Surface: 21.45

hole diameter: 100 mm | Drilling fluid: | Northing: 15514.17 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			13	9		**SHALE:** Dark grey, distinctly laminated at 0°. *(continued)*	FR		D 0.38 A 1.13	25		-End core loss. -50mm fractured rock. -JT,60°,PL,SO,CN (7.40m-7.44m) -JT,60°,PL,SO,CN (7.44m-7.46m) -40mm fractured rock. -JT,60°,PL,SO,CN (8.0m-8.02m) -PT,0°,PL,SO,Co 5mm fractured rock.
			12									-20mm fractured rock.
				10					D 0.08 A 0.83	86		-SM,0°,PL,SO,CO,10mm clay.
			11									
				11					D 0.25 A 1.44			
			10						D 0.1 A 1.25			-40mm fractured rock.
				12								
			9									-10mm fractured rock.
				13					D 0.25 A 1.06	59		
			8									-20mm fractured rock. -JT,90°,PL,SO,CN (13.46m-13.53m)
				14					D 0.3 A 1.29			-JT,75°,PL,SO,CN (13.70m-13.76m)
			7						D 1.14 A 1.04			-JT,45°,PL,SO,CN.
				15						83		-JT,75°,PL,SO,CN 5mm clay (15.0m-15.05m)
			6									
				16					D 0.02 A 1.01			

ALL DEFECTS PT, 0° , PL, SO, CN, SN, VN UNLESS OTHERWISE NOTED.

method
DT diatube; AS auger screwing; AD auger drilling; RR roller/tricone; CB claw or blade bit; NMLC NMLC core; NQ, HQ, PQ wireline core

core-lift
casing used; barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material; no core recovered

water
10/1/98 water level on date shown; water inflow; partial drill fluid loss; complete drill fluid loss; water pressure test result (lugeons) for depth interval shown (25)

weathering
FR fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; XW extremely weathered; DW distinctly weathered (covers MW and HW)

strength
VL very low; L low; M medium; H high; VH very high; EH extremely high

defect type
JT joint; PT parting; SM seam; SZ sheared zone; SS sheared surface; CS crushed seam

planarity
PL planar; CU curved; UN undulating; ST stepped; IR irregular

roughness
VR very rough; RO rough; SO smooth; SL slickensided

coating
CN clean; SN stained; VN veneer; CO coating

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Engineering Log - Cored Borehole

Borehole No. **BH1A**

Sheet 4 of 4

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***2.5.2007***

Principal:

Date completed: ***3.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5355.26 | slope: -90° | R.L. Surface: 21.45

hole diameter: 100 mm | Drilling fluid: | Northing: 15514.17 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			5	17		**SHALE:** Dark grey, distinctly laminated at 0°. *(continued)*	FR		D 0.05 A 1.03	83		-JT,30°,PL,SO,CN 5mm clay (16.45m-16.47m)
												-20mm fractured rock.
												-JT,60°,PL,SO,CN (16.52m-16.56m)
												-JT,30°,PL,SO,CN (16.56m-16.65m)
												-70mm fractured rock and clay.
												-JT,90°,IR,SO,CN (16.80m-16.83m)
												-JT,85°,PL,SO,CN (16.87m-17.13m)
												-JT,45°,PL,SO,CN (17.06m-17.08m)
												-JT,90°,PL,SO,CN (17.17m-17.20m)
												-20mm fractured rock.
												-30mm fractured rock.
			4	18						50		
									D 0.14 A 0.75			
												-JT,90°,PL,SO,CN (18.17m-18.28m)
												-JT,90°,CU,SO,CN (18.30m-18.35m)
			3						D 0.24 A 0.82			18.48m - End of hole.
						BH1A terminated at 18.48m						
				19								
			2									
				20								
			1									
				21								
			0									
				22								
			-1									
				23								
			-2									
				24								

method

DT	diatube
AS	auger screwing
AD	auger drilling
RR	roller/tricone
CB	claw or blade bit
NMLC	NMLC core
NQ, HQ, PQ	wireline core

core-lift

- casing used
- barrel withdrawn

graphic log/core recovery

- core recovered - graphic symbols indicate material
- no core recovered

water

- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- 25 water pressure test result (lugeons) for depth interval shown

weathering

FR	fresh
SW	slightly weathered
MW	moderately weathered
HW	highly weathered
XW	extremely weathered
DW	distinctly weathered (covers MW and HW)

strength

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

defect type

JT	joint
PT	parting
SM	seam
SZ	sheared zone
SS	sheared surface
CS	crushed seam

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

coating

CN	clean
SN	stained
VN	veneer
CO	coating

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Engineering Log - Borehole

Borehole No. **BH2A**

Sheet 1 of 4

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***1.5.2007***

Principal:

Date completed: ***2.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model and mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: 100 mm | Northing 15488.08 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADV									**FILL:** Woodchip and topsoil.	<Wp			FILL
									FILL: SILTY CLAY: Low to medium plasticity, dark brown/black with some root fibres.	<Wp			
				SPT 4,4,5 N*=9	21	1		CL-CH	**FILL: SILTY CLAY:** Medium plasticity, dark brown/ with trace of fine gravel.	=Wp	VSt-H	×	RESIDUAL
									SILTY CLAY: Medium to high plasticity, orange brown mottled red-grey, with trace of fine shale gravel.			×	
ADT					20	2			**SHALE:** Extremely weathered, brown and grey, very low to low strength.				SHALE V bit refusal at 2.0m.
					19	3							
					18	4			**SHALE:** Highly weathered, brown and grey, low strength.				
					17	5							TC bit refusal at 5.0m.
									Borehole BH2A continued as cored hole				
					16	6							
					15	7							
					14	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE GEOTLCOV23048AB.GPJ COFFEY.GDT 5.30.07

Form GEO 5.3 Issue 3 Rev.2

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Engineering Log - Cored Borehole

Borehole No. **BH2A**

Sheet 2 of 4

Project No: **GEOTLCOV23048AB**

Client: **Bovis Lend Lease**

Date started: **1.5.2007**

Principal:

Date completed: **2.5.2007**

Project: **Additional Proposed Commercial Development**

Logged by: **SH**

Borehole Location: **Site 4B, Sydney Olympic Park**

Checked by: **PJW**

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: 100 mm Drilling fluid: | Northing: 15488.08 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
			21	1								
			20	2								
			19	3								
			18	4								
			17	5		Continued from non-cored borehole						
NMLC						**SHALE:** Grey mottled brown, distinctly laminated @ 0°.	HW-MW		D 0.21 A 0.13			5.0m - Core starts
												-SM, 0°, PL, SO, CO. 30mm clay, 320pp.
												-SM, 0°, PL, SO, CO. 20mm clay.
												-10mm fractured rock.
												-JT, 90°, PL, SO, SN (5.48m - 5.50m)
												-JT, 25°, CU, SO, SN.
												-SM,0°, PL, SO, CO. 20mm clay and fractured rock.
												-SM, 0°, PL, SO, CO. 10mm clay.
												-30mm fractured rock.
						SHALE: Dark grey and grey, distinctly laminated @ 0°.	MW-SW					
							FR		D 0.47 A 0.75			
												-20mm fractured rock.
									D 0.83 A 0.87			-20mm fractured rock.
												-20mm fractured rock.
			16	6						35		
			15	7								
			14	8						75		

method

DT	diatube
AS	auger screwing
AD	auger drilling
RR	roller/tricone
CB	claw or blade bit
NMLC	NMLC core
NQ, HQ, PQ	wireline core

core-lift

- casing used
- barrel withdrawn

graphic log/core recovery

- core recovered - graphic symbols indicate material
- no core recovered

water

- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- water pressure test result (lugeons) for depth interval shown (25)

weathering

FR	fresh
SW	slightly weathered
MW	moderately weathered
HW	highly weathered
XW	extremely weathered
DW	distinctly weathered (covers MW and HW)

strength

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

defect type

JT	joint
PT	parting
SM	seam
SZ	sheared zone
SS	sheared surface
CS	crushed seam

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

coating

CN	clean
SN	stained
VN	veneer
CO	coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No.	***BH2A***
Sheet	3 of 4
Project No:	***GEOTLCOV23048AB***
Client:	***Bovis Lend Lease***
Date started:	***1.5.2007***
Principal:	
Date completed:	***2.5.2007***
Project:	***Additional Proposed Commercial Development***
Logged by:	***SH***
Borehole Location:	***Site 4B, Sydney Olympic Park***
Checked by:	***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: 100 mm Drilling fluid: | Northing: 15488.08 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			13	9		**SHALE:** Dark grey and grey, distinctly laminated @ 0°. *(continued)*	FR		D 0.79 A 0.93	75		-10mm fractured rock.
			12	10					D 1.11 A 1.56			-PT,5°, PL, SO, CN. -PT,10°, PL, SO, CN.
			11	11					D 0.96 A 1.08			JT, 30°, PL,SO,CN (11.54m - 11.57m)
		11/05/07	10	12					D 0.34 A 0.92	77		-JT, 50°, PL, SO,CN (11.48m - 11.55m) -Highly weathered rock. -20mm fractured rock. -PT, 15°, PL, SO, CN. -10mm fractured rock.
			9	13					D 0.07 A 0.88			-20mm fractured rock. -JT, 30°, PL, SO, CN. (11.75m - 11.78m)
			8	14						90		-30mm fractured rock.
			7	15					D 0.07 A 0.87			
			6	16					D 0.39 A 1.19			-20mm fractured rock. -30mm fractured rock.

ALL DEFECTS PT,0°,PL,SO, CN, SN,VN UNLESS OTHERWISE NOTED.

method

DT	diatube
AS	auger screwing
AD	auger drilling
RR	roller/tricone
CB	claw or blade bit
NMLC	NMLC core
NQ, HQ, PQ	wireline core

core-lift

- casing used
- barrel withdrawn

graphic log/core recovery

- core recovered - graphic symbols indicate material
- no core recovered

water

- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- 25 water pressure test result (lugeons) for depth interval shown

weathering

FR	fresh
SW	slightly weathered
MW	moderately weathered
HW	highly weathered
XW	extremely weathered
DW	distinctly weathered (covers MW and HW)

strength

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

defect type

JT	joint
PT	parting
SM	seam
SZ	sheared zone
SS	sheared surface
CS	crushed seam

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

coating

CN	clean
SN	stained
VN	veneer
CO	coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH2A**

Sheet 4 of 4

Project No: **GEOTLCOV23048AB**

Client: **Bovis Lend Lease**

Date started: **1.5.2007**

Principal:

Date completed: **2.5.2007**

Project: **Additional Proposed Commercial Development**

Logged by: **SH**

Borehole Location: **Site 4B, Sydney Olympic Park**

Checked by: **PJW**

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: 100 mm | Drilling fluid: | Northing: 15488.08 | bearing: | datum: AHD

drilling information					material substance					rock mass defects		
method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength VL L M H VH EH	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm 30 100 300 1000 3000	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			5	17		**SHALE:** Dark grey and grey, distinctly laminated @ 0°. *(continued)*	FR		D 0.06 A 0.63 D 0.45 A 0.84	23		-30mm fractured rock. -SM, 0°, PL, SO, CO. 10mm clay. -PT, 5°, PL, SO, CN. -50mm fractured rock. -JT, 60, PL, SO, CN (16.31m - 16.36m) -JT, 30°, PL, SO, CN (16.39m - 16.42m) -40mm fractured rock. -JT,90°, PL, SO, CN (16.69m - 16.72m) -PT,15°, PL, SO, CN. -40mm fractured rock. -JT, 90°, PL, SO, CN (16.79m - 16.83m) -20mm fractured rock. -SM, 0°, PL, SO, CO. 50mm clay, 90pp. -100mm fractured rock. -JT, 35°, PL, SO, CN. -JT, 85°, PL, SO, CN (17.00m - 17.20m) -PT,5°, PL, SO, CN. -SM, 0°, PL, SO, CO. 20 mm clay. -JT, 90°, PL, SO, CN (17.41m - 17.47m) -SM, 0°, PL, SO, CO. 20mm clay. -Highly fractured zone and joints at 90°. 17.70m - End of hole.
			4	18		50mm PVC standpipe installed in hole, slotted section from 2.0m to 17.70m, cemented gatic cover on surface. Sand backfill 2.0m to 17.70m. Bentonite plug 0 to 2.0m. BH2A terminated at 17.7m						
			3	19								
			2	20								
			1	21								
			0	22								
			-1	23								
			-2	24								

method

DT	diatube
AS	auger screwing
AD	auger drilling
RR	roller/tricone
CB	claw or blade bit
NMLC	NMLC core
NQ, HQ, PQ	wireline core

core-lift

- casing used
- barrel withdrawn

graphic log/core recovery

- core recovered - graphic symbols indicate material
- no core recovered

water

- 10/1/98 water level on date shown
- water inflow
- partial drill fluid loss
- complete drill fluid loss
- 25 water pressure test result (lugeons) for depth interval shown

weathering

FR	fresh
SW	slightly weathered
MW	moderately weathered
HW	highly weathered
XW	extremely weathered
DW	distinctly weathered (covers MW and HW)

strength

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

defect type

JT	joint
PT	parting
SM	seam
SZ	sheared zone
SS	sheared surface
CS	crushed seam

planarity

PL	planar
CU	curved
UN	undulating
ST	stepped
IR	irregular

roughness

VR	very rough
RO	rough
SO	smooth
SL	slickensided

coating

CN	clean
SN	stained
VN	veneer
CO	coating

coffey geotechnics

Engineering Log - Borehole

Borehole No.	***BH3A***
Sheet	1 of 4
Project No:	***GEOTLCOV23048AB***
Client:	***Bovis Lend Lease***
Date started:	***30.4.2006***
Principal:	
Date completed:	***1.5.2007***
Project:	***Additional Proposed Commercial Development***
Logged by:	***SH***
Borehole Location:	***Site 4B, Sydney Olympic Park***
Checked by:	***PJW***

drill model and mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: 100 mm | Northing 15520.4 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADV									**FILL: ASPHALT.**	D			PAVEMENT
									FILL: GRAVELLY CLAYEY SAND: Medium to fine grained, dark brown/dark grey, fine to medium gravel.	= Wp	VSt-H		FILL
				SPT 2,4,4 N*=8	21	1		CL-CH	**SILTY CLAY:** Medium plasticity, orange-brown mottle red-grey, with trace of fine shale.			× ×	RESIDUAL
ADT									**SHALE:** Extremely to highly weathered, brown and grey, very low strength.				SHALE V bit refusal at 1.50m.
					20	2							
					19	3							
					18	4							
					17	5			**SHALE:** Highly weathered, brown and grey, low strength.				TC bit refusal at 6.0m.
					16	6			Borehole BH3A continued as cored hole				
					15	7							
					14	8							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support: M mud, C casing, N nil

penetration: 1 2 3 4 — no resistance ranging to refusal

water: 10/1/98 water level on date shown; water inflow; water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No.	***BH3A***
Sheet	2 of 4
Project No:	***GEOTLCOV23048AB***
Client:	***Bovis Lend Lease***
Date started:	***30.4.2006***
Principal:	
Date completed:	***1.5.2007***
Project:	***Additional Proposed Commercial Development***
Logged by:	***SH***
Borehole Location:	***Site 4B, Sydney Olympic Park***
Checked by:	***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: 100 mm | Drilling fluid: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
			21	1								
			20	2								
			19	3								
			18	4								
			17	5								
			16	6		Continued from non-cored borehole						
NMLC						NO CORE: 0.12m core loss.						6.00m - Start core loss.
						SHALE: Grey and dark grey, distinctly laminated at 0°.	HW - MW		D 0.29 A 0.14	27		6.12m - End core loss.
							MW					-PT, 0°, CU, SO, SN.
							SW					-PT, 0°, PL, SO, CO. 5mm fractured rock.
			15	7								-JT, 30°, PL, SO, SN.
												-JT, 30°, PL, SO, CO. 5-10mm fractured rock.
												-PT, 25°, PL, SO, CN.
									D 0.04 A 0.5			-JT, 30°, PL, SO, CN. 5mm fractured rock.
												-PT, 20°, PL, SO, SN.
							SW - FR					-PT, 15°, PL, SO, CN.
			14	8								-PT, 0°, PL, SO, CO. 5mm fractured rock.

