WorleyParsons

resources & energy

EcoNomics

LANDCOM

North Tuncurry (NSW) Residential Land Development

Soil Contamination Investigation

301020-02358 – 00-EN-REP-0001

28 April 2010

Infrastructure & Environment
Level 12, 333 Collins Street
Melbourne VIC 3000
Australia
Telephone: +61 3 8676 3500
Facsimile: +61 3 8676 3505
www.worleyparsons.com
ABN 61 001 279 812

LANDCOM
NORTH TUNCURRY (NSW) RESIDENTIAL LAND DEVELOPMENT
SOIL CONTAMINATION INVESTIGATION

Disclaimer

PROJECT 301020-02358 - NORTH TUNCURRY (NSW) RESIDENTIAL LAND DEVELOPMENT

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	J Lee	C Barker	N/A	23/04/2010	N/A	
B	Issued to client	J Lee	C Barker	L Missen	28/04/2010		

CONTENTS

1 INTRODUCTION

1.1 Background

WorleyParsons was engaged by Landcom to conduct a Soil Contamination Investigation (SCI) at the North Tuncurry site on the New South Wales (NSW) Mid-North Coast (the site). The shaded area shown in **Figure 1** outlines the location of the site within the vicinity of North Tuncurry.

The Department of Lands and Landcom have entered into a Project Delivery Agreement (PDA) for the development of the site. The agreement authorises the implementation of site investigations for due-diligence purposes, to determine the feasibility of the site for residential development. Detailed investigations are required to determine the extent and nature of site constraints to allow planning of future development options. The site is nominated as a future urban release area in the Mid-North Coast Regional Strategy 2006-31. This SCI forms a small and contributing component of the detailed investigations required as part of the planning stages.

1.2 Objectives

The objectives of this SCI were to:

- Identify potential land contamination issues that may impact on the proposed development of the site; and
- Conduct a preliminary assessment of the risk to human health, the environment, and the future use of the site, in the context of potential land contamination.

1.3 Scope of Works

The agreed scope of this SCI was undertaken by WorleyParsons and did not include groundwater investigations and was limited to soil sampling and analysis.

The final scope of works essentially included:

- Review of site physical characteristics and available historical information, including previous environmental reports, and regional topography and geology;
- Compilation of an Occupational, Health and Safety plan for mobilisation to/from and within the site, and soil sampling at the site;
- Location of underground services using a Dial Before You Dig enquiry;
- Hand-augering, logging and sampling of 16 soil borehole locations (refer to **Figure 2**);
- Chemical analysis of selected soil samples collected from fieldworks for identified potential contaminants of concern;

- Comparison of soil chemical concentrations with relevant 'tier-one' screening level guidelines as part of a preliminary assessment of risk that the future site development may pose to: human health, the environment and future site use including buildings; and
- Preparation of this report.

2 SITE INFORMATION

The following information was obtained from field observation and the following sources:

- Scanned 1:250,000 Newcastle (Sheet S1 56-2) Geological map viewed from the Geoscience Australia Government website www.ga.gov.au (ref. 14);
- J. Roberts, B. Engel and J. Chapman (June 1988) *Geology of the Camberwell, Dungog and Bulahdelah 1:100,000 Sheets*, Geological Survey of New South Wales Department of Mineral Resources (1988) (ref. 15); and
- WorleyParsons SCI field work conducted between 13 and 14 January 2010.

2.1 Site Description and Key Features

The North Tuncurry site is situated on the NSW Mid-North Coast, approximately 160 km north of Newcastle and 320 km from the Sydney Central Business District (CBD). The site is in the Local Government Area of Great Lakes Council, and is contained within several Crown Land allotments. The Forster Tuncurry Golf Course and Country Club (the golf course) is located within the vicinity of the site and does not form part of this SCI.

The site comprises an irregular, approximately rectangular area of land, occupying approximately 430 ha. The site is bounded by the Nine Mile Beach coastline to the east, The Lakes Way and residential and rural grazing to the west, developed land including residential and an educational facility to the south, and Crown Lands and a landfill (and waste processing facility) to the north (refer to **Figure 2** attached in **Appendix 1**). A cleared electricity easement runs parallel to The Lakes Way adjacent to the western boundary of the site.

At the time of the WorleyParsons 13 and 14 January 2010 field visit, illegally dumped waste materials including: domestic waste, construction and demolition waste, pieces of scrap metal and abandoned cars were observed across the site.

The golf course is located within the southern portion of the site with access from The Lakes Way. The access road to the golf course partially runs along a former airfield runway, located on the southern end of the site. However no significant evidence of any former infrastructure relating to the airfield was evident, except for a 'crushed rock' surface area located adjacent to the start of the golf course access road, which was stockpiled with imported fill material and gravel (understood to be used in the construction of the access road way). At the time of our field work, council workers were undertaking truck maintenance work at the area and engine oil was observed to have been released to the ground from this work (refer to Photograph 5 in **Appendix 4**).

2.2 Topography

The closest surface water bodies are the Wallamba River and Millers Mistake Creek situated approximately between 0.5 and 1.0 km to the west of the site, the Nine Mile Beach (Pacific Ocean) located approximately 300 m to the east, and Wallis Lake situated approximately 1.0 km to the south. The majority of the site is characterised by low lying remnant sand dunes in the west, through to more defined, undulating dunes in the east. The dunes are arranged roughly parallel to the coastline.

2.3 Geology

The 1:250,000 Geological series (Sheet S1 56-2) Newcastle Map Sheet (ref. 14), indicates that the site is underlain by Quaternary age: gravel, sand, silt, clay, ("Waterloo Rock" marine and fresh water deposits). Underlying the sediments are the Devonian age: mudstone, sandstone, conglomerate, greywacke, tuff and chert, including the "Barraba Mudstone", "Baldwin Formation" and "Barraba Series".

Review of the Geological Survey of New South Wales Department of Mineral Resources (DMR) (1988) report (ref. 15) also indicated that the site is located within the Bulahdelah 1:100,000 Geological Sheet, where surrounding areas are known to contain significant mined/quarried deposits and resources of various industrial minerals and rock.

2.4 Vegetation

With the exception of a number of unsealed access tracks that transect the site in a grid-like pattern, the site is vacant and is mostly vegetated. The site is dominated by coastal heath, with scattered occurrences of Blackbutt forest and Blackbutt bloodwood associations. Remnant stands of non-native pine trees were observed in various locations across the site related to former plantation timber activities. In addition, minor evidence of former plantation activities was noted (the disturbance of large areas of the site and remnant stands of pine trees were observed).

3 REVIEW OF PREVIOUS ENVIRONMENTAL REPORTS

A review of available previous environmental assessment reports for the site was conducted. Two reports are known to have been undertaken. These include:

a) *Phase 1 Environmental Site Assessment – Landcom, North Tuncurry, NSW (Draft Report)* (January 2006), Environmental Resources Management (ERM) Australia (ref. 12); and

b) *Preliminary Phase 2 Environmental Site Assessment – North Tuncurry, NSW (Draft)* (June 2006), ERM Australia (ref. 13).

Relevant information relating to the site provided within the reports listed has been summarised below.

***Phase 1 Environmental Site Assessment – Landcom, North Tuncurry, NSW (Draft Report)* (January 2006), ERM Australia**

The objectives of this Phase 1 Assessment were to assess the likelihood of environmental contamination arising from past and present land uses at the site. The scope involved: Site History Review of relevant previous investigation reports, published information database/maps and aerial photographs, and a site inspection. Findings relating specifically to the site were:

- The review of the 1971 aerial photograph noted the presence of the airfield runway in the southern portion of the site. However the review of the coloured aerial photograph revealed that the airfield runaway was no longer in full time use in 1991.
- Strip sand mining and a dam likely related to the mining activities was evident to the north of the site as per the review of the 1971 aerial photograph. It is understood that more access tracks related to the minerals exploration drilling activities, have been cut across the site as the years progressed. The review of the 1991 aerial photograph indicated that the sand mining activities may have ceased, and instead the adjacent area is developed into a landfill and waste sorting facility.
- Potential presence of residual contamination associated with former pine plantation from the use of herbicides and pesticides over the whole site was evident. It was suggested by ERM that based on the time gap since the plantation was active (burnt out in 1939), the high leaching soil conditions and the success of native species in re-colonising the site, contamination levels of these types may have somewhat abated in the shallow soils.
- Illegally dumped waste material was observed across the site, which included abandoned vehicles, construction and demolition waste (including potential asbestos cement materials), waste oil and chemical containers and domestic wastes. It was suggested that some localised contamination to soils and possibly shallow groundwater may have occurred as a result.

It was recommended that a Phase 2 contamination investigation be conducted to ascertain the extent of these potentially contaminating historical activities.

***Preliminary Phase 2 Environmental Site Assessment – North Tuncurry, NSW (Draft)* (June 2006), ERM Australia**

The purpose of this preliminary intrusive site assessment was to identify impacts resulting from on-site past and present activities on and/or adjacent to the site, which may affect future land use. The overall assessment included a targeted soil sampling program based on the findings of the Phase 1 Assessment, further assessment of the potential for impact with regard to past sand mining activities, and assessment of the need for further investigation and provision of recommendations for remedial measures as deemed necessary. Results were as follows:

- Total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) including benzo(a)pyrene were reported in shallow soils at levels exceeding the selected site assessment guidelines in the vicinity of the former airfield runway and along the electricity easement.
- A significant amount of fibrous material fragments were observed on the ground at various locations across the site (samples of which were assessed as containing asbestos fibres).
- Based on the inferred direction of shallow groundwater flow and the distance of the nearby North Tuncurry Municipal Landfill from the site, it was inferred that landfill leachate is not expected to impact shallow groundwater beneath the site.
- Potential exposure to low-level radiation (Naturally Occurring Radioactive Materials – NORMs) as a result of historical nearby sand mining activities was not expected to pose a significant site risk.

Overall, the assessment identified some localised areas of impacted soil and dispersed fibrous material fragments that will warrant remediation if the site is to be developed for standard residential purposes (i.e., a more sensitive usage than the current use). It was indicated that evidence of significant gross impact across the broader site was not identified in relation to known historical and current land uses.

It was indicated that the need for site remediation will depend on the specific nature and location of the proposed development. It is anticipated that any future site development will require a site-specific and development-specific Remedial Action Plan (RAP) that will specifically address the identified areas of localised soil impact, general need to remediate illegal waste dumping sites, and the need to remove or effectively limit exposure to asbestos containing materials (ACMs).

4 INVESTIGATION METHODOLOGY

4.1 Fieldwork

WorleyParsons conducted a soil investigation program giving consideration to the following standards and guidelines:

- National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure*, December 1999 (ref. 7);
- Australian Standard (AS 4482.1) *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*. Standards Australia Publications, 2005 (ref. 9); and
- Australian Standard (AS 4482.2) *Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Substances*. Standards Australia Publications, 1999 (ref. 10).

Soil sampling was carried out on 12 and 13 January 2010 and comprised the augering of 16 boreholes to a maximum depth of 1.0 m below the existing ground level (m bgl) and collection of typically two targeted soil samples from each location. The boreholes were manually excavated by the use of a Sand Auger handled by WorleyParsons field engineers. Prior to the commencement of the augering, a check for buried services was carried out by referring to the plans provided in the Dial Before You Dig site-specific search.

Soil samples were collected generally at or near the existing ground surface and sub-surface (0.5 m and 1.0 m bgl). The sampling procedure comprised:

- Collection of samples off the augers using disposable nitrile gloves;
- Labelling laboratory prepared glass sample containers with individual and unique identification including: project number, sampling date, borehole number and depth;
- Placing the collected soil samples into prepared glass containers and then into a cooled, insulated and sealed ‘chiller pack’;
- Decontaminating all sampling equipment between individual sampling locations using a 3 % solution of phosphate free detergent and then rinsing with potable water prior to collection of each new soil sample; and
- Transportation/dispatch of samples to the responsible analytical testing laboratory under suitable Chain Of Custody (COC) documentation, a copy of which is attached in **Appendix 3**.

All soil samples were screened in the field for volatile organic compounds (VOCs) using a photo-ionisation detector (PID). The PID was calibrated with isobutylene gas prior to use. The PID readings are included on the borehole logs in **Appendix 2**.

Following their completion, the boreholes were backfilled with the augered soil cuttings.

The locations of the boreholes are displayed in **Figure 2** attached in **Appendix 1**. The borehole logs are presented in **Appendix 2** and are preceded by explanatory notes of descriptive terms and symbols used in their preparation.

Selected site photographs are presented in **Appendix 4**.

4.2 Laboratory Testing

A total of 54 soil samples (including four duplicates) were collected, with 44 of these selected for laboratory analysis. These samples were submitted to the following laboratories:

- Primary laboratory - Ecowise Environmental (Ecowise) in Melbourne.
- Secondary laboratory – MGT Environmental Consulting Pty Ltd (MGT) in Melbourne.

Both Ecowise and MGT are accredited by the National Association of Testing Authorities (NATA), Australia for the analyses undertaken.

The soil samples selected for analysis were chosen to provide a representative indication of site soil contamination. The selected samples were analysed for the following potential contaminants:

- TPH, Mono-Aromatic Hydrocarbons: Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and PAH.
- Metals Screen (including: aluminium, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, vanadium and zinc).
- Herbicides (including Phenoxy Acetic Acid (PAA) and Triazine).
- Pesticides (including Organochlorine (OCP) and Organophosphorus (OPP)).
- pH.

The remaining 10 samples not selected for analysis were placed on “hold” at the laboratory to allow further analysis at a later date, if required (typically across a one-month nominal holding period). All analyses were conducted within the soil sample holding times recommended by AS 4482.1-2005 (ref. 9). Copies of the NATA certified laboratory reports and a summary table of the environmental laboratory test results are provided in **Appendix 3**.

4.3 Quality Assurance / Quality Control – Analytical Data

Quality Assurance (QA) is the policies, procedures and actions established to provide and maintain a degree of confidence in data integrity and accuracy. Quality Control (QC) is a sample or procedure intended to verify performance characteristics of a system. A QA/QC program was implemented

during the assessment in general accordance with the guidelines provided in the NEPM (1999) (ref. 7) and the Australian Standard (AS 4482.1-2005) (ref. 9) to ensure the reliability of analytical data.

The primary objectives of this process were to ensure that data of known quality was reported, and to identify if the data could be used to fulfill the overall project objectives. The process involved the checking of analytical procedure compliance and assessment of the accuracy and precision of the analytical data from a range of QC measurements generated from both the sampling and analytical programs.

Specific parameters that were checked and assessed by WorleyParsons for this project included:

- Collection of split and blind field duplicate samples;
- Storage and preservation of samples upon collection and during transport to the laboratory;
- Transportation of samples with accompanying COC documentation;
- Compliance with sample holding times and use of appropriate analytical procedures;
- Review of laboratory blind and split duplicate samples result;
- Review of internal analysis of laboratory duplicates, spikes and blanks; and
- Review the occurrence of apparently unusual or anomalous results, such as, laboratory results that appear to be inconsistent with field observations or measurements.

A quantitative measure of the accuracy of the check analyses results obtained was made using a calculated relative percentage difference (RPD) values. The RPD values were calculated using the following equation.

$$RPD(\%) = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} \times 100$$

Where, Co = concentration obtained from original sample

Cs = concentration obtained from the duplicate sample

The calculated RPD values and summary of the above-mentioned analytical data validation results are included in **Appendix 3**.

4.4 Health and Safety Protocols

Fieldwork conducted as part of this investigation was performed in general accordance with protocols and procedures documented in the WorleyParsons 'OneWay' management framework which establishes corporate expectations for how we will progress towards vision of zero harm. A Health and Safety Management Plan was prepared for the fieldwork program. The purpose of the plan was to establish personal protection standards and mandatory safe working practices to minimise health and safety risks to employees, sub-contractors and the general public during field activities.

5 REGULATORY FRAMEWORK AND APPLICABLE GUIDELINES

In accordance with Section 105 of the NSW *Contaminated Land Management Act 1977* (CLM Act) (ref. 1), the relevant guidelines considered to be applicable in this investigation are discussed below. Reference with regard to the duty to report contamination under the CLM Act (ref. 1) is provided in the document "Contaminated Sites: Guidelines on the Duty to Report Contamination under the *Contaminated Land Management Act 1997*" (ref. 3).

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

- NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition),* NSW Department of Environment and Conservation, Sydney (ref. 2);
- NSW EPA (1994) *Contaminated Sites: Guidelines for Assessing Service Station Sites,* NSW Environment Protection Authority, Sydney (ref. 6); and
- NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure 1999,* National Environment Protection Council, Canberra (ref. 7).

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

The NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme* (ref. 2) and the NEPC 1999 (ref. 7), present soil investigation levels based on health-based soil investigation levels (HBIL) for different land-uses (as discussed below), as well as provisional phytotoxicity-based ecological investigation levels (EIL).

The investigation levels are provided for a number of land use scenarios including:

'A' Residential with gardens and accessible soil, including children's day-care centres, pre-schools, primary schools, townhouses, and villas;

'D' Residential with minimal access to soil, including high-rise apartments and flats;

'E' Parks, recreational open space, playing fields, including secondary schools; and

'F' Commercial or industrial.

Based on the proposed residential development for the site, the HBIL for residential land use, provided in Column 1 'A' of Appendix II in the NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd edition)* (ref. 2) have been adopted in this investigation.

The NSW EPA (2006) guideline (ref. 2) do not provide threshold levels for volatile petroleum hydrocarbon compounds. In the absence of investigation levels for petroleum hydrocarbons, the NSW EPA (1994) *Contaminated Sites: Guidelines for Assessing Service Station Site* (ref. 6) threshold concentrations for sensitive land use have been adopted.

Consideration should also be made if contamination does not cause the land to be aesthetically offensive to the senses of humans. Generally, the land is considered to be aesthetically acceptable if the soils are free of chemical substances or wastes, staining or odours. Potential beneficial use of the land should be assessed during fieldworks for the presence of visual or olfactory evidence of contamination. As an example, significant soil staining or the presence of demolition waste or rubble could be an issue to consider.

The adopted soil investigation levels are included in Table 1 of **Appendix 3**.

6 ASSESSMENT OF SOIL CONTAMINATION

6.1 Site Specific Geological Conditions

Lithological logs are provided in **Appendix 2**. The geological profile encountered during the soil investigation program consisted of sandy topsoil with traces of organics, underlain by light grey brown sand, which is consistent with the expected geology. The general soil profile observed at the site is described below.

0 – 0.05 m bgl	:	Topsoil (SAND), rootlets, light grey, dry.
0.05 – 0.3 m bgl	:	SAND and organic matter, traces of rootlets, grey brown, fine grained, moist.
0.3 – 0.8 m bgl	:	SAND, high quartz content, light grey, well sorted, moist.
0.8 – 1.0 m bgl	:	SAND and mottled dark grey organic matter, light brown, well sorted, moist to wet.

A description of soil lithology encountered at each location, including samples collected, is presented in the borehole logs provided in **Appendix 2**.

Other notable observations recorded during the soil investigation activities included:

- PID readings were measured and ranged from 0 ppm to 51 ppm. PID readings were recorded above 5 ppm at borehole locations: BH7, BH8, BH11, BH13 and BH15, however no hydrocarbon-like odours were observed.
- Imported fill observed from the 'crushed rock' surface area located in the southern part of the site.
- Hydrocarbon-like odours were observed and PID readings were measured at 25 ppm and 9 ppm in targeted soil samples 'Surface 1' and 'Surface 2' respectively, collected from within the 'crushed rock' surface area, located adjacent to the beginning of golf course access road. It was noted that a couple of council workers were undertaking truck maintenance work at the site, and engine oil was observed to have been released to the ground at this area.
- Groundwater was not encountered during the soil investigation.

VOC concentrations were measured in the field using a calibrated PID as a means of identifying potentially contaminated soils. Equipment error was encountered during the sampling program, as readings were increasing and not stabilizing, despite VOCs not being detected in the ambient environment. This was verified by turning off and turning the PID back on. In general VOC concentrations were below detection limits, which is consistent with the concentration of VOCs in the samples reported as below laboratory limits of reporting (LOR).

6.2 Soil Analytical Results

A comparison of soil analytical results compared to the relevant guidelines considered to be applicable to this investigation, in accordance with Section 105 of the NSW Contaminated Land Management Act (1977) (ref.1) are discussed below and are summarised in the Table 1 of **Appendix 3**.

6.2.1 Protection of Highly Modified Ecosystems

Chemical concentrations at the site have been compared with EILs (refer to Table 1). Except the two target samples collected from the crushed rock surface area and sample BH6/0.05-0.15 which reported nickel concentration above the investigation level, the remaining soil samples reported concentrations of: inorganics, TPH, BTEX, PAH, herbicides, pesticides as either below the guideline values or less than the laboratory LOR.

No guideline values were available for aluminium and iron. However, with exception of the targeted surface soil samples, reported aluminium and iron concentrations for the other samples ranged between 17 mg/kg (BH5/0.4-0.5) to 3,200 mg/kg (BH12/0.1-0.2), and 11 mg/kg (BH7/0.5-0.6) to 6,600 mg/kg (BH12/0.1-0.2). The targeted samples: 'Surface 1' and 'Surface 2' reported aluminium concentrations at 1,200 mg/kg and 9,100 mg/kg respectively, and iron concentrations at 2,500 mg/kg and 31,000 mg/kg respectively.

No ecological guideline values were available for comparison against: PAH, BTEX and TPH concentrations except the adoption of NSW EPA *Guidelines for assessing service station sites* (1994) (ref. 6) threshold concentrations, protective of terrestrial organisms in soil for Toluene, Ethyl benzene and Total xylenes (TEX). Where target samples were analysed for TEX, the reported concentrations in 'Surface 2' were below the threshold concentrations however concentrations in 'Surface 1' were above the NSW EPA guideline values (ref. 6).

6.2.2 Protection of Human Health

With the exception of samples: BH6/0.05-0.15, Surface 1 and Surface 2, all soil sample results reported below the adopted HBIL for 'sensitive residential'. The nickel concentration (950 mg/kg) in sample (BH6/0.05-0.15) was above the HBIL of 600 mg/kg.

The PAH (Total) concentrations in targeted soil samples 'Surface 1' and 'Surface 2' were above the HBIL of 20 mg/kg. The NSW EPA *Guidelines for assessing service station sites* (1994) (ref. 6) threshold concentrations for BTEX and TPH were adopted in evaluating the reported concentrations in 'Surface 1' and 'Surface 2' samples. The concentrations of TPH: C_6-C_9 fraction for both samples (Surface 1 and Surface 2) were reported at <100 mg/kg and <20 mg/kg respectively. Sample 'Surface 2' falls within guideline, however, the reported concentration of <100 mg/kg in sample 'Surface 1' falls above the guideline concentration of 65 mg/kg. The reported concentrations of TPH C_{10}-C_{36} fractions for soil samples 'Surface 1' and 'Surface 2' were respectively above and below the guideline of 1,000 mg/kg.

