TABLE 7: RECOMMENDED BATTER SLOPES FOR TRENCHES

Material	Permanent Batter (1)	Temporary Batter (2)
Topsoil, Fill or Soft Soils	4H:1V	3H:1V
Alluvial Soil (Firm to Hard)	3H:1V	2H:1V
Residual Soil (Very Stiff to Hard)	2H:1V	1.5H:1V
Class V Sandstone	1.5H:1V	1H:1V

Notes:

1 – Permanent Batters refer to batters permanently constructed and left in place over the design life of the pipeline.

2 – Temporary Batters are batter constructed for construction purposes. If steeper batters than these are proposed, then this would need to be assessed by a geotechnical engineer.

These recommendations in Table 7 assume:

- The ground surface is horizontal beyond the crest of the excavation;
- The slopes are well drained with no seepage and runoff concentrated on or above the batter slopes;
- No surcharge loads (such as buildings) are located within a horizontal distance of the cut crest equal to the vertical height of the cut.
- No significant water inflows are encountered within the depth of cut.

Flatter batters than those recommended in Table 7 may be required if the above assumptions do not apply and in particular where Very Soft to Soft Clay Alluvial soils are encountered.

11.3.2 Creek Crossings and Rail Crossing

As indicated in Figure 1, CTP09 and CTP12 are located at topographical low points being a drainage channel and Abernetheys creek respectively. At these locations, the walls of the test pit excavations were observed to be collapsing under their own weight. Care will need to be exercised in this area and trenches may require flatter batters or permanent shoring with adequate drainage during construction for the proposed gas pipeline.

Trenching at these locations and near creek crossings will be problematic. To avoid trenching through these areas, it is recommended that underboring of drainage channels and creek crossings be considered. This is recommended in order to:

- Minimise the development of an alternate erosion path potentially exposing the gas pipeline;
- Avoid development of a erosion point retreat or weak point in the bed of the creek.

If under boring is to be employed, then it is suggested that several boreholes or piezocones be carried out at these areas prior to the commencement of site works to better understand the properties of the underlying soil profile at these locations. Depending on the likely depth of underbore, we would suggest that they be terminated at at least 6m (and potentially deeper) below existing ground surface level, in order to better assess the subsurface conditions.

For the rail crossing area, the pipeline may need to be deepened to accommodate the minimum requirements of Railcorp with respect to installation of services beneath Railcorp railway areas. Appendix H contains general information concerning the Railcorp requirements for minor underbores. It is recommended that Railcorp be consulted prior to finalising the design level of the underbore beneath the Rail track area. A track monitoring plan, a Railcorp approved surveyor and a suitably qualified geotechnical engineer (approved by Railcorp) will need to be engaged to monitor the condition of the track during underboring.

11.4 Retaining Structures

Where there is insufficient room to batter excavations, retaining structures will be required to retain soils and possibly the more weathered rock. Various retention systems could be employed and Coffey would be pleased to provide advice on such systems if provided with details of the proposed structures. In this case it is likely that the most practical solution for the support of trenches would involve the installation of temporary shoring boxes braced with props.

The design of shoring will need to be carried out by a company experienced in the design of such systems. The assumed lateral pressure distributions may need to be modified to account for material layering, surcharge loads due to the ground level not being horizontal, any concentrated pad or strip footing loadings, or hydrostatic pressure due to build-up of water behind the wall (e.g. from broken services).

11.5 Backfill and Compaction of materials within Trenches

In the absence of specific compaction requirements from the designer of the future gas pipeline, recommendations have been provided concerning the type, compaction and testing of the backfill materials. The designers of the gas pipeline may have other specific requirements to ensure uniform support of the gas pipeline is maintained.

The materials used for backfilling of the trenches should be materials capable of providing uniform basal, wall and cover support for the service pipes. In general this material should comprise a granular soil such as a uniform sand or fine gravel sourced from an alluvial quarry or crushed rock quarry source.

The excavated materials from the trenches are not considered suitable materials for backfilling in the immediate vicinity of the pipeline due to the difficulty in achieving uniform basal, wall and roof support for the pipeline. Granular materials ‘flow’ around pipelines and would be suitable for this purpose. The excavated materials from the pipeline trenches could be used as cover materials once suitably compacted soils have covered the installed pipe.

Suitable sand or gravel backfill materials should be compacted to achieve a minimum density index of at least 70%. Regular testing of the density of backfill materials around the pipeline should be carried out by an appropriately qualified Geotechnical Testing Authority in accordance with the guidelines for trenching works in AS3798-2007.

11.6 Contamination Issues

The results of the assessment identified some potentially contaminating activities and associated AECs and COCs along the proposed pipeline route. These were associated with:

- Storage and use of fuels and chemicals with operations at the former rail yard depot (Railway Street);
- Fill of unknown origin and quality;
- Possible leaks from the sewer line and nearby treatment plant; and
- Potential application of pesticides and fertilisers (mainly in rural areas, but could have occurred across all parts of the assessment area).

The AECs were assessed as having a low to moderate likelihood of contamination being present.

Evidence of petroleum or other contaminant impacts were not recorded in the sample locations (CBH1/SS01 and CBH2/SS02) excavated opposite the former rail depot. Observations made of this area noted evidence of possible former groundwater monitoring wells suggesting evidence of previous assessments. We recommend that careful observations are made during trenching works within this general area for evidence of odorous or discoloured soils which could suggest evidence of contamination. If evidence of such contamination is noted then, advice should be sought from an experienced environmental consultant and these soils should be kept separate to other soils and adequately managed.

Fill soils were observed at locations along Railway Street and at one location on Fletchers Land and one location on Pestells Lane. The fill along Railway Street had the appearance of mainly roadmaking materials. The other fill at Fletchers and Pestells Lane was described as topsoil fill, but likely to comprise mixtures of topsoil and road making materials on the road verge. Evidence of contamination was generally not recorded in the fill except for one sample where asbestos was detected on Fletchers Lane. Ten additional soil samples were collected and analysed in this area to further assess the potential extent of the asbestos. No further asbestos was identified. The source of the asbestos is not known at this stage, but could be associated with one or more sources such as former break pads or discarded wastes. The presence of asbestos in this area would need be taken into consideration in the earthworks component of the pipeline construction to adequately manage potential risks to human health and appropriate management and disposal of excavated soils.

When handling such materials the work must be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as *National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)[NOHSC:2002(2005)].*

Evidence of contamination impacts from the sewer or the treatment plant were not recorded within Lots 2 and 5 from previous works carried out by Coffey in this area. Elevated concentrations of zinc and lead were noted in groundwater sampled from one well above drinking water and/or protection of freshwater aquatic ecosystem trigger values. The source of the metals was not known and was noted as potentially being associated with background concentrations. Due to the proximity of the adjacent treatment plant, we recommend that any trench dewatering from trenching in Lots 2 and 5 be adequately tested and managed with due regard to potential contaminants.

Other evidence of contamination was not identified across the assessment area.

If any evidence of potential contamination is identified during the pipeline construction such as soils with odours, staining, wastes, drums etc. then Coffey Environments should be contacted to make an assessment of these soils for contamination. Excess soil that requires disposal offsite should be appropriately classified based on the DECC (2009) Waste Classification Guidelines