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No. **BH3A**
Sheet 3 of 4
Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***
Date started: ***30.4.2006***
Principal:
Date completed: ***1.5.2007***
Project: ***Additional Proposed Commercial Development***
Logged by: ***SH***
Borehole Location: ***Site 4B, Sydney Olympic Park***
Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22
hole diameter: 100 mm | Drilling fluid: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	Is(50) MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC		11/05/07	13	9		**SHALE:** Grey and dark grey, distinctly laminated at 0°. *(continued)*	SW - FR		D 0.26 A 0.85	27		-PT, 0°, IR, SO, CN. -PT, 5°, IR, SO, CN. -SM, 0°, Pl, SO, CO. 10mm fractured rock.
			12	10			FR		D 0.52 A 1.78	67		-JT, 80°, PL, SO, CN (9.22m - 9.42m) -PT, 10°, PL, SO, CN. -JT, 90°, PL, SO, CO. 10mm fractured rock (9.42m - 9.45m) -JT, 65°, PL, SO, CO. 10mm fractured rock (9.48m - 9.52m) -JT, 70°, PL, SO, CN (9.67m - 9.78m)
			11	11					D 0.14 A 1.31			-PT, 5°, PL, SO, CN.
			10	12					D 0.03 A 1.13			-JT, 65°, PL, SO, CN (11.29m - 11.35m) -JT, 60°, PL, SO, CN (11.35m - 11.38m)
			9	13					D 0.41 A 0.62	97		
			8	14					D 0.05 A 1.57			
			7	15					D 1.03 A 1.08	87		
			6	16					D 0.23 A 0.96			

ALL DEFECTS PT, 0°, PL, SO, CN, SN, VN UNLESS OTHERWISE NOTED.

method
DT diatube
AS auger screwing
AD auger drilling
RR roller/tricone
CB claw or blade bit
NMLC NMLC core
NQ, HQ, PQ wireline core

core-lift
casing used
barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material
no core recovered

water
10/1/98 water level on date shown
water inflow
partial drill fluid loss
complete drill fluid loss
25 water pressure test result (lugeons) for depth interval shown

weathering
FR fresh
SW slightly weathered
MW moderately weathered
HW highly weathered
XW extremely weathered
DW distinctly weathered (covers MW and HW)

strength
VL very low
L low
M medium
H high
VH very high
EH extremely high

defect type
JT joint
PT parting
SM seam
SZ sheared zone
SS sheared surface
CS crushed seam

planarity
PL planar
CU curved
UN undulating
ST stepped
IR irregular

roughness
VR very rough
RO rough
SO smooth
SL slickensided

coating
CN clean
SN stained
VN veneer
CO coating

coffey geotechnics

Engineering Log - Cored Borehole

Borehole No.	***BH3A***
Sheet	4 of 4
Project No:	***GEOTLCOV23048AB***
Client:	***Bovis Lend Lease***
Date started:	***30.4.2006***
Principal:	
Date completed:	***1.5.2007***
Project:	***Additional Proposed Commercial Development***
Logged by:	***SH***
Borehole Location:	***Site 4B, Sydney Olympic Park***
Checked by:	***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: 100 mm | Drilling fluid: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance** | **rock mass defects**

method	core-lift	water	RL	depth metres	graphic log core recovery	material: rock type; grain characteristics, colour, structure, minor components	weathering alteration	estimated strength (VL L M H VH EH)	$Is_{(50)}$ MPa D- diametral A- axial	RQD %	defect spacing mm (30 100 300 1000 3000)	defect description: type, inclination, planarity, roughness, coating, thickness — particular / general
NMLC			5	17		**SHALE:** Grey and dark grey, distinctly laminated at 0°. *(continued)*	FR		D 0.62 A 1.02	87		-JT, 60°, PL, SO, CN (15.92m - 16.00m) -JT, 70°, PL, SO, CN (16.09m - 16.10m) -JT, 45°, PL, SO, CN. -50mm fractured rock. -JT, 90°, PL, SO, CN (16.69m - 16.76m) -JT. 45°, PL, SO, CN (16.76m - 16.78m) -JT, 45°, PL, SO, CN (16.78m - 16.81m) -PT, 20°, PL, SO, CN. -JT, 45°, Pl, SO, CN (17.36m - 17.41m) -JT, 50°, PL, SO, CN (17.46m - 17.52m)
			4	18					D 0.1 A 0.49			
			3	19		50mm PVC standpipe installed in hole, slotted section from 12.15m to 18.15m, cemented gatic cover on surface. Sand backfill 1.0m to 618.15m. Bentonite plug 0 to 1.0m. BH3A terminated at 18.15m						-JT, 45°, PL, SO, CN (17.56m - 17.52m) -JT, 60°, PL, SO, CN. -JT, 60°, PL, SO, CN. (18.86m - 18.90m) 18.15m - End of hole
			2	20								
			1	21								
			0	22								
			-1	23								
			-2	24								

method
DT diatube; AS auger screwing; AD auger drilling; RR roller/tricone; CB claw or blade bit; NMLC NMLC core; NQ, HQ, PQ wireline core

core-lift
casing used; barrel withdrawn

graphic log/core recovery
core recovered - graphic symbols indicate material; no core recovered

water
10/1/98 water level on date shown; water inflow; partial drill fluid loss; complete drill fluid loss; water pressure test result (lugeons) for depth interval shown (25)

weathering
FR fresh; SW slightly weathered; MW moderately weathered; HW highly weathered; XW extremely weathered; DW distinctly weathered (covers MW and HW)

strength
VL very low; L low; M medium; H high; VH very high; EH extremely high

defect type
JT joint; PT parting; SM seam; SZ sheared zone; SS sheared surface; CS crushed seam

planarity
PL planar; CU curved; UN undulating; ST stepped; IR irregular

roughness
VR very rough; RO rough; SO smooth; SL slickensided

coating
CN clean; SN stained; VN veneer; CO coating

coffey geotechnics

Engineering Log - Piezometer

Borehole No. **BH2A**

Sheet 1 of 3

Project No: **GEOTLCOV23048AB**

Client: **Bovis Lend Lease**

Date started: **1.5.2007**

Principal:

Date completed: **2.5.2007**

Project: **Additional Proposed Commercial Development**

Logged by: **SH**

Borehole Location: **Site 4B, Sydney Olympic Park**

Checked by: **PJW**

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: | Northing: 15488.08 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV						21	1			**FILL:** Woodchip and topsoil.	<Wp		FILL
										FILL: SILTY CLAY: Low to medium plasticity, dark brown/black with some root fibres.	<Wp		
				SPT 4,4,5 N*=9					CL-CH	**FILL: SILTY CLAY:** Medium plasticity, dark brown/ with trace of fine gravel.	=Wp	VSt-H	RESIDUAL
										SILTY CLAY: Medium to high plasticity, orange brown mottled red-grey, with trace of fine shale gravel.			
ADT						20	2			**SHALE:** Extremely weathered, brown and grey, very low to low strength.			SHALE V bit refusal at 2.0m.
						19	3						
						18	4			**SHALE:** Highly weathered, brown and grey, low strength.			
						17	5						TC bit refusal at 5.0m.
NMLC										**SHALE:** Grey mottled brown, distinctly laminated @ 0°.			
						16	6			**SHALE:** Dark grey and grey, distinctly laminated @ 0°.			
						15	7						
						14	8						

PIEZOMETER GEOTLCOV23048AB.GPJ COFFEY.GDT 5.30.07

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Borehole No. **BH2A**

Sheet 2 of 3

Engineering Log - Piezometer

Project No: **GEOTLCOV23048AB**

Client: **Bovis Lend Lease**

Date started: **1.5.2007**

Principal:

Date completed: **2.5.2007**

Project: **Additional Proposed Commercial Development**

Logged by: **SH**

Borehole Location: **Site 4B, Sydney Olympic Park**

Checked by: **PJW**

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: | Northing: 15488.08 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
NMLC			11/05/07			13 12 11 10 9 8 7 6	9 10 11 12 13 14 15 16			**SHALE:** Dark grey and grey, distinctly laminated @ 0°. *(continued)*			

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Borehole No. **BH2A**

Sheet 3 of 3

Project No: **GEOTLCOV23048AB**

Engineering Log - Piezometer

Client: ***Bovis Lend Lease***

Date started: ***1.5.2007***

Principal:

Date completed: ***2.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5352.66 | slope: -90° | R.L. Surface: 21.86

hole diameter: | Northing: 15488.08 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
NMLC						5	17			**SHALE:** Dark grey and grey, distinctly laminated @ 0°. *(continued)*			
						4	18			50mm PVC standpipe installed in hole, slotted section from 2.0m to 17.70m, cemented gatic cover on surface. Sand backfill 2.0m to 17.70m. Bentonite plug 0 to 2.0m. Borehole terminated at 17.7m			
						3	19						
						2	20						
						1	21						
						0	22						
						-1	23						
						-2	24						

PIEZOMETER GEOTLCOV23048AB.GPJ COFFEY.GDT 5.30.07

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Piezometer

Borehole No. **BH3A**

Sheet 1 of 3

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***30.4.2006***

Principal:

Date completed: ***1.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV						21	1			**FILL: ASPHALT.**	D		PAVEMENT
										FILL: GRAVELLY CLAYEY SAND: Medium to fine grained, dark brown/dark grey, fine to medium gravel.	= Wp	VSt-H	FILL
				SPT 2,4,4 N*=8					CL-CH	**SILTY CLAY:** Medium plasticity, orange-brown mottle red-grey, with trace of fine shale.			RESIDUAL
ADT						20	2			**SHALE:** Extremely to highly weathered, brown and grey, very low strength.			SHALE V bit refusal at 1.50m.
						19	3						
						18	4						
						17	5			**SHALE:** Highly weathered, brown and grey, low strength.			
NMLC						16	6			NO CORE: 0.12m core loss.			TC bit refusal at 6.0m.
						15	7			**SHALE:** Grey and dark grey, distinctly laminated at 0°.			
						14	8						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Borehole No. **BH3A**

Sheet 2 of 3

Engineering Log - Piezometer

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***30.4.2006***

Principal:

Date completed: ***1.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
NMLC			11/05/07			13	9			**SHALE:** Grey and dark grey, distinctly laminated at 0°. *(continued)*			
						12	10						
						11	11						
						10	12						
						9	13						
						8	14						
						7	15						
						6	16						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Piezometer

Borehole No. **BH3A**

Sheet 3 of 3

Project No: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***30.4.2006***

Principal:

Date completed: ***1.5.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SH***

Borehole Location: ***Site 4B, Sydney Olympic Park***

Checked by: ***PJW***

drill model & mounting: Mobil B80 Truck | Easting: 5375.17 | slope: -90° | R.L. Surface: 22

hole diameter: | Northing: 15520.4 | bearing: | datum: AHD

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
NMLC						5 / 4	17 / 18			**SHALE:** Grey and dark grey, distinctly laminated at 0°. *(continued)*			
						3 / 2 / 1 / 0 / -1 / -2	19 / 20 / 21 / 22 / 23 / 24			50mm PVC standpipe installed in hole, slotted section from 12.15m to 18.15m, cemented gatic cover on surface. Sand backfill 1.0m to 618.15m. Bentonite plug 0 to 1.0m. Borehole terminated at 18.15m			

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP01**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed	E					**FILL**: Topsoil: Mulch: Silty Sand: fine to medium grained, dark brown to brown, some rootlets.	M	L		FILL. Wood chip mulch
									FILL: Silty CLAY, medium plasticity, pale red to pale brown, some indurated rock fragments, traces of organic matter and fine to medium grained sand.	M	St		FILL. Compacted clay
				E+Dup4		0.5							
				E					**Silty CLAY**: Medium to high plasticity, pale red to red with some indurated rock fragments.	M			RESIDUAL SOIL
						1.0			Becomes high plasticity, pale grey to grey clay				
									Test pit TP01 terminated at 1.1m				
						1.5							
						2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP02**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed	E				**Asphalt Pavement**	M	H		Pavement
								FILL: Gravelly Clayey SAND: fine to coarse gravel, grey to pale grey, low plasticity clay with some aggregate material.				FILL. Roadbase material mxed with ~4% cement. No odour noted.
					0.5			**Silty Clay**: medium - high plasticity, red to pale red with traces of rootlets and indurated rock fragments.	M	St		RESIDUAL, SOIL
								Becoming high plasticity red to pale grey and mottled.		VSt		
					1.0			**SHALE**: Extremely weathered, pale grey to grey.				BEDROCK
								Test pit TP02 terminated at 1.35m				
					1.5							
					2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP03**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed	E+Dup1					**FILL**: Topsoil: Mulch: Sandy Clayey Silt: dark brown to brown, low plasticity clay, fine to medium grained sand with some rootlets and </= 50% organic matter.	M	VL		FILL
									FILL: Topsoil: Sandy Silty Clay: low plasticity to medium plasticity, pale orange to brown, fine to medium grained sand.	M	F		FILL
				E		0.5			**Silty CLAY**: medium plasticity to high plasticity, dark red to red, traces of indurated rock fragments and rootlets.		St		RESIDUAL SOIL
									Becoming high plasticity, red to pale grey mottled clay.		VSt		
						1.0			**SHALE**: extremely weathered, pale grey to grey.				BEDROCK
						1.5			Test pit TP03 terminated at 1.36m				
						2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation No. **TP04**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed	E+Dup3				**FILL**: Topsoil: Mulch: Sandy Silt: Brown to dark brown, fine to medium grained sand with some rootlets, traces of clay.	M	L		FILL
												FILL
				E				**FILL**: Topsoil: CLAYEY SAND, Silt: Brown to dark brown, fine to medium grained sand, low plasticity clay content, some rootlets, traces of decayed wood.	M	St		FILL
				E	0.5			**FILL**: Silty Clay: Medium plasticity to high plasticity, pale orange to orange with some fine to coarse grained sand, traces of roots. Increase in clay content from 0.4m.				
					1.0			**Silty CLAY**: Medium plasticity to high plasticity, orange to pale red.		St		RESIDUAL SOIL
					1.5			Test pit TP04 terminated at 1m				
					2.0							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP05**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed						**FILL**: Topsoil: Mulch: Sandy Silt: dark brown to brown, fine to medium grained sand with some rootlets.	M	L		FILL.
				E+Dup2					**FILL**: Silty SAND: fine to medium grained, dark brown to brown with some clay content, traces of organic matter and rootlets.				FILL.
				E		0.5			**FILL**: Sandy Silty Clay: medium to low plasticity, pale grey to grey and pale orange to orange, fine to medium grained sand with some basalt ballast gravel (30mm), moderately cemented.				FILL. ROADBASE
				E		1.0							
						1.5			**Silty CLAY**: high plasticity, pale grey to grey mottled with some indurated rock fragments	M	VSt		
						2.0			Test pit TP05 terminated at 1.5m				

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP07**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed						**Asphalt Pavement**				Pavement.
				E					**FILL**: gravelly sand: fine to coarse gravel, pale grey to grey, aggregate material mixed with cement, well compacted.	D			FILL: Roadbase, aggregate - crushed bricks and concrete mixed with ~4% cement - well compacted. Slight hydrocarbon odour.
				E					**FILL**: Sandy Silty Clay: medium plasticity, pale orange to pale grey, fine to coarse grained sand with traces of gravel.	M			FILL. Odours.
				E		0.5			**Silty CLAY**: medium to high plasticity, dark red to red with traces of charcoal, indurated rock fragments.				RESIDUAL SOIL
									Test pit TP07 terminated at 0.6m				
						1.0							
						1.5							
						2.0							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP09**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed						**Asphalt Pavement**	D	H		Pavement.
									FILL: gravelly sand:fine to coarse grained, pale grey to grey, aggregate material mixed with cement, well compacted.	M	St		FILL: Roadbase.
				E					**Silty CLAY**: medium to high plasticity, pale red to red with some grey mottling.				RESIDUAL SOIL
						0.5			Becomes high plasticity clay from 0.35m				
						1.0			**SHALE**: Extremely weathered, pale grey to grey.				BEDROCK
									Test pit TP09 terminated at 1m				
						1.5							
						2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Excavation