BTEX concentrations in sample 'Surface 2' were reported below the laboratory LOR. Except benzene (<0.5 mg/kg), detected TEX concentrations of 2.6 mg/kg, 1.6 mg/kg and 18 mg/kg respectively were reported in sample 'Surface 1'.

6.2.3 Aesthetics

Potential issues with regard to aesthetics are likely to include the near-surface soil staining as a result of engine oil discharge which were observed present within the crushed rock area at the junction of the road way leading to the golf course, and illegally dumped waste materials including: domestic waste, construction and demolition waste, pieces of scrap metal and abandoned cars observed across the site. ACMs were not observed during the field work undertaken by WorleyParsons.

6.3 Discussion on pH and Potential for Acid Sulfate Soils

6.3.1 Soil pH Consideration

With pH results for soil, the water component of the soil is where pH is measured. Dissolved chemicals cause the soil to be either acidic or alkaline. In this case analytical laboratory testing indicated a pH range between 4.2 to 6.2, with an average pH of 5. This suggests that the shallow soils are slightly acid.

- This level of acidity is just outside the ideal range for plant growth.
- The Australian piling code AS 2159-1995 (ref. 11) suggests that for steel corrosion, pH within the range 5 to 9 is not a determining factor.
- No testing was conducted for sulfate in soil, which represents a potential data gap (see discussion below).

6.3.2 Potential for Acid Sulfate Soils

Acid Sulfate Soils (ASS) are soils containing iron sulfides (mostly pyrite (FeS_2) with typically smaller quantities of iron monosulfides (FeS)). If the iron sulfides are exposed to atmospheric oxygen, they can be oxidised. This produces a mix of: sulfuric acid, aluminum, iron and other metals, that can move into coastal waters, often causing significant impacts to the environment and built environment.

The iron sulfides are generally contained in a layer of waterlogged soil in their natural state. This layer can be clay or sand. Shallow water prevents oxygen in the air reacting with the iron sulfides. This layer is commonly known as potential acid sulfate soil (PASS), because it has the potential to oxidise to sulfuric acid

As a consequence of these conditions prevailing in the Holocene period, many Australian low-lying coastal plains have tracts of Potentially Acid Sulfate Soils (PASS) or ASS.

Draining of floodplains and wetlands on the coast or drying of usually inundated wetlands inland results in permanently saturated soils becoming exposed to the atmosphere. When this occurs, this exposure causes a number of chemical reactions, resulting in a build-up of sulfuric acid, iron and aluminium.

In general, iron sulfide layers may be expected to occur where the surface elevation is less than 5 m above mean sea level. In Australia, iron sulfide layers are found along the coastlines of the Northern Territory, Queensland and New South Wales. They are also found along the northern coastline of Western Australia, and around Perth, Adelaide and Westernport Bay near Melbourne.

The level of acidity observed in these relatively shallow site soil samples, coupled with the general observation that aluminium and iron concentrations in soils are typically higher in near-surface soil samples than deeper samples at the same locations, would suggest that these sands may be PASS.

7 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the soil investigation undertaken as part of this SCI, the following may be concluded:

- Based on the information provided by DMR (1988) (ref. 15), the site is located in a region known for heavy mineral sand resources. These sediments are mature, quartz-rich "marine" and aeolian sands, which contain a mature suite of heavy metals (*rutile, zircon, ilmenite* and *monazite*). It is likely that the high iron concentrations reported in the samples collected are represented by the presence of *rutile* and *ilmenite*. These sediments are noted to be present in Quaternary coastal beach ridge barriers and dunes. Relevant to the concentrations reported to date, iron is deemed to be naturally occurring.
- With the exception of one nickel concentration in a near surface soil sample at location BH6, the other inorganic concentrations were below the adopted 'tier-one' guidelines for maintenance of ecosystems and human health guidelines.
- Petroleum hydrocarbon contamination was encountered in surface soils collected from the 'crushed rock' area located adjacent to the beginning of the golf course access road.
- Aluminium and iron concentrations were typically higher in near-surface soil samples than deeper samples at the same sampling location, which would suggest that these sands may be PASS.
- Other than the above mentioned, all reported chemical concentrations were below the adopted maintenance of ecosystem and protection of human health guidelines (residential).
- Potential issues with regard to aesthetics include: the near surface soil staining observed to be present within the 'crushed rock' area adjacent to the golf course access way, the obvious illegally dumped waste materials across the site (near surface) and the potential for other waste and ACMs as outlined in Section 6.2.
- Groundwater was not assessed within the general work scope but shallow groundwater is expected to be present.

Based on the findings and observations during this SCI, WorleyParsons recommends that a combination of remediation works and management procedures be implemented at the site during development. Remediation works would initially involve the removal of illegally dumped waste materials (e.g., domestic waste, construction and demolition waste, pieces of scrap metal and abandoned cars) observed across the site, and the removal of the near surface impacted soil within the 'crushed rock' surface area located adjacent to the beginning of golf course access road. Remediation of localised hydrocarbon impacted soil may involve either treatment (on or off site) or off-site disposal. A suitable environmental consultant should be present during the removal of the soil, for

the purpose of identifying and sampling potentially impacted soil that may be encountered during these works.

WorleyParsons recommends the following for Landcom's consideration.

- Conduct the assessment of shallow groundwater conditions across the site and for areas adjacent to potential off-site contaminated sources (landfill) with respect to human health and ecological risk.
- Checks should be made on these shallow sand soils at the site for PASS with additional field soil sampling and laboratory anaytical testing including:
    i. Field screening allowance for pH_{field} and $pH_{fox,}$; and
    ii. Presence of PASS and Actual Acid Sulfate Soil (AASS). This testing (given we have sands) should utilise the 'Chromium Suite' that includes the analysis for pH_{KCL}, Chromium Reducible Sulfur (SCR), Titratable Actual Acidity (TAA) and Acid Neutralisation Capacity (ANC). These results will combine to assess net acidity and if-required, potential lime treatment rates for excavated/exposed soils using Acid-Base Accounting.
- Appropriate management of waste materials during removal from site.
- Preparation of a Remediation Action Plan (RAP), which will outline the remediation goals, methods of remediation and validation requirements. This would include information on removal and/or remediation of contaminated soils, and other information.
- Implementation of the RAP to remediate the site in association with the Master Planning exercise for the proposed development, so that the site does not pose a risk to human health or the environment.
- It is expected that this RAP would include as a required future stage:
    i. Preparation and implementation of an appropriate Construction Management Plan to provide guidance on the approach, management of contaminated soil and generation during site construction; and
    ii. Preparation and implementation of an appropriate Site Management Plan to risk manage any residual contamination that remain on site (post-remediation).

8 REFERENCES

1) NSW Government (1997) Contaminated Land Management Act 1997 No 140.

2) NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition), NSW Department of Environment and Conservation, Sydney.

3) NSW EPA (2009) Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, New South Wales Environment Protection Authority (June 2009).

4) NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines. New South Wales Environment Protection Authority.

5) NSW EPS (2000) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites. New South Wales Environment Protection Authority.

6) NSW EPA (1994). Contaminated Sites – Guidelines for Assessing Service Station Sites. New South Wales Environment Protection Authority (December 1994).

7) NEPC (1999). National Environment Protection (Assessment of Site Contamination) Measures. National Environment Protection Council (NEPC).

8) ANZECC (1992). Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites. Australian and New Zealand Environment Conservation Council, (January 1992).

9) Australian Standard AS 4482.1–2005 “Guide to the sampling and investigation of potentially contaminated soil, Part 1: non-volatile and semi volatile compounds”

10) Australian Standard AS 4482.2 (1999). Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 2: Volatile Compounds. Australian Standard (AS).

11) Australian Standard AS 2159-1995 "Piling – Design and Installation".

12) *Phase 1 Environmental Site Assessment – Landcom, North Tuncurry, NSW (Draft Report)* (January 2006), Environmental Resources Management (ERM) Australia.

13) *Preliminary Phase 2 Environmental Site Assessment – North Tuncurry, NSW (Draft)* (June 2006), ERM Australia.

14) Newcastle Geological Map 1:250,000 (Sheet S1 56-2) sourced from the Geoscience Australia Government website www.ga.gov.au.

15) J. Roberts, B. Engel and J. Chapman (June 1988) *Geology of the Camberwell, Dungog and Bulahdelah 1:100,000 Sheets*, Geological Survey of New South Wales Department of Mineral Resources (1988).

9 LIMITATIONS

This report was prepared for the exclusive use of LANDCOM, and is intended to provide LANDCOM with an understanding of the potential for environmental contamination at the Site. The scope of services performed in completing this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this report or the findings, conclusions, or recommendations presented herein is at the sole risk of said user.

The findings and recommendations in this report are based upon data and information obtained during a visit by WorleyParsons personnel to the Site identified herein and the condition of the Site on the date or period of the visit, supplemented by information and data obtained by/or provided to WorleyParsons and described within this report.

The WorleyParsons work as covered by this report was completed in accordance with the agreed Terms and Conditions associated with the following series of documents:

- LANDCOM – North Tuncurry Coastal Hazard & Flood Study Brief, May 2009.
- WorleyParsons Tender 996/09 North Tuncurry Coastal Hazard & Flood Study, dated 19 January 2010; and
- WorleyParsons Revised Tender 996/09 North Tuncurry – Revised Fee, dated 12 October 2009.

The conclusions provided herein by WorleyParsons are based upon the agreed scope of work as prescribed in these documents.

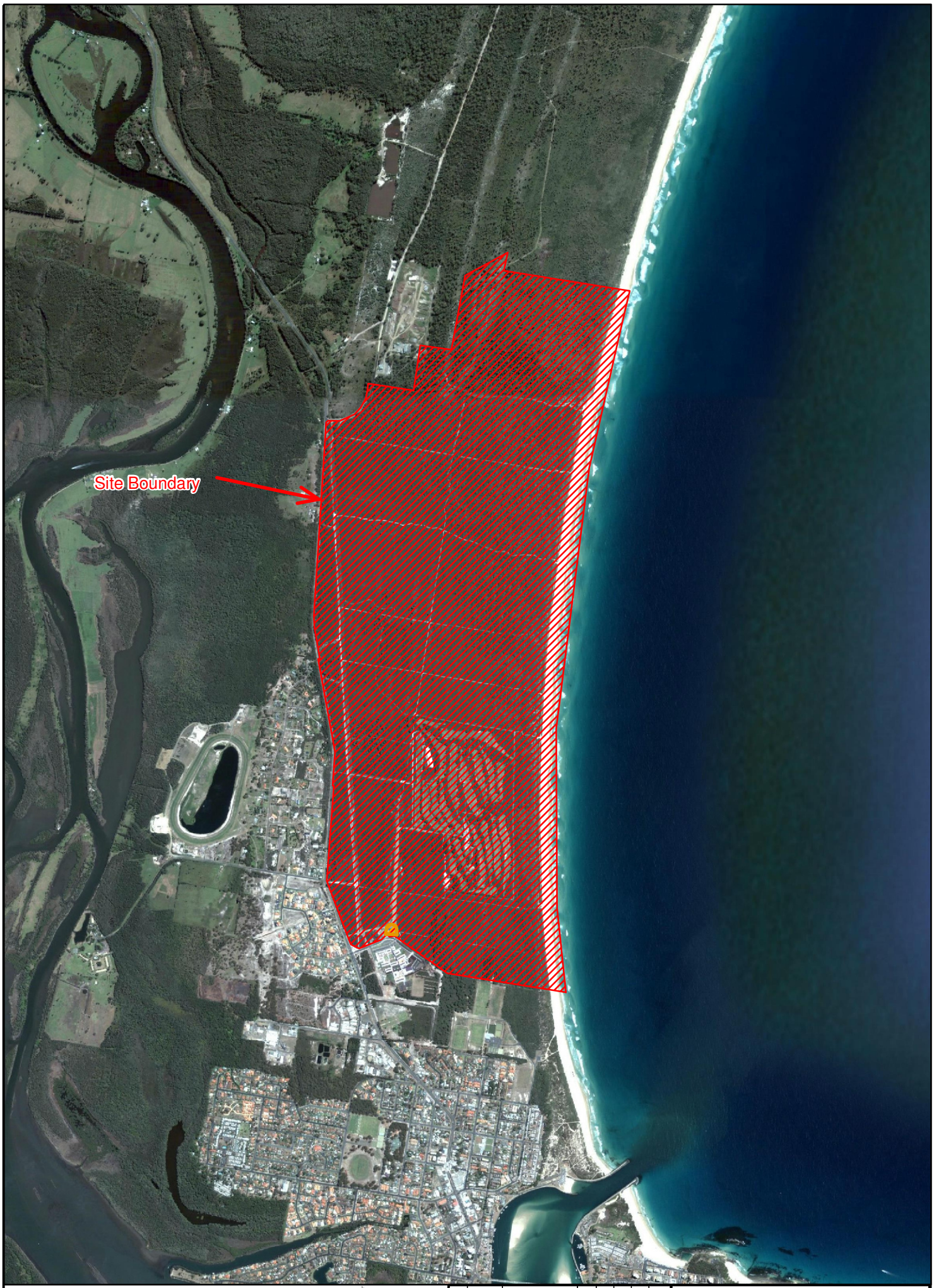
The report has been prepared in accordance with industry standard practices. The completed work outlined in this report was based in part on visual observations of the Site and associated conditions. The professional opinion expressed by WorleyParsons cannot be extended to areas of the Site that were unavailable for direct observation.

The objective of the project was to assess the environmental conditions of the Site with respect to existing environmental regulations and practices, but excludes the compliance of past owners/tenants with Council, State and/or Federal regulations or laws.

Conclusions in this report may be based on information provided by others, which is believed to be accurate but cannot be guaranteed.

It should be recognised that this study was not intended to be a definitive investigation of contamination at the Site (for example a detailed investigation of groundwater contamination potential was not conducted with the agreed scope of work). Given that the scope of the services for this investigation included limited soil sampling and analytical testing, it is possible that currently unrecognised contamination may remain at the Site, and, if present, that the levels of contamination may vary.

Appendix 1 Figures



N

SCALE 1:25000 (at A4)

0 0.25 0.5 1 km

Coordinate System: Projected (Zone 55)
Datum: GDA 1994

Rev	Date	Revision Description	ORIG	CHK	ENG	QA	APPD
0	27/04/2010		AB	JL	-	-	-

WorleyParsons
resources & energy

North Tuncurry (NSW)

Figure 1.

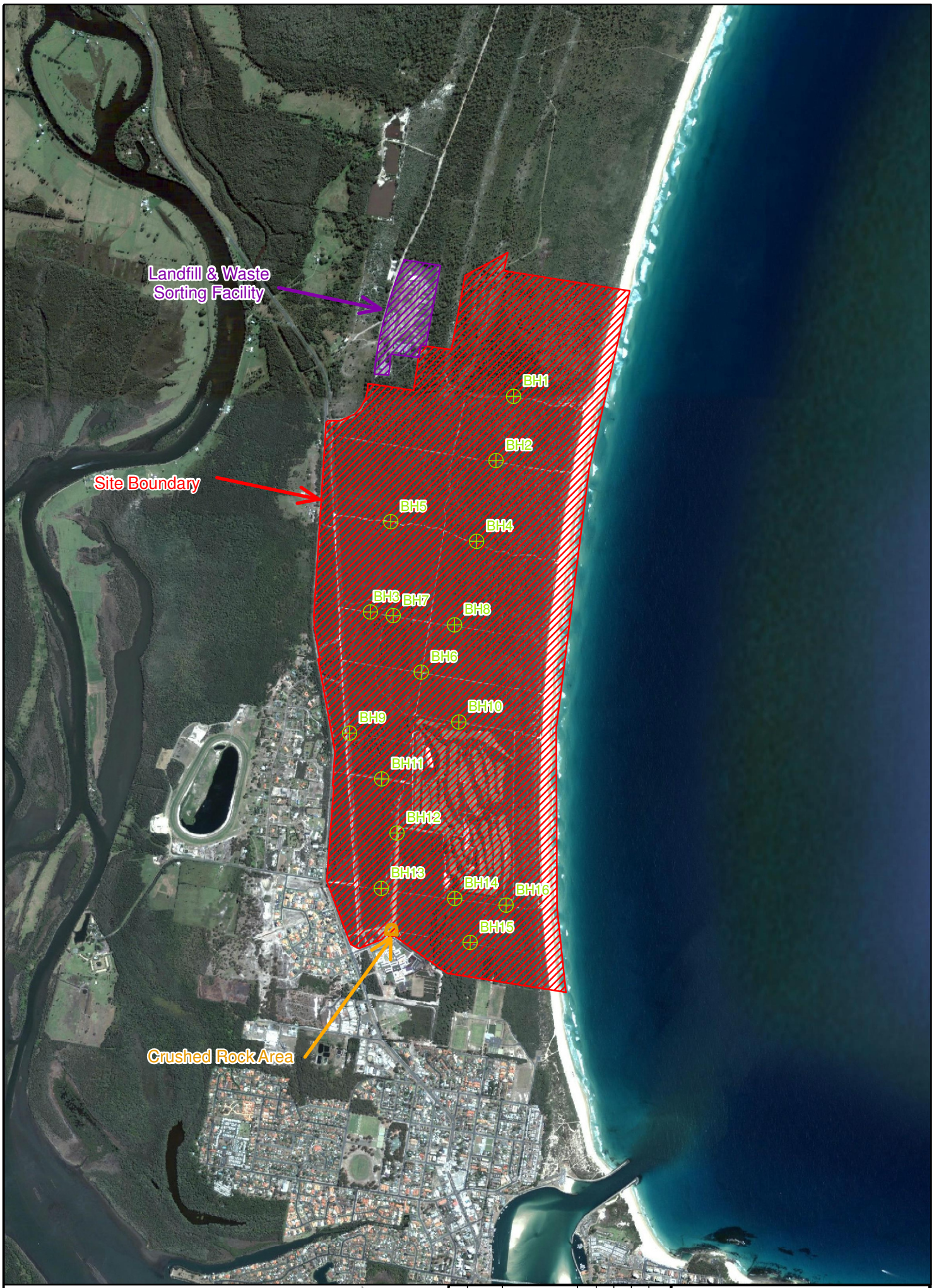
Site Plan

Project No: 301020-02358

File Name: Tuncurry_google_aerials_03.mxd

Compiled by WORLEYPARSONS SOUTHERN OPERATIONS GEOMATICS

Path: K:\FRASER\GEOTECHNICAL\PROJECTS\301020-02358 North Tuncurry Residential Land Development\10_Engineer\10-13_EN-Environment



N

SCALE 1:25000 (at A4)

0 0.25 0.5 1 km

Coordinate System: Projected (Zone 55)
Datum: GDA 1994

Rev	Date	Revision Description	ORIG	CHK	ENG	QA	APPD
0	27/04/2010		AB	JL	-	-	-

WorleyParsons
resources & energy

North Tuncurry (NSW)

Figure 2.

Soil Borehole Location Plan

Project No: 301020-02358 | File Name: Tuncurry_google_aerials_03.mxd

Compiled by WORLEYPARSONS SOUTHERN OPERATIONS GEOMATICS

Path: K:\FRASER\GEOTECHNICAL\PROJECTS\301020-02358 North Tuncurry Residential Land Development\10_Engineer\10-13_EN-Environment

Appendix 2 Soil Borehole Logs

Worley
ABN 61 001 279 812

EXPLANATORY NOTES FOR BOREHOLE/VIBROCORE LOGS

Geotechnical logging is carried out in general accordance with Australian Standard AS 1726 - 1993 "Geotechnical site investigations". The description of soils is based on the Unified Soil Classification system and includes type, plasticity, particle characteristics, colour and minor components. Classification of soils is based on particle size distribution and plasticity, in accordance with Appendix A of AS 1726 - 1993. The terminology used by Worley Pty Ltd to describe the condition of soils for logging purposes is summarised below.

MOISTURE CONDITION

Term	Symbol	Field Guide
Dry	D	Looks and feels dry. Cohesive soils usually hard, friable or powdery. Granular soils are cohesionless and free running
Moist	M	Feels cool and darkened in colour. Cohesive soils can be moulded by hand. Granular soils tend to cohere
Wet	W	Feels cool and darkened in colour. Cohesive soils usually weakened and free water forms on hands when remoulding. Granular soils tend to cohere

CONSISTENCY OF COHESIVE SOILS

Term	Symbol	Undrained Shear Strength (kPa)	Field Guide
Very Soft	VS	Less than 12	Exudes between fingers when squeezed in hand
Soft	S	12 to 25	Can be moulded by light finger pressure
Firm	F	25 to 50	Can be moulded by strong finger pressure
Stiff	St	50 to 100	Cannot be moulded by fingers, can be indented by thumb
Very Stiff	VSt	100 to 200	Can be indented by thumb nail
Hard	Hd	More than 200	Can be indented with difficulty by thumb nail

DENSITY OF GRANULAR SOILS

Term	Symbol	Density Index (%)
Very Loose	VL	Less than 15
Loose	L	15 to 35
Medium Dense	MD	35 to 65
Dense	D	65 to 85
Very Dense	VD	More than 85

PLASTICITY OF FINE GRAINED SOILS

Term	Range of Liquid Limit (%)
Low Plasticity	Less than 35
Medium Plasticity	35 to 50
High Plasticity	More than 50

MINOR COMPONENTS

Term	Field Guide	Material Proportion
Trace of	Presence just detectable	Coarse grained soils less than 5 % Fine grained soils less than 15 %
With some	Presence easily detectable	Coarse grained soils between 5 to 12 % Fine grained soils between 15 to 30 %

SAMPLE/TEST

Details of field testing (and samples retrieved) including the following:

SPT	Standard Penetration Test (blows per 150mm and N value), HB - hammer bouncing, RW - rod weight
U	63mm diameter Thin Walled Tube Sample
HV	Hand Vane Test
PP	Pocket Penetrometer Test
Bs	Bulk Sample
	Disturbed Sample Interval (laboratory test result can be provided or alternatively type of test indicated "X")

Worley
ABN 61 001 279 812

CEMENTATION CLASSIFICATION

Term	Symbol	Definition
Uncemented	Uc	Clean grains exhibiting soil properties
Very weakly cemented	Vwk	Cement on some grains, collapsing feel under very light finger pressure
Weakly cemented	Wk	Cement on many grains, collapsing feel under finger pressure, breaks down to individual grains
Moderately weakly cemented	Mwk	Cement on most grains, breaks down to lumps under finger pressure, can crush to individual grains under knife blade
Moderately cemented	Mo	Cement on most grains, can break fragments off by hand and crush to small lumps under knife blade
Well cemented	We	All grains cemented together, cannot break fragments off by hand, dull sound under hammer
Very well cemented	Vwe	Most primary pores filled with cement, requires firm blow with hammer to break off fragments, rings when struck

Notes:

1. The cementation classification in AS 1726 - 1993 is provided for soils.
2. The above classification system uses terms commonly adopted by geotechnical engineering practice in Western Australia.