Excavation No. **TP10**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed						**Asphalt Pavement**	D	H		Pavement
									FILL: gravelly sand: fine to coarse grained, pale grey to grey.				FILL: Roadbase.
				E					**Silty CLAY**: high plasticity, dark orange to red to pale grey, mottled, traces of rotten wood and indurated rock fragments, moderately cemented.	M	St		RESIDUAL SOIL
						0.5			**SHALE**: Extremely weathered, pale grey to grey.				BEDROCK
									Test pit TP10 terminated at 0.7m				
						1.0							
						1.5							
						2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **TP11**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed			0.0			**Asphalt Pavement**	D	H		Pavement
									FILL: gravelly sand: fine to coarse grained, pale grey to grey, with some silt, becoming pale brown to brown at 1.5m.	M	St		FILL. Roadbase, mixed with ~4% cement, compacted.
				E					**Silty CLAY**: medium to high plasticity, pale orange to pale red, some indurated rock fragments, moderately cemented. Becomes high plasticity, pale red to pale grey mottled at 0.4m				RESIDUAL SOIL
						0.5							
						1.0							
						1.5			**SHALE**: Extremely weathered, pale grey to grey.				BEDROCK
									Test pit TP11 terminated at 1.5m				
						2.0							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TESTPIT GEOTLCOV23048AB.GPJ COFFEY.GDT 7.4.07

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Engineering Log - Excavation

Excavation No. **TP12**

Sheet 1 of 1

Office Job No.: **GEOTLCOV23048AB**

Client: ***Bovis Lend Lease***

Date started: ***24.4.2007***

Principal:

Date completed: ***24.4.2007***

Project: ***Additional Proposed Commercial Development***

Logged by: ***SL***

Test pit location: ***Site 4B, corner of Herb Elliot Ave and Olympic Blvd***

Checked by: ***SD***

equipment type and model: | Pit Orientation: | Easting: m | R.L. Surface:

excavation dimensions: 2.1m long 0.7m wide | Northing: m | datum: AHD

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH			Not Observed						**Asphalt Pavement**	D			Pavement
				E					**FILL**: gravelly SAND: fine to coarse grained, pale grey to grey with some crushed concrete.	M			FILL. Roadbase
									Silty CLAY: medium plasticity, pale red to red, pale grey to grey mottled with traces of charcoal and indurated rock fragments.				RESIDUAL SOIL
						0.5			Test pit TP12 terminated at 0.5m				
						1.0							
						1.5							
						2.0							

Sketch

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
S shoring N nil

penetration
1 2 3 4 no resistance ranging to refusal

water
water level on date shown
water inflow
water outflow

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
V vane shear (kPa)
Bs bulk sample
E environmental sample
R refusal

classification symbols and soil description
based on unified classification system

moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix B

Borehole Logs (August 2006)

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Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit W_L less than 35%. • Modium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, I_S50 (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (Is50). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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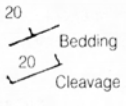
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

DEFECT SHAPE TERMS	
Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS	
Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS	
Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS	
Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

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Borehole No. **BH01**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Engineering Log - Borehole

Client: ***Bovis Lend Lease***

Date started: ***10.8.2006***

Principal:

Date completed: ***10.8.2006***

Project: ***Proposed Commercial Development***

Logged by: ***JRD***

Borehole Location: ***Cnr Herb Elliott Dr & Olympic Blvd***

Checked by: ***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADV			None Observed	E					**FILL:** ASPHALT	D	VD		FILL
									FILL: GRAVELLY CLAY: Low to medium plasticity, pale brown, gravel is fine to medium with some fine to medium sand				
						0.5							
				E					**SILTY CLAY:** Medium to high plasticity, grey, trace fine sand		VSt	×	RESIDUAL SPT near refusal at 0.6m. Only 0.1m sample recovered.
				SPT >25 N*=R		1.0							After 25 blows hammer passed 110mm
						1.5			**SILTY CLAY**: Medium to high plasticity, brown to orange		St	×	After 25 blows hammer passed 130mm. Crumbled under pp at 160kPa
				SPT >25 N*=R					**SILTY CLAY**: Medium to high plasiticy, grey				
						2.0							After 30 blows hammer refused within first 150mm
				SPT >25 N*=R					**SILTY CLAY**: Medium to high plasticity, brown to orange				
									SILTY CLAY: High plasticity, grey, trace fine to medium sand				
									Borehole BH01 terminated at 2.2m				
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole No. **BH02**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: ***Bovis Lend Lease***

Date started: ***10.8.2006***

Principal:

Date completed: ***10.8.2006***

Project: ***Proposed Commercial Development***

Logged by: ***JRD***

Borehole Location: ***Cnr Herb Elliott Dr & Olympic Blvd***

Checked by: ***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E					**FILL:** ASPHALT	D			FILL
									FILL: GRAVELLY CLAYEY SAND: Medium plasticity, pale brown to pale grey, gravel is fine to medium, some sand fine to medium, possibly bonded with cement				Ground cement odour
									SILTY CLAY: Medium plasticity, pale brown to pale grey, with some fine to medium sand and fine to medium ironstone gravel. Becoming brown to orange toward bottom of layer.				RESIDUAL
				SPT >25 N=R		0.5							After 25 blows SPT passed 120mm. No sample recovered.
				E		1.0			Borehole BH02 terminated at 1m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH03**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **10.8.2006**

Principal:

Date completed: **10.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E		0.5			**FILL:** ASPHALT **FILL:** CLAY: Medium to high plasticity, mottled red, brown and grey with some fine sand	D			FILL
				SPT 11,16,16 N*=32		1.0			**SILTY CLAY**: Medium plasticity, pale grey to grey, with some brown medium to coarse ironstone gravel layers up to 0.1m thick, moderately cemented.				RESIDUAL
				SPT 20,25,<25 N=R							VSt	×	After >25 blows hammer passed 100mm in 3rd 150mm section
						1.5			Borehole BH03 terminated at 1.4m				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole No. **BH04**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **10.8.2006**

Principal:

Date completed: **10.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E					**FILL:** ASPHALT	D			FILL
									FILL: GRAVELLY SAND: Fine to medium grained sand and gravels	M			Roadbase, loose
						0.5			**FILL:**SILTY CLAY: Medium plasticity, mottled brown, dark brown and red, with some fine to medium sand				
				SPT 3,5,7 N*=12					**SILTY CLAY:** Medium to high plasticity, mottled brown, red and pale grey		VSt	×	RESIDUAL
						1.0					St	×	
				SPT 4,4,6 N*=10					Becoming pale grey to red				
						1.5			**SILTY CLAY**: Medium to high plasticity, pale grey, grey and brown with some brown layers of medium to coarse ironstone gravel		H	600 ×	Possible Extremely Weathered Shale
				E		2.0							
									Borehole BH04 terminated at 2m				
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH05**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **11.8.2006**

Principal:

Date completed: **11.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADV			None Observed	E		0.5			**FILL:** ASPHALT **FILL**: GRAVELLY SAND: Fine to medium, brown to dark brown, gravel is fine to medium	D M			FILL Roadbase
				E					**SILTY CLAY:** Medium to high plasticity, dark brown and brown with red mottle. Trace medium to coarse ironstone gravels				RESIDUAL
				SPT 3,5,8 N*=13		1.0			Predominately pale grey with some organic material			×	
				SPT 7,>25 N=R		1.5						×	
						2.0			**SHALE**: Extremely weathered, pale grey with some rootlet pockets				SHALE
									Borehole BH05 terminated at 2m				
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH06**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **11.8.2006**

Principal:

Date completed: **11.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
			None Observed						**FILL:** ASPHALT	D			FILL
									FILL: GRAVELLY SAND: Fine to medium, brown to dark brown, gravel is fine to medium				
				E					**SILTY CLAY:** High plasticity, pale brown with red mottle, trace fine sand and fine to medium ironstone gravel	M			RESIDUAL
						0.5							
						1.0			**SILTY CLAY**: Medium to high plasticity, pale gray with some ironstone bonded layers at 1.1m.				
				SPT >25 N=R					Becoming pale brown to red in cutttings 1.1 to 1.5m				After 25 blows hammer passed 120mm 2 pieces black gravel, possible slag in infill in tip of SPT sampler. Slag not observed in SPT from shallow sample
				E		1.5							
									Borehole BH06 terminated at 1.5m				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH07**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **11.8.2006**

Principal:

Date completed: **11.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADV			None Observed	E					**FILL:** ASPHALT	D			FILL
				E					**FILL**: GRAVELLY SAND: fine to medium, brown, gravel is fine to medium	M			RESIDUAL
						0.5			**SILTY CLAY:** Medium to high plasticity, brown with red and grey mottle				
				SPT >25 N=R		1.0			**SILTY CLAY**: Medium to high plasticity, pale grey to grey				After 25 blows hammer passed 100mm
									Borehole BH07 terminated at 1.3m				
						1.5							
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH08**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **11.8.2006**

Principal:

Date completed: **11.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
ADT			None Observed			0.0			**FILL:** ASPHALT	D			FILL
									FILL: GRAVELLY SAND: Fine to medium, brown to dark brown, gravel fine to medium				
				E					**SILTY CLAY:** High plasticity, brown to dark brown with indistinct red mottle. Trace fine to medium sand	M	VSt	600	RESIDUAL
						0.5							
									SILTY CLAY: Medium to high plasticity, pale grey to grey with bands brown ironstone up to 0.05m thick				
				E		1.0							SPT blows not recorded. Near refusal after 300mm.
						1.5			Borehole BH08 terminated at 1.5m				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No. **BH09**

Sheet 1 of 1

Project No: **GEOTLCOV23048AA**

Client: **Bovis Lend Lease**

Date started: **11.8.2006**

Principal:

Date completed: **11.8.2006**

Project: **Proposed Commercial Development**

Logged by: **JRD**

Borehole Location: **Cnr Herb Elliott Dr & Olympic Blvd**

Checked by: **JML**

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa (100 200 300 400)	structure and additional observations
ADT			None Observed			0.0			**FILL**: Woodchip and topsoil	M			FILL
				E					**FILL**: SILTY CLAY: Medium plasticity, brown to dark brown with trace fine to medium sand and fine to medium gravel				
				E					**FILL**: GRAVELLY SAND: Fine to coarse, dark grey to black to green, gravel is fine to coarse				Greenish colour observed on soil
				E		0.5			**FILL**: SILTY CLAY: Medium plasticity, brown to dark brown to grey with some fine to medium ironstone gravel. Trace black fragments and possible brick fragments				
				SPT 2,4,8 N=12		1.0			**SILTY CLAY**: Medium to high plasticity, brown and grey with red mottle, some fine to medium ironstone gravel			x	RESIDUAL
				SPT 5,8,10 N*=18		1.5			Becoming brown / pale grey / red				
						2.0			**SHALE**: Extremely weathered shale, high plasticity, pale grey with some pale brown ironstone				SHALE
						2.5			Borehole BH09 terminated at 2.2m				
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil

C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No.	***BH10***
Sheet	1 of 1
Project No:	***GEOTLCOV23048AA***
Client:	***Bovis Lend Lease***
Date started:	***11.8.2006***
Principal:	
Date completed:	***11.8.2006***
Project:	***Proposed Commercial Development***
Logged by:	***JRD***
Borehole Location:	***Cnr Herb Elliott Dr & Olympic Blvd***
Checked by:	***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADT			None Observed			0.0			**FILL**: Woodchip and topsoil **FILL**: SILT: Brown to dark brown	D			FILL
				E		0.5			**SILTY CLAY:** Medium to high plasticity, dark brown and brown with red mottle				RESIDUAL
						1.0							
						1.5			**SILTY CLAY**: Medium to high plasticity, mottled red, brown and pale grey				
				E					**SHALE**: Extremely weathered shale, medium to high plasticity, pale grey with some brown ironstone gravel bands				SHALE 1.5m - SPT blows not recorded near refusal after 150mm
						2.0			Borehole BH10 terminated at 1.8m				
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*bit shown by suffix	
e.g.	ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole No.	***BH11***
Sheet	1 of 1
Project No:	***GEOTLCOV23048AA***
Client:	***Bovis Lend Lease***
Date started:	***11.8.2006***
Principal:	
Date completed:	***11.8.2006***
Project:	***Proposed Commercial Development***
Logged by:	***JRD***
Borehole Location:	***Cnr Herb Elliott Dr & Olympic Blvd***
Checked by:	***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E					**FILL**: Woodchip and topsoil	M			FILL
									FILL: SILTY CLAY: Medium plasticity, pale brown, trace black medium gravel				
				E + DUP2		0.5			**FILL**: SILTY CLAY: Medium to high plasticity, dark brown and brown with red mottle. Trace black fine to medium gravel in top 0.1m				Possible residual
						1.0			**SILTY CLAY**: Medium to high plasticity, pale grey and brown with red mottle				RESIDUAL
				SPT 1,3,5 N*=8		1.5			**SILTY CLAY**: Medium to high plasticity, pale grey with brown ironstone bands				
						2.0			Borehole BH11 terminated at 1.6m				
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No.	***BH12***
Sheet	1 of 1
Project No:	***GEOTLCOV23048AA***
Client: ***Bovis Lend Lease***	Date started: ***11.8.2006***
Principal:	Date completed: ***11.8.2006***
Project: ***Proposed Commercial Development***	Logged by: ***JRD***
Borehole Location: ***Cnr Herb Elliott Dr & Olympic Blvd***	Checked by: ***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E					**FILL**: Woodchip and topsoil **FILL**: SILT: Dark brown with some fine sand	D			FILL
				E		0.5			**FILL**: SILTY CLAY: Medium plasticity, brown to dark brown and orange mottle				
				SPT 8,10,18 N=28		1.0			**SILTY CLAY**: Medium to high plasticity, pale grey, pale brown and red mottle, some fine to medium ironstone gravel bands				RESIDUAL
						1.5			**SHALE**: Extremely weathered shale, high plasticity, brown and pale grey with some brown ironstone gravels				SHALE
									Borehole BH12 terminated at 1.6m				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*bit shown by suffix	
e.g.	ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Borehole

Borehole No.	***BH13***
Sheet	1 of 1
Project No:	***GEOTLCOV23048AA***
Client: ***Bovis Lend Lease***	Date started: ***11.8.2006***
Principal:	Date completed: ***11.8.2006***
Project: ***Proposed Commercial Development***	Logged by: ***JRD***
Borehole Location: ***Cnr Herb Elliott Dr & Olympic Blvd***	Checked by: ***JML***

drill model and mounting: Edson 300 | Easting: | slope: -90° | R.L. Surface:

hole diameter: 100 mm | Northing | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
ADT			None Observed	E					**FILL**: Woodchip and topsoil				FILL
				E + DUP3		0.5			**FILL**: SILTY CLAY: Medium to high plasticity, dark brown and some organic material, and some fine to medium sand and fine to medium gravel				RESIDUAL
				E		1.0			**SILTY CLAY**: Medium to high plasticity, mottled brown, red and orange, some fine to medium ironstone gravels Becoming pale grey, brown and red mottled with decreasing ironstone gravel Increasing ironstone gravel bands up to 0.05m				SPT near refusal at 1.4m
						1.5			Borehole BH13 terminated at 1.4m				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown
water inflow
water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
V	vane shear (kPa)
P	pressuremeter
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

BOREHOLE 23048AA.GPJ COFFEY.GDT 23.1.07

Form GEO 5.3 Issue 3 Rev.2

Appendix C

PID Results (August 2006)

Coffey Geosciences Pty Ltd
ACN 003 335 516

form E5.1 - photoionisation detector results

job no:
GEOTLCOV23048AA

sheet 1 of 3

Coffey

client:	Bovis Lend Lease	office:	Lane Cove
principal:		date:	10/8/06
project:	Proposed Commercial Development	by:	JRD
location:	Cnr Herb Elliot Ave & Olympic Blvd	checked by:	JML
PID serial number:	*MINIRAE 2000 (SN: 110-002708)*	lamp voltage:	*10.6eV*