DEFECT SPACING

Term	Symbol	Definition
Extremely Wide	Ew	More than 2m
Wide	W	600mm to 2m
Moderate	M	200 to 600mm
Close	C	60 to 200mm
Very Close	Vc	20 to 60mm
Extremely Close	Ec	Less than 20mm

ROCK MASS WEATHERING

Weathering of the rock mass in relation to the distribution of weathered materials and the effect of defects is described below.

Grade	Description
I	No visible sign of weathering except perhaps staining on defect surfaces
II	Almost all rock is discoloured by slight weathering
III	Less than half of the material is moderately to extremely weathered, some residual boulders/corestones may be present
IV	More than half of the material is moderately to extremely weathered, occasional corestones may be present
V	The material is extremely weathered with mass structure largely intact
VI	Refer to soil classification system

Note:

1. The above weathering grades apply to relatively large scale exposures. For boreholes, weathering terms discussed previously apply.

ROCK MASS BLOCK SHAPE

Blocky	Equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greater than cross section

Worley
ABN 61 001 279 812

KEY TO DEFECT DESCRIPTIVE TERMS USED ON CORED BOREHOLE LOGS

(SHEET 2 of 2)

DEFECT DESCRIPTORS

[a] **Type:**

F - Fault
J - Joint
Fo - Foliation
V - Vein
B - Bedding
S - Shear

[b] Dip of fracture surface measured relative to a plane perpendicular to core axis (dip direction to be provided if core orientated)

[c] **Planarity:**

Un - Undulating, wavy surface
Pl - Planar, no variation in orientation
St - Stepped, well defined steps present
Ir - Irregular, many changes in orientation

[d] **Roughness:**

Slk - Slickensides, visual evidence of striations
S - Smooth, surface appears and feels smooth
SR - Slightly rough, asperities on the defect surface are distinguishable and can be felt
R - Rough, some ridges and angle steps are evident, asperities are clearly visible and surface feels abrasive
VR - Very rough, near right angle steps and ridges occur on the defect surface

[e] **Type of Infilling:**

Cl - Clay
Ca - Calcite
Ch - Chlorite
Fe - Iron oxide
Gy - Gypsum
H - Healed
Mn - Manganese oxide
Gr - Gravel
Py - Pyrite
Qz - Quartz
Sd - Sand
CA - Calcrete
Si - Silt
Uk - Unknown

[f] **Amount of Infilling:**

Cn - Clean, no visible coating or infilling
Su - Surface Stain, no visible coating or infilling but surfaces are discoloured
Vn - Veneer, a visible coating or infilling too thin to measure, may be patchy
Co - Coating, visible coating or infilling up to 1mm thick
Fi - Filled, coating or infilling greater than 1mm thick with amount in millimetres. Thick soil infilling to be described as seams if boundaries roughly parallel, or crushed seams if composed of rock fragments e.g. brecciated

Notes:

1. Cores with defect spacings in the range extremely close to close can be collectively denoted as "highly fractured" where considered appropriate

2. NR - not recorded NA - not applicable

CORED BOREHOLE LOG

Worley
ABN 61 001 279 812

BOREHOLE NO.:

SHEET: OF

CLIENT:

PROJECT:

LOCATION:

JOB NUMBER:

DATE COMMENCED:

DATE COMPLETED:

LOGGED BY:

CHECKED BY:

Drill Contractor: | Drill Fluid: | Hole Angle: | Easting: | Surface R.L.:

Drill Model: | Bore Size: | Bearing: | Northing: | Datum:

Method	Casing	Drill Rate (min/m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Material Description	Cementation/ Weathering	Estimated Strength	Defect Spacing (mm)	Lift & Core Recovery (%)	RQD %	Lab Tests: PLI (MPa)	Lab Tests: UCS (MPa)	Lab Tests: ITS (MPa)	Lab Tests: Other	Field Records / Comments and Defect Description	Water
1	2	3	4	4	5	6	7	8	9	10	11	12	13	13	13	13	14	16
PQ-3	Open Hole	6.7	-13.0	0.5	Marine Sands	CL	CARBONATE SAND (SP): fine to medium grained, subrounded, pale grey, trace fine grained carbonate gravel (shells).	CL									Probe refusal between 0.4 to 0.7m. Material description based on grab sample.	
																	Core loss: 0 to 0.6m	
			-13.5	1.0	Coastal Limestone		CALCIRUDITE: fine to medium grained comprising shells/shell fragments and rounded lithic clasts to 15mm in calcarenite matrix, granular texture, grey, white, pale brown.	Mo-Mwk	L		1 / 60	27	0.42				a b c d e f 15	
							0.9 to 1.1m: some borings		L-M								B, 30, Pl, R, Cl, Vn	
							...grading to calcarenite											

KEY TO CORED BOREHOLE LOG (SHEET 1 OF 2)

The top section of the log is self explanatory giving details of the project including the client, location, drill contractor, job number, date, logger, drill information and survey data. The main part of the log is summarised below.

1 METHOD: Drill method; PQ-3 Core, HQ-3 Core, Washbore etc

2 CASING: Depth and size of casing or open hole

3 DRILL RATE: Time to drill/core interval (minutes per metre)

4 RL/DEPTH: Elevation relative to datum or distance in metres below ground level

5 GEOLOGICAL UNIT: Identification of the geological unit (if known) or symbol used for identification of geological unit on site plan

6 GRAPHIC LOG: Graphic pattern of rock or material type

7 MATERIAL DESCRIPTION: Lithologic description in the order; rock or material type, grain size and shape, texture/fabric, colour, mineral composition or minor inclusions

8 CEMENTATION: Rock cementation descriptor e.g. Coastal Limestone and pedocretes

WEATHERING: Rock weathering descriptor e.g. most rocks and ancient limestones

9 ESTIMATED STRENGTH: Rock strength descriptor

10 DEFECT SPACING: Graphic record of spacing between natural pre-existing defects. Known breaks induced by drilling or handling core (denoted as "m") are discounted. Zones of core loss are left blank

11 LIFT/%REC: The end of a core run is defined as the lift. Core recovery represents the ratio of core recovered to the length drilled for the corresponding core run and is expressed as a percentage. Intervals of core loss are denoted "CL"

12 RQD: Rock Quality Designation; is the ratio of the length of sound core recovered in pieces over 100mm to the length of core run drilled. Mechanical breaks are discounted

13 TESTS: Field or laboratory test results e.g. point load index (diametral-D or axial-A), uniaxial compressive strength, indirect tensile strength (Brazil test)

14 FIELD RECORD/COMMENTS: Comments on drilling, fluid loss, core loss, sampling etc

15 DEFECT DESCRIPTION: Annotated description using terms described on the following page (Items a to f)

16 WATER: Water level/depth; time (24 hr clock) and date to be provided

Notes on RQD:

1. Residual soil, extremely weathered material and highly weathered rock are judged not to be representative of sound core. Very weakly cemented, weakly cemented and moderately weakly cemented materials are judged not to be representative of sound core.
2. Engineering judgement is required when assessing RQD in variably cemented limestone containing cavities, and should therefore be used as indicative only.

Worley
ABN 61 001 279 812

EXPLANATORY NOTES FOR CORED BOREHOLE LOGS

Geotechnical logging is carried out in general accordance with Australian Standard AS 1726 - 1993 "Geotechnical site investigations". The terminology used by Worley Pty Ltd to describe the condition of rocks and associated materials for logging purposes is summarised below.

WEATHERING CLASSIFICATION

Term	Symbol	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 i.e. it either disintegrates or can be remoulded in water. Original fabric still evident
Highly Weathered Rock	HW	Rock is weathered to such an extent that it shows considerable change in appearance and loss in strength. Material is still a rock but of relatively low strength
Moderately Weathered Rock	MW	Rock is weathered to such an extent that it shows a visible change in appearance with significant loss in strength
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh Rock	FR	Rock shows no sign of decomposition or staining

Notes:

1. AS 1726 - 1993 suggests the term "distinctly weathered" to cover the range from extremely weathered to slightly weathered. For projects where it is judged that there is no advantage in differentiating between highly weathered and moderately weathered, "distinctly weathered" may be adopted using the definition given in AS 1726 - 1993.
2. Moderately weathered and highly weathered definitions above are taken from AS 1726 - 1981

ROCK MATERIAL STRENGTH

Term	Symbol	Point Load Index $I_{s(50)}$ (MPa)	Field Guide
Very Low	VL	Less than 0.1	Material crumbles under firm blows with sharp end of geological 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 knife, indentations 1 to 3mm show with firm blows 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	Readily scored with 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 diameter cannot 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 pick to break, rock rings under hammer

Notes:

1. The term "extremely low" is not used as a rock material strength term. Although it is stated in AS 1726 - 1993 the accompanying field guide clearly states that materials in that strength range are soils in engineering terms.
2. Anisotropy of rock samples may affect field assessment of strength.
3. Uniaxial Compressive Strength (UCS) values are to be stated where tested for project specific correlation with Point Load Strength Index.

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH1***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:**	453113	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:**	6445047	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, fine grained, dry.				
						SAND: greyish brown, with traces of organic matter, fine to medium grained, moist.		BH1/0.05-0.15 = Dup 3	PID recorded at 0.4 ppm.	
			0.5			SAND: light brown, with some organic matter, fine to medium grained quartz, moist.		BH1/0.5-0.6	PID recorded at 0.3 ppm.	
			1.0					BH1/0.9-1.0	PID recorded at 0.4 ppm.	
						End of BH1 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH2***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 453004	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6444649	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, fine grained, dry.				
						SAND: greyish brown, with rootlets and some organic matter, fine to medium grained, moist.		BH2/0.05-0.15	PID recorded at 0.2 ppm.	
						SAND: light brown, with traces of organic matter, fine to medium grained, moist.		BH2/0.4-0.5	PID recorded at 0.4 ppm.	
			0.5							
			1.0			End of BH2 at 1m		BH2/0.9-1.0	PID recorded at 0.2 ppm.	
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH3***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:**	452224	**Surface R.L.:**	N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:**	6443709	**Datum:**	

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA						SAND (Topsoil): light grey, with rootlets, fine grained, dry.				
						SAND: greyish brown, with some organic matter, fine to medium grained, moist.		BH3/0.05-0.15	PID recorded at 0.0 ppm.	
			0.5			SAND: light greyish brown, well sorted, fine to medium grained quartz, moist.		BH3/0.5-0.6	PID recorded at 0.3 ppm.	
			1.0					BH3/0.9-1.0	PID recorded at 0.2 ppm.	
						End of BH3 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH4***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452884	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6444148	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND: light grey, with rootlets, fine grained, dry.		BH5/0.05-0.15	PID recorded at 0.1 ppm.	
						SAND: dark greyish brown, with some organic matter, fine to medium grained, moist.				
			0.5			SAND: light brown, well sorted, fine to medium grained, moist.		BH5/0.4-0.5	PID recorded at 0.1 ppm.	
			1.0					BH5/0.9-1.0	PID recorded at 0.0 ppm.	
						End of BH4 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH5***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:**	452350	**Surface R.L.:**	N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:**	6444269	**Datum:**	

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.5			SAND (Topsoil): light grey, fine grained, dry.				
						SAND: dark greyish brown, with some organic matter, fine to medium grained, dry to moist.		BH5/0.05-0.15	PID recorded at 0.3 ppm.	
						SAND: light grey, with mottled black organic matter, fine to medium grained quartz, moist.		BH5/0.4-0.5	PID recorded at 0.4 ppm.	
			1.0					BH5/0.9-1.0	PID recorded at 0.4 ppm.	
						End of BH5 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH6***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452540	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6443336	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, with rootlets, fine grained, dry.				
						SAND: greyish brown, with some organic matter, fine to medium grained, moist.		BH6/0.05-0.15	PID recorded at 1.0 ppm.	
			0.5			SAND: light grey, well sorted, fine to medium grained, moist.		BH6/0.4-0.5	PID recorded at 0.1 ppm.	
			1.0					BH6/0.9-1.0	PID recorded at 0.2 ppm.	
						End of BH6 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH7***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:**	452365	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:**	6443687	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.5			SAND (Topsoil): light grey, fine grained, dry. SAND: dark greyish brown, with abundant rootlets and some organic matter, fine grained, moist. SAND: dark greyish brown, with traces of silt, fine to medium grained, moist. SAND: light grey, fine to medium grained quartz, moist.		BH7/0.05-0.15 = Dup 2 BH7/0.5-0.6 BH7/0.9-1.0	PID recorded at 51.1 ppm. PID recorded at 5.1 ppm. PID recorded at 5.0 ppm.	
			1.0			End of BH7 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH8***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452746	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6443629	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, with traces of rootlets, dry.		BH8/0-0.1	PID recorded at 32.0 ppm.	
						SAND: light grey, with some organic matter, dry.				
						SAND: brown, with interbedded heavily oxidised silty clay, reddish brown, firm, with some rootlets, moist.		BH8/0.4-0.5	PID recorded at 24.2 ppm.	
			0.5			SAND: light grey, with traces of silt and organic matter, moist.				
						SAND: light grey, with traces of silt lamenation and rootlets, fine to medium grained, moist.		BH8/0.9-1.0	PID recorded at 7.6 ppm.	
			1.0			End of BH8 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH9***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452095	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6442957	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, fine grained, dry.				
						SAND: greyish brown, with some organic matter, fine to medium grained, dry to moist.		BH9/0.05-0.15 = Dup 4	PID recorded at 0.0 ppm.	
			0.5			SAND: grey, with traces of organic matter, well sorted, moist.		BH9/0.4-0.5	PID recorded at 0.6 ppm.	
						SAND: light grey, with mottled black organic matter, well sorted, moist.		BH9/0.9-1.0	PID recorded at 0.0 ppm.	
			1.0			End of BH9 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH10***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452772	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6443027	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, with some rootlets, dry.				
						SAND: dark grey, with some organic matter, dry.		BH10/0.05-0.15	PID recorded at 0.0 ppm.	
						SAND: greyish brown, with traces of organic matter, well sorted, moist.				
			0.5			SAND: light brown, fine to medium grained quartz, well sorted, moist.		BH10/0.4-0.5	PID recorded at 0.0 ppm	
						SAND: brown, well sorted, moist to wet.		BH10/0.9-1.0	PID recorded at 0.3 ppm.	
			1.0			End of BH10 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH11***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452294	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6442673	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
						SAND (Topsoil): light grey, with some rootlets, dry.				
						SAND: greyish brown, with rootlets and some organic matter, fine to medium grained, dry to moist.		BH11/0.05-0.15	PID recorded at 15.0 ppm.	
HA			0.5			SAND: light grey, fine to medium grained quartz, moist.		BH11/0.4-0.5	PID recorded at 15.9 ppm.	
						Possible interbeds of organic lense (of less than 5 mm).		BH11/0.9-1.0	PID recorded at 7.6 ppm.	
			1.0			End of BH11 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH12***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***12.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***12.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452389	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6442338	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			Sandy SILT (Topsoil): dark brown, with gravel (fill from roadway), with some rootlets, dry.				
						Silty SAND: dark brown, with traces of rootlets, dry to moist.		BH12/0.1-0.2	PID recorded at 0.7 ppm.	
						SAND: dark grey, with traces of rootlets, fine to medium grained, well sorted, moist.				
						SAND: light grey, fine to medium grained quartz, well sorted, moist.		BH12/0.4-0.5	PID recorded at 0.4 ppm.	
			0.5							
								BH12/0.8-0.9	PID recorded at 0.1 ppm.	
			1.0			End of BH12 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH13***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***13.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***13.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:**	452291	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:**	6441994	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): light grey, with some organic matter, dry.				
								BH13/0.05-0.15	PID recorded at 9.3 ppm.	
						SAND: dark greyish brown, with some organic matter, fine grained, moist.				
			0.5					BH13/0.4-0.5	PID recorded at 10.9 ppm.	
						SAND: grey, with traces of organic matter, fine to medium grained quartz, well sorted, moist.				
								BH13/0.8-0.9	PID recorded at 10.5 ppm.	
			1.0			End of BH13 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH14***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***12.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***12.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452747	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6441931	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): brown, with some mulch (wood chips and barks), dry.				
						SAND: brown, with some rootlets and organic matter, fine to medium grained, dry.		BH14/0.1-0.2	PID recorded at 2.4 ppm.	
			0.5			SAND: light grey, fine to medium grained quartz, moist.		BH14/0.4-0.5	PID recorded at 0.9 ppm.	
						Becoming fine grained quartz with mottled black organic matter.		BH14/0.8-0.9	PID recorded at 0.2 ppm.	
			1.0			End of BH14 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons resources & energy

BOREHOLE NO.: ***BH15***

SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***12.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***12.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 452844	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6441659	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND: grey, with traces of organic matter, fine grained quartz, dry.				
								BH15/0.1-0.2	PID recorded at 10.1 ppm.	
						SAND: light grey, fine to medium grained quartz, dry to moist.				
			0.5			Becoming moist.		BH15/0.6-0.7	PID recorded at 11.7 ppm.	
						Becoming light brown, and less quartz.				
			1.0					BH15/0.9-1.0	PID recorded at 0.7 ppm.	
						End of BH15 at 1m				
			1.5							
			2.0							

ENVIRONMENTAL BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***BH16***
SHEET: 1 OF 1

CLIENT:	***LANDCOM***	DATE COMMENCED:	***12.1.2010***
PROJECT:	***North Tuncurry Soil Contamination Investigation***	DATE COMPLETED:	***12.1.2010***
LOCATION:	***North Tuncurry, NSW***	LOGGED BY:	***JL & TW***
JOB NUMBER:	***301020-02358***	CHECKED BY:	***JH***

Drill Contractor:	N/A	**Bore Size:**	50 mm	**Hole Angle:**	°	**Easting:** 453067	**Surface R.L.:** N/A
Drill Model:		**Drill Fluid:**		**Bearing:**		**Northing:** 6441890	**Datum:**

Method	Casing	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Sample / In - situ Test	Field Records / Comments	Water
HA			0.0			SAND (Topsoil): brown, with some mulch (wood chips and barks), dry.				
						Silty SAND: greyish brown, with some rootlets, dry.		BH16/0.05-0.15 = Dup 1	PID recorded at 1.1 ppm.	
						SAND: greyish brown, coarse grained, moist.				
			0.5			SAND: light brown, medium grained, moist.		BH16/0.5-0.6	PID recorded at 0.6 ppm.	
			1.0					BH16/0.9-1.0	PID recorded at 0.2 ppm.	
						End of BH16 at 1m				
			1.5							
			2.0							

Appendix 3 Tabulated Soil Results & Analytical Laboratory Reports

Project: Coastal Hazard and Flood Study (LANDCOM)
Subject: Table 1 - Tabulated Soil Analytical Results (mg/kg)

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)	Borehole Locations														
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH1			BH2			BH3		BH4		BH5			BH6	
	Analytes *mg/kg unless stated*	**A**[1]	**D**[2]	**E**[3]	**F**[4]			**BH1/0.05-0.15**	**BH1/0.5-0.6**	**BH1/0.9-1.0**	**BH2/0.05-0.15**	**BH2/0.4-0.5**	**BH2/0.9-1.0**	**BH3/0.05-0.15**	**BH3/0.5-0.6**	**BH4/0.05-0.15**	**BH4/0.4-0.5**	**BH5/0.05-0.15**	**BH5/0.4-0.5**	**BH5/0.9-1.0**	**BH6/0.05-0.15**	**BH6/0.4-0.5**
Sample Descriptions	**Sample Date**	-	-	-	-	-	-	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010
	Laboratory	-	-	-	-	-	-	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise
	Laboratory Report Number	-	-	-	-	-	-	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693
	Laboratory Sample ID	-	-	-	-	-	-	2056276	2056278	2056279	2056273	2056274	2056275	2056280	2056281	2056270	2056271	2056267	2056268	2056269	2056283	2056284
	Assumed Depth Interval (m)	-	-	-	-	-	-	0.05-0.15	0.5-0.6	0.9-1.0	0.05-0.15	0.4-0.5	0.9-1.0	0.05-0.15	0.5-0.6	0.05-0.15	0.4-0.5	0.05-0.15	0.4-0.5	0.9-1.0	0.05-0.15	0.4-0.5
	Sample Type	-	-	-	-	-	-	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	QA Sample	-	-	-	-	-	-	Dup 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PID (ppm)	-	-	-	-	-	-	0.4	0.3	0.4	0.2	0.4	0.2	0	0.3	0.1	0.1	0.3	0.4	0.4	1.0	0.1
	pH (units)	-	-	-	-	-	-	4.7	4.9	5.1	5.1	4.6	5.1	4.7	4.9	4.8	5.2	4.7	5.1	5.1	5.1	5.2
Inorganics / Metals	**Aluminium (Al)**	-	-	-	-	-	-	140	33	45	43	95	140	84	19	62	40	117	17	34	170	24
	Antimony (Sb)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Arsenic (As) (total)	100	400	200	500	**20**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Barium (Ba)	-	-	-	-	-	-	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Beryllium (Be)	20	80	40	100	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Boron (B)	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	17	<10
	Cadmium (Cd)	20	80	40	100	**3**	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Total Chromium (Cr)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Cobalt (Co)	100	400	200	500	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Copper (Cu)	1000	4000	2000	5000	**100**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	9	<5
	Iron (Fe)	-	-	-	-	-	-	150	82	250	89	130	470	110	22	82	36	120	22	32	520	37
	Lead (Pb)	300	1200	600	1500	**600**	300	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	47	<5
	Manganese (Mn)	1500	6000	3000	7500	**500**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5
	Mercury (Hg) (total)	15	30	30	75	**1**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Molybdenum (Mo)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Nickel (Ni)	600	2400	600	3000	**60**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**950**	<5
	Selenium (Se)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Silver (Ag)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Strontium (Sr)	-	-	-	-	-	-	8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Thallium (Tl)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Tin (Sn)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	<5
	Titanium (Ti)	-	-	-	-	-	-	<5	<5	5	<5	<5	9	8	7	<5	6	<5	<5	5	<5	<5
	Vanadium (V)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Zinc (Zn)	7000	28000	14000	35000	**200**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	15	<5
Polyaromatic Hydrocarbons (PAHs)	**Acenaphthene**	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Acenapthylene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Anthracene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(a) Anthracene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(a) Pyrene	1	4	2	5	-	1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(b) Fluoranthene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(g,h,i) perylene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzo(k) Fluoranthene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chrysene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dibenzo(a,h) Anthracene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fluoranthene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fluorene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Indeno (1,2,3-c,d) Pyrene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Naphthalene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Phenanthrene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pyrene	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PAH (Total)	20	80	40	100	-	20	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocyclic Aromatic Hydrocarbons (MAHs)	**Benzene**	-	-	-	-	-	1	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Toluene	-	-	-	-	-	1.4[g] / 130[h]	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethyl Benzene	-	-	-	-	-	3.1[i] / 50[j]	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Xylene	-	-	-	-	-	14[k] / 25[l]	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Monocyclic aromatic hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons (TRHs)	**C6-C9**	-	-	-	-	-	65	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C10-C14	-	-	-	-	-	1000	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C15-C28	-	-	-	-	-		<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C29-C36	-	-	-	-	-		<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)	Borehole Locations												
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH1			BH2			BH3		BH4		BH5			BH6	
	Analytes *mg/kg unless stated*	**A**[1]	**D**[2]	**E**[3]	**F**[4]			**BH1/0.05-0.15**	**BH1/0.5-0.6**	**BH1/0.9-1.0**	**BH2/0.05-0.15**	**BH2/0.4-0.5**	**BH2/0.9-1.0**	**BH3/0.05-0.15**	**BH3/0.5-0.6**	**BH4/0.05-0.15**	**BH4/0.4-0.5**	**BH5/0.05-0.15**	**BH5/0.4-0.5**	**BH5/0.9-1.0**	**BH6/0.05-0.15**	**BH6/0.4-0.5**
Organochlorine Pesticides (OCPs)	**Aldrin**	10	40	20	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Dieldrin					-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin Aldehyde	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endrin Ketone	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	4,4'-DDD	200	800	400	1000	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	4,4'-DDE					-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	4,4'-DDT					-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	α–BHC	–	–	–	–	–	–	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	β–BHC	–	–	–	–	–	–	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	γ–BHC (Lindane)	–	–	–	–	–	–	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	δ–BHC	–	–	–	–	–	–	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan I	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan II	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Endosulfan Sulphate	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Heptachlor	10	40	20	50	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Heptachlor Epoxide	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Hexachlorobenzene	-	-	-	-	-		<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Methoxychlor	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Toxaphene	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Chlordane	50	200	100	250	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-	-	-
	Organochlorine Pesticides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides (OPPs)	**Chloryyrifos**	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Diazinon	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Duchlorvos	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Ethion	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Fenthion	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Malathion	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Mevinphos	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Parathion	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Ronnel (Fenchlorfos)	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Stirofos	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
Herbi-cides	**24 Dichlorophenoxy**	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	245 Trichlorphenoxy	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	2-Methyl-4-Chlorophe	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
Triazines	**Ametryn**	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Atrazine	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Prometon	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Prometryn	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Propazine	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Simazine	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Simetryn	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Terbuthylazine	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-
	Terbutryn	-	-	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-	-	-

Notes:

Human exposure settings based on land use established for:

1. 'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centres, kindergartens, preschools and primary schools.
2. Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard such as high-rise apartments and flats.
3. Parks, recreational open space and playing fields: includes secondary schools.
4. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

5. Interim EILs for the urban setting are based on considerations of phytotoxicity, ANZECC B levels, and soil survey data from urban residential properties in four Australian capital cities.

6. For protection of built structures.

- : Denotes no data available.

g, i & k : Threshold concentration (Netherlands Maximum Permissible Concentration) for protection of terrestrial organisms (ref. 6).

h & j : Human health (and ecologically) based protection levels, from the Netherlands intervention value (ref. 6).

123 Bold font denotes reported concentration exceeded the adopted provisional phytotoxicity-based investigation levels (ref. 2).

123 Bold and shaded font denotes reported concentration exceeded the adopted health-based investigation levels for 'A' - Standard residential (ref. 2).

Project: Coastal Hazard and Flood Study (LANDCOM)
Subject: Table 1 - Tabulated Soil Analytical Results (mg/kg)

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)	Borehole Locations													
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH7		BH8		BH9		BH10			BH11		BH12		BH13		
	Analytes *mg/kg unless stated*	**A**[1]	**D**[2]	**E**[3]	**F**[4]			**BH7/0.05-0.15**	**BH7/0.5-0.6**	**BH8/0.0-0.1**	**BH8/0.4-0.5**	**BH9/0.05-0.15**	**BH9/0.4-0.5**	**BH10/0.05-0.15**	**BH10/0.4-0.5**	**BH10/0.9-1.0**	**BH11/0.05-0.15**	**BH11/0.4-0.5**	**BH12/0.1-0.2**	**BH12/0.4-0.5**	**BH13/0.05-0.15**	**BH13/0.4-0.5**	**BH13/0.8-0.9**
Sample Descriptions	**Sample Date**	-	-	-	-	-	-	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	13/1/2010	12/1/2010	12/1/2010	13/1/2010	13/1/2010	13/1/2010
	Laboratory	-	-	-	-	-	-	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise
	Laboratory Report Number	-	-	-	-	-	-	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693	139693
	Laboratory Sample ID	-	-	-	-	-	-	2056264	2056265	2056261	2056262	2056289	2056290	2056286	2056287	2056288	2056258	2056259	2056242	2056243	2056255	2056256	2056257
	Assumed Depth Interval (m)	-	-	-	-	-	-	0.05-0.15	0.5-0.6	0.0-0.1	0.4-0.5	0.05-0.15	0.4-0.5	0.05-0.15	0.4-0.5	0.9-1.0	0.05-0.15	0.4-0.5	0.1-0.2	0.4-0.5	0.05-0.15	0.4-0.5	0.8-0.9
	Sample Type	-	-	-	-	-	-	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	QA Sample	-	-	-	-	-	-	Dup 2	-	-	-	Dup 4	-	-	-	-	-	-	-	-	-	-	-
	PID (ppm)	-	-	-	-	-	-	51.1	5.1	32.0	24.2	0	0.6	0	0	0.3	15	15.9	0.7	0.4	9.3	10.9	10.5
	pH (units)	-	-	-	-	-	-	4.8	5.1	5.2	4.1	5.1	4.9	5.3	5.2	4.8	4.6	5.7	6.2	6	4.8	4.6	5
Inorganics / Metals	**Aluminium (Al)**	-	-	-	-	-	-	110	21	50	89	180	50	200	77	260	120	23	3200	270	110	87	25
	Antimony (Sb)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Arsenic (As) (total)	100	400	200	500	**20**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Barium (Ba)	-	-	-	-	-	-	<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5	23	<5	<5	<5	<5
	Beryllium (Be)	20	80	40	100	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Boron (B)	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10
	Cadmium (Cd)	20	80	40	100	**3**	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Total Chromium (Cr)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Cobalt (Co)	100	400	200	500	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Copper (Cu)	1000	4000	2000	5000	**100**	-	<5	7	<5	<5	<5	<5	<5	<5	8	<5	<5	8	<5	<5	<5	<5
	Iron (Fe)	-	-	-	-	-	-	110	11	50	49	250	56	170	210	1000	160	26	6600	340	180	55	25
	Lead (Pb)	300	1200	600	1500	**600**	300	<5	<5	<5	<5	<5	<5	<5	<5	28	<5	<5	28	<5	<5	<5	<5
	Manganese (Mn)	1500	6000	3000	7500	**500**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	120	6	<5	<5	<5
	Mercury (Hg) (total)	15	30	30	75	**1**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Molybdenum (Mo)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Nickel (Ni)	600	2400	600	3000	**60**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Selenium (Se)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Silver (Ag)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Strontium (Sr)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	<5	<5	<5
	Thallium (Tl)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Tin (Sn)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Titanium (Ti)	-	-	-	-	-	-	<5	<5	<5	<5	8	6	<5	<5	15	6	8	84	17	<5	<5	<5
	Vanadium (V)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	13	<5	<5	<5	<5
	Zinc (Zn)	7000	28000	14000	35000	**200**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	17	<5	<5	<5	<5
Polyaromatic Hydrocarbons (PAHs)	**Acenaphthene**	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	<0.1	<0.1	-	-	-
	Acenapthylene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.1	<0.1	-	-	-
	Anthracene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	<0.1	<0.1	-	-	-
	Benzo(a) Anthracene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.2	<0.1	-	-	-
	Benzo(a) Pyrene	1	4	2	5	-	1	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.2	<0.1	-	-	-
	Benzo(b) Fluoranthene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.6	<0.1	-	-	-
	Benzo(g,h,i) perylene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.7	<0.1	-	-	-
	Benzo(k) Fluoranthene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.6	<0.1	-	-	-
	Chrysene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.3	<0.1	-	-	-
	Dibenzo(a,h) Anthracene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.2	<0.1	-	-	-
	Fluoranthene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.3	<0.1	-	-	-
	Fluorene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	<0.1	<0.1	-	-	-
	Indeno (1,2,3-c,d) Pyrene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.6	<0.1	-	-	-
	Naphthalene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	<0.1	<0.1	-	-	-
	Phenanthrene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.1	<0.1	-	-	-
	Pyrene	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	0.3	<0.1	-	-	-
	PAH (Total)	20	80	40	100	-	20	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	4.2	<0.1	-	-	-
Monocyclic Aromatic Hydrocarbons (MAHs)	**Benzene**	-	-	-	-	-	1	-	-	<0.5	-	<0.5	<0.5	-	-	-	-	-	<0.5	<0.5	-	-	-
	Toluene	-	-	-	-	-	1.4[g] / 130[h]	-	-	<0.5	-	<0.5	<0.5	-	-	-	-	-	<0.5	<0.5	-	-	-
	Ethyl Benzene	-	-	-	-	-	3.1[i] / 50[j]	-	-	<0.5	-	<0.5	<0.5	-	-	-	-	-	<0.5	<0.5	-	-	-
	Xylene	-	-	-	-	-	14[k] / 25[j]	-	-	<0.5	-	<0.5	<0.5	-	-	-	-	-	<0.5	<0.5	-	-	-
	Monocyclic aromatic hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons (TRHs)	**C6-C9**	-	-	-	-	-	65	-	-	<20	-	<20	<20	-	-	-	-	-	<20	<20	-	-	-
	C10-C14	-	-	-	-	-	1000	-	-	<20	-	<20	<20	-	-	-	-	-	<20	<20	-	-	-
	C15-C28	-	-	-	-	-		-	-	<50	-	<50	<50	-	-	-	-	-	<50	<50	-	-	-
	C29-C36	-	-	-	-	-		-	-	<50	-	<50	<50	-	-	-	-	-	<50	<50	-	-	-

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)	Borehole Locations														
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH7		BH8		BH9		BH10			BH11		BH12		BH13		
	Analytes *mg/kg unless stated*	A[1]	D[2]	E[3]	F[4]			BH7/0.05-0.15	BH7/0.5-0.6	BH8/0.0-0.1	BH8/0.4-0.5	BH9/0.05-0.15	BH9/0.4-0.5	BH10/0.05-0.15	BH10/0.4-0.5	BH10/0.9-1.0	BH11/0.05-0.15	BH11/0.4-0.5	BH12/0.1-0.2	BH12/0.4-0.5	BH13/0.05-0.15	BH13/0.4-0.5	BH13/0.8-0.9
Organochlorine Pesticides (OCPs)	**Aldrin**	~~10~~	~~40~~	~~20~~	~~50~~	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Dieldrin					-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endrin	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endrin Ketone	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	4,4'-DDD	200	800	400	1000	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	4,4'-DDE					-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	4,4'-DDT					-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	α–BHC	–	–	–	–	–	–	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	β–BHC	–	–	–	–	–	–	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	γ–BHC (Lindane)	–	–	–	–	–	–	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	δ–BHC	–	–	–	–	–	–	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endosulfan I	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endosulfan II	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Endosulfan Sulphate	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Heptachlor	10	40	20	50	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Hexachlorobenzene	-	-	-	-	-		-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Methoxychlor	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Toxaphene	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Chlordane	50	200	100	250	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-	-
	Organochlorine Pesticides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides (OPPs)	**Chloryyrifos**	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Diazinon	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Duchlorvos	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Ethion	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Fenthion	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Malathion	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Mevinphos	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Parathion	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Ronnel (Fenchlorfos)	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Stirofos	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
Herbi-cides	**24 Dichlorophenoxy**	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	245 Trichlorphenoxy	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	2-Methyl-4-Chlorophe	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
Triazines	**Ametryn**	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Atrazine	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Prometon	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Prometryn	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Propazine	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Simazine	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Simetryn	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Terbuthylazine	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-
	Terbutryn	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-	-

Notes:

Human exposure settings based on land use established for:

1. 'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centre
2. Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard such as high-rise apartments and flats.
3. Parks, recreational open space and playing fields: includes secondary schools.
4. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

5. Interim EILs for the urban setting are based on considerations of phytotoxicity, ANZECC B levels, and soil survey data from urban residential properties in four Australian capital cities.

6. For protection of built structures.

- : Denotes no data available.

g, i & k : Threshold concentration (Netherlands Maximum Permissible Concentration) for protection of terrestrial organisms (ref. 6).

h & j : Human health (and ecologically) based protection levels, from the Netherlands intervention value (ref. 6).

123 Bold font denotes reported concentration exceeded the adopted provisional phytotoxicity-based investigation levels (ref. 2).

123 Bold and shaded font denotes reported concentration exceeded the adopted health-based investigation levels for 'A' - Standard residential (ref. 2).

Project: Coastal Hazard and Flood Study (LANDCOM)
Subject: Table 1 - Tabulated Soil Analytical Results (mg/kg)

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)	Borehole Locations								
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH14		BH15		BH16			(Target) Surface	
	Analytes *mg/kg unless stated*	**A**[1]	**D**[2]	**E**[3]	**F**[4]			**BH14/0.1-0.2**	**BH14/0.4-0.5**	**BH15/0.1-0.2**	**BH15/0.6-0.7**	**BH16/0.05-0.15**	**BH16/0.5-0.6**	**BH16/0.9-1.0**	**Surface 1**	**Surface 2**
Sample Descriptions	**Sample Date**	-	-	-	-	-	-	12/1/2010	12/1/2010	12/1/2010	12/1/2010	12/1/2010	12/1/2010	12/1/2010	13/1/2010	13/01/2010
	Laboratory	-	-	-	-	-	-	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise	Ecowise
	Laboratory Report Number	-	-	-	-	-	-	139693	139693	139693	139693	139693	139693	139693	139693	139693
	Laboratory Sample ID	-	-	-	-	-	-	2056251	2056252	2056245	2056246	2056248	2056249	2056250	2056292	2056293
	Assumed Depth Interval (m)	-	-	-	-	-	-	0.1-0.2	0.4-0.5	0.1-0.2	0.6-0.7	0.05-0.15	0.5-0.6	0.9-1.0	Surface	0.1-0.2
	Sample Type	-	-	-	-	-	-	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Tar	Soil
	QA Sample	-	-	-	-	-	-	-	-	-	-	Dup 1	-	-	-	-
	PID (ppm)	-	-	-	-	-	-	2.4	0.9	10.1	11.7	1.1	0.6	0.2	25.2	9.1
	pH (units)	-	-	-	-	-	-	4.3	4.7	4.7	5.2	4.2	5.1	5.5	-	-
Inorganics / Metals	**Aluminium (Al)**	-	-	-	-	-	-	210	30	140	83	210	65	68	1200	9100
	Antimony (Sb)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Arsenic (As) (total)	100	400	200	500	**20**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Barium (Ba)	-	-	-	-	-	-	<5	<5	<5	<5	5	<5	<5	<5	84
	Beryllium (Be)	20	80	40	100	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Boron (B)	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Cadmium (Cd)	20	80	40	100	**3**	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Total Chromium (Cr)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	8
	Cobalt (Co)	100	400	200	500	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Copper (Cu)	1000	4000	2000	5000	**100**	-	<5	<5	<5	<5	<5	<5	<5	**<5**	11
	Iron (Fe)	-	-	-	-	-	-	200	22	100	310	260	210	250	2500	31000
	Lead (Pb)	300	1200	600	1500	**600**	300	<5	<5	<5	<5	<5	<5	<5	<5	10
	Manganese (Mn)	1500	6000	3000	7500	**500**	-	<5	<5	<5	<5	<5	<5	<5	60	150
	Mercury (Hg) (total)	15	30	30	75	**1**	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Molybdenum (Mo)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Nickel (Ni)	600	2400	600	3000	**60**	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Selenium (Se)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Silver (Ag)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Strontium (Sr)	-	-	-	-	-	-	<5	<5	<5	<5	6	<5	<5	30	6
	Thallium (Tl)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Tin (Sn)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Titanium (Ti)	-	-	-	-	-	-	<5	<5	<5	6	<5	7	7	18	44
	Vanadium (V)	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	44
	Zinc (Zn)	7000	28000	14000	35000	**200**	-	<5	<5	<5	<5	<5	<5	<5	7	34
Polyaromatic Hydrocarbons (PAHs)	**Acenaphthene**	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<0.3
	Acenapthylene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	0.6
	Anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	0.7
	Benzo(a) Anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	2.8
	Benzo(a) Pyrene	1	4	2	5	-	1	-	-	-	-	-	-	-	<3	**3.3**
	Benzo(b) Fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	7.9
	Benzo(g,h,i) perylene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	9.9
	Benzo(k) Fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	7.9
	Chrysene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	4.4
	Dibenzo(a,h) Anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	2.3
	Fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	4.1
	Fluorene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<0.3
	Indeno (1,2,3-c,d) Pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	8.6
	Naphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	41	0.4
	Phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	1.6
	Pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	3.7
	PAH (Total)	20	80	40	100	-	20	-	-	-	-	-	-	-	**41**	**58**
Monocyclic Aromatic Hydrocarbons (MAHs)	**Benzene**	-	-	-	-	-	1	-	-	-	-	-	-	-	<0.5	<0.5
	Toluene	-	-	-	-	-	1.4[g] / 130[h]	-	-	-	-	-	-	-	2.6	<0.5
	Ethyl Benzene	-	-	-	-	-	3.1[i] / 50[j]	-	-	-	-	-	-	-	1.6	<0.5
	Xylene	-	-	-	-	-	14[k] / 25[j]	-	-	-	-	-	-	-	**18**	<0.5
	Monocyclic aromatic hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total Recoverable Hydrocarbons (TRHs)	**C6-C9**	-	-	-	-	-	65	-	-	-	-	-	-	-	<100	<20
	C10-C14	-	-	-	-	-	1000	-	-	-	-	-	-	-	**1600**	41
	C15-C28	-	-	-	-	-		-	-	-	-	-	-	-	<300	73
	C29-C36	-	-	-	-	-		-	-	-	-	-	-	-	**2200**	220

		NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* Appendix II: Soil investigation levels for urban development sites in NSW (ref. 2)					NSW EPA Service station sites (ref. 6)			Borehole Locations						
		Health-based investigation levels (mg/kg)				Provisional phytotoxicity-based investigation levels[5] (mg/kg)	Table 3 of Service Station Sites: Assessment and Remediation Guideline Levels	BH14		BH15		BH16			(Target) Surface	
	Analytes *mg/kg unless stated*	**A**[1]	**D**[2]	**E**[3]	**F**[4]			**BH14/0.1-0.2**	**BH14/0.4-0.5**	**BH15/0.1-0.2**	**BH15/0.6-0.7**	**BH16/0.05-0.15**	**BH16/0.5-0.6**	**BH16/0.9-1.0**	**Surface 1**	**Surface 2**
Organochlorine Pesticides (OCPs)	**Aldrin**	10	40	20	50	-	-	-	-	<0.05	-	-	-	-	-	-
	Dieldrin					-	-	-	-	<0.05	-	-	-	-	-	-
	Endrin	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Endrin Aldehyde	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Endrin Ketone	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	4,4'-DDD	200	800	400	1000	-	-	-	-	<0.05	-	-	-	-	-	-
	4,4'-DDE					-	-	-	-	<0.05	-	-	-	-	-	-
	4,4'-DDT					-	-	-	-	<0.05	-	-	-	-	-	-
	α–BHC	–	–	–	–	–	–	-	-	<0.05	-	-	-	-	-	-
	β–BHC	–	–	–	–	–	–	-	-	<0.05	-	-	-	-	-	-
	γ–BHC (Lindane)	–	–	–	–	–	–	-	-	<0.05	-	-	-	-	-	-
	δ–BHC	–	–	–	–	–	–	-	-	<0.05	-	-	-	-	-	-
	Endosulfan I	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Endosulfan II	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Endosulfan Sulphate	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Heptachlor	10	40	20	50	-	-	-	-	<0.05	-	-	-	-	-	-
	Heptachlor Epoxide	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Hexachlorobenzene	-	-	-	-	-		-	-	<0.05	-	-	-	-	-	-
	Methoxychlor	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Toxaphene	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
	Chlordane	50	200	100	250	-	-	-	-	<0.05	-	-	-	-	-	-
	Organochlorine Pesticides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides (OPPs)	**Chloryyrifos**	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Diazinon	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Duchlorvos	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Ethion	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Fenthion	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Malathion	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Mevinphos	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Parathion	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Ronnel (Fenchlorfos)	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Stirofos	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
Herbi-cides	**24 Dichlorophenoxy**	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	245 Trichlorphenoxy	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	2-Methyl-4-Chlorophe	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
Triazines	**Ametryn**	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Atrazine	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Prometon	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Prometryn	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Propazine	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Simazine	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Simetryn	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Terbuthylazine	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Terbutryn	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-

Notes:

Human exposure settings based on land use established for:

1. 'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centre
2. Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard such as high-rise apartments and flats.
3. Parks, recreational open space and playing fields: includes secondary schools.
4. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

5. Interim EILs for the urban setting are based on considerations of phytotoxicity, ANZECC B levels, and soil survey data from urban residential properties in four Australian capital cities.

6. For protection of built structures.

- : Denotes no data available.

g, i & k : Threshold concentration (Netherlands Maximum Permissible Concentration) for protection of terrestrial organisms (ref. 6).

h & j : Human health (and ecologically) based protection levels, from the Netherlands intervention value (ref. 6).

123 Bold font denotes reported concentration exceeded the adopted provisional phytotoxicity-based investigation levels (ref. 2).

123 Bold and shaded font denotes reported concentration exceeded the adopted health-based investigation levels for 'A' - Standard residential (ref. 2).