PID Calibration Record

Date / Time of Calibration: 11 am 10/8/06

Calibration gas: 100 ppm ISOBUTYLENE

☑ Zero Calibration (0.0ppm) Actual Reading 0.0 ppm

☑ Span Calibration (100pm) Actual Reading 100 ppm

Calibrated by: James Dutton

SAMPLE ID	DEPTH	DURATION (mins)	BACKGROUND READING (ppm)	MAXIMUM READING (ppm)	LAST READING (ppm)	NOTES
BH1	0.03-0.10	1	0.0	0.5	0.1	
BH1	0.5-0.6	1	0.0	INSUFFICIENT SAMPLE		
BH1	1.1-1.2	1	0.0	INSUFFICIENT SAMPLE		
BH1	1.5-1.6	1	0.0	INSUFFICIENT SAMPLE		
BH1	2.0-2.2	0	0.0	1.1	0.8	
BH2	0.1-0.2	1	0.0	INSUFFICIENT SAMPLE		
BH2	0.9-1.0	1	0.0	INSUFFICIENT SAMPLE		
BH3	0.05-0.10	1	0.0	0.7	0.3	
BH3	0.5-0.6	1	0.0	0.4	0.1	
BH3	1.0-1.2	1	0.0	0.2	0.1	
BH4	0.05-0.10	1	0.0	0.5	0.0	
BH4	0.5-0.7	1	0.0	0.5	0.1	
BH4	1.1-1.3	1	0.0	0.8	0.5	
BH4	1.6-1.7	1	0.0	1.2	0.9	
BH5	0.05-0.10	1	0.0	0.0	0.0	
BH5	0.5-0.7	1	0.0	0.1	0.0	
BH5	1.0-1.2	1	0.0	0.0	0.0	
BH5	1.6-1.8	1	0.0	0.0	0.0	

Fill in the test type as follows:-

BH ( ) = soil gas probe sample; (soil type - unified classification system in parentheses)

HS ( ) = headspace sample (with soil type-unified classification system in parentheses)

Coffey Geosciences Pty Ltd
ACN 003 335 516

form E5.1 - photoionisation detector results

job no:
GEOTLCOV23048AA

sheet 2 of 3

Coffey

client:	Bovis Lend Lease	office:	Lane Cove
principal:		date:	11/8/06
project:	Proposed Commercial Development	by:	JRD
location:	Cnr Herb Elliot Ave & Olympic Blvd	checked by:	JML
PID serial number:	*MINIRAE 2000 (SN: 110-002708)*	lamp voltage:	*10.6eV*

PID Calibration Record

Date / Time of Calibration: 8 am 11/8/06

Calibration gas: 100 ppm ISOBUTYLENE

☑ Zero Calibration (0.0ppm) Actual Reading 0.0 ppm

☑ Span Calibration (100pm) Actual Reading 100 ppm

Calibrated by: James Dutton

SAMPLE ID	DEPTH	DURATION (mins)	BACKGROUND READING (ppm)	MAXIMUM READING (ppm)	LAST READING (ppm)	NOTES
BH6	0.25-0.4	1	0.0	0.1	0.0	
BH6	1.0-1.1	1	0.0	INSUFFICIENT SAMPLE		
BH6	1.3-1.5	1	0.0	0.5	0.1	
BH7	0.05-0.10	1	0.0	0.2	0.1	
BH7	0.2-0.4	1	0.0	0.1	0.0	
BH7	1.0-1.1	1	0.0	0.0	0.0	
BH8	0.2-0.4	1	0.0	0.0	0.0	
BH8	1.0-1.3	1	0.0	0.0	0.0	
BH9	0.2-0.3	1	0.0	0.2	0.0	
BH9	0.35-0.45	1	0.0	0.3	0.0	
BH9	0.5-0.7	1	0.0	0.2	0.0	
BH9	1.0-1.3	1	0.0	0.1	0.1	
BH9	1.7-1.95	1	0.0	0.5	0.0	
BH10	0.5-0.95	1	0.0	0.3	0.1	
BH10	1.5-1.65	1	0.0	0.0	0.0	
BH11	0-0.05	1	0.0	0.0	0.0	
BH11	0.2-0.6	1	0.0	0.4	0.1	
BH11	1.1-1.3	1	0.0	0.6	0.2	

Fill in the test type as follows:- BH ( ) = soil gas probe sample; (soil type - unified classification system in parentheses)
HS ( ) = headspace sample (with soil type-unified classification system in parentheses)

Coffey Geosciences Pty Ltd
ACN 003 335 516

form E5.1 - photoionisation detector results

job no: GEOTLCOV23048AA

sheet 3 of 3

Coffey

client:	Bovis Lend Lease	office:	Lane Cove
principal:		date:	11/8/06
project:	Proposed Commercial Development	by:	JRD
location:	Cnr Herb Elliot Ave & Olympic Blvd	checked by:	JML
PID serial number:	*MINIRAE 2000 (SN: 110-002708)*	lamp voltage:	*10.6eV*

PID Calibration Record

Date / Time of Calibration: 8 am 11/8/06

Calibration gas: 100 ppm ISOBUTYLENE

☑ Zero Calibration (0.0ppm) Actual Reading 0.0 ppm

☑ Span Calibration (100pm) Actual Reading 100 ppm

Calibrated by: James Dutton

SAMPLE ID	DEPTH	DURATION (mins)	BACKGROUND READING (ppm)	MAXIMUM READING (ppm)	LAST READING (ppm)	NOTES
BH12	0.05-0.10	1	0.0	0.2	0.0	
BH12	0.3-0.6	1	0.0	0.1	0.0	
BH12	1.1-1.3	1	0.0	0.0	0.0	
BH13	0.1-0.2	1	0.0	0.2	0.0	
BH13	0.3-0.7	1	0.0	0.0	0.0	
BH13	1.0-1.4	1	0.0	0.6	0.2	

Fill in the test type as follows:-

BH ( ) = soil gas probe sample; (soil type - unified classification system in parentheses)

HS ( ) = headspace sample (with soil type-unified classification system in parentheses)

Appendix D

Laboratory Reports and Chain of Custody Documentation

coffey

Chain of Custody

No: 0884

Laboratory Quotation / Order No: GEOTLCOV

Job No: 23048AB Sheet 2 of 2

Dispatch to: (Address & Phone No.) SGS	Sampled by: Sam Levi	Consigning Officer: LCOV. Syd.
		Date Dispatched: 27.4.07
Attention: Cheryl Chen	Project Manager: (report results to) Susan Dillon	Courier Service: DIRECT 27
		Consignment Note No: 6780

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Sam Levi DIRECT 27 6780	26/4/07	0970	DIRECT 27	26/4/07	0920
			Noreen.	27/4/07	1.30pm.

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	PAHs	~~TPHs~~	~~MAHs BTEX~~	Metals: *	Asbestos	Sample Condition on Receipt
18	SOIL	glass jars + ice	TP11 0.2-0.3	23/4/07	X			X	X	
~~19~~ 19			TP12 0.1-0.2	"	X			X	X	
20			DUP 1	24/4/07						
* send to ALS *		(1)	DUP2		X			X		
21			DUP3							
22			DUP 4		X			X		

Analyses Required

Environmental Division
Sydney
Work Order
ES0705438

Telephone : 61-2-8784 8555

Special Laboratory Instructions: * As page 1

Detection Limits:

Turnaround Required: 5 days

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

64220/9-06

Copies: **WHITE:** Sign on release. **YELLOW:** If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey. **BLUE:** To be returned with results.

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**COFFEY GEOTECHNICS**	**Laboratory**	: Environmental Division Sydney	**Page**	:	**1 of 7**
Contact	:	MS SUSAN DILLON	**Contact**	: Victor Kedicioglu			
Address	:	P O BOX 125 NORTH RYDE NSW AUSTRALIA 1670	**Address**	: 277-289 Woodpark Road Smithfield NSW Australia 2164	**Work order**	:	**ES0705438**
					Amendment No.	:	
Project	:	GEOTLCOV23048AB	**Quote number**	: EN/007/07	**Date received**	:	**27 Apr 2007**
Order number	:	- Not provided -			**Date issued**	:	**4 May 2007**
C-O-C number	:	0884					
Site	:	- Not provided -					
E-mail	:	susan_dillon@coffey.com.au	**E-mail**	: Victor.Kedicioglu@alsenviro.com	**No. of samples**		
Telephone	:	99111000	**Telephone**	: 61-2-8784 8555	**Received**	:	1
Facsimile	:	99111001	**Facsimile**	: 61-2-8784 8500	**Analysed**	:	1

This final report for the ALSE work order reference ES0705438 supersedes any previous reports with this reference.

Results apply to the sample as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Laboratory Duplicates (DUP); Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Samples (LCS); Recovery and Acceptance Limits
- Matrix Spikes (MS); Recovery and Acceptance Limits

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

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

Accredited for compliance with ISO/IED 17025

This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Department
Celine Conceicao	Inorganics - NATA 825 (10911 - Sydney)
Pabi Subba	Organics - NATA 825 (10911 - Sydney)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

The quality control term **Laboratory Duplicate** refers to an intralaboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity.
- Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. *Abbreviations:* ***LOR*** = *Limit of Reporting,* ***RPD*** = *Relative Percent Difference.*
* Indicates failed QC. The permitted ranges for the RPD of Laboratory Duplicates (relative percent deviation) are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting:- Result < 10 times LOR, no limit - Result between 10 and 20 times LOR, 0% - 50% - Result > 20 times LOR, 0% - 20%

Matrix Type: SOIL ***Laboratory Duplicates (DUP) Report***

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA055: Moisture Content						
EA055: Moisture Content - (QC Lot: 398949)				**%**	**%**	**%**
ES0705392-001	Anonymous	Moisture Content (dried @ 103°C)	1.0 %	12.5	14.0	11.5
ES0705430-004	Anonymous	Moisture Content (dried @ 103°C)	1.0 %	16.0	16.4	2.7
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 400818)				**mg/kg**	**mg/kg**	**%**
EB0704517-001	Anonymous	Arsenic	5 mg/kg	<5	<5	0.0
		Cadmium	1 mg/kg	<1	<1	0.0
		Chromium	2 mg/kg	3	3	0.0
		Copper	5 mg/kg	<5	<5	0.0
		Lead	5 mg/kg	<5	<5	0.0
		Nickel	2 mg/kg	<2	<2	0.0
		Zinc	5 mg/kg	<5	<5	0.0
ES0705438-001	DUP2	Arsenic	5 mg/kg	<5	<5	0.0
		Cadmium	1 mg/kg	<1	<1	0.0
		Chromium	2 mg/kg	3	4	32.2
		Copper	5 mg/kg	<5	<5	0.0
		Lead	5 mg/kg	<5	<5	0.0
		Nickel	2 mg/kg	<2	2	0.0
		Zinc	5 mg/kg	5	15	93.9
EG035T: Total Mercury by FIMS						
EG035T: Total Mercury by FIMS - (QC Lot: 400819)				**mg/kg**	**mg/kg**	**%**
EB0704517-001	Anonymous	Mercury	0.1 mg/kg	0.1	<0.1	0.0
ES0705438-001	DUP2	Mercury	0.1 mg/kg	<0.1	<0.1	0.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303)				**mg/kg**	**mg/kg**	**%**
ES0705364-021	Anonymous	Naphthalene	0.5 mg/kg	<0.5	<0.5	0.0

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - continued						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303) - continued				mg/kg	mg/kg	%
ES0705364-021	Anonymous	Acenaphthylene	0.5 mg/kg	<0.5	<0.5	0.0
		Acenaphthene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluorene	0.5 mg/kg	<0.5	<0.5	0.0
		Phenanthrene	0.5 mg/kg	<0.5	<0.5	0.0
		Anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Chrysene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(b)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(k)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Indeno(1,2,3,cd)pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Dibenz(a,h)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(g,h,i)perylene	0.5 mg/kg	<0.5	<0.5	0.0
ES0705364-031	Anonymous	Naphthalene	0.5 mg/kg	<0.5	<0.5	0.0
		Acenaphthylene	0.5 mg/kg	<0.5	<0.5	0.0
		Acenaphthene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluorene	0.5 mg/kg	<0.5	<0.5	0.0
		Phenanthrene	0.5 mg/kg	<0.5	<0.5	0.0
		Anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Benz(a)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Chrysene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(b)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(k)fluoranthene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(a)pyrene	0.5 mg/kg	<0.5	<0.5	0.0
		Indeno(1,2,3,cd)pyrene	0.5 mg/kg	<0.5	<0.5	0.0

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - continued						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303) - continued				**mg/kg**	**mg/kg**	**%**
ES0705364-031	Anonymous	Dibenz(a,h)anthracene	0.5 mg/kg	<0.5	<0.5	0.0
		Benzo(g,h,i)perylene	0.5 mg/kg	<0.5	<0.5	0.0

Quality Control Report - Method Blank (MB) and Laboratory Control Samples (LCS)

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC type is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a known, interference free matrix spiked with target analytes or certified reference material. The purpose of this QC type is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of actual laboratory data. Flagged outliers on control limits for inorganics tests may be within the NEPM specified data quality objective of recoveries in the range of 70 to 130%. Where this occurs, no corrective action is taken. Abbreviations: LOR = Limit of reporting.

Matrix Type: SOIL

Method Blank (MB) and Laboratory Control Samples (LCS) Report

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 400818)		mg/kg	mg/kg	%	%	%
Arsenic	5 mg/kg	<5	----	----	----	----
	5 mg/kg	----	13.1	96.8	86.6	123
Cadmium	1 mg/kg	<1	----	----	----	----
	1 mg/kg	----	2.76	89.7	79.9	120
Chromium	2 mg/kg	<2	----	----	----	----
	2 mg/kg	----	60.9	95.5	87.1	119
Copper	5 mg/kg	----	54.7	93.8	85.2	117
	5 mg/kg	<5	----	----	----	----
Lead	5 mg/kg	<5	----	----	----	----
	5 mg/kg	----	55.2	90.2	82.1	117
Nickel	2 mg/kg	----	54.8	102	88	122
	2 mg/kg	<2	----	----	----	----
Zinc	5 mg/kg	----	104	91.5	79	116
	5 mg/kg	<5	----	----	----	----
EG035T: Total Mercury by FIMS						
EG035T: Total Mercury by FIMS - (QC Lot: 400819)		mg/kg	mg/kg	%	%	%
Mercury	0.1 mg/kg	<0.1	----	----	----	----
	0.1 mg/kg	----	1.4	89.3	73.7	108
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303)		mg/kg	mg/kg	%	%	%
Acenaphthene	0.5 mg/kg	----	4	86.0	81.5	112
	0.5 mg/kg	<0.5	----	----	----	----
Acenaphthylene	0.5 mg/kg	----	4	105	79.6	113
	0.5 mg/kg	<0.5	----	----	----	----

ALS Environmental

Matrix Type: SOIL

Method Blank (MB) and Laboratory Control Samples (LCS) Report

		Method blank result	Actual Results		Recovery Limits	
			Spike concentration	Spike Recovery	Dynamic Recovery Limits	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - continued						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303) - continued		mg/kg	mg/kg	%	%	%
Anthracene	0.5 mg/kg	----	4	109	81.1	112
	0.5 mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	0.5 mg/kg	<0.5	----	----	----	----
	0.5 mg/kg	----	4	85.6	77.2	112
Benzo(a)pyrene	0.5 mg/kg	----	4	96.4	76.4	113
	0.5 mg/kg	<0.5	----	----	----	----
Benzo(b)fluoranthene	0.5 mg/kg	----	4	102	71.8	118
	0.5 mg/kg	<0.5	----	----	----	----
Benzo(g,h,i)perylene	0.5 mg/kg	----	4	108	72.4	114
	0.5 mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	0.5 mg/kg	----	4	102	74.2	117
	0.5 mg/kg	<0.5	----	----	----	----
Chrysene	0.5 mg/kg	----	4	97.6	79.8	114
	0.5 mg/kg	<0.5	----	----	----	----
Dibenz(a,h)anthracene	0.5 mg/kg	----	4	108	71.7	113
	0.5 mg/kg	<0.5	----	----	----	----
Fluoranthene	0.5 mg/kg	<0.5	----	----	----	----
	0.5 mg/kg	----	4	93.8	78.8	113
Fluorene	0.5 mg/kg	----	4	93.6	79.9	112
	0.5 mg/kg	<0.5	----	----	----	----
Indeno(1,2,3,cd)pyrene	0.5 mg/kg	----	4	106	71	113
	0.5 mg/kg	<0.5	----	----	----	----
Naphthalene	0.5 mg/kg	----	4	108	81.9	113
	0.5 mg/kg	<0.5	----	----	----	----
Phenanthrene	0.5 mg/kg	----	4	101	79.4	114
	0.5 mg/kg	<0.5	----	----	----	----
Pyrene	0.5 mg/kg	<0.5	----	----	----	----
	0.5 mg/kg	----	4	95.0	78.9	113