Project: Coastal Hazard and Flood Study (LANDCOM)
Subject: Table 2 - Relative Percentage Differences (mg/kg)

		Relative Percentage Differences (%)											
		BH1			BH7			BH9			BH16		
	Analytes mg/kg unless stated	BH1/0.05-0.15	Dup 3	RPD %	BH7/0.05-0.15	Dup 2	RPD %	BH9/0.05-0.15	Dup 4	RPD %	BH16/0.05-0.15	Dup 1	RPD %
Sample Descriptions	Sample Date	13/1/2010	13/1/2010		13/1/2010	13/1/2010		13/1/2010	13/1/2010		12/1/2010	12/1/2010	
	Laboratory	Ecowise	Ecowise		Ecowise	MGT		Ecowise	MGT		Ecowise	Ecowise	
	Laboratory Report Number	139693	139693		139693	258085-V1		139693	258085-V1		139693	139693	
	Laboratory Sample ID	2056276	2056295		2056264	M10-JA03597		2056289	M10-JA03598		2056248	2056254	
	Assumed Depth Interval (m)	0.05-0.15	0.05-0.15		0.05-0.15	0.05-0.15		0.05-0.15	0.05-0.15		0.05-0.15	0.05-0.15	
	Sample Type	Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
	pH (units)	4.7	4.8	2%	4.8	4.4	9%	5.1	5.1	0	4.2	4.4	5%
Inorganics / Metals	Aluminium (Al)	140	130	7%	110	-	na	180	-	na	210	210	0%
	Antimony (Sb)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Arsenic (As) (total)	<5	<5	na	<5	<2	na	<5	<2	na	<5	<5	na
	Barium (Ba)	7	<5	na	<5	-	na	<5	-	na	5	<5	na
	Beryllium (Be)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Boron (B)	<10	<10	na	<10	-	na	<10	-	na	<10	<10	na
	Cadmium (Cd)	<0.2	<0.2	na	<0.2	<0.5	na	<0.2	<0.5	na	<0.2	<0.2	na
	Total Chromium (Cr)	<5	<5	na	<5	<5	na	<5	<5	na	<5	<5	na
	Cobalt (Co)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Copper (Cu)	<5	<5	na	<5	<5	na	<5	<5	na	<5	<5	na
	Iron (Fe)	150	260	**54%**	110	-	na	250	-	na	260	140	**60%**
	Lead (Pb)	<5	<5	na	<5	<5	na	<5	<5	na	<5	<5	na
	Manganese (Mn)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Mercury (Hg) (total)	<0.05	<0.05	na	<0.05	<0.1	na	<0.05	<0.1	na	<0.05	<0.05	na
	Molybdenum (Mo)	<5	<5	na	<5	<10	na	<5	<10	na	<5	<5	na
	Nickel (Ni)	<5	<5	na	<5	<5	na	<5	<5	na	<5	<5	na
	Selenium (Se)	<5	<5	na	<5	<2	na	<5	<2	na	<5	<5	na
	Silver (Ag)	<5	<5	na	<5	<5	na	<5	<5	na	<5	<5	na
	Strontium (Sr)	8	6	29%	<5	-	na	<5	-	na	6	<5	na
	Thallium (Tl)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Tin (Sn)	<5	<5	na	<5	<10	na	<5	<10	na	<5	<5	na
	Titanium (Ti)	<5	<5	na	<5	-	na	8	-	na	<5	6	na
	Vanadium (V)	<5	<5	na	<5	-	na	<5	-	na	<5	<5	na
	Zinc (Zn)	<5	6	na	<5	<5	na	<5	<5	na	<5	<5	na
Polyaromatic Hydrocarbons (PAHs)	Acenaphthene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Acenapthylene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Anthracene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Benzo(a) Anthracene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Benzo(a) Pyrene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Benzo(b) Fluoranthene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Benzo(g,h,i) perylene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Benzo(k) Fluoranthene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Chrysene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Dibenzo(a,h) Anthracene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Fluoranthene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Fluorene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Indeno (1,2,3-c,d) Pyrene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Naphthalene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Phenanthrene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	Pyrene	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
	PAH (Total)	<0.1	<0.1	na	-	-	-	<0.1	<0.1	na	-	-	-
Monocyclic Aromatic Hydrocarbons (MAHs)	Benzene	<0.5	<0.5	na	-	-	-	<0.5	<0.05	na	-	-	-
	Toluene	<0.5	<0.5	na	-	-	-	<0.5	<0.05	na	-	-	-
	Ethyl Benzene	<0.5	<0.5	na	-	-	-	<0.5	<0.05	na	-	-	-
	Xylene	<0.5	<0.5	na	-	-	-	<0.5	<0.05	na	-	-	-
	Monocyclic aromatic hydrocarbons	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons (TRHs)	C6-C9	<20	<20	na	-	-	-	<20	<20	na	-	-	-
	C10-C14	<20	<20	na	-	-	-	<20	<50	na	-	-	-
	C15-C28	<50	<50	na	-	-	-	<50	<100	na	-	-	-
	C29-C36	<50	<50	na	-	-	-	<50	<100	na	-	-	-
Organochlorine Pesticides (OCPs)	Aldrin	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Dieldrin	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endrin	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endrin Aldehyde	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endrin Ketone	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	4,4'-DDD	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	4,4'-DDE	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	4,4'-DDT	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	a-BHC	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	b-BHC	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	g-BHC (Lindane)	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	d-BHC	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endosulfan I	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endosulfan II	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Endosulfan Sulphate	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Heptachlor	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Heptachlor Epoxide	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Hexachlorobenzene	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Methoxychlor	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Toxaphene	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Chlordane	<0.05	<0.05	na	-	-	-	-	-	-	-	-	-
	Organochlorine Pesticides	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides (OPPs)	Chloryyrifos	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Diazinon	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Duchlorvos	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Ethion	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Fenthion	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Malathion	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Mevinphos	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Parathion	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Ronnel (Fenchlorfos)	<0.5	<0.5	na	-			-			-		
	Stirofos	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
Herbicide	24 Dichlorophenoxy	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	245 Trichlorphenoxy	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	2-Methyl-4-Chlorophe	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
Triazines	Ametryn	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Atrazine	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Prometon	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Prometryn	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Propazine	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Simazine	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Simetryn	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Terbuthylazine	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-
	Terbutryn	<0.5	<0.5	na	-	-	-	-	-	-	-	-	-

Notes:

na : not applicable

123 : Denotes calculated Relative Percentage Difference (%) above 50%.

mgt Environmental

ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au web : www.mgtenv.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : 03 9564 7055
NATA Site # 1254

Sydney
1a Chilvers Rd
Thornleigh NSW 2120
Phone : 02 9484 3300
NATA Site # 18217

Adelaide
140 Richmond Rd
Marleston SA 5033
Phone : 08 8443 4430

Company Name: Worley Parsons Melbourne
Address: Level 12, 333 Collins Stree
Melbourne
VIC 3000

Order No.:
Report #: 258085
Phone: 8676 3500
Fax: 8676 3505

Received: Jan 15, 2010 12:00
Due: Jan 22, 2010 09:02
Priority: 5 Day
Contact name: June Lee

Client Job No.: PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

mgt Client Manager: Andrew Thexton

Sample Detail					% Moisture	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract)	Selenium	Silver	Tin	Zinc	Monocyclic Aromatic Hydrocarbons	Polycyclic Aromatic Hydrocarbons	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted																					
Melbourne Laboratory - NATA Site #1254					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site #18217																					
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																	
DUP 2	Jan 13, 2010		Soil	M10-JA03597	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
DUP 4	Jan 13, 2010		Soil	M10-JA03598	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

mgt Environmental

ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au web : www.mgtenv.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : 03 9564 7055
NATA Site # 1254

Sydney
1a Chilvers Rd
Thornleigh NSW 2120
Phone : 02 9484 3300
NATA Site # 18217

Adelaide
140 Richmond Rd
Marleston SA 5033
Phone : 08 8443 4430

Sample Receipt Advice

Company name: **Worley Parsons Melbourne**

Contact name: June Lee
Client job number: PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT
COC number: Not provided
Turn around time: 5 Day
Date received: Jan 15, 2010
MGT lab reference: **258085**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ All samples were provided chilled.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Thexton on Phone : (03) 9564 7055 or by e.mail: athexton@mgtenv.com.au

Results will be delivered electronically via e.mail to June Lee - June.Lee@WorleyParsons.com.

mgt Sample Receipt

Site: Landcom / North Tuncurry, NSW
Project: Preliminary Environmental Site Assessment (Soil)

No.	Borehole ID	Sample IDs	Date	TPH/BTEX/PAH	Metals Screen	pH	Herbicides, PAA	Herbicides, Triazine	OCPs, OPPs	Comments
1		BH12/0.1-0.2	12-Jan-10	1	1	1				
2	BH12	BH12/0.4-0.5	12-Jan-10	1	1	1				
3		BH12/0.8-0.9	12-Jan-10							
4		BH15/0.1-0.2	12-Jan-10		1	1	1	1	1	
5	BH15	BH15/0.6-0.7	12-Jan-10		1	1				
6		BH15/0.9-1.0	12-Jan-10							
7		BH16/0.05-0.15	12-Jan-10		1	1				
8	BH16	BH16/0.5-0.6	12-Jan-10		1	1				
9		BH16/0.9-1.0	12-Jan-10		1	1				
10		BH14/0.1-0.2	12-Jan-10		1	1				
11	BH14	BH14/0.4-0.5	12-Jan-10		1	1				
12		BH14/0.8-0.9	12-Jan-10							
13		BH13/0.05-0.15	13-Jan-10		1	1	1	1	1	
14	BH13	BH13/0.4-0.5	13-Jan-10		1	1				
15		BH13/0.8-0.9	13-Jan-10		1	1				
16		BH11/0.05-0.15	13-Jan-10		1	1				
17	BH11	BH11/0.4-0.5	13-Jan-10		1	1				
18		BH11/0.9-1.0	13-Jan-10							
19		BH8/0-0.1	13-Jan-10	1	1	1				
20	BH8	BH8/0.4-0.5	13-Jan-10		1	1				
21		BH8/0.9-1.0	13-Jan-10							
22		BH7/0.05-0.15	13-Jan-10		1	1				
23	BH7	BH7/0.5-0.6	13-Jan-10		1	1				
24		BH7/0.9-1.0	13-Jan-10							
25		BH5/0.05-0.15	13-Jan-10		1	1	1	1	1	
26	BH5	BH5/0.4-0.5	13-Jan-10		1	1				
27		BH5/0.9-1.0	13-Jan-10		1	1				
28		BH4/0.05-0.15	13-Jan-10		1	1				
29	BH4	BH4/0.4-0.5	13-Jan-10		1	1				
30		BH4/0.9-1.0	13-Jan-10							
31		BH2/0.05-0.15	13-Jan-10		1	1	1	1	1	
32	BH2	BH2/0.4-0.5	13-Jan-10		1	1				
33		BH2/0.9-1.0	13-Jan-10		1	1				
34		BH1/0.05-0.15	13-Jan-10	1	1	1	1	1	1	
35	BH1	BH1/0.5-0.6	13-Jan-10		1	1				
36		BH1/0.9-1.0	13-Jan-10		1	1				
37		BH3/0.05-0.15	13-Jan-10		1	1				
38	BH3	BH3/0.5-0.6	13-Jan-10		1	1				
39		BH3/0.9-1.0	13-Jan-10							
40		BH6/0.05-0.15	13-Jan-10		1	1				
41	BH6	BH6/0.4-0.5	13-Jan-10		1	1				
42		BH6/0.9-1.0	13-Jan-10							
43		BH10/0.05-0.15	13-Jan-10		1	1	1	1	1	
44	BH10	BH10/0.4-0.5	13-Jan-10		1	1				
45		BH10/0.9-1.0	13-Jan-10		1	1				
46		BH9/0.05-0.15	13-Jan-10	1	1	1				
47	BH9	BH9/0.4-0.5	13-Jan-10	1	1	1				
48		BH9/0.9-1.0	13-Jan-10							
49		Surface 1	13-Jan-10	1	1					
50		Surface 2	13-Jan-10	1	1					
51	Blind	Dup 1	12-Jan-10		1	1				
52	Split	Dup 2	13-Jan-10		1	1				MGT to analyse
53	Blind	Dup 3	13-Jan-10	1	1	1	1	1	1	
54	Split	Dup 4	13-Jan-10	1	1	1				MGT to analyse

Received by: Rhys
Rep: 258085

WorleyParsons
resources & energy

CHAIN OF CUSTODY Documentation

PROJECT Number	
PROJECT Title	Landcom site in Nth. Tuncurry
WorleyParsons Address/Office	Level 12, 333 Collins St. Melbourne 3000
Project Manager	Dan Messiter
Contact Number	0400 336 426
Field Personnel	June Lee / Trevor Wall
Contact Number	0410325128 / (03) 8676 3354
Requested Completion Date	Standard
Quotation Number	
Laboratory	EnWise / ALS
Laboratory Address (Address for Courier)	
Laboratory Contact	Linna Truong
Laboratory Email/Contact Number	(03) 87568000
Final Report	✓
Email	✓
Fascimile	

Sample Information							Container			Requested Analytes		Laboratory Batch Number
Lab ID	Client Sample ID	Date	Time	Composite Sample	Sample Matrix (S: Soil, W: Water, A: Air, SL: Sludge, GW: Groundwater)	Preservative	Type (J: Soil Jar, B: Bag, G: Glass bottle, V: Vial, P: Plastic bottle)	Number	Volume (mL)	HOLD		
	BH11/0.9-1.0	13/1/10	AM	–	S	ICE	J			/		Notes
	BH8/0-0.10			–						/		
	BH8/0.4-0.5			–						/		
	BH8/0.9-1.0			–						/		
	BH7/0.05-0.15			–						/		
	BH7/0.5-0.6			–						/		
	BH7/0.9-1.0			–						/		
	BH5/0.05-0.15			–						/		
	BH5/0.4-0.5			–						/		
	BH5/0.9-1.0			–						/		
	BH4/0.05-0.15			–						/		
	BH4/0.4-0.5			–						/		
	BH4/0.9-1.0			–						/		
	BH2/0.05-0.15			–						/		
	BH2/0.4-0.5			–						/		
	BH2/0.9-1.0			–						/		
	BH1/0.05-0.15			–						/		
	Dup 2			–						/		

Sampled by	June Lee & Trevor Wall	Date/Time	13/1/2010
Received by Courier		Date/Time	
Received by Laboratory		Date/Time	15/1/10 1053
Comments			
Relinquished by		Date/Time	
Relinquished by	MGT	Date/Time	15/1/10 2:30pm

Email results to june.lee@worleyparsons.com Ref: 258085

WorleyParsons
resources & energy

CHAIN OF CUSTODY Documentation

PROJECT Number	
PROJECT Title	Landcom site in Nth. Tuncurry

WorleyParsons Address/Office	Level 12, 333 Collins St, Melbourne 3000
Project Manager	Dan Messiter
Contact Number	0400 336426
Field Personnel	June Lee & Trevor Wall
Contact Number	0410325128 / (03) 8676 3354
Requested Completion Date	Standard
Quotation Number	

Laboratory	EnviroSe / ALS
Laboratory Address (Address for Courier)	
Laboratory Contact	Linna Truong
Laboratory Email/Contact Number	(03) 8756 8000
Final Report ☐	Email ☐ Fascimile ☐

Lab ID	Client Sample ID	Date	Time	Composite Sample	Sample Matrix (S: Soil, W: Water, SL: Sludge, A: Air, GW: Groundwater)	Preservative	Container Type (J: Soil Jar, B: Bag, G: Glass bottle, V: Vial, P: Plastic bottle)	Container Number	Container Volume (mL)	Requested Analytes: HOLD.	Laboratory Batch Number / Notes
	BH1/0.5-0.6	13/1/10	AM	–	S	ice	J			/	
	BH1/0.9-1.0	↓	↓	–	↓	↓	↓			/	
	BH3/0.05-0.15		PM	–						/	
	BH3/0.5-0.6			–						/	
	BA3/0.9-1.0			–						/	
	BH6/0.05-0.15			–						/	
	BH6/0.4-0.5			–						/	
	BH6/0.9-1.0			–						/	
	BH10/0.05-0.15			–						/	
	BH10/0.4-0.5			–						/	
	BH10/0.9-1.0			–						/	
	BH9/0.05-0.15			–						/	
	BH9/0.4-0.5			–						/	
	BH9/0.9-1.0			–						/	
	Surface 1			–						/	
	Surface 2			–						/	
	Dup 4			–						/	
	Dup 3	↓	↓	–	↓	↓	↓			/	

Sampled by	June Lee & Trevor Wall	Date/Time	13/1/2010
Received by Courier		Date/Time	
Received by Laboratory		Date/Time	14/1/10 1000
Relinquised by		Date/Time	
Relinquished by		Date/Time	

Comments: Email results to june.lee@worleyparsons.com Rep: 258085

10-04736

De Palma, Carmin

From: Truong, Linna
Sent: Thursday, 28 January 2010 12:16 PM
To: De Palma, Carmin
Subject: WORLEYPARSONS ADDITIONAL - Landcom site in Nth Tuncurry - Rec 15/1/10 REQUEST FOR FURTHER ANALYSES

From: Lee, June (Melbourne) [mailto:June.Lee@WorleyParsons.com]
Sent: Thursday, 28 January 2010 12:08 PM
To: Truong, Linna
Cc: Messiter, Dan (East Newcastle)
Subject: RE: Landcom site in Nth Tuncurry - Rec 15/1/10 REQUEST FOR FURTHER ANALYSES

Hi Linna

Can we request the following leachate analyses be carried out on the samples (as listed below) and reported in Ecowise report number 139693.

Lab Sample ID	WorleyParsons Sample ID	Analysis Required
2056242	BH12/0.1-0.2	Acetate leach and DI leach on IRON
2056286	BH10/0.05-0.15	Acetate leach and DI leach on IRON
2056288	BH10/0.9-1.0	Acetate leach and DI leach on IRON
2056293	Surface 2	Acetate leach and Di leach on IRON
2056283	BH6/0.05-0.15	Acetate leach and DI leach on NICKEL

Requested Turnaround: **Standard**

Please call should you have any questions related to this email.

Thanks for your help!

Kind regards
June lee

From: Truong, Linna [mailto:LTruong@ecowise.com.au]
Sent: Thursday, 21 January 2010 2:26 PM
To: Lee, June (Melbourne)
Subject: Ref: Landcom site in Nth Tuncurry - Rec 15/1/10 - Completed report as attached

Linna Truong
Client Manager
Ecowise Environmental
Analytical Services
(Now Part of ALS Laboratory Group)
Melbourne, Australia

Phone: +61 3 8756 8000
Direct: +61 3 8756 8112
Fax: +61 3 9763 1862

www.ecowise.com.au
www.alsglobal.com

28/01/2010

Client: **WorleyParsons Ltd**

Address: Level 12, 333 Collins Street
MELBOURNE VIC 3000

Attention: **June Lee**

Certificate of Analysis

Batch No: 10-04736

Final Report

Report Number: **141632**

Ecowise Australia Pty Ltd
Caribbean Business Park
22 Dalmore Drive
Scoresby VIC 3179

Tel: 03 8756 8000
Fax: 03 9763 1862

Date Issued: **02-Feb-2010**

Client Program Ref: **Landcom Site Nth Tuncurry**

PO No: **Not Available**

Date Sampled: **12-Jan-2010**

Ecowise Program Ref: **WORLEYPARSONS**

Date Received: **28-Jan-2010**

The sample(s) referred to in this report were analysed by the following method(s):

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
ASLP(Ace) Prep	AS4439.3	Melbourne	**ASLP(DI) Prep**	AS4439.3	Melbourne	**MS ASLP(Acet) Metals**	AS4439.3; WSL 032	Melbourne
MS ASLP (D.I) Metals	AS4439.3 WSL 032	Melbourne						

Principal Contact for this Report:

Linna Truong
Client Manager

NATA No. 992

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

Accredited for compliance with ISO/IEC 17025.

The results in this report were authorised by:

Name	*Title*
Brad Snibson	**Client Manager**
John Earl	**Team Leader - Metals**
John Levvey	**Principal Trace Metals Chemist**

Batch No: 10-04736

Date Issued: **02-Feb-2010**

Client: **WorleyParsons Ltd**

Report Number: **141632**

Client Program Ref: **Landcom Site Nth Tuncurry**

Ecowise Program Ref: **WORLEYPARSONS**

Ecowise Environmental

Metals- ASLP (Delonised Water)

Sample	Sampled Date	Your Ref	Analysis:	MS ASLP (D.I) Metals	MS ASLP (D.I) Metals
			Component:	ASLP-Iron	ASLP-Nickel
			Units:	mg/L	mg/L
			Sample Type		
2068811	12-01-10	BH12/0.1-0.2	SOIL	6.1	
2068812	12-01-10	BH10/0.05-0.15	SOIL	<0.2	
2068813	12-01-10	BH10/0.9-1.0	SOIL	1.2	
2068814	12-01-10	Surface 2	SOIL	19	
2068815	12-01-10	BH6/0.05-0.15	SOIL		<0.01

Metals- ASLP (Acetate Buffer)

Sample	Sampled Date	Your Ref	Analysis:	MS ASLP(Acet) Metals	MS ASLP(Acet) Metals
			Component:	ASLP-Iron	ASLP-Nickel
			Units:	mg/L	mg/L
			Sample Type		
2068811	12-01-10	BH12/0.1-0.2	SOIL	1.4	
2068812	12-01-10	BH10/0.05-0.15	SOIL	<0.2	
2068813	12-01-10	BH10/0.9-1.0	SOIL	0.9	
2068814	12-01-10	Surface 2	SOIL	0.2	
2068815	12-01-10	BH6/0.05-0.15	SOIL		<0.01

D.I. Water Leachate Preparation

Sample	Sampled Date	Your Ref	Analysis:	ASLP(DI) Prep	ASLP(DI) Prep
			Component:	Leach Fluid pH	pH (post rolling)
			Units:	pH units	pH units
			Sample Type		
2068811	12-01-10	BH12/0.1-0.2	SOIL	4.6	5.2
2068812	12-01-10	BH10/0.05-0.15	SOIL	4.6	4.7
2068813	12-01-10	BH10/0.9-1.0	SOIL	4.6	4.1
2068814	12-01-10	Surface 2	SOIL	4.6	6.6
2068815	12-01-10	BH6/0.05-0.15	SOIL	4.6	4.7

Acetate Leachate Preparation

Sample	Sampled Date	Your Ref	Analysis:	ASLP(Ace) Prep	ASLP(Ace) Prep
			Component:	Leach Fluid pH	pH (post rolling)
			Units:	pH units	pH units
			Sample Type		
2068811	12-01-10	BH12/0.1-0.2	SOIL	4.9	4.8
2068812	12-01-10	BH10/0.05-0.15	SOIL	4.9	4.8
2068813	12-01-10	BH10/0.9-1.0	SOIL	4.9	4.8
2068814	12-01-10	Surface 2	SOIL	4.9	4.8
2068815	12-01-10	BH6/0.05-0.15	SOIL	4.9	4.8

Client: **WorleyParsons Ltd**

Client Program Ref: **Landcom Site Nth Tuncurry**

Batch No: 10-04736

Report Number: **141632**

Ecowise Program Ref: **WORLEYPARSONS**

Date Issued: **02-Feb-2010**

Ecowise Environmental

Client: **WorleyParsons Ltd**

Client Program Ref: **Landcom Site Nth Tuncurry**

Batch No: 10-04736

Report Number: **141632**

Ecowise Program Ref: **WORLEYPARSONS**

Date Issued: **02-Feb-2010**

Ecowise Environmental

Quality Control

Metals- ASLP (Delonised Water)

		MS ASLP (D.I) Metals	MS ASLP (D.I) Metals
		ASLP-Iron	ASLP-Nickel
2072341 BLANK	Value	<0.2	<0.01
2068815 DUPLICATE	Sample Value		<0.01
2068815 DUPLICATE	Duplicate Value		<0.01
2068815 DUPLICATE	**% RPD**		**0**
2068815 SPIKE	Sample Value	<0.2	<0.01
2068815 SPIKE	Expected Value	0.43	0.40
2068815 SPIKE	**% Recovery**	**105**	**102**

Metals- ASLP (Acetate Buffer)

		MS ASLP(Acet) Metals	MS ASLP(Acet) Metals
		ASLP-Iron	ASLP-Nickel
2072344 BLANK	Value	<0.2	<0.01
2068815 DUPLICATE	Sample Value	<0.2	<0.01
2068815 DUPLICATE	Duplicate Value	<0.2	<0.01
2068815 DUPLICATE	**% RPD**	**0**	**0**
2068815 SPIKE	Sample Value	<0.2	<0.01
2068815 SPIKE	Expected Value	0.40	0.40
2068815 SPIKE	**% Recovery**	**84.2**	**92.7**

WorleyParsons
resources & energy

CHAIN OF CUSTODY Documentation

PROJECT Number	
PROJECT Title	in Landcom site @ Nth. Turramurra

WorleyParsons Address/Office	Level 12, 333 Collins St, Melbourne 3000
Project Manager	Dan Messiter
Contact Number	0400336426
Requested Completion Date	Standard
Field Personnel	June Lee & Trevor Wall
Contact Number	0410325128 OR (03)8676 3354
Quotation Number	

Laboratory	EcoWise / ALS
Laboratory Address (Address for Courier)	
Laboratory Contact	Linna Truong
Laboratory Email/Contact Number	(03) 87568000

Final Report ☑ Email ☑ Fascimile ☐

Lab ID	Client Sample ID	Date	Time	Composite Sample	Sample Matrix (S: Soil, W: Water, A: Air, SL: Sludge, GW: Groundwater)	Preservative	Container Type (J: Soil Jar, B: Bag, G: Glass bottle, V: Vial, P: Plastic bottle)	Number	Volume (mL)	Hold	Laboratory Batch Number	Notes
	BH12/0.1-0.2	12/1/10	PM	–	S	ICE	J			✓	10-03110	
	BH12/0.4-0.5			–						✓		
	BH12/0.8-0.9			–						✓		
	BH15/0.1-0.2			–						✓		
	BH15/0.6-0.7			–						✓		
	BH15/0.9-1.0			–						✓		
	BH16/0.05-0.15			–						✓		
	BH16/0.5-0.6			–						✓		
	BH16/0.9-1.0			–						✓		
	BH14/0.1-0.2			–						✓		
	BH14/0.4-0.5			–						✓		
	BH14/0.8-0.9	↓	↓	–	↓	↓	↓			✓		
	Dup 2			–						✓		
	BH13/0.05-0.15	13/1/10	AM	–	S	ICE	J			✓		
	BH13/0.4-0.5			–						✓		
	BH13/0.8-0.9			–						✓		
	BH11/0.05-0.15			–						✓		
	BH11/0.4-0.5	↓	↓	–	↓	↓	↓			✓		

Sampled by	June Lee & Trevor Wall	Date/Time	12 & 13 Jan 2010
Received by Courier		Date/Time	
Received by Laboratory		Date/Time	14/1/10 1000
Relinquised by		Date/Time	
Relinquished by		Date/Time	

Additional Comments: Email results to june.lee@worleyparsons.com

WorleyParsons
resources & energy

CHAIN OF CUSTODY Documentation

PROJECT Number	
PROJECT Title	Landcom site in Nth. Tuncurry

WorleyParsons Address/Office	Level 12, 333 Collins St. Melbourne 3000
Project Manager	Dan Messiter
Contact Number	0400 336 426
Requested Completion Date	Standard
Field Personnel	June Lee / Trevor Wall
Contact Number	0410325128 / (03) 8676 3354
Quotation Number	

Laboratory	EcoWise / ALS
Laboratory Address (Address for Courier)	
Laboratory Contact	Linna Truong
Laboratory Email/Contact Number	(03) 87568000

Final Report ☑ Email ☑ Fascimile ☐

Sample Information							Container			Requested Analytes															Laboratory Batch Number
Lab ID	Client Sample ID	Date	Time	Composite Sample	Sample Matrix S: Soil W: Water A: Air SL: Sludge GW: Groundwater	Preservative	Type J: Soil Jar B: Bag G: Glass bottle V: Vial P: Plastic bottle	Number	Volume (mL)	HOLD															Notes
	BH11/0.9-1.0	13/1/10	AM	–	S	ice	J			/															
	BH8/0-0.10			–						/															
	BH8/0.4-0.5			–						/															
	BH8/0.9-1.0			–						/															
	BH7/0.05-0.15			–						/															
	BH7/0.5-0.6			–						/															
	BH7/0.9-1.0			–						/															
	BH5/0.05-0.15			–						/															
	BH5/0.4-0.5			–						/															
	BH5/0.9-1.0			–						/															
	BH4/0.05-0.15			–						/															
	BH4/0.4-0.5			–						/															
	BH4/0.9-1.0			–						/															
	BH2/0.05-0.15			–						/															
	BH2/0.4-0.5			–						/															
	BH2/0.9-1.0			–						/															
	BH1/0.05-0.15			–						/															
	Dup 2			–						/															

Sampled by	June Lee & Trevor Wall	Date/Time	13/1/2010
Received by Courier		Date/Time	
Received by Laboratory		Date/Time	14/1/10 1055
Relinquised by		Date/Time	
Relinquished by		Date/Time	

Additional Comments: Email results to june.lee@worleyparsons.com

WorleyParsons
resources & energy

CHAIN OF CUSTODY Documentation

PROJECT Number	
PROJECT Title	Landcom site in Nth. Tuncurry

WorleyParsons Address/Office	Level 12, 333 Collins St, Melbourne 3000
Project Manager	Dan Messiter
Contact Number	0400 336426
Field Personnel	June Lee & Trevor Wall
Contact Number	0410325128 / (03) 8677 63354
Requested Completion Date	Standard
Quotation Number	

Laboratory	EnviroSense / ALS
Laboratory Address (Address for Courier)	
Laboratory Contact	Linna Truong
Laboratory Email/Contact Number	(03) 8756 8000

Final Report ☐ Email ☐ Fascimile ☐

Lab ID	Client Sample ID	Date	Time	Composite Sample	Sample Matrix (S: Soil W: Water A: Air SL: Sludge GW: Groundwater)	Preservative	Container Type (J: Soil Jar B: Bag G: Glass bottle V: Vial P: Plastic bottle)	Container Number	Container Volume (mL)	HOLD.	Laboratory Batch Number / Notes
	BH1/0.5-0.6	13/1/10	AM	–	S	ice	J			/	
	BH1/0.9-1.0		↓	–						/	
	BH3/0.05-0.15		PM	–						/	
	BH3/0.5-0.6			–						/	
	BH3/0.9-1.0			–						/	
	BH6/0.05-0.15			–						/	
	BH6/0.4-0.5			–						/	
	BH6/0.9-1.0			–						/	
	BH10/0.05-0.15			–						/	
	BH10/0.4-0.5			–						/	
	BH10/0.9-1.0			–						/	
	BH9/0.05-0.15			–						/	
	BH9/0.4-0.5			–						/	
	BH9/0.9-1.0			–						/	
	Surface 1			–						/	
	Surface 2			–						/	
	Dup 4			–						/	
	Dup 3	↓	↓	–	↓	↓	↓			/	

Sampled by	June Lee & Trevor Wall	Date/Time	13/1/2010
Received by Courier	✓	Date/Time	
Received by Laboratory		Date/Time	14/1/10 1000
Relinquised by		Date/Time	
Relinquished by		Date/Time	

Additional Comments: Email results to june.lee@worleyparsons.com

Site: Landcom / North Tuncurry, NSW
Project: Preliminary Environmental Site Assessment (Soil)

No.	Borehole ID	Sample IDs	Date	TPH/BTEX/PAH	Metals Screen	pH	Herbicides, PAA	Herbicides, Triazine	OCPs, OPPs	Comments
1		BH12/0.1-0.2	12-Jan-10	1	1	1				
2	BH12	BH12/0.4-0.5	12-Jan-10	1	1	1				
3		BH12/0.8-0.9	12-Jan-10							
4		BH15/0.1-0.2	12-Jan-10		1	1	1	1	1	
5	BH15	BH15/0.6-0.7	12-Jan-10		1	1				
6		BH15/0.9-1.0	12-Jan-10							
7		BH16/0.05-0.15	12-Jan-10		1	1				
8	BH16	BH16/0.5-0.6	12-Jan-10		1	1				
9		BH16/0.9-1.0	12-Jan-10		1	1				
10		BH14/0.1-0.2	12-Jan-10		1	1				
11	BH14	BH14/0.4-0.5	12-Jan-10		1	1				
12		BH14/0.8-0.9	12-Jan-10							
13		BH13/0.05-0.15	13-Jan-10		1	1	1	1	1	
14	BH13	BH13/0.4-0.5	13-Jan-10		1	1				
15		BH13/0.8-0.9	13-Jan-10		1	1				
16		BH11/0.05-0.15	13-Jan-10		1	1				
17	BH11	BH11/0.4-0.5	13-Jan-10		1	1				
18		BH11/0.9-1.0	13-Jan-10							
19		BH8/0-0.1	13-Jan-10	1	1	1				
20	BH8	BH8/0.4-0.5	13-Jan-10		1	1				
21		BH8/0.9-1.0	13-Jan-10							
22		BH7/0.05-0.15	13-Jan-10		1	1				
23	BH7	BH7/0.5-0.6	13-Jan-10		1	1				
24		BH7/0.9-1.0	13-Jan-10							
25		BH5/0.05-0.15	13-Jan-10		1	1	1	1	1	
26	BH5	BH5/0.4-0.5	13-Jan-10		1	1				
27		BH5/0.9-1.0	13-Jan-10		1	1				
28		BH4/0.05-0.15	13-Jan-10		1	1				
29	BH4	BH4/0.4-0.5	13-Jan-10		1	1				
30		BH4/0.9-1.0	13-Jan-10							
31		BH2/0.05-0.15	13-Jan-10		1	1	1	1	1	
32	BH2	BH2/0.4-0.5	13-Jan-10		1	1				
33		BH2/0.9-1.0	13-Jan-10		1	1				
34		BH1/0.05-0.15	13-Jan-10	1	1	1	1	1	1	
35	BH1	BH1/0.5-0.6	13-Jan-10		1	1				
36		BH1/0.9-1.0	13-Jan-10		1	1				
37		BH3/0.05-0.15	13-Jan-10		1	1				
38	BH3	BH3/0.5-0.6	13-Jan-10		1	1				
39		BH3/0.9-1.0	13-Jan-10							
40		BH6/0.05-0.15	13-Jan-10		1	1				
41	BH6	BH6/0.4-0.5	13-Jan-10		1	1				
42		BH6/0.9-1.0	13-Jan-10							
43		BH10/0.05-0.15	13-Jan-10		1	1	1	1	1	
44	BH10	BH10/0.4-0.5	13-Jan-10		1	1				
45		BH10/0.9-1.0	13-Jan-10		1	1				
46		BH9/0.05-0.15	13-Jan-10	1	1	1				
47	BH9	BH9/0.4-0.5	13-Jan-10	1	1	1				
48		BH9/0.9-1.0	13-Jan-10							
49		Surface 1	13-Jan-10	1	1					
50		Surface 2	13-Jan-10	1	1					
51	Blind	Dup 1	12-Jan-10		1	1				
52	Split	Dup 2	13-Jan-10		1	1				MGT to analyse
53	Blind	Dup 3	13-Jan-10	1	1	1	1	1	1	
54	Split	Dup 4	13-Jan-10	1	1	1				MGT to analyse

Ecowise Australia Ptv Ltd
Melbourne Laboratory
Caribbean Business Park
22 Dalmore Drive
Scoresby VIC 3179

Phone : 03 8756 8000
Fax : 03 9763 1862
Email : melbourne@ecowise.com.au
Web : www.ecowise.com.au

Sample Receipt Advice (SRA)

Client:
SUNDRY CUSTOMER

Client Contact: **June Lee**
Phone : 86763943
Mobile :
Fax :
Email : june.lee@worleyparsons.com

Batch Summary:

Ecowise Batch No : **10-03110**

Date Received : 15-Jan-2010
Scheduled Reporting Date : 20-Jan-2010
Client Job Ref : WorleyParsons
No. of Sample(s) : 54

Program : Sundry Melbourne
Purchase Order : n/a
NATA report : Reqd.

Lab. Contact : **Alex Harrison**
Phone: (03) 8756 8106
Email: aharrison@ecowise.com.au

Consignment /Sample Information:

COC Received : YES

COC is complete, correct and unambiguous: YES

- ✓ Samples are Chilled.
- ✓ All samples have been received as described in the COC.
- ✓ Samples have been received in appropriate containers with correct preservatives.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

Comments:

Samples Dup 2 and Dup 4 - sent to MGT to analyse as reqeusted.

Client: **WorleyParsons**

Address: Level 12, 333 Collins St
Melbourne VIC 3000

Attention: **June Lee**

Certificate of Analysis

Batch No: 10-03110

Final Report

Ecowise Australia Pty Ltd
Caribbean Business Park
22 Dalmore Drive
Scoresby VIC 3179

Tel: 03 8756 8000
Fax: 03 9763 1862

Report Number: **139693**

Date Issued: **21-Jan-2010**

Client Program Ref: **WorleyParsons**

PO No: **Not Available**

Date Sampled: **12-Jan-2010 - 13-Jan-2010**

Ecowise Program Ref: **SUNDRY_MEL**

Date Received: **15-Jan-2010**

The sample(s) referred to in this report were analysed by the following method(s):

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
HERBICIDES	VIC-CM036	Melbourne	**MAH**	VIC-CM047	Melbourne	**MS Total Metals**	WSL 032	Melbourne
OCP	WSL 8080B	Melbourne	**OP**	VIC-CM044	Melbourne	**PAH**	WSL 8100B	Melbourne
pH	WSL 062	Melbourne	**TPH**	VIC-CM030	Melbourne	**Triazines**	WSL 071	Melbourne

*** Landcom site in Nth Tuncurry**

Principal Contact for this Report:

Linna Truong
Client Manager

NATA No. 992

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

Accredited for compliance with ISO/IEC 17025.

The results in this report were authorised by:

Name	*Title*
Hao Zhang	**Principal Organic Chemist**
John Earl	**Team Leader - Metals**
Kosta Christopoulos	**Chemist/Analyst**
Michael Clahsen	**Principal Inorganic Chemist**

Client: **WorleyParsons**

Client Program Ref: **WorleyParsons**

Batch No: 10-03110

Report Number: **139693**

Ecowise Program Ref: **SUNDRY_MEL**

Date Issued: **21-Jan-2010**

Ecowise Environmental

Soil Analysis

Sample	Sampled Date	Your Ref	Analysis: / Component: / Units: / Sample Type	pH / pH Units
2056242	12-01-10	BH12/0.1-0.2	SOIL	6.2
2056243	12-01-10	BH12/0.4-0.5	SOIL	6.0
2056245	12-01-10	BH15/0.1-0.2	SOIL	4.7
2056246	12-01-10	BH15/0.6-0.7	SOIL	5.2
2056248	12-01-10	BH16/0.05-0.15	SOIL	4.2
2056249	12-01-10	BH16/0.5-0.6	SOIL	5.1
2056250	12-01-10	BH16/0.9-1.0	SOIL	5.5
2056251	12-01-10	BH14/0.1-0.2	SOIL	4.3
2056252	12-01-10	BH14/0.4-0.5	SOIL	4.7
2056254	12-01-10	Dup 1	SOIL	4.4
2056255	13-01-10	BH13/0.05-0.15	SOIL	4.8
2056256	13-01-10	BH13/0.4-0.5	SOIL	4.6
2056257	13-01-10	BH13/0.8-0.9	SOIL	5.0
2056258	13-01-10	BH11/0.05-0.15	SOIL	4.6
2056259	13-01-10	BH11/0.4-0.5	SOIL	5.7
2056261	13-01-10	BH8/0-0.10	SOIL	5.2
2056262	13-01-10	BH8/0.4-0.5	SOIL	4.1
2056264	13-01-10	BH7/0.05-0.15	SOIL	4.8
2056265	13-01-10	BH7/0.5-0.6	SOIL	5.1
2056267	13-01-10	BH5/0.05-0.15	SOIL	4.7
2056268	13-01-10	BH5/0.4-0.5	SOIL	5.1
2056269	13-01-10	BH5/0.9-1.0	SOIL	5.1
2056270	13-01-10	BH4/0.05-0.15	SOIL	4.8
2056271	13-01-10	BH4/0.4-0.5	SOIL	5.2
2056273	13-01-10	BH2/0.05-0.15	SOIL	5.1
2056274	13-01-10	BH2/0.4-0.5	SOIL	4.6
2056275	13-01-10	BH2/0.9-1.0	SOIL	5.1
2056276	13-01-10	BH1/0.05-0.15	SOIL	4.7
2056278	13-01-10	BH1/0.5-0.6	SOIL	4.9
2056279	13-01-10	BH1/0.9-1.0	SOIL	5.1
2056280	13-01-10	BH3/0.05-0.15	SOIL	4.7
2056281	13-01-10	BH3/0.5-0.6	SOIL	4.9
2056283	13-01-10	BH6/0.05-0.15	SOIL	5.1
2056284	13-01-10	BH6/0.4-0.5	SOIL	5.2

Client: **WorleyParsons**

Client Program Ref: **WorleyParsons**

Batch No: 10-03110

Report Number: **139693**

Ecowise Program Ref: **SUNDRY_MEL**

Date Issued: **21-Jan-2010**

Ecowise Environmental

				pH
				pH Units
2056286	13-01-10	BH10/0.05-0.15	SOIL	5.3
2056287	13-01-10	BH10/0.4-0.5	SOIL	5.2
2056288	13-01-10	BH10/0.9-1.0	SOIL	4.8
2056289	13-01-10	BH9/0.05-0.15	SOIL	5.1
2056290	13-01-10	BH9/0.4-0.5	SOIL	4.9
2056295	13-01-10	Dup 3	SOIL	4.8

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

Soil Metals

Sample	Sampled Date	Your Ref	Analysis: / Component: / Units: / Sample Type	MS Total Metals Al mg/kg	MS Total Metals Sb mg/kg	MS Total Metals As mg/kg	MS Total Metals Ba mg/kg	MS Total Metals Be mg/kg	MS Total Metals B mg/kg	MS Total Metals Cd mg/kg	MS Total Metals Cr mg/kg	MS Total Metals Co mg/kg
2056242	12-01-10	BH12/0.1-0.2	SOIL	3200	<5	<5	23	<5	10	<0.2	<5	<5
2056243	12-01-10	BH12/0.4-0.5	SOIL	270	<5	<5	<5	<5	<10	<0.2	<5	<5
2056245	12-01-10	BH15/0.1-0.2	SOIL	140	<5	<5	<5	<5	<10	<0.2	<5	<5
2056246	12-01-10	BH15/0.6-0.7	SOIL	83	<5	<5	<5	<5	<10	<0.2	<5	<5
2056248	12-01-10	BH16/0.05-0.15	SOIL	210	<5	<5	5	<5	<10	<0.2	<5	<5
2056249	12-01-10	BH16/0.5-0.6	SOIL	65	<5	<5	<5	<5	<10	<0.2	<5	<5
2056250	12-01-10	BH16/0.9-1.0	SOIL	68	<5	<5	<5	<5	<10	<0.2	<5	<5
2056251	12-01-10	BH14/0.1-0.2	SOIL	210	<5	<5	<5	<5	<10	<0.2	<5	<5
2056252	12-01-10	BH14/0.4-0.5	SOIL	30	<5	<5	<5	<5	<10	<0.2	<5	<5
2056254	12-01-10	Dup 1	SOIL	210	<5	<5	<5	<5	<10	<0.2	<5	<5
2056255	13-01-10	BH13/0.05-0.15	SOIL	110	<5	<5	<5	<5	<10	<0.2	<5	<5
2056256	13-01-10	BH13/0.4-0.5	SOIL	87	<5	<5	<5	<5	<10	<0.2	<5	<5
2056257	13-01-10	BH13/0.8-0.9	SOIL	25	<5	<5	<5	<5	<10	<0.2	<5	<5
2056258	13-01-10	BH11/0.05-0.15	SOIL	120	<5	<5	<5	<5	<10	<0.2	<5	<5
2056259	13-01-10	BH11/0.4-0.5	SOIL	23	<5	<5	<5	<5	<10	<0.2	<5	<5
2056261	13-01-10	BH8/0-0.10	SOIL	50	<5	<5	<5	<5	<10	<0.2	<5	<5
2056262	13-01-10	BH8/0.4-0.5	SOIL	89	<5	<5	6	<5	<10	<0.2	<5	<5
2056264	13-01-10	BH7/0.05-0.15	SOIL	110	<5	<5	<5	<5	<10	<0.2	<5	<5
2056265	13-01-10	BH7/0.5-0.6	SOIL	21	<5	<5	<5	<5	<10	<0.2	<5	<5
2056267	13-01-10	BH5/0.05-0.15	SOIL	110	<5	<5	<5	<5	<10	<0.2	<5	<5
2056268	13-01-10	BH5/0.4-0.5	SOIL	17	<5	<5	<5	<5	<10	<0.2	<5	<5
2056269	13-01-10	BH5/0.9-1.0	SOIL	34	<5	<5	<5	<5	<10	<0.2	<5	<5
2056270	13-01-10	BH4/0.05-0.15	SOIL	62	<5	<5	<5	<5	<10	<0.2	<5	<5
2056271	13-01-10	BH4/0.4-0.5	SOIL	40	<5	<5	<5	<5	<10	<0.2	<5	<5
2056273	13-01-10	BH2/0.05-0.15	SOIL	43	<5	<5	<5	<5	<10	<0.2	<5	<5
2056274	13-01-10	BH2/0.4-0.5	SOIL	95	<5	<5	<5	<5	<10	<0.2	<5	<5
2056275	13-01-10	BH2/0.9-1.0	SOIL	140	<5	<5	<5	<5	<10	<0.2	<5	<5
2056276	13-01-10	BH1/0.05-0.15	SOIL	140	<5	<5	7	<5	<10	<0.2	<5	<5
2056278	13-01-10	BH1/0.5-0.6	SOIL	33	<5	<5	<5	<5	<10	<0.2	<5	<5
2056279	13-01-10	BH1/0.9-1.0	SOIL	45	<5	<5	<5	<5	<10	<0.2	<5	<5
2056280	13-01-10	BH3/0.05-0.15	SOIL	84	<5	<5	<5	<5	<10	<0.2	<5	<5
2056281	13-01-10	BH3/0.5-0.6	SOIL	19	<5	<5	<5	<5	<10	<0.2	<5	<5
2056283	13-01-10	BH6/0.05-0.15	SOIL	170	<5	<5	<5	<5	17	<0.2	<5	<5
2056284	13-01-10	BH6/0.4-0.5	SOIL	24	<5	<5	<5	<5	<10	<0.2	<5	<5

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise.