ALS Environmental

Quality Control Report - Matrix Spikes (MS)

The quality control term **Matrix Spike (MS)** refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC type is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQO's). 'Ideal' recovery ranges stated may be waived in the event of sample matrix interferences. - Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. *Abbreviations:* ***LOR*** *= Limit of Reporting,* ***RPD*** *= Relative Percent Difference.*

* Indicates failed QC

Matrix Type: SOIL

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
EG005T: Total Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 400818)				mg/kg	mg/kg	%	%	%
Arsenic	EB0704517-001	Anonymous	5 mg/kg	50	<5	110	70	130
Cadmium			1 mg/kg	50	<1	121	70	130
Chromium			2 mg/kg	50	3	123	70	130
Copper			5 mg/kg	250	<5	119	70	130
Lead			5 mg/kg	250	<5	119	70	130
Nickel			2 mg/kg	50	<2	114	70	130
Zinc			5 mg/kg	250	<5	118	70	130
EG035T: Total Mercury by FIMS								
EG035T: Total Mercury by FIMS - (QC Lot: 400819)				mg/kg	mg/kg	%	%	%
Mercury	EB0704517-001	Anonymous	0.1 mg/kg	5	0.1	125	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - (QC Lot: 399303)				mg/kg	mg/kg	%	%	%
Acenaphthene	ES0705364-021	Anonymous	0.5 mg/kg	10	<0.5	107	70	130
Pyrene			0.5 mg/kg	10	<0.5	112	70	130

ALS Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Client	:	**COFFEY GEOTECHNICS**	**Laboratory**	:	Environmental Division Sydney	**Page**	: **1 of 5**
Contact	:	MS SUSAN DILLON	**Contact**	:	Victor Kedicioglu		
Address	:	P O BOX 125 NORTH RYDE NSW AUSTRALIA 1670	**Address**	:	277-289 Woodpark Road Smithfield NSW Australia 2164	**Work order**	: **ES0705438**
						Amendment No.	:
Project	:	GEOTLCOV23048AB	**Quote number**	:	EN/007/07	**Date received**	: 27 Apr 2007
Order number	:	- Not provided -				**Date issued**	: 4 May 2007
C-O-C number	:	0884					
Site	:	- Not provided -					
E-mail	:	susan_dillon@coffey.com.au	**E-mail**	:	Victor.Kedicioglu@alsenviro.com	**No. of samples**	
Telephone	:	99111000	**Telephone**	:	61-2-8784 8555	**Received**	: 1
Facsimile	:	99111001	**Facsimile**	:	61-2-8784 8500	**Analysed**	: 1

This Interpretive Quality Control Report was issued on 4 May 2007 for the ALS work order reference ES0705438 and supersedes any previous reports with this reference.
This report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Type Frequency Compliance
- Summary of all Quality Control Outliers
- Brief Method Summaries

ALS Environmental

Interpretive Quality Control Report - Analysis Holding Time

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the sample aliquot was taken. Elapsed time to analysis represents time from sampling where no extraction / digestion is involved or time from extraction / digestion where this is present. For composite samples, sampling date/time is taken as that of the oldest sample contributing to that composite. Sample date/time for laboratory produced leaches are taken from the completion date/time of the leaching process. Outliers for holding time are based on USEPA SW846, APHA, AS and NEPM (1999). Failed outliers, refer to the 'Summary of Outliers'.

Matrix Type: SOIL ***Analysis Holding Time and Preservation***

Method / **Container /** Client Sample ID(s)	**Date Sampled**	**Extraction / Preparation**			**Analysis**		
		Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis	Pass?
EA055-103: Moisture Content							
Soil Glass Jar - Unpreserved							
DUP2	**24 Apr 2007**	----	----	----	**30 Apr 2007**	1 May 2007	Pass
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved							
DUP2	**24 Apr 2007**	**2 May 2007**	21 Oct 2007	Pass	**3 May 2007**	21 Oct 2007	Pass
EG035T: Total Mercury by FIMS							
Soil Glass Jar - Unpreserved							
DUP2	**24 Apr 2007**	**2 May 2007**	22 May 2007	Pass	**3 May 2007**	22 May 2007	Pass
EP075(SIM): PAH/Phenols (SIM)							
Soil Glass Jar - Unpreserved							
DUP2	**24 Apr 2007**	**30 Apr 2007**	8 May 2007	Pass	**1 May 2007**	9 Jun 2007	Pass

Interpretive Quality Control Report - Frequency of Quality Control Samples

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which this work order was processed. Actual rate should be greater than or equal to the expected rate.

Matrix Type: SOIL ***Frequency of Quality Control Samples***

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
EA055-103: Moisture Content	2	14	**14.3**	**10.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG005T: Total Metals by ICP-AES	2	16	**12.5**	**10.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035T: Total Mercury by FIMS	2	16	**12.5**	**10.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075(SIM): PAH/Phenols (SIM)	2	20	**10.0**	**10.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
Laboratory Control Samples (LCS)					
EG005T: Total Metals by ICP-AES	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035T: Total Mercury by FIMS	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075(SIM): PAH/Phenols (SIM)	1	20	**5.0**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
Method Blanks (MB)					
EG005T: Total Metals by ICP-AES	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035T: Total Mercury by FIMS	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075(SIM): PAH/Phenols (SIM)	1	20	**5.0**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
Matrix Spikes (MS)					
EG005T: Total Metals by ICP-AES	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035T: Total Mercury by FIMS	1	16	**6.3**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075(SIM): PAH/Phenols (SIM)	1	20	**5.0**	**5.0**	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement

Interpretive Quality Control Report - Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged on the 'Quality Control Report'. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). Flagged outliers on control limits for inorganics tests may be within the NEPM specified data quality objective of recoveries in the range of 70 to 130%. Where this occurs, no corrective action is taken. - Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot.

Non-surrogates

- **For all matrices, no RPD recovery outliers occur for the duplicate analysis.**
- **For all matrices, no method blank result outliers occur.**
- **For all matrices, no laboratory spike recoveries breaches occur.**
- **For all matrices, no matrix spike recoveries breaches occur.**

Surrogates

- **For all matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time

The following report highlights outliers within this 'Interpretive Quality Control Report - Analysis Holding Time'.

- **No holding time outliers occur.**

Outliers : Frequency of Quality Control Samples

The following report highlights outliers within this 'Interpretive Quality Control Report - Frequency of Quality Control Samples'.

- **No frequency outliers occur.**

Method Reference Summary

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported herein. Reference methods from which ALSE methods are based are provided in parenthesis.

Matrix Type: SOIL ***Method Reference Summary***

Preparation Methods

EN69 : Hot Block Digest for metals in soils sediments and sludges - USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)

ORG17B : Tumbler Extraction of Solids (Option B - Non-concentrating) - In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Analytical Methods

EA055-103 : Moisture Content - A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)

EG005T : Total Metals by ICP-AES - (APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)

EG035T : Total Mercury by FIMS - AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)

EP075(SIM) : PAH/Phenols (SIM) - (USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 502 and 507)

AUSTRALIAN LABORATORY SERVICES PTY LTD ABN 84 009 936 029
277-289 Woodpark Road Smithfield NSW 2164 Australia
Telephone: 61-2-8784 8555 Facsimile: 61-2-8784 8500 http://www.alsenviro.com/

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive report

Client Details

Client	:	**COFFEY GEOTECHNICS**
Contact	:	**MS SUSAN DILLON**
Address	:	P O BOX 125 NORTH RYDE NSW AUSTRALIA 1670
Project	:	**GEOTLCOV23048AB**
Order number	:	**- Not provided -**
C-O-C Number	:	**0884**
Site	:	**- Not provided -**
Sampler	:	**SAM LEVI**
E-mail	:	susan_dillon@coffey.com.au
Telephone	:	99111000
Facsimile	:	99111001

Laboratory Details

Laboratory	:	**Environmental Division Sydney**
Manager	:	**Victor Kedicioglu**
Address	:	277-289 Woodpark Road Smithfield NSW Australia 2164
Quote number	:	EB20070062
Work order	:	**ES0705438**
E-mail	:	Victor.Kedicioglu@alsenviro.com
Telephone	:	61-2-8784 8555
Facsimile	:	61-2-8784 8500

Dates

Date Samples Received	:	27 Apr 2007	**SRA Issue Date**	:	27 Apr 2007
Scheduled Reporting Date	:	**4 May 2007**	**Client Requested Date**	:	4 May 2007

Delivery Details

Mode of Delivery	:	Carrier.	**Temperature**	:	CHILLED - Ice bricks present
No. of coolers/boxes	:	1 HARD	**No. of samples** - **Received**		1
Security Seal	:	Intact.	- **Analysed**		1

Comments

- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**

- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Nanthini Coilparampil
- Analytical work for this work order will be conducted at ALSE Sydney.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.
- When the sampling time is not supplied on the COC documentation, ALSE defaults the sampling time to that of the COC 'relinquishment' time (if supplied). If this also is not supplied, ALSE defaults the sampling time to the 'time of receipt at Laboratory'.

Client	: COFFEY GEOTECHNICS	**Work Order**	: ES0705438
Project	: GEOTLCOV23048AB	**ALS Quote Reference**	: EB20070062

Summary of Sample(s) / Container(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as moisture and preparation tasks, that form an implicit part of that package.

ALS Sample ID.	Client Sample ID - Sample Date	**Requested Analysis**									
		EA055-103 - SOIL Moisture Content	**EP075 SIM PAH only - SOIL** SIM - PAH only	**S-02 - SOIL** 8 Metals (incl. Digestion)							
ES0705438-001	**DUP2 - 24 Apr 2007**	]	]	]							
	Total(s) :	**1**	**1**	**1**							

Client	: COFFEY GEOTECHNICS	**Work Order**	: ES0705438
Project	: GEOTLCOV23048AB	**ALS Quote Reference**	: EB20070062

Requested Reports

l **MS SUSAN DILLON**

-	A4 - AU Quality Control Report - NEPM format	Email	susan_dillon@coffey.com.au
-	A4 - AU Certificate of Analysis - NEPM format	Email	susan_dillon@coffey.com.au
-	A4 - AU Interpretive Quality Control Report - NEPM format	Email	susan_dillon@coffey.com.au
-	EDI Format - ENMRG	Email	susan_dillon@coffey.com.au
-	A4 - AU Sample Receipt Notification - Comprehensive format	Email	susan_dillon@coffey.com.au
-	Default - Chain of Custody	Email	susan_dillon@coffey.com.au
-	A4 - AU Tax Invoice	Email	susan_dillon@coffey.com.au

Sample Container(s) / Preservation Non-Compliance Log

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

l **No sample container / preservation non-compliance exist.**

3 May 2007 **TEST REPORT**

Coffey Environments Pty Ltd
8/12 Mars Road
LANE COVE WEST
NSW 2066

Your Reference: GEOTLCOV23048AB
Report Number: 52183

Attention: Susan Dillon

Dear Susan
The following samples were received from you on the date indicated.

Samples:	Qty.	22 Soils
Date of Receipt of Samples:		26/04/07
Date of Receipt of Instructions:		26/04/07
Date Preliminary Report Emailed:		Not Issued

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

James McMahon
Business Manager Sydney
Approved Signatory

Edward Ibrahim
Laboratory Services Manager

SGS Australia Pty Ltd ABN 44 000 964 278 | Environmental Services Unit 16, 33 Maddox Street, Alexandria Australia t (02) 8594 0400 f (02) 8594 0499 | www.au.sgs.com
Member of the SGS Group

PAHs in Soil Our Reference: Your Reference Sample Type Depth Date Sampled	UNITS ---------- ----------	52183-1 TP1 Soil 0.0-0.1 24/04/2007	52183-2 TP1 Soil 0.3-0.4 24/04/2007	52183-4 TP2 Soil 0.1-0.2 24/04/2007	52183-5 TP3 Soil 0.0-0.1 24/04/2007	52183-6 TP3 Soil 0.3-0.4 24/04/2007
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	0.2	1.0	0.2
Pyrene	mg/kg	0.2	<0.1	0.2	1.0	0.2
Benzo[*a*]anthracene	mg/kg	<0.1	<0.1	0.1	0.4	0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.5	0.1
Benzo[*b,k*]fluoranthene	mg/kg	<0.2	<0.2	<0.2	1.0	0.3
Benzo[*a*]pyrene	mg/kg	0.08	0.07	0.12	0.60	0.16
Indeno[*123-cd*]pyrene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Dibenzo[*ah*]anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*ghi*]perylene	mg/kg	<0.1	<0.1	<0.1	0.5	0.1
Total PAH's	mg/kg	<1.78	<1.57	<1.82	<6.40	<1.96
Nitrobenzene-d5	%	123	78	87	83	85
2-Fluorobiphenyl	%	121	78	95	87	90
p -Terphenyl-*d14*	%	123	91	98	89	96

PAHs in Soil Our Reference: Your Reference Sample Type Depth Date Sampled	UNITS ---------- ----------	52183-7 TP4 Soil 0.0-0.1 24/04/2007	52183-8 TP4 Soil 0.2-0.3 24/04/2007	52183-10 TP5 Soil 0.1-0.2 24/04/2007	52183-11 TP5 Soil 0.3-0.4 24/04/2007	52183-13 TP7 Soil 0.1-0.2 23/04/2007
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.3
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	0.2	<0.1	<0.1	0.1
Pyrene	mg/kg	0.2	0.3	<0.1	<0.1	0.2
Benzo[*a*]anthracene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1
Benzo[*b,k*]fluoranthene	mg/kg	0.2	0.3	<0.2	<0.2	<0.2
Benzo[*a*]pyrene	mg/kg	0.14	0.18	<0.05	<0.05	<0.05
Indeno[*123-cd*]pyrene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Dibenzo[*ah*]anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*ghi*]perylene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1
Total PAH's	mg/kg	<1.84	<2.08	<1.55	<1.55	<1.85
Nitrobenzene-d5	%	82	97	93	78	87
2-Fluorobiphenyl	%	84	97	95	84	90
p -Terphenyl-*d14*	%	96	101	102	96	96

PAHs in Soil Our Reference: Your Reference Sample Type Depth Date Sampled	UNITS ---------- ----------	52183-15 TP7 Soil 0.4-0.5 23/04/2007	52183-16 TP9 Soil 0.2-0.3 23/04/2007	52183-17 TP10 Soil 0.2-0.3 23/04/2007	52183-18 TP11 Soil 0.2-0.3 23/04/2007	52183-19 TP12 Soil 0.1-0.2 23/04/2007
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*a*]anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*b,k*]fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo[*a*]pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[*123-cd*]pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo[*ah*]anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*ghi*]perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAH's	mg/kg	<1.55	<1.55	<1.55	<1.55	<1.55
Nitrobenzene-d5	%	78	81	105	81	79
2-Fluorobiphenyl	%	86	82	100	81	82
p -Terphenyl-*d14*	%	88	90	105	95	93

PAHs in Soil Our Reference: Your Reference Sample Type Depth Date Sampled	UNITS ---------- ----------	52183-22 DUP4 Soil - 24/04/2007
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo[*a*]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[*b,k*]fluoranthene	mg/kg	<0.2
Benzo[*a*]pyrene	mg/kg	<0.05
Indeno[*123-cd*]pyrene	mg/kg	<0.1
Dibenzo[*ah*]anthracene	mg/kg	<0.1
Benzo[*ghi*]perylene	mg/kg	<0.1
Total PAH's	mg/kg	<1.55
Nitrobenzene-d5	%	79
2-Fluorobiphenyl	%	77
p -Terphenyl-*d14*	%	106

Acid Extractable Metals in Soil						
Our Reference:	UNITS	52183-1	52183-2	52183-4	52183-5	52183-6
Your Reference	----------	TP1	TP1	TP2	TP3	TP3
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.3-0.4	0.1-0.2	0.0-0.1	0.3-0.4
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	24/04/2007
Arsenic	mg/kg	6	8	4	10	12
Cadmium	mg/kg	0.2	0.5	0.2	0.6	0.9
Chromium	mg/kg	9.4	23	13	20	26
Copper	mg/kg	11	13	13	12	9.4
Lead	mg/kg	14	15	28	27	27
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	mg/kg	8.3	2.4	5.2	5.6	3.6
Zinc	mg/kg	54	8.3	41	40	25

Acid Extractable Metals in Soil						
Our Reference:	UNITS	52183-7	52183-8	52183-10	52183-11	52183-13
Your Reference	----------	TP4	TP4	TP5	TP5	TP7
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.2-0.3	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	23/04/2007
Arsenic	mg/kg	4	10	<3	<3	4
Cadmium	mg/kg	0.2	0.5	<0.1	0.3	0.2
Chromium	mg/kg	10	19	3.0	11	12
Copper	mg/kg	18	9.4	1.9	27	18
Lead	mg/kg	17	18	4	9.2	52
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	0.25
Nickel	mg/kg	15	3.9	1.3	54	7.7
Zinc	mg/kg	47	17	5.4	35	52

Acid Extractable Metals in Soil						
Our Reference:	UNITS	52183-15	52183-16	52183-17	52183-18	52183-19
Your Reference	----------	TP7	TP9	TP10	TP11	TP12
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.2-0.3	0.1-0.2
Date Sampled		23/04/2007	23/04/2007	23/04/2007	23/04/2007	23/04/2007
Arsenic	mg/kg	10	7	7	10	6
Cadmium	mg/kg	0.4	0.3	0.5	0.6	0.5
Chromium	mg/kg	21	12	16	23	16
Copper	mg/kg	17	11	12	21	23
Lead	mg/kg	16	13	17	20	19
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	mg/kg	2.5	0.8	0.6	2.4	1.7
Zinc	mg/kg	10	5.2	5.5	17	18

Acid Extractable Metals in Soil Our Reference: Your Reference Sample Type Depth Date Sampled	UNITS ---------- ----------	52183-22 DUP4 Soil - 24/04/2007
Arsenic	mg/kg	10
Cadmium	mg/kg	0.6
Chromium	mg/kg	26
Copper	mg/kg	12
Lead	mg/kg	17
Mercury	mg/kg	<0.05
Nickel	mg/kg	4.6
Zinc	mg/kg	15

Asbestos ID in soil						
Our Reference:	UNITS	52183-1	52183-2	52183-4	52183-5	52183-6
Your Reference	----------	TP1	TP1	TP2	TP3	TP3
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.3-0.4	0.1-0.2	0.0-0.1	0.3-0.4
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	24/04/2007
Sample Description		81g soil, rocks	41g clay	77g sand, rocks	52g clay, soil	35g clay, soil
Asbestos ID in soil		No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID in soil						
Our Reference:	UNITS	52183-7	52183-8	52183-10	52183-11	52183-13
Your Reference	----------	TP4	TP4	TP5	TP5	TP7
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.2-0.3	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	23/04/2007
Sample Description		51g soil, rocks	44g soil	48g soil, sand	36g clay	47g clay, sand, rocks
Asbestos ID in soil		No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID in soil						
Our Reference:	UNITS	52183-15	52183-16	52183-17	52183-18	52183-19
Your Reference	----------	TP7	TP9	TP10	TP11	TP12
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.2-0.3	0.1-0.2
Date Sampled		23/04/2007	23/04/2007	23/04/2007	23/04/2007	23/04/2007
Sample Description		37g clay	44g clay	44g clay	39g clay	28g clay
Asbestos ID in soil		No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Hold sample-**NO test required**						
Our Reference:	UNITS	52183-3	52183-9	52183-12	52183-14	52183-20
Your Reference	----------	TP1	TP4	TP5	TP7	DUP1
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.6-0.7	0.4-0.5	0.9-1.0	0.3-0.4	-
Date Sampled		24/04/2007	24/04/2007	24/04/2007	23/04/2007	24/04/2007
Sample on HOLD		#	#	#	#	#

Hold sample-**NO test required**		
Our Reference:	UNITS	52183-21
Your Reference	----------	DUP3
Sample Type	----------	Soil
Depth		-
Date Sampled		24/04/2007
Sample on HOLD		#

Moisture						
Our Reference:	UNITS	52183-1	52183-2	52183-4	52183-5	52183-6
Your Reference	----------	TP1	TP1	TP2	TP3	TP3
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.3-0.4	0.1-0.2	0.0-0.1	0.3-0.4
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	24/04/2007
Moisture	%	24	25	13	16	15

Moisture						
Our Reference:	UNITS	52183-7	52183-8	52183-10	52183-11	52183-13
Your Reference	----------	TP4	TP4	TP5	TP5	TP7
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.0-0.1	0.2-0.3	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		24/04/2007	24/04/2007	24/04/2007	24/04/2007	23/04/2007
Moisture	%	19	8	9	13	4

Moisture						
Our Reference:	UNITS	52183-15	52183-16	52183-17	52183-18	52183-19
Your Reference	----------	TP7	TP9	TP10	TP11	TP12
Sample Type	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.2-0.3	0.1-0.2
Date Sampled		23/04/2007	23/04/2007	23/04/2007	23/04/2007	23/04/2007
Moisture	%	18	20	19	23	17

Moisture		
Our Reference:	UNITS	52183-22
Your Reference	----------	DUP4
Sample Type	----------	Soil
Depth		-
Date Sampled		24/04/2007
Moisture	%	23

Method ID	Methodology Summary
SEO-030	PAHs by GC/MS - Determination of Polynuclear Aromatic Hydrocarbons (PAH's) by Gas Chromatography / Mass Spectrometry following extraction with dichloromethane or dichloromethane/acetone. The surrogate spike used is p-Terphenyl-d14.
SEM-010	Metals - Determination of various metals by ICP-AES following aqua regia digest.
SEM-005	Mercury - Determination of Mercury by Cold Vapour Generation Atomic Absorption Spectroscopy.
AN602	Qualitative identification of asbestos type fibres in bulk using Polarised Light Microscopy and Dispersion Staining Techniques. Accreditation does not cover the identification of Synthetic Mineral Fibre.
AN002	Preparation of soils, sediments and sludges undergo analysis by either air drying, compositing, subsampling and 1:5 soil water extraction where required. Moisture content is determined by drying the sample at 105 ± 5°C.

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Naphthalene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	52183-2	118 || [N/T]
Acenaphthylene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	52183-2	91 || [N/T]
Acenaphthene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	52183-2	136 || [N/T]
Fluorene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Phenanthrene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	52183-2	127 || [N/T]
Anthracene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	52183-2	134 || [N/T]
Fluoranthene	mg/kg	0.1	SEO-030	<0.1	52183-1	0.2 || 0.1 || RPD: 67	52183-2	131 || [N/T]
Pyrene	mg/kg	0.1	SEO-030	<0.1	52183-1	0.2 || 0.1 || RPD: 67	52183-2	128 || [N/T]
Benzo[*a*]anthracene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Benzo[*b,k*]fluoranthene	mg/kg	0.2	SEO-030	<0.2	52183-1	<0.2 || <0.2	[NR]	[NR]
Benzo[*a*]pyrene	mg/kg	0.05	SEO-030	<0.05	52183-1	0.08 || 0.07 || RPD: 13	52183-2	127 || [N/T]
Indeno[*123-cd*]pyrene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo[*ah*]anthracene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Benzo[*ghi*]perylene	mg/kg	0.1	SEO-030	<0.1	52183-1	<0.1 || <0.1	[NR]	[NR]
Total PAH's	mg/kg	1.55	SEO-030	1.55	52183-1	<1.78 || <1.57	[NR]	[NR]
Nitrobenzene-d5	%	0	SEO-030	78	52183-1	123 || 108 || RPD: 13	52183-2	86 || [N/T]
2-Fluorobiphenyl	%	0	SEO-030	92	52183-1	121 || 106 || RPD: 13	52183-2	86 || [N/T]
p -Terphenyl-*d* 14	%	0	SEO-030	98	52183-1	123 || 106 || RPD: 15	52183-2	95 || [N/T]

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Arsenic	mg/kg	3	SEM-010	<3	52183-1	6 || 5 || RPD: 18	52183-2	91 || [N/T]
Cadmium	mg/kg	0.1	SEM-010	<0.1	52183-1	0.2 || 0.2 || RPD: 0	52183-2	96 || [N/T]
Chromium	mg/kg	0.3	SEM-010	<0.3	52183-1	9.4 || 8.4 || RPD: 11	52183-2	98 || [N/T]
Copper	mg/kg	0.5	SEM-010	<0.5	52183-1	11 || 13 || RPD: 17	52183-2	103 || [N/T]
Lead	mg/kg	1	SEM-010	<1	52183-1	14 || 13 || RPD: 7	52183-2	91 || [N/T]
Mercury	mg/kg	0.05	SEM-005	<0.05	52183-1	<0.05 || <0.05	52183-2	102 || [N/T]
Nickel	mg/kg	0.5	SEM-010	<0.5	52183-1	8.3 || 9.8 || RPD: 17	52183-2	92 || [N/T]
Zinc	mg/kg	0.3	SEM-010	<0.3	52183-1	54 || 53 || RPD: 2	52183-2	101 || [N/T]

QUALITY CONTROL Hold sample-**NO test** required	UNITS	PQL	METHOD	Blank
Sample on HOLD				[NT]

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Moisture	%	1	AN002	<1

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Naphthalene	mg/kg	52183-15	<0.1 || <0.1
Acenaphthylene	mg/kg	52183-15	<0.1 || <0.1
Acenaphthene	mg/kg	52183-15	<0.1 || <0.1
Fluorene	mg/kg	52183-15	<0.1 || <0.1
Phenanthrene	mg/kg	52183-15	<0.1 || <0.1
Anthracene	mg/kg	52183-15	<0.1 || <0.1
Fluoranthene	mg/kg	52183-15	<0.1 || <0.1
Pyrene	mg/kg	52183-15	<0.1 || <0.1
Benzo[a]anthracene	mg/kg	52183-15	<0.1 || <0.1
Chrysene	mg/kg	52183-15	<0.1 || <0.1
Benzo[*b,k*]fluoranthene	mg/kg	52183-15	<0.2 || <0.2
Benzo[*a*]pyrene	mg/kg	52183-15	<0.05 || <0.05
Indeno[*123-cd*]pyrene	mg/kg	52183-15	<0.1 || <0.1
Dibenzo[*ah*]anthracene	mg/kg	52183-15	<0.1 || <0.1
Benzo[*ghi*]perylene	mg/kg	52183-15	<0.1 || <0.1
Total PAH's	mg/kg	52183-15	<1.55 || <1.55
Nitrobenzene-d5	%	52183-15	78 || 72 || RPD: 8
2-Fluorobiphenyl	%	52183-15	86 || 73 || RPD: 16
p -Terphenyl-*d14*	%	52183-15	88 || 98 || RPD: 11

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Arsenic	mg/kg	52183-15	10 || 10 || RPD: 0
Cadmium	mg/kg	52183-15	0.4 || 0.5 || RPD: 22
Chromium	mg/kg	52183-15	21 || 20 || RPD: 5
Copper	mg/kg	52183-15	17 || 15 || RPD: 12
Lead	mg/kg	52183-15	16 || 16 || RPD: 0
Mercury	mg/kg	52183-15	<0.05 || <0.05
Nickel	mg/kg	52183-15	2.5 || 2.5 || RPD: 0
Zinc	mg/kg	52183-15	10 || 9.9 || RPD: 1

Result Codes

[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Accreditation
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

Sampled by the client

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy.
This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

Asbestos analysed by Wonnie Condos.
Date Organics extraction commenced: 01/05/07
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Dioxins/Furans* and PAH in XAD and PUF).

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.
Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 10 samples.
Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.
Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.
Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.
Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.

15 May 2007 **TEST REPORT**

Coffey Environments Pty Ltd
8/12 Mars Road
LANE COVE WEST
NSW 2066

Your Reference: GEOTLCOV23048AB - TCLP testing
Report Number: 52183A

Attention: Susan Dillon

Dear Susan
The following samples were received from you on the date indicated.

Samples: Qty.	8 Soil Samples
Date of Receipt of Samples:	26/04/07
Date of Receipt of Instructions:	07/05/07
Date Preliminary Report Emailed:	Not Issued

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

Ly Kim Ha
Senior Organic Chemist

Edward Ibrahim
Laboratory Services Manager

Alexandra Stenta
Key Account Representative

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 16, 33 Maddox Street, Alexandria Australia
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www.au.sgs.com
Member of the SGS Group

PAHs in TCLP (USEPA 1311) Our Reference: Your Reference Sample Type Date Sampled Depth	UNITS ---------- ----------	52183A-2 TP1 Soil 24/04/2007 0.3-0.4	52183A-4 TP2 Soil 24/04/2007 0.1-0.2	52183A-5 TP3 Soil 24/04/2007 0.0-0.1	52183A-6 TP3 Soil 24/04/2007 0.3-0.4	52183A-8 TP4 Soil 24/04/2007 0.2-0.3
pH of soil for fluid# determ.	pH units	5.10	8.90	7.92	6.63	5.65
Extraction fluid used		1	1	1	1	1
pH of soil for fluid # determ. (acid)	pH units	1.43	1.70	1.60	1.63	1.63
pH of final Leachate	pH units	4.78	5.66	4.88	4.80	4.79
Naphthalene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo[*a*]anthracene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo[*b,k*]fluoranthene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo[*a*]pyrene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno[*123-cd*]pyrene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzo[*ah*]anthracene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo[*ghi*]perylene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAH's	µg/L	<8.0	<8.0	<8.0	<8.0	<8.0
Nitrobenzene-d5	%	87	92	84	75	85
2-Fluorobiphenyl	%	100	99	86	86	95
p -Terphenyl-*d14*	%	129	110	98	104	108

Metals on TCLP extract Our Reference: Your Reference Sample Type Date Sampled Depth	UNITS ---------- ----------	52183A-4 TP2 Soil 24/04/2007 0.1-0.2	52183A-6 TP3 Soil 24/04/2007 0.3-0.4	52183A-11 TP5 Soil 24/04/2007 0.3-0.4	52183A-13 TP7 Soil 23/04/2007 0.1-0.2	52183A-18 TP11 Soil 23/04/2007 0.2-0.3
pH of soil for fluid# determ.	pH units	[NA]	[NA]	7.67	8.23	7.70
pH of soil for fluid # determ. (acid)	pH units	[NA]	[NA]	1.60	1.66	1.66
Extraction fluid used		[NA]	[NA]	1	1	1
pH of final Leachate	pH units	[NA]	[NA]	4.87	6.27	5.04
Arsenic	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	<0.01	<0.01	<0.01	0.01	<0.01
Lead	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020
Mercury	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	mg/L	<0.009	<0.009	0.023	<0.009	<0.009
Zinc	mg/L	0.021	0.016	0.031	0.072	0.007

Method ID	Methodology Summary
SEP-003	Toxicity Characteristic Leaching Procedure (TCLP) and AS Bottle leach procedure.
SEO-030	PAHs by GC/MS - Determination of Polynuclear Aromatic Hydrocarbons (PAH's) by Gas Chromatography / Mass Spectrometry following extraction with dichloromethane or dichloromethane/acetone. The surrogate spike used is p-Terphenyl-d14.
SEM-010	Metals - Determination of various metals by ICP-AES following aqua regia digest.
SEM-005	Mercury - Determination of Mercury by Cold Vapour Generation Atomic Absorption Spectroscopy.

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
pH of soil for fluid# determ.	pH units		SEP-003	[NT]	[NT]	[NT]	[NR]	[NR]
Extraction fluid used			SEP-003	1	[NT]	[NT]	[NR]	[NR]
pH of soil for fluid # determ. (acid)	pH units		SEP-003	[NT]	[NT]	[NT]	[NR]	[NR]
pH of final Leachate	pH units		SEP-003	4.93	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	96 || [N/T]
Acenaphthylene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	86 || [N/T]
Acenaphthene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	117 || [N/T]
Fluorene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Phenanthrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	99 || [N/T]
Anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	111 || [N/T]
Fluoranthene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	101 || [N/T]
Pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	104 || [N/T]
Benzo[*a*]anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Benzo[*b,k*]fluoranthene	µg/L	1.0	SEO-030	<1.0	[NT]	[NT]	[NR]	[NR]
Benzo[*a*]pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	117 || [N/T]
Indeno[*123-cd*]pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Dibenzo[*ah*]anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Benzo[*ghi*]perylene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Total PAH's	µg/L	8.0		8.0	[NT]	[NT]	[NR]	[NR]
Nitrobenzene-d5	%	0	SEO-030	118	[NT]	[NT]	LCS	90 || [N/T]
2-Fluorobiphenyl	%	0	SEO-030	106	[NT]	[NT]	LCS	92 || [N/T]
p -Terphenyl-*d* 14	%	0	SEO-030	120	[NT]	[NT]	LCS	99 || [N/T]

QUALITY CONTROL Metals on TCLP extract	UNITS	PQL	METHOD	Blank
pH of soil for fluid# determ.	pH units		SEP-003	[NT]
pH of soil for fluid # determ. (acid)	pH units		SEP-003	[NT]
Extraction fluid used			SEP-003	1
pH of final Leachate	pH units		SEP-003	4.93
Arsenic	mg/L	0.05	SEM-010	<0.05
Cadmium	mg/L	0.002	SEM-010	<0.002
Chromium	mg/L	0.005	SEM-010	<0.005
Copper	mg/L	0.01	SEM-010	<0.01
Lead	mg/L	0.02	SEM-010	<0.020
Mercury	mg/L	0.0005	SEM-005	<0.0005
Nickel	mg/L	0.009	SEM-010	<0.009
Zinc	mg/L	0.006	SEM-010	<0.006

Result Codes

[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Accreditation
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

Date Organics extraction commenced: 13/04/07
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Dioxins/Furans* and PAH in XAD and PUF).
This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.
Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 10 samples.
Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.
Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.
Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.
Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.

SGS Environmental Services
Unit 16, 33 Maddox St. Alexandria NSW 2015
Telephone Number : (+61 2) 8594 0400
Fax Number : (+61 2) 8594 0499

SAMPLE RECEIPT CONFIRMATION

COMPANY	:	Coffey Environments Pty Ltd	FAX NO.	:	02 9911 1002
ATTENTION	:	Susan Dillon	PAGES	:	1
FROM	:	Sample Receipt	DATE	:	10/05/07

This is to confirm that samples for Project **GEOTLCOV23048AB** were received on **09/05/07** the results are expected to be ready on **15/05/07** . Please quote SGS Reference: **52470** when making enquiries regarding this project. Please refer to below which details information about the integrity of the samples and other useful information.

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples, unless otherwise instructed.

Samples received in good order:	YES
Samples received in correct containers:	YES
Samples received without headspace:	YES
Sufficient quantity supplied:	YES
Upon receipt sample temperature:	Cool
Cooling Method:	None
Sample containers provided by:	SGS
Samples Clearly Labelled:	YES
Turnaround time requested:	Standard
Completed documentation received:	YES

Comments:

Trip Spike can be done on BTEX only.
Trip Blank only can be done BTEX & TRH C6-C9.
Terms and conditions are available from www.au.sgs.com

The signed chain of custody will be returned to you with the original report.

18 May 2007 **TEST REPORT**

Coffey Environments Pty Ltd
8/12 Mars Road
LANE COVE WEST
NSW 2066

Your Reference: GEOTLCOV23048AB
Report Number: 52470

Attention: Susan Dillon

Dear Susan
The following samples were received from you on the date indicated.

Samples: Qty.	5 Waters
Date of Receipt of Samples:	09/05/07
Date of Receipt of Instructions:	09/05/07
Date Preliminary Report Emailed:	Not Issued

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

Ly Kim Ha
Senior Organic Chemist

Edward Ibrahim
Laboratory Services Manager

Alexandra Stenta
Key Account Representative

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 16, 33 Maddox Street, Alexandria Australia
t (02) 8594 0400 f (02) 8594 0499
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Member of the SGS Group

VOC's in water Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water
Dichlorodifluoromethane	µg/L	<50	<50	<50
Chloromethane	µg/L	<50	<50	<50
Vinyl Chloride	µg/L	<50	<50	<50
Bromomethane	µg/L	<50	<50	<50
Chloroethane	µg/L	<50	<50	<50
Trichlorofluoromethane	µg/L	<50	<50	<50
1,1-Dichloroethene	µg/L	<50	<50	<50
trans-1,2-Dichloroethene	µg/L	<50	<50	<50
1,1-Dichloroethane	µg/L	<50	<50	<50
cis-1,2-Dichloroethene	µg/L	<50	<50	<50
Bromochloromethane	µg/L	<50	<50	<50
Chloroform	µg/L	<50	<50	<50
2,2-Dichloropropane	µg/L	<50	<50	<50
1,2-Dichloroethane	µg/L	<50	<50	<50
1,1,1-Trichloroethane	µg/L	<50	<50	<50
1,1-Dichloropropene	µg/L	<50	<50	<50
Carbon tetrachloride	µg/L	<50	<50	<50
Benzene	µg/L	<50	<50	<50
Dibromomethane	µg/L	<50	<50	<50
1,2-Dichloropropane	µg/L	<50	<50	<50
Trichloroethene	µg/L	<50	<50	<50
Bromodichloromethane	µg/L	<50	<50	<50
trans-1,3-Dichloropropene	µg/L	<50	<50	<50
cis-1,3-Dichloropropene	µg/L	<50	<50	<50
1,1,2-Trichloroethane	µg/L	<50	<50	<50
Toluene	µg/L	<50	<50	<50
1,3-Dichloropropane	µg/L	<50	<50	<50
Dibromochloromethane	µg/L	<50	<50	<50
1,2-Dibromoethane	µg/L	<50	<50	<50
Tetrachloroethene	µg/L	<50	<50	<50
1,1,1,2-Tetrachloroethane	µg/L	<50	<50	<50
Chlorobenzene	µg/L	<50	<50	<50
Ethyl benzene	µg/L	<50	<50	<50
Bromoform	µg/L	<50	<50	<50
m/p-Xylenes	µg/L	<100	<100	<100
Styrene	µg/L	<50	<50	<50
1,1,2,2-Tetrachloroethane	µg/L	<50	<50	<50
o-Xylene	µg/L	<50	<50	<50
1,2,3-Trichloropropane	µg/L	<50	<50	<50

VOC's in water Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water
Isopropylbenzene	µg/L	<50	<50	<50
Bromobenzene	µg/L	<50	<50	<50
n-Propylbenzene	µg/L	<50	<50	<50
2-Chlorotoluene	µg/L	<50	<50	<50
4-Chlorotoluene	µg/L	<50	<50	<50
1,3,5-Trimethylbenzene	µg/L	<50	<50	<50
tert-Butylbenzene	µg/L	<50	<50	<50
1,2,4-Trimethylbenzene	µg/L	<50	<50	<50
1,3-Dichlorobenzene	µg/L	<50	<50	<50
sec-Butylbenzene	µg/L	<50	<50	<50
1,4-Dichlorobenzene	µg/L	<50	<50	<50
p-Isopropyltoluene	µg/L	<50	<50	<50
1,2-Dichlorobenzene	µg/L	<50	<50	<50
n-Butylbenzene	µg/L	<50	<50	<50
1,2-Dibromo-3-chloropropane	µg/L	<50	<50	<50
1,2,4-Trichlorobenzene	µg/L	<50	<50	<50
Naphthalene	µg/L	<50	<50	<50
Hexachlorobutadiene	µg/L	<50	<50	<50
1,2,3-Trichlorobenzene	µg/L	<50	<50	<50
Dibromofluoromethane	% Recovery	84	98	91
1,2-Dichloroethane-d4	% recovery	89	104	95
Toluene-*d8 Surrogate 2*	% recovery	82	94	89
4-Bromofluorobenzene *Surrogate 3*	% recovery	82	93	89

BTEX in Water Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-4 Trip Spike water	52470-5 Trip Blank water
Benzene	mg/L	94	<0.001
Toluene	mg/L	92	<0.001
Ethylbenzene	mg/L	92	<0.001
Total Xylenes	mg/L	95	<0.003

TRH in water with C6-C9 by P/T Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water	52470-5 Trip Blank water
TRH C_6 - C_9 P&T	mg/L	<0.4	<0.4	<0.4	<0.040
TRH C_{10} - C_{14}	mg/L	0.7	1.4	0.5	[NA]
TRH C_{15} - C_{28}	mg/L	2.7	0.9	2.4	[NA]
TRH C_{29} - C_{36}	mg/L	0.5	<0.2	0.4	[NA]

PAHs in Water Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water
Naphthalene	µg/L	7.5	17	6.9
Acenaphthylene	µg/L	<1.5	<1.5	<1.5
Acenaphthene	µg/L	<1.5	<1.5	<1.5
Fluorene	µg/L	<1.5	<1.5	<1.5
Phenanthrene	µg/L	2.6	2.4	2.3
Anthracene	µg/L	<1.5	<1.5	<1.5
Fluoranthene	µg/L	<1.5	<1.5	<1.5
Pyrene	µg/L	<1.5	<1.5	<1.5
Benzo[*a*]anthracene	µg/L	<1.5	<1.5	<1.5
Chrysene	µg/L	<1.5	<1.5	<1.5
Benzo*[b,k]*fluoranthene	µg/L	<3.0	<3.0	<3.0
Benzo[*a*]pyrene	µg/L	<1.5	<1.5	<1.5
Indeno[*123-cd*]pyrene	µg/L	<1.5	<1.5	<1.5
Dibenzo[*ah*]anthracene	µg/L	<1.5	<1.5	<1.5
Benzo[*ghi*]perylene	µg/L	<1.5	<1.5	<1.5
Total PAH's	µg/L	<31.10	<40.10	<30.20
Nitrobenzene-d5	%	91	98	77
2-Fluorobiphenyl	%	92	96	74
p -Terphenyl-*d14*	%	106	109	89

Inorganics Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water
Sulphate, SO4	mg/L	70	140	69
Total Kjeldahl Nitrogen	mg/L	19	39	22
Total Phosphorus as P	mg/L	<0.10	<0.10	<0.10

Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Type	UNITS ---------- ----------	52470-1 BH2 water	52470-2 BH3 water	52470-3 DUPA water
Arsenic	µg/L	1.6	1.7	1.4
Cadmium	µg/L	<0.10	<0.10	<0.10
Chromium	µg/L	<1.0	1.6	<1.0
Copper	µg/L	2.1	5.4	2.3
Lead	µg/L	1.8	1.0	1.5
Mercury	µg/L	<0.50	<0.50	<0.50
Nickel	µg/L	2.0	3.5	2.0
Zinc	µg/L	16	30	18

Method ID	Methodology Summary
SEO-019	VOCs by P&T GC/MS- Determination of Volatile Organic Compounds by Purge and Trap then Gas Chromatography / Mass spectrometry following extraction with methanol for soils. Waters are introduced directly on the purge and trap.
SEO-017	BTEX/TRH C6-C9 - Determination by Purge and Trap Gas Chromatography with Flame Ionisation Detection (FID) and Photo Ionisation Detection (PID). The surrogate spike used is aaa-trifluorotoluene.
SEO-020	TRH - Determination of Total Recoverable Hydrocarbons by gas chromatography following extraction with DCM/Acetone for solids and DCM for liquids.
SEO-030	PAHs by GC/MS - Determination of Polynuclear Aromatic Hydrocarbons (PAH's) by Gas Chromatography / Mass Spectrometry following extraction with dichloromethane or dichloromethane/acetone. The surrogate spike used is p-Terphenyl-d14.
SEI-038	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 20th ED, 4110-B.
SEI-069	Sulphide - determined titrimetrically using an iodometric titration following a zinc acetate treatment to overcome interferences. Based on APHA 20th ED, 4500-S2-F.
Ext-043	Subcontracted to LabPoint. Nata Accreditation No: 11111
SEI-067	Total Phosphorus - Jirka modification, followed by colorimetric determination using an Ascorbic Acid method, in accordance with APHA 20th ED, 4500-P-F. Analysis is carried out by SGS Environmental Services Welshpool.
AN320	Metals - Determination of various metals by ICP-MS at trace levels following aqua regia digest. Method based on USEPA 6020A.
SEM-005	Mercury - Determination of Mercury by Cold Vapour Generation Atomic Absorption Spectroscopy.

QUALITY CONTROL VOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Dichlorodifluoromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	92 || [N/T]
1,1-Dichloroethene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
trans-1,2-Dichloroethene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
cis-1,2-Dichloroethene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	76 || [N/T]
2,2-Dichloropropane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2-Dichloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	78 || [N/T]
1,1,1-Trichloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,1-Dichloropropene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	83 || [N/T]
Dibromomethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2-Dichloropropane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	75 || [N/T]
Bromodichloromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
trans-1,3-Dichloropropene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
cis-1,3-Dichloropropene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,1,2-Trichloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Toluene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	74 || [N/T]
1,3-Dichloropropane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2-Dibromoethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,1,1,2-Tetrachloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	80 || [N/T]
Ethyl benzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	87 || [N/T]
Bromoform	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
m/p-Xylenes	µg/L	10	SEO-019	<10	[NT]	[NT]	LCS	90 || [N/T]
Styrene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,1,2,2-Tetrachloroethane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
o-Xylene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	LCS	87 || [N/T]
1,2,3-Trichloropropane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
n-Propylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
2-Chlorotoluene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
4-Chlorotoluene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,3,5-Trimethylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
tert-Butylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2,4-Trimethylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,3-Dichlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
sec-Butylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,4-Dichlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
p-Isopropyltoluene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2-Dichlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
n-Butylbenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2-Dibromo-3-chloropropane	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2,4-Trichlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
1,2,3-Trichlorobenzene	µg/L	5	SEO-019	<5.0	[NT]	[NT]	[NR]	[NR]
Dibromofluoromethane	% Recovery		SEO-019	87	[NT]	[NT]	LCS	79 || [N/T]
1,2-Dichloroethane-d4	% recovery		SEO-019	92	[NT]	[NT]	LCS	80 || [N/T]
Toluene-*d8 Surrogate* 2	% recovery		SEO-019	88	[NT]	[NT]	LCS	77 || [N/T]
4-Bromofluorobenzene *Surrogate 3*	% recovery		SEO-019	89	[NT]	[NT]	LCS	80 || [N/T]

QUALITY CONTROL **BTEX in Water**	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Benzene	mg/L	0.001	SEO-017	<0.001	[NT]	[NT]	LCS	92 || [N/T]
Toluene	mg/L	0.001	SEO-017	<0.001	[NT]	[NT]	LCS	91 || [N/T]
Ethylbenzene	mg/L	0.001	SEO-017	<0.001	[NT]	[NT]	LCS	91 || [N/T]
Total Xylenes	mg/L	0.003	SEO-017	<0.003	[NT]	[NT]	LCS	93 || [N/T]
QUALITY CONTROL TRH in water with C6-C9 by P/T	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
TRH C_6 - C_9 P&T	mg/L	0.04	SEO-017	<0.040	[NT]	[NT]	LCS	92 || [N/T]
TRH C_{10} - C_{14}	mg/L	0.1	SEO-020	<0.1	[NT]	[NT]	LCS	92 || [N/T]
TRH C_{15} - C_{28}	mg/L	0.2	SEO-020	<0.2	[NT]	[NT]	LCS	91 || [N/T]
TRH C_{29} - C_{36}	mg/L	0.2	SEO-020	<0.2	[NT]	[NT]	LCS	94 || [N/T]
QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Naphthalene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	77 || [N/T]
Acenaphthylene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	73 || [N/T]
Acenaphthene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	97 || [N/T]
Fluorene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Phenanthrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	81 || [N/T]
Anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	91 || [N/T]
Fluoranthene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	82 || [N/T]
Pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	85 || [N/T]
Benzo[*a*]anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Benzo[*b,k*]fluoranthene	µg/L	1.0	SEO-030	<1.0	[NT]	[NT]	[NR]	[NR]
Benzo[*a*]pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	LCS	97 || [N/T]
Indeno[*123-cd*]pyrene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Dibenzo[*ah*]anthracene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Benzo[*ghi*]perylene	µg/L	0.5	SEO-030	<0.5	[NT]	[NT]	[NR]	[NR]
Total PAH's	µg/L	8.0		8.0	[NT]	[NT]	[NR]	[NR]
Nitrobenzene-d5	%	0	SEO-030	94	[NT]	[NT]	LCS	91 || [N/T]
2-Fluorobiphenyl	%	0	SEO-030	97	[NT]	[NT]	LCS	91 || [N/T]
p -Terphenyl-*d*14	%	0	SEO-030	102	[NT]	[NT]	LCS	99 || [N/T]

QUALITY CONTROL **Inorganics**	**UNITS**	**PQL**	**METHOD**	**Blank**	**Duplicate Sm#**	**Duplicate** **Base + Duplicate + %RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate + %RPD**
Sulphate, SO4	mg/L	0.4	SEI-038	<0.4	[NT]	[NT]	LCS	98 || [N/T]
Sulphide	mg/L	0.5	SEI-069	<0.5	[NT]	[NT]	[NR]	[NR]
Total Kjeldahl Nitrogen	mg/L	0.5	Ext-043	<0.5	[NT]	[NT]	[NR]	[NR]
Total Phosphorus as P	mg/L	0.1	SEI-067	<0.10	[NT]	[NT]	LCS	95 || [N/T]
QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Arsenic	µg/L	1	AN320	<1.0	52470-1	1.6 || 1.5 || RPD: 6	52470-3	109 || [N/T]
Cadmium	µg/L	0.1	AN320	<0.10	52470-1	<0.10 || <0.10	52470-3	81 || [N/T]
Chromium	µg/L	1	AN320	<1.0	52470-1	<1.0 || <1.0	52470-3	97 || [N/T]
Copper	µg/L	1	AN320	<1.0	52470-1	2.1 || 2.1 || RPD: 0	52470-3	94 || [N/T]
Lead	µg/L	1	AN320	<1.0	52470-1	1.8 || 1.7 || RPD: 6	52470-3	90 || [N/T]
Mercury	µg/L	0.5	SEM-005	<0.50	52470-1	<0.50 || [N/T]	52470-3	102 || [N/T]
Nickel	µg/L	1	AN320	<1.0	52470-1	2.0 || 2.0 || RPD: 0	52470-3	92 || [N/T]
Zinc	µg/L	1	AN320	<1.0	52470-1	16 || 18 || RPD: 12	52470-3	107 || [N/T]

Result Codes

[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Accreditation
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

VOC, TRH and PAH level of reporting has been raised due to sample matrix interference.

Sulphide analysis could not be performed due to the nature of sample matrix.
Date Organics extraction commenced: 10/05/07
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Dioxins/Furans* and PAH in XAD and PUF).

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.
Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 10 samples.
Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.
Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.
Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.
Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.

AU.SampleReceipt.Sydney (Sydney)

From: Susan Dillon [Susan_Dillon@coffey.com.au]
Sent: Monday, 7 May 2007 9:51 AM
To: AU.SampleReceipt.Sydney (Sydney)
Subject: TCLP testing

26/4/07

GEOTLCOV23048AB

Hi Angela,

I would like to schedule the following samples from batch 52183 for TCLP testing:

#4	TP2 0.1 - 0.2 - metals and PAH	Soil	24/4/07
#6	TP3 0.3 - 0.4 - metals and PAH		24/4/07
#11	TP5 0.3 - 0.4 - metals only		24/4/07
#13	TP7 0.1 - 0.2 - metals only		23/4/07
#18	TP11 0.2 - 0.3 - metals only		23/4/07
#5	TP3 0.0 - 0.1 - PAH only		24/4/07 .
#8	TP4 0.2 - 0.3 - PAH only		24/4/07
#2	TP1 0.3 - 0.4 - PAH only		24/4/07 .

I require these resulta on a five-day turnaround.
The purchase order for this work is 16354 -please quote this number on your invoice.

If there are any problems or if you need more information, please do not hesitate to call me.

Kind regards,

SGS REF:- 52183 A
Due Date:- 14/5/07.
TAT:- STANDARD.

SUSAN DILLON
Environmental Geologist
Coffey Environments Pty Ltd
8/12 Mars Road Lane Cove West NSW 2066 Australia
T (+61) (2) 9911 1099 F (+61) (2) 9911 1002
www.coffey.com.au

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name: Coffey Environments
Address: 8/12 Mars Road Lane Cove West, NSW, 2066

Contact Name: Susan Dillon

Project Name/No: ENVILCON23048AB
Purchase Order No:
Results Required By:
Telephone: (02) 9911-7099
Facsimile:
Email: susan_dillon@coffey.com.au

Client Sample ID	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	TPH	BTEX	PAH	OC / OP / PCB	TOTAL PHENOLICS	METALS (8)	VOC's	Nutrients *
BH2	1	X			4	X		X			X	X	X
BH3	2	X			4	X		X			X	X	X
DUPA	3	X			4	X		X			X	X	X
Trip Spike	4	X			1		X						
Trip Blank	5	X			2		X						

SGS
Received 9/5/07
By Chem1
Time 8 am/pm
Samples intact (yes/no)
Ice/Cooler Pack yes/no
Comments: 52470 * To be Advised on testing.

Relinquished By: N. Fortune
Relinquished By:
Samples Intact: Yes/ No
Comments:

Date/Time: 9.5.07 / 13:15
Date/Time:
Temperature: Ambient / Chilled

Received By: Chem1
Received By:
Sample Cooler Sealed: Yes/ No

Date/Time 9/5/07 1:15pm
Date/Time
Laboratory Quotation No:

* Nutrients — Sulphate, Sulphide, TKN, total P

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Company Name: Coffey Environments
Address: 8/42 Maps Road Lane Cove West, NSW, 2066

Contact Name: Susan Dillon

Project Name/No: GROT LCOV23048AB
Purchase Order No:
Results Required By:
Telephone: (02) 9911-1099
Facsimile:
Email: susan_dillon@coffey.com.au

Client Sample ID	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	TPH	BTEX	PAH	OC / OP / PCB	TOTAL PHENOLICS	METALS (8)	VOC's	Nutrients *	BTEX	TRH C6-C9			
BH2		X			4	X		X			X	X	X					
BH3		X			4	X		X			X	X	X					
DUPA		X			4	X		X			X	X	X					
Trip Spike		X			1	X	~~X~~							X				
Trip Blank.		X			2	X	~~X~~							X	X			

SGS
Received 9/5/07
By Cheryl
Time 1:15 am/pm
Samples intact yes/no
Ice/Cooler Pack yes/no
Comments: 50470

Relinquished By: N. Foster
Date/Time: 9.5.07 / 13:15
Received By: Cheryl
Date/Time 9/5/07 1:15pm

Relinquished By:
Date/Time:
Received By:
Date/Time

Samples Intact: Yes/ No
Temperature: Ambient / Chilled
Sample Cooler Sealed: Yes/ No
Laboratory Quotation No:

Comments:

* Nutrients — Sulphate, Sulphide, TKN, total P

Appendix E

QA/QC Reports

DATA COMPLETENESS

Field Considerations

	Yes / No	Comment
Were all critical locations sampled?	Yes	
Were all critical depths sampled?	Yes	
Were the SOPs appropriate and complied with?	Yes	Based on Coffey Geosciences Environmental Field Manual
Was the sampler adequately experienced?	Yes	
Was the field documentation complete?	Yes	
Is a copy of the signed chain of custody form for each batch of samples included?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were all critical samples analysed according to sampling plan?	Yes	Due to the thin fill deposits encountered at the site only one sample was submitted for analysis from four test pits, rather than two as stated in the proposal.
Were analytes analysed as per sampling plan?	Yes	
Were the laboratory methods appropriate?	Yes	See Table G1
Were the laboratory methods adopted NATA endorsed?	Yes	
Was the NATA Seal on the laboratory reports?	Yes	
Were the laboratory reports signed by an authorised person?	Yes	

Were the laboratory PQLs below the criteria?	No	Detection limits of 0.5ug/L for mercury are marginally above the ANZECC marine water quality trigger values of 0.4ug/L respectively. This is not considered to affect the conclusions of the report
Was sample documentation complete?	Yes	
Were sample holding times complied with?	Yes	See Table G2

COMPLETENESS CONCLUSION

	Yes / No	Comment
Was data adequately complete?	Yes	The data was considered adequately complete to meet the objectives of the assessment.

DATA COMPARABILITY

Field considerations

	Yes / No	Comment
Was there more than one sampling round?	Yes	A previous investigation was undertaken by Coffey Geotechnics in August 2006, which included soil sampling.
Were the same sampling methodology and SOPs used for all sampling?	Yes	
Was all sampling undertaken by the same sampler?	No	Sampling was undertaken by separate field engineers, however, both field engineers followed the same SOPs and sampling methodology.
Were sample containers, preservation, filtering the same?	Yes	Containers and preservation was the same for soil sampling. Only one round of groundwater sampling was conducted (during the recent investigations).
Could climatic conditions (temperature, rainfall, wind) have influenced data comparability?	No	
Were the same types of samples collected (filtered, size fractions etc) for each media?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were the same analytical methods used (including clean up)?	Yes	
Were the PQLs the same?	No	PQLs used in the recent investigations were lower than for the previous investigations for metals and PAHs.
Were the same laboratories used?	No	ALS was used as the primary laboratory during the previous investigations. SGS were used as the primary laboratory for the recent investigations with ALS used as the duplicate laboratory.
Were the units reported the same?	Yes	

COMPARABILITY CONCLUSION

	Yes / No	Comment
Was data adequately comparable?	Yes	

DATA REPRESENTATIVENESS

Field Considerations

	Yes / No	Comment
Was appropriate media sampled?	Yes	
Was all media identified sampled?	Yes	
Were the samples properly and adequately preserved? This includes keeping the samples chilled, where applicable.	Yes	
Were the samples in proper custody between the field and reaching the laboratory?	Yes	

Were the samples received by the laboratory in good condition?	Yes	

Laboratory Considerations

	Yes / No	Comment
Were all samples analysed according to SAQP?	No	At four test pits locations only one sample of fill was submitted for analysis instead of two, as stated in the proposal, as the fill deposits were found to be very thin in parts of the site and only one sample could be collected.

REPRESENTATIVENESS CONCLUSION

	Yes / No	Comment
Was data adequately representative?	Yes	

DATA PRECISION AND ACCURACY

Field considerations

	Yes / No	Comment
Were the SOPs appropriate and complied with?	Yes	Based on Coffey Geosciences' Environmental Field Manual

Laboratory Considerations

SOIL

	Metals	TPH (C10-C36)	TPH (C6-C9), BTEX	PAH	OCP	PCB	Asbestos
Primary	41	26	26	41	8	8	41
Field QA/QC							
Intralab Dup	4, 9.8%	3, 11.5%	3, 11.5%	4, 9.8%	0	0	3, 7.3%
Interlab Dup	1, 2.4%	0	0	1, 2.4%	0	0	0
Trip Spikes	0	0	2	0	0	0	0
Trip Blanks	0	0	2	0	0	0	0
Wash Blanks	1	1	1	1	0	0	0
LAB QA/QC							
Lab Blanks	3	2	2	3	1	1	0
Lab Dups	6	4	4	6	1	1	0
Matrix Spikes / Dups	3	2	2	3	1	1	0
Lab Control	2	2	2	2	1	1	0
Surrogate	0	0	3	3	1	1	0

GROUNDWATER

	Metals	TPH (C10-C36)	TPH (C6-C9), BTEX	PAH	Nutrients	VOC
Primary	2	2	2	2	2	2
Field QA/QC						
Intralab Dup	1	1	1	1	1	1
Interlab Dup	0	0	0	0	0	0

Trip Spikes	0	0	1	0	0	0
Trip Blanks	0	0	1	0	0	0
Wash Blanks	0	0	0	0	0	0
LAB QA/QC						
Lab Blanks	1	1	1	1	1	1
Lab Dups	1	0	0	0	0	1
Matrix Spikes / Dups	1	0	0	0	0	1
Lab Control	0	1	1	1	1	1
Surrogate	0	0	0	3	0	4

INSERT SECTION ON OTHER MEDIA AS REQUIRED

	Yes / No	Comment
Field QA/QC		
Were an adequate number of field duplicates analysed?	No	Inter-lab duplicates were not at a rate of 5% for the combined investigations. However, inter-laboratory duplicates reached the target of 5% for the current investigations. An inter laboratory duplicate was not collected for groundwater. The analysis of one duplicate sample was considered sufficient for a preliminary assessment of groundwater quality.
Were the RPDs of the field duplicates within control limits?	No	RPDs for heavy metals in the intra-laboratory duplicates exceeded the control limits in the previous and the current investigations in fill and natural soil. It is considered that this is due to the heterogeneity of soils at the site. Generally, the exceedances were low and the total concentrations of metals were not detected above the nominated soil investigation levels. These exceedances are not considered to impact the usability of the data.
Were an adequate number of trip blanks analysed?	Yes	Trip blanks were analysed during the previous soil investigations and during the recent groundwater investigations. Trip blanks were not included with the recent soil investigations as volatile contaminants

		were not identified as potential contaminants of concern.
Were the trip blanks free of contaminants	Yes	
Were an adequate number of trip spikes analysed?	Yes	Trip spikes were analysed during the previous soil investigations and during the recent groundwater investigations. Trip spikes were not included with the recent soil investigations as volatile contaminants were not identified as potential contaminants of concern.
Were the trip spikes recoveries within control limits?	Yes	
Were an adequate number of wash blanks analysed?	Yes	Wash blanks were collected during the previous soil investigation. As dedicated sampling equipment was used to obtain each groundwater sample and each soil sample during the recent soil investigations, wash blanks were not required to be collected during the groundwater or recent soil works
Were the wash blanks free of contaminants?	Yes	
Lab QA/QC		
Were an adequate number of laboratory blank samples analysed?	Yes	
Were the blanks free of contaminants?	Yes	
Were an adequate number of laboratory matrix spikes and laboratory control samples analysed?	Yes	
Were an adequate number of surrogate spike samples analysed?	Yes	
Were the spikes recoveries	No	A recovery level of surrogate sample for TPH (C6 – C9)/BTEX and a matrix spike sample for

within control limits?		organochlorine pesticides from the previous investigations marginally exceeded the upper data quality objective. TPH (C6 – C9)/BTEX and organochlorine pesticides were not detected in any of the samples analysed during the previous or recent investigations. This result is not considered to affect the usability of the data.
Were an adequate number of laboratory duplicates analysed?	Yes	
Were the laboratory duplicate RPDs within control limits?	No	In batch 52183 for soil, the RPD for fluoroanthene marginally exceeded the recommended limit of 50%. This is considered likely to be due to the concentrations detected in the two samples being close to the LOR of 0.1mg/kg where. At such low concentrations small variations in the sample and the duplicate can results in high RPDs. These results are not considered to affect the usability of the data.

PRECISION AND ACCURACY CONCLUSION

	Yes / No	Comment
Was soil data adequately precise?	Yes	
Was soil data adequately accurate?	Yes	
Was the groundwater data adequately precise?	Yes	
Was the groundwater data adequately accurate?	Yes	

Table G1: Laboratory Methodologies

Analysis	Method Based On	NATA Registered
TPH C6-C9/BTEX	Based on USEPA 8260	Yes
TPH C10-C36	Based on USEPA 8015B	Yes

PAH	Based on USEPA 8270	Yes
Metals	Based on USEPA 200.7 (soil) / USEPA 6020A (water)	Yes
OCP	Based on USEPA 8080/8140	Yes
PCB	Based on USEPA 8080	Yes
VOC	Based on USEPA 8260	Yes
Asbestos	Based on AS 4964-2004	Yes

Table G2: Holding Times

Analysis	Holding Time	Maximum Time Between Sampling and Extraction	Holding Times Met
TPH C6-C9/BTEX	14 days	5 days	Yes
TPH C10-C36	14 days	5 days	Yes
PAH	14 days	5 days	Yes
Metals	6 months	5 days	Yes
OCP	14 days	4 days	Yes
PCB	14 days	4 days	Yes
Asbestos	-	2 days	Yes