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

				MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
				Al mg/kg	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg
2056286	13-01-10	BH10/0.05-0.15	SOIL	200	<5	<5	<5	<5	<10	<0.2	<5	<5
2056287	13-01-10	BH10/0.4-0.5	SOIL	77	<5	<5	<5	<5	<10	<0.2	<5	<5
2056288	13-01-10	BH10/0.9-1.0	SOIL	260	<5	<5	<5	<5	<10	<0.2	<5	<5
2056289	13-01-10	BH9/0.05-0.15	SOIL	180	<5	<5	<5	<5	<10	<0.2	<5	<5
2056290	13-01-10	BH9/0.4-0.5	SOIL	50	<5	<5	<5	<5	<10	<0.2	<5	<5
2056292	13-01-10	Surface 1	TAR	1200	<5	<5	<5	<5	<10	<0.2	<5	<5
2056293	13-01-10	Surface 2	SOIL	9100	<5	<5	84	<5	<10	<0.2	8	<5
2056295	13-01-10	Dup 3	SOIL	130	<5	<5	<5	<5	<10	<0.2	<5	<5

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Soil Metals

Sample	Sampled Date	Your Ref	Analysis: / Component: / Units: / Sample Type	MS Total Metals Cu mg/kg	MS Total Metals Fe mg/kg	MS Total Metals Pb mg/kg	MS Total Metals Mn mg/kg	MS Total Metals Hg mg/kg	MS Total Metals Mo mg/kg	MS Total Metals Ni mg/kg	MS Total Metals Se mg/kg	MS Total Metals Ag mg/kg
2056242	12-01-10	BH12/0.1-0.2	SOIL	8	6600	28	120	<0.05	<5	<5	<5	<5
2056243	12-01-10	BH12/0.4-0.5	SOIL	<5	340	<5	6	<0.05	<5	<5	<5	<5
2056245	12-01-10	BH15/0.1-0.2	SOIL	<5	100	<5	<5	0.05	<5	<5	<5	<5
2056246	12-01-10	BH15/0.6-0.7	SOIL	<5	310	<5	<5	<0.05	<5	<5	<5	<5
2056248	12-01-10	BH16/0.05-0.15	SOIL	<5	260	<5	<5	<0.05	<5	<5	<5	<5
2056249	12-01-10	BH16/0.5-0.6	SOIL	<5	210	<5	<5	<0.05	<5	<5	<5	<5
2056250	12-01-10	BH16/0.9-1.0	SOIL	<5	250	<5	<5	<0.05	<5	<5	<5	<5
2056251	12-01-10	BH14/0.1-0.2	SOIL	<5	200	<5	<5	<0.05	<5	<5	<5	<5
2056252	12-01-10	BH14/0.4-0.5	SOIL	<5	22	<5	<5	<0.05	<5	<5	<5	<5
2056254	12-01-10	Dup 1	SOIL	<5	260	<5	<5	<0.05	<5	<5	<5	<5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<5	180	<5	<5	<0.05	<5	<5	<5	<5
2056256	13-01-10	BH13/0.4-0.5	SOIL	<5	55	<5	<5	<0.05	<5	<5	<5	<5
2056257	13-01-10	BH13/0.8-0.9	SOIL	<5	25	<5	<5	<0.05	<5	<5	<5	<5
2056258	13-01-10	BH11/0.05-0.15	SOIL	<5	160	<5	<5	<0.05	<5	<5	<5	<5
2056259	13-01-10	BH11/0.4-0.5	SOIL	<5	26	<5	<5	<0.05	<5	<5	<5	<5
2056261	13-01-10	BH8/0-0.10	SOIL	<5	50	<5	<5	<0.05	<5	<5	<5	<5
2056262	13-01-10	BH8/0.4-0.5	SOIL	<5	49	<5	<5	<0.05	<5	<5	<5	<5
2056264	13-01-10	BH7/0.05-0.15	SOIL	<5	110	<5	<5	<0.05	<5	<5	<5	<5
2056265	13-01-10	BH7/0.5-0.6	SOIL	7	11	<5	<5	<0.05	<5	<5	<5	<5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<5	120	<5	<5	<0.05	<5	<5	<5	<5
2056268	13-01-10	BH5/0.4-0.5	SOIL	<5	22	<5	<5	<0.05	<5	<5	<5	<5
2056269	13-01-10	BH5/0.9-1.0	SOIL	<5	32	<5	<5	<0.05	<5	<5	<5	<5
2056270	13-01-10	BH4/0.05-0.15	SOIL	<5	82	<5	<5	<0.05	<5	<5	<5	<5
2056271	13-01-10	BH4/0.4-0.5	SOIL	<5	36	<5	<5	<0.05	<5	<5	<5	<5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<5	89	<5	<5	<0.05	<5	<5	<5	<5
2056274	13-01-10	BH2/0.4-0.5	SOIL	<5	130	<5	<5	<0.05	<5	<5	<5	<5
2056275	13-01-10	BH2/0.9-1.0	SOIL	<5	470	<5	<5	<0.05	<5	<5	<5	<5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<5	150	<5	<5	<0.05	<5	<5	<5	<5
2056278	13-01-10	BH1/0.5-0.6	SOIL	<5	82	<5	<5	<0.05	<5	<5	<5	<5
2056279	13-01-10	BH1/0.9-1.0	SOIL	<5	250	<5	<5	<0.05	<5	<5	<5	<5
2056280	13-01-10	BH3/0.05-0.15	SOIL	<5	110	<5	<5	<0.05	<5	<5	<5	<5
2056281	13-01-10	BH3/0.5-0.6	SOIL	<5	22	<5	<5	<0.05	<5	<5	<5	<5
2056283	13-01-10	BH6/0.05-0.15	SOIL	9	520	47	6	<0.05	<5	950	<5	<5
2056284	13-01-10	BH6/0.4-0.5	SOIL	<5	37	<5	<5	<0.05	<5	<5	<5	<5

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise.

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

				MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
				Cu mg/kg	Fe mg/kg	Pb mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Ni mg/kg	Se mg/kg	Ag mg/kg
2056286	13-01-10	BH10/0.05-0.15	SOIL	<5	170	<5	<5	<0.05	<5	<5	<5	<5
2056287	13-01-10	BH10/0.4-0.5	SOIL	<5	210	<5	<5	<0.05	<5	<5	<5	<5
2056288	13-01-10	BH10/0.9-1.0	SOIL	8	1000	<5	<5	<0.05	<5	<5	<5	<5
2056289	13-01-10	BH9/0.05-0.15	SOIL	<5	250	<5	<5	<0.05	<5	<5	<5	<5
2056290	13-01-10	BH9/0.4-0.5	SOIL	<5	56	<5	<5	<0.05	<5	<5	<5	<5
2056292	13-01-10	Surface 1	TAR	<5	2500	<5	60	<0.05	<5	<5	<5	<5
2056293	13-01-10	Surface 2	SOIL	11	31000	10	150	<0.05	<5	<5	<5	<5
2056295	13-01-10	Dup 3	SOIL	<5	140	<5	<5	<0.05	<5	<5	<5	<5

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise.

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

Soil Metals

Sample	Sampled Date	Your Ref	Component: Units: Sample Type	MS Total Metals Sr mg/kg	MS Total Metals Tl mg/kg	MS Total Metals Sn mg/kg	MS Total Metals Ti mg/kg	MS Total Metals V mg/kg	MS Total Metals Zn mg/kg
2056242	12-01-10	BH12/0.1-0.2	SOIL	6	<5	<5	84	13	17
2056243	12-01-10	BH12/0.4-0.5	SOIL	<5	<5	<5	17	<5	<5
2056245	12-01-10	BH15/0.1-0.2	SOIL	<5	<5	<5	<5	<5	<5
2056246	12-01-10	BH15/0.6-0.7	SOIL	<5	<5	<5	6	<5	<5
2056248	12-01-10	BH16/0.05-0.15	SOIL	6	<5	<5	<5	<5	<5
2056249	12-01-10	BH16/0.5-0.6	SOIL	<5	<5	<5	7	<5	<5
2056250	12-01-10	BH16/0.9-1.0	SOIL	<5	<5	<5	7	<5	<5
2056251	12-01-10	BH14/0.1-0.2	SOIL	<5	<5	<5	<5	<5	<5
2056252	12-01-10	BH14/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056254	12-01-10	Dup 1	SOIL	<5	<5	<5	6	<5	<5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056256	13-01-10	BH13/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056257	13-01-10	BH13/0.8-0.9	SOIL	<5	<5	<5	<5	<5	<5
2056258	13-01-10	BH11/0.05-0.15	SOIL	<5	<5	<5	6	<5	<5
2056259	13-01-10	BH11/0.4-0.5	SOIL	<5	<5	<5	8	<5	<5
2056261	13-01-10	BH8/0-0.10	SOIL	<5	<5	<5	<5	<5	<5
2056262	13-01-10	BH8/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056264	13-01-10	BH7/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056265	13-01-10	BH7/0.5-0.6	SOIL	<5	<5	<5	<5	<5	<5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056268	13-01-10	BH5/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056269	13-01-10	BH5/0.9-1.0	SOIL	<5	<5	<5	5	<5	<5
2056270	13-01-10	BH4/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056271	13-01-10	BH4/0.4-0.5	SOIL	<5	<5	<5	6	<5	<5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056274	13-01-10	BH2/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056275	13-01-10	BH2/0.9-1.0	SOIL	<5	<5	<5	9	<5	<5
2056276	13-01-10	BH1/0.05-0.15	SOIL	8	<5	<5	<5	<5	<5
2056278	13-01-10	BH1/0.5-0.6	SOIL	<5	<5	<5	<5	<5	<5
2056279	13-01-10	BH1/0.9-1.0	SOIL	<5	<5	<5	5	<5	<5
2056280	13-01-10	BH3/0.05-0.15	SOIL	<5	<5	<5	8	<5	<5
2056281	13-01-10	BH3/0.5-0.6	SOIL	<5	<5	<5	7	<5	<5
2056283	13-01-10	BH6/0.05-0.15	SOIL	<5	<5	10	<5	<5	15
2056284	13-01-10	BH6/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

				MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
				Sr mg/kg	Tl mg/kg	Sn mg/kg	Ti mg/kg	V mg/kg	Zn mg/kg
2056286	13-01-10	BH10/0.05-0.15	SOIL	<5	<5	<5	<5	<5	<5
2056287	13-01-10	BH10/0.4-0.5	SOIL	<5	<5	<5	<5	<5	<5
2056288	13-01-10	BH10/0.9-1.0	SOIL	<5	<5	<5	15	<5	<5
2056289	13-01-10	BH9/0.05-0.15	SOIL	<5	<5	<5	8	<5	<5
2056290	13-01-10	BH9/0.4-0.5	SOIL	<5	<5	<5	6	<5	<5
2056292	13-01-10	Surface 1	TAR	30	<5	<5	18	<5	7
2056293	13-01-10	Surface 2	SOIL	6	<5	<5	44	44	34
2056295	13-01-10	Dup 3	SOIL	6	<5	<5	<5	<5	6

Soil MAH

Sample	*Sampled Date*	*Your Ref*	*Analysis:*	MAH	MAH	MAH	MAH	MAH	MAH	MAH
			Component:	BENZ	TOLUENE	ETHBENZ	XYLENE	STYRENE	CUMENE	124TMBEN
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type							
2056242	12-01-10	BH12/0.1-0.2	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056243	12-01-10	BH12/0.4-0.5	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056261	13-01-10	BH8/0-0.10	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056289	13-01-10	BH9/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056290	13-01-10	BH9/0.4-0.5	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056292	13-01-10	Surface 1	TAR	<0.5	2.6	1.6	18	<0.5	0.8	10
2056293	13-01-10	Surface 2	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295	13-01-10	Dup 3	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Soil TPH

Sample	Sampled Date	Your Ref	Analysis:	TPH	TPH	TPH	TPH
			Component:	TPHC6+	TPHC10+	TPHC15+	TPHC29+
			Units:	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type				
2056242	12-01-10	BH12/0.1-0.2	SOIL	<20	<20	<50	<50
2056243	12-01-10	BH12/0.4-0.5	SOIL	<20	<20	<50	<50
2056261	13-01-10	BH8/0-0.10	SOIL	<20	<20	<50	<50
2056276	13-01-10	BH1/0.05-0.15	SOIL	<20	<20	<50	<50
2056289	13-01-10	BH9/0.05-0.15	SOIL	<20	<20	<50	<50
2056290	13-01-10	BH9/0.4-0.5	SOIL	<20	<20	<50	<50
2056292	13-01-10	Surface 1	TAR	<100	1600	<300	2200
2056293	13-01-10	Surface 2	SOIL	<20	41	73	220
2056295	13-01-10	Dup 3	SOIL	<20	<20	<50	<50

Soil PAH

Sample	Sampled Date	Your Ref	Analysis:	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
			Component:	ACE	ACY	ANT	BAA	BAP	BBF	BGP	BKF	CHR
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
2056242	12-01-10	BH12/0.1-0.2	SOIL	<0.1	0.1	<0.1	0.2	0.2	0.6	0.7	0.6	0.3
2056243	12-01-10	BH12/0.4-0.5	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056261	13-01-10	BH8/0-0.10	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056289	13-01-10	BH9/0.05-0.15	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056290	13-01-10	BH9/0.4-0.5	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056292	13-01-10	Surface 1	TAR	<3	<3	<3	<3	<3	<3	<3	<3	<3
2056293	13-01-10	Surface 2	SOIL	<0.3	0.6	0.7	2.8	3.3	7.9	9.9	7.9	4.4
2056295	13-01-10	Dup 3	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

Soil PAH

Sample	Sampled Date	Your Ref	Sample Type	PAH DBA mg/kg	PAH FLA mg/kg	PAH FLU mg/kg	PAH IPY mg/kg	PAH NAP mg/kg	PAH PHE mg/kg	PAH PYR mg/kg	PAH TOTPAHs mg/kg
2056242	12-01-10	BH12/0.1-0.2	SOIL	0.2	0.3	<0.1	0.6	<0.1	0.1	0.3	4.2
2056243	12-01-10	BH12/0.4-0.5	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056261	13-01-10	BH8/0-0.10	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056289	13-01-10	BH9/0.05-0.15	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056290	13-01-10	BH9/0.4-0.5	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056292	13-01-10	Surface 1	TAR	<3	<3	<3	<3	41	<3	<3	41
2056293	13-01-10	Surface 2	SOIL	2.3	4.1	<0.3	8.6	0.4	1.6	3.7	58
2056295	13-01-10	Dup 3	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Sample Type	OCP ABHC mg/kg	OCP AENDOSUL mg/kg	OCP ALDR mg/kg	OCP BBHC mg/kg	OCP BENDOSUL mg/kg	OCP cis-Chlordane mg/kg	OCP trans-Chlordane mg/kg	OCP DBHC mg/kg	OCP DDD mg/kg
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056295	13-01-10	Dup 3	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Sample Type	OCP DDE mg/kg	OCP DDT mg/kg	OCP DIEL mg/kg	OCP ENDOS mg/kg	OCP ENDR mg/kg	OCP ENDRALD mg/kg	OCP ENDRKET mg/kg	OCP HCB mg/kg	OCP HEPEP mg/kg
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056295	13-01-10	Dup 3	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Analysis:	OCP	OCP	OCP
			Component:	HEPT	LIND	METHOX
			Units:	mg/kg	mg/kg	mg/kg
			Sample Type			
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.05	<0.05	<0.05
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.05	<0.05	<0.05
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.05	<0.05	<0.05
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.05	<0.05	<0.05
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.05	<0.05	<0.05
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.05	<0.05	<0.05
2056295	13-01-10	Dup 3	SOIL	<0.05	<0.05	<0.05

Soil O.P. Pesticides

Sample	Sampled Date	Your Ref	Analysis:	OP	OP	OP	OP	OP	OP	OP	OP	OP
			Component:	CHLORFOS	DIAZINON	DICHLVOS	ETHION	FENTHIO	MALTHION	MEVPHOS	PARATH	RONNEL
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295	13-01-10	Dup 3	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil O.P. Pesticides

Sample	Sampled Date	Your Ref	Analysis:	OP
			Component:	STIROFOS
			Units:	mg/kg
			Sample Type	
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.5
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.5
2056295	13-01-10	Dup 3	SOIL	<0.5

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Soil Herbicides

Sample	Sampled Date	Your Ref	Analysis:	HERBICIDES	HERBICIDES	HERBICIDES
			Component:	2,4-D	2,4,5-T	MCPA
			Units:	mg/kg	mg/kg	mg/kg
			Sample Type			
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.5	<0.5	<0.5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.5	<0.5	<0.5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.5	<0.5	<0.5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.5	<0.5	<0.5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.5	<0.5	<0.5
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.5	<0.5	<0.5
2056295	13-01-10	Dup 3	SOIL	<0.5	<0.5	<0.5

Soil Triazines

Sample	Sampled Date	Your Ref	Analysis:	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines
			Component:	AMETRYN	ATRAZINE	PROMETON	PROMETRY	PROPAZIN	SIMAZINE	TBAZINE	SIMETRYN	TERBUTRYN
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
2056245	12-01-10	BH15/0.1-0.2	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056255	13-01-10	BH13/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056267	13-01-10	BH5/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056273	13-01-10	BH2/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056276	13-01-10	BH1/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056286	13-01-10	BH10/0.05-0.15	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295	13-01-10	Dup 3	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Client: **WorleyParsons**

Client Program Ref: **WorleyParsons**

Batch No: 10-03110

Report Number: **139693**

Ecowise Program Ref: **SUNDRY_MEL**

Date Issued: **21-Jan-2010**

Ecowise Environmental

Quality Control

Soil Herbicides

	HERBICIDES	HERBICIDES	HERBICIDES
	2,4-D	2,4,5-T	MCPA
2056295 DUPLICATE Sample Value	<0.5	<0.5	<0.5
2056295 DUPLICATE Duplicate Value	<0.5	<0.5	<0.5
2056295 DUPLICATE % RPD	**0**	**0**	**0**
2056295 SPIKE Sample Value	<0.5	<0.5	<0.5
2056295 SPIKE Expected Value	2.1	2.1	2.1
2056295 SPIKE % Recovery	**70.4**	**63.4**	**65.2**
2061381 BLANK Value	<0.5	<0.5	<0.5

Soil MAH

	MAH	MAH	MAH	MAH	MAH	MAH	MAH
	BENZ	TOLUENE	ETHBENZ	XYLENE	STYRENE	CUMENE	124TMBEN
2056243 DUPLICATE Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056243 DUPLICATE Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056243 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2056276 SPIKE Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056276 SPIKE Expected Value	3.7	3.7	3.7	11	3.7	3.7	3.7
2056276 SPIKE % Recovery	**85.3**	**88.1**	**82.7**	**89.4**	**101**	**99.1**	**88.8**
2057671 BLANK Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil O.C. Pesticides

	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
	ABHC	AENDOSUL	ALDR	BBHC	BENDOSUL	cis-Chlordane	trans-Chlordane	DBHC	DDD
2056730 DUPLICATE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 DUPLICATE Duplicate Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2056730 SPIKE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 SPIKE Expected Value	2.6	1.3	1.3	2.2	1.3	1.3	1.3	2.6	1.3
2056730 SPIKE % Recovery	**107**	**98.0**	**104**	**111**	**90.0**	**98.0**	**108**	**104**	**98.0**
2059694 BLANK Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
	DDE	DDT	DIEL	ENDOS	ENDR	ENDRALD	ENDRKET	HCB	HEPEP
2056730 DUPLICATE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 DUPLICATE Duplicate Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2056730 SPIKE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2056730 SPIKE Expected Value	1.3	1.3	1.3	1.3	1.3	1.3	1.3	2.3	1.3

Batch No: 10-03110

Client: **WorleyParsons**

Report Number: **139693**

Date Issued: **21-Jan-2010**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

		OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
		DDE	DDT	DIEL	ENDOS	ENDR	ENDRALD	ENDRKET	HCB	HEPEP
2056730 SPIKE	**% Recovery**	**90.0**	**74.0**	**90.0**	**76.0**	**90.0**	**76.0**	**90.0**	**113**	**108**
2059694 BLANK	Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

		OCP	OCP	OCP
		HEPT	LIND	METHOX
2056730 DUPLICATE	Sample Value	<0.05	<0.05	<0.05
2056730 DUPLICATE	Duplicate Value	<0.05	<0.05	<0.05
2056730 DUPLICATE	**% RPD**	**0**	**0**	**0**
2056730 SPIKE	Sample Value	<0.05	<0.05	<0.05
2056730 SPIKE	Expected Value	1.3	2.6	1.3
2056730 SPIKE	**% Recovery**	**98.0**	**109**	**72.0**
2059694 BLANK	Value	<0.05	<0.05	<0.05

Soil O.P. Pesticides

		OP	OP	OP	OP	OP	OP	OP	OP	OP
		CHLORFOS	DIAZINON	DICHLVOS	ETHION	FENTHIO	MALTHION	MEVPHOS	PARATH	RONNEL
2056295 DUPLICATE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295 DUPLICATE	Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295 DUPLICATE	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2056295 SPIKE	Sample Value	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5		<0.5
2056295 SPIKE	Expected Value	1.3	1.3		1.3	1.3	1.3	1.3		1.3
2056295 SPIKE	**% Recovery**	**94.0**	**90.0**		**74.0**	**94.0**	**86.0**	**76.0**		**96.0**
2060074 BLANK	Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil O.P. Pesticides

		OP
		STIROFOS
2056295 DUPLICATE	Sample Value	<0.5
2056295 DUPLICATE	Duplicate Value	<0.5
2056295 DUPLICATE	**% RPD**	**0**
2056295 SPIKE	Sample Value	<0.5
2056295 SPIKE	Expected Value	1.3
2056295 SPIKE	**% Recovery**	**76.0**
2060074 BLANK	Value	<0.5

Soil PAH

		PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
		ACE	ACY	ANT	BAA	BAP	BBF	BGP	BKF	CHR
2056295 SPIKE	Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
2056295 SPIKE	Expected Value	1.3	1.3	1.3	1.3	1.3	1.3		1.3	1.3

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
	ACE	ACY	ANT	BAA	BAP	BBF	BGP	BKF	CHR
2056295 SPIKE % Recovery	**108**	**98.0**	**98.0**	**92.0**	**70.0**	**72.0**		**84.0**	**80.0**
2056730 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056730 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056730 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2059702 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2058113 DUPLICATE Sample Value	<0.3	0.5	0.7	3.2	4.4	3.6	4.0	3.6	3.2
2058113 DUPLICATE Duplicate Value	<0.3	0.5	0.7	3.2	4.4	3.5	3.9	3.5	3.2
2058113 DUPLICATE % RPD	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**3.8**	**3.4**	**3.8**	**0.0**
2061470 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil PAH

	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
	DBA	FLA	FLU	IPY	NAP	PHE	PYR	TOTPAHs
2056295 SPIKE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
2056295 SPIKE Expected Value	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
2056295 SPIKE % Recovery	**74.0**	**94.0**	**108**	**74.0**	**100**	**100**	**96.0**	
2056730 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056730 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2056730 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2059702 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2058113 DUPLICATE Sample Value	1.2	5.5	<0.3	3.1	<0.3	1.7	5.9	41
2058113 DUPLICATE Duplicate Value	1.2	5.5	<0.3	3.1	<0.3	1.7	5.8	40
2058113 DUPLICATE % RPD	**0.0**	**0.0**	**0**	**0.0**	**0**	**0.0**	**2.3**	**1.0**
2061470 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil Analysis

	pH
	pH
2057509 BLANK Value	5.6
2056283 DUPLICATE Sample Value	5.1
2056283 DUPLICATE Duplicate Value	5.3
2056283 DUPLICATE % RPD	**3.7**

Soil Metals

	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
	Al	Sb	As	Ba	Be	B	Cd	Cr	Co
2057663 BLANK Value	<5	<5	<5	<5	<5	<10	<0.2	<5	<5
2055682 DUPLICATE Sample Value			<5				<0.2		
2055682 DUPLICATE Duplicate Value			<5				<0.2		
2055682 DUPLICATE % RPD			**0**				**0**		

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise.

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

		MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
		Al	Sb	As	Ba	Be	B	Cd	Cr	Co
2056243 SPIKE	Sample Value			<5	<5	<5	<10	<0.2	<5	<5
2056243 SPIKE	Expected Value			100	100	100	100	100	100	100
2056243 SPIKE	**% Recovery**			**110**	**113**	**116**	**114**	**110**	**108**	**109**
2059945 BLANK	Value	<5	<5	<5	<5	<5	<10	<0.2	<5	<5
2056256 SPIKE	Sample Value		<5	<5	<5	<5	<10	<0.2	<5	<5
2056256 SPIKE	Expected Value		100	100	100	100	100	100	100	100
2056256 SPIKE	**% Recovery**		**107**	**90.1**	**94.2**	**93.8**	**94.0**	**92.8**	**92.7**	**95.9**
2056281 DUPLICATE	Sample Value	19	<5	<5		<5	<10	<0.2	<5	<5
2056281 DUPLICATE	Duplicate Value	19	<5	<5		<5	<10	<0.2	<5	<5
2056281 DUPLICATE	**% RPD**	**0.7**	**0**	**0**		**0**	**0**	**0**	**0**	**0**
2059956 BLANK	Value	<5	<5	<5	<5	<5	<10	<0.2	<5	<5
2056295 SPIKE	Sample Value		<5	<5	<5	<5	<10	<0.2	<5	<5
2056295 SPIKE	Expected Value		100	100	100	100	100	100	100	100
2056295 SPIKE	**% Recovery**		**102**	**87.6**	**92.3**	**94.4**	**101**	**90.1**	**94.8**	**95.6**
2056925 DUPLICATE	Sample Value	10000	<5	<5	25	<5	<10	<0.2	24	11
2056925 DUPLICATE	Duplicate Value	11000	<5	<5	29	<5	<10	<0.2	24	13
2056925 DUPLICATE	**% RPD**	**11.5**	**0**	**0**	**13.1**	**0**	**0**	**0**	**2.8**	**15.6**

Soil Metals

		MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
		Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag
2057663 BLANK	Value	<5	<10	<5	<5	<0.05	<5	<5	<5	<5
2055682 DUPLICATE	Sample Value	22		9		<0.05	<5	110	<5	<5
2055682 DUPLICATE	Duplicate Value	22		10		<0.05	<5	110	<5	<5
2055682 DUPLICATE	**% RPD**	**1.8**		**3.8**		**0**	**0**	**0.8**	**0**	**0**
2056243 SPIKE	Sample Value	<5		<5	6	<0.05	<5		<5	
2056243 SPIKE	Expected Value	100		100	100	1.0	100		100	
2056243 SPIKE	**% Recovery**	**107**		**111**	**107**	**101**	**117**		**107**	
2059945 BLANK	Value	<5	<10	<5	<5	<0.05	<5	<5	<5	<5
2056256 SPIKE	Sample Value	<5	55	<5	<5	<0.05	<5	<5	<5	
2056256 SPIKE	Expected Value	100	150	100	100	1.0	100	100	100	
2056256 SPIKE	**% Recovery**	**95.1**	**99.3**	**98.8**	**93.6**	**87.0**	**94.6**	**91.6**	**87.5**	
2056281 DUPLICATE	Sample Value	<5	22	<5			<5	<5	<5	<5
2056281 DUPLICATE	Duplicate Value	<5	27	<5			<5	<5	<5	<5
2056281 DUPLICATE	**% RPD**	**0**	**19.5**	**0**			**0**	**0**	**0**	**0**
2059956 BLANK	Value	<5	<10	<5	<5	<0.05	<5	<5	<5	<5
2056295 SPIKE	Sample Value	<5		<5	<5	<0.05	<5	<5	<5	
2056295 SPIKE	Expected Value	100		100	100	1.0	100	100	100	

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise.

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

Ecowise Environmental

	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag
2056295 SPIKE % Recovery	**92.3**		**96.6**	**94.3**	**86.9**	**91.2**	**92.5**	**83.7**	
2056925 DUPLICATE Sample Value	7	15000	17	330	<0.05	<5	8	<5	
2056925 DUPLICATE Duplicate Value	8	16000	14	410	<0.05	<5	9	<5	
2056925 DUPLICATE % RPD	**12.4**	**7.8**	**22.2**	**20.7**	**0**	**0**	**11.0**	**0**	

Soil Metals

	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
	Sr	Tl	Sn	Ti	V	Zn
2057663 BLANK Value	<5	<5	<5	<5	<5	<5
2055682 DUPLICATE Sample Value			<5			40
2055682 DUPLICATE Duplicate Value			<5			39
2055682 DUPLICATE % RPD			**0**			**3.4**
2056243 SPIKE Sample Value	<5	<5	<5	17	<5	<5
2056243 SPIKE Expected Value	100	100	100	110	100	100
2056243 SPIKE % Recovery	**111**	**104**	**118**	**105**	**110**	**102**
2059945 BLANK Value	<5	<5	<5	<5	<5	<5
2056256 SPIKE Sample Value	<5	<5	<5	<5	<5	<5
2056256 SPIKE Expected Value	100	100	100	100	100	100
2056256 SPIKE % Recovery	**95.5**	**101**	**97.4**	**91.4**	**96.5**	**87.4**
2056281 DUPLICATE Sample Value	<5	<5	<5	7		
2056281 DUPLICATE Duplicate Value	<5	<5	<5	8		
2056281 DUPLICATE % RPD	**0**	**0**	**0**	**14.4**		
2059956 BLANK Value	<5	<5	<5	<5	<5	<5
2056295 SPIKE Sample Value	6	<5	<5	<5	<5	6
2056295 SPIKE Expected Value	110	100	100	100	100	110
2056295 SPIKE % Recovery	**93.7**	**93.1**	**93.4**	**91.6**	**95.7**	**84.0**
2056925 DUPLICATE Sample Value	10	<5	<5	36	45	13
2056925 DUPLICATE Duplicate Value	11	<5	<5	42	46	11
2056925 DUPLICATE % RPD	**5.8**	**0**	**0**	**16.1**	**1.4**	**12.3**

Soil TPH

	TPH	TPH	TPH	TPH
	TPHC6+	TPHC10+	TPHC15+	TPHC29+
2056730 DUPLICATE Sample Value	<20	<20	<50	<50
2056730 DUPLICATE Duplicate Value	<20	<20	<50	<50
2056730 DUPLICATE % RPD	**0**	**0**	**0**	**0**
2056730 SPIKE Sample Value			<50	
2056730 SPIKE Expected Value			310	
2056730 SPIKE % Recovery			**89.5**	

Batch No: 10-03110

Date Issued: **21-Jan-2010**

Client: **WorleyParsons**

Report Number: **139693**

Client Program Ref: **WorleyParsons**

Ecowise Program Ref: **SUNDRY_MEL**

			TPH	TPH	TPH	TPH
			TPHC6+	TPHC10+	TPHC15+	TPHC29+
2060192	BLANK	Value	<20	<20	<50	<50
2056781	SPIKE	Sample Value			<50	
2056781	SPIKE	Expected Value			470	
2056781	**SPIKE**	**% Recovery**			**94.3**	
2056295	DUPLICATE	Sample Value	<20	<20	<50	<50
2056295	DUPLICATE	Duplicate Value	<20	<20	<50	<50
2056295	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**
2060347	BLANK	Value	<20	<20	<50	<50

Soil Triazines

			Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines	Triazines
			AMETRYN	ATRAZINE	PROMETON	PROMETRY	PROPAZIN	SIMAZINE	TBAZINE	SIMETRYN	TERBUTRYN
2056295	DUPLICATE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295	DUPLICATE	Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2056295	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2060076	BLANK	Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

mgt Environmental

ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au web : www.mgtenv.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : 03 9564 7055
NATA Site # 1254

Sydney
1a Chilvers Rd
Thornleigh NSW 2120
Phone : 02 9484 3300
NATA Site # 18217

Adelaide
140 Richmond Rd
Marleston SA 5033
Phone : 08 8443 4430

CERTIFICATE OF ANALYSIS

Worley Parsons Melbourne
Level 12, 333 Collins Stree
Melbourne
VIC 3000
Site: PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

Order Number:
Date Received: Jan 15, 2010
Date Sampled: Jan 13, 2010
Date Reported: Jan 22, 2010
Contact: June Lee

Methods

- USEPA 8270C Polycyclic Aromatic Hydrocarbons
- USEPA 8260B - MGT 350A Monocyclic Aromatic Hydrocarbons
- TRH C6-C36 - MGT 100A
- USEPA 6020 Heavy Metals & USEPA 7470/71 Mercury
- Method 102 - ANZECC - % Moisture
- APHA 4500 pH by Direct Measurement

Comments

Notes

Authorised

Report Number: 258085-V1

Michael Wright
Senior Principal Chemist
NATA Signatory

Rhonda Chouman
Client Manager
NATA Signatory

Orlando Scalzo
Chief Organic Chemist
NATA Signatory

Andrew Cook
Chief Inorganic Chemist

NATA
WORLD RECOGNISED ACCREDITATION

NATA Corporate Accreditation Number 1261
The tests, calibrations or measurements covered by this document have been performed in accordance with NATA requirements which include the requirements of ISO/IEC 17025 and are traceable to national standards of measurement.

Environmental Laboratories Industry Group

GLOSSARY OF TERMS

UNITS

mg/kg	milligrams per Kilogram	**mg/l**	milligrams per litre
ug/l	micrograms per litre	**ppm**	Parts per million
ppb	Parts per billion	**%**	Percentage
org/100ml	Organisms per 100 millilitres	**NTU**	Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environment Protection Authority
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice

QC - ACCEPTANCE CRITERIA

RPD Duplicates	Results <10 times the LOR : No Limit Results between 10-20 times LOR : RPD must lie between 0-50% Results >20 times LOR : RPD must lie between 0-20%
LCS Recoveries	Recoveries must lie between 70-130% - Phenols 30-130%
CRM Recoveries	Recoveries must lie between 70-130% - Phenols 30-130%
Method Blanks	Not to exceed LOR
SPIKE Recoveries	Recoveries must lie between 70-130% - Phenols 30-130%
Surrogate Recoveries	Recoveries must lie between 50-150% - Phenols 20-130%

GENERAL COMMENTS

1. All results in this report supersede any previously corresponded results.
2. All soil results are reported on a dry basis.
3. Samples are analysed on an as received basis.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR this is due to either Matrix Interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Orgaonchlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
7. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
8. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
9. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two two sets of data below the LOR with a positive RPD - eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

REPORT SPECIFIC NOTES

mgt Environmental

ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au web : www.mgtenv.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : 03 9564 7055
NATA Site # 1254

Sydney
1a Chilvers Rd
Thornleigh NSW 2120
Phone : 02 9484 3300
NATA Site # 18217

Adelaide
140 Richmond Rd
Marleston SA 5033
Phone : 08 8443 4430

Company Name: Worley Parsons Melbourne
Address: Level 12, 333 Collins Stree
Melbourne
VIC 3000

Order No.:
Report #: 258085
Phone: 8676 3500
Fax: 8676 3505

Received: Jan 15, 2010 12:00
Due: Jan 22, 2010 09:02
Priority: 5 Day
Contact name: June Lee

Client Job No.: PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

mgt Client Manager: Andrew Thexton

Sample Detail					% Moisture	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	pH (1:5 Aqueous extract)	Selenium	Silver	Tin	Zinc	Monocyclic Aromatic Hydrocarbons	Polycyclic Aromatic Hydrocarbons	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted																					
Melbourne Laboratory - NATA Site #1254					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site #18217																					
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																	
DUP 2	Jan 13, 2010		Soil	M10-JA03597	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
DUP 4	Jan 13, 2010		Soil	M10-JA03598	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Worley Parsons Melbourne Level 12, 333 Collins Stree Melbourne VIC 3000	Client Sample ID Lab Number Matrix Sample Date		DUP 2 M10-JA03597 Soil Jan 13, 2010	DUP 4 M10-JA03598 Soil Jan 13, 2010
Analysis Type	**LOR**	**Units**		
Total Recoverable Hydrocarbons				
TRH C6-C9 Fraction by GC	20	mg/kg	-	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	-	< 50
TRH C15-C28 Fraction by GC	100	mg/kg	-	< 100
TRH C29-C36 Fraction by GC	100	mg/kg	-	< 100
Monocyclic Aromatic Hydrocarbons				
Benzene	0.05	mg/kg	-	< 0.05
Toluene	0.05	mg/kg	-	< 0.05
Ethylbenzene	0.05	mg/kg	-	< 0.05
Xylenes(ortho.meta and para)	0.05	mg/kg	-	< 0.05
Fluorobenzene (surr.)	1	%	-	83
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	0.1	mg/kg	-	< 0.1
Acenaphthylene	0.1	mg/kg	-	< 0.1
Anthracene	0.1	mg/kg	-	< 0.1
Benz(a)anthracene	0.1	mg/kg	-	< 0.1
Benzo(a)pyrene	0.1	mg/kg	-	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	-	< 0.1
Benzo(g.h.i)perylene	0.1	mg/kg	-	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	-	< 0.1
Chrysene	0.1	mg/kg	-	< 0.1
Dibenz(a.h)anthracene	0.1	mg/kg	-	< 0.1
Fluoranthene	0.1	mg/kg	-	< 0.1
Fluorene	0.1	mg/kg	-	< 0.1
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	-	< 0.1
Naphthalene	0.1	mg/kg	-	< 0.1
Phenanthrene	0.1	mg/kg	-	< 0.1
Pyrene	0.1	mg/kg	-	< 0.1
Total PAH	0.1	mg/kg	-	< 0.1
p-Terphenyl-d14 (surr.)	1	%	-	108
2-Fluorobiphenyl (surr.)	1	%	-	99

COMMENTS:

Worley Parsons Melbourne **Level 12, 333 Collins Stree** **Melbourne** **VIC 3000**	**Client Sample ID**		**DUP 2**	**DUP 4**
	Lab Number		**M10-JA03597**	**M10-JA03598**
	Matrix		**Soil**	**Soil**
	Sample Date		**Jan 13, 2010**	**Jan 13, 2010**
Analysis Type	**LOR**	**Units**		
% Moisture	0.1	%	16	4.1
pH (1:5 Aqueous extract)	0.1	units	4.4	5.1
Heavy Metals				
Arsenic	2.0	mg/kg	< 2	< 2
Cadmium	0.5	mg/kg	< 0.5	< 0.5
Chromium	5	mg/kg	< 5	< 5
Copper	5	mg/kg	< 5	< 5
Lead	5	mg/kg	< 5	< 5
Mercury	0.1	mg/kg	< 0.1	< 0.1
Molybdenum	10	mg/kg	< 10	< 10
Nickel	5	mg/kg	< 5	< 5
Selenium	2	mg/kg	< 2	< 2
Silver	5	mg/kg	< 5	< 5
Tin	10	mg/kg	< 10	< 10
Zinc	5	mg/kg	< 5	< 5

COMMENTS:

Worley Parsons Melbourne **Level 12, 333 Collins Stree** **Melbourne** **VIC 3000**	**Client Sample ID**	**DUP 2**	**DUP 2**	**RPD**	**SPIKE**	**LCS**	**Method blank**
	Lab Number	**10-JA03597**	**10-JA03597**	**10-JA03597**	**10-JA03597**	**Batch**	**Batch**
	QA Description		**Duplicate**	**Duplicate % RPD**	**Spike % Recovery**	**% Recovery**	
	Matrix	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
	Sample Date	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**
Analysis Type	**Units**			% RPD	% Recovery	% Recovery	mg/L
pH (1:5 Aqueous extract)		4.4	4.4	-	-	-	-
Heavy Metals		Batch	Batch	Batch	Batch		
Arsenic		< 2	< 2	< 1	93	96	< 2
Cadmium		< 0.5	< 0.5	< 1	97	109	< 0.5
Chromium		< 5	< 5	< 1	77	109	< 5
Copper		8.3	27	100	102	106	< 5
Lead		14	14	5.0	110	104	< 5
Molybdenum		< 10	< 10	< 1	76	102	< 10
Nickel		< 5	7.6	62	93	102	< 5
Selenium		< 2	< 2	< 1	91	102	< 2
Silver		< 5	< 5	< 1	118	114	< 5
Tin		< 10	< 10	< 1	97	103	< 10
Zinc		27	31	11	91	100	< 5

COMMENTS:

Worley Parsons Melbourne Level 12, 333 Collins Stree Melbourne VIC 3000	Client Sample ID	DUP 4	DUP 4	RPD	SPIKE	LCS	Method blank
	Lab Number	10-JA03598	10-JA03598	10-JA03598	10-JA03598	Batch	Batch
	QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	% Recovery	
	Matrix	Soil	Soil	Soil	Soil	Soil	Soil
	Sample Date	Jan 13, 2010	Jan 13, 2010	Jan 13, 2010	Jan 13, 2010	Jan 13, 2010	Jan 13, 2010
Analysis Type	**Units**			% RPD	% Recovery	% Recovery	mg/L
pH (1:5 Aqueous extract)		5.1	5.1	-	-	-	-
Total Recoverable Hydrocarbons		Batch	Batch	Batch	Batch		
TRH C6-C9 Fraction by GC		< 20	< 20	< 1	77	92	< 20
TRH C10-C14 Fraction by GC		< 50	< 50	< 1	101	105	< 50
TRH C15-C28 Fraction by GC		< 100	< 100	< 1	-	-	< 100
TRH C29-C36 Fraction by GC		< 100	< 100	< 1	-	-	< 100
Monocyclic Aromatic Hydrocarbons		Batch	Batch	Batch	Batch		
Benzene		< 0.05	< 0.05	< 1	80	98	< 0.05
Toluene		< 0.05	< 0.05	< 1	81	97	< 0.05
Ethylbenzene		< 0.05	< 0.05	< 1	83	99	< 0.05
Xylenes(ortho.meta and para)		< 0.05	< 0.05	< 1	77	84	< 0.05
Polycyclic Aromatic Hydrocarbons		Batch	Batch	Batch	Batch		
Acenaphthene		< 0.1	< 0.1	< 1	105	105	< 0.1
Acenaphthylene		< 0.1	< 0.1	< 1	111	106	< 0.1
Anthracene		< 0.1	< 0.1	< 1	108	104	< 0.1
Benz(a)anthracene		< 0.2	< 0.2	< 1	115	102	< 0.1
Benzo(a)pyrene		< 0.1	< 0.1	< 1	110	99	< 0.1
Benzo(b)fluoranthene		< 0.1	< 0.1	< 1	115	109	< 0.1
Benzo(g.h.i)perylene		< 0.1	< 0.1	< 1	114	99	< 0.1
Benzo(k)fluoranthene		< 0.1	< 0.1	< 1	111	101	< 0.1
Chrysene		< 0.2	< 0.2	< 1	114	107	< 0.1
Dibenz(a.h)anthracene		< 0.1	< 0.1	< 1	125	86	< 0.1
Fluoranthene		< 0.2	< 0.2	< 1	111	100	< 0.1
Fluorene		< 0.1	< 0.1	< 1	109	105	< 0.1
Indeno(1.2.3-cd)pyrene		< 0.1	< 0.1	< 1	123	93	< 0.1
Naphthalene		< 0.1	< 0.1	< 1	85	111	< 0.1
Phenanthrene		< 0.1	< 0.1	< 1	108	105	< 0.1
Pyrene		< 0.2	< 0.2	< 1	110	100	< 0.1
Heavy Metals		Batch	Batch	Batch	Batch		

COMMENTS:

mgt Environmental

ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au web : www.mgtenv.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : 03 9564 7055
NATA Site # 1254

Sydney
1a Chilvers Rd
Thornleigh NSW 2120
Phone : 02 9484 3300
NATA Site # 18217

Adelaide
140 Richmond Rd
Marleston SA 5033
Phone : 08 8443 4430

Worley Parsons Melbourne
Level 12, 333 Collins Stree
Melbourne

VIC 3000

Client Sample	**DUP 4**	**DUP 4**	**RPD**	**SPIKE**	**Method blank**
Lab Number	**10-JA03598**	**10-JA03598**	**10-JA03598**	**10-JA03598**	**Batch**
QA Description		**Duplicate**	**Duplicate % RPD**	**Spike % Recovery**	
Matrix	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
Sample Date	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**	**Jan 13, 2010**
Units			% RPD	% Recovery	mg/L
Heavy Metals	Batch	Batch	Batch	Batch	
Mercury	< 0.1	< 0.1	< 1	76	< 0.1

COMMENTS:

Appendix 4 Site Photographs (13 and 14 January 2010)

Photograph 1

Looking to the east of the site. Typical view of dense vegetation observed across the site.

Photograph 2

Looking west towards BH15. Access to borehole location BH15 had to be undertaken by foot due to dense vegetation and narrow pathway for vehicle access.

Photograph 3

Looking north towards BH9. Electricity easement parallel to The Lakes Way adjacent to the western boundary of the site.

Photograph 4

Looking east towards existing (stand pipe – locked) piezometer located adjacent to the west of borehole location BH14.

Photograph 5

Looking east towards 'crushed rock' area located adjacent to the start of the golf course access road. Note vehicle maintenance work undertaken by Council workers within the area.

Photograph 6

Surface condition of where vehicle maintenance work was carried out at the 'crushed rock' area located adjacent to the beginning of the golf course access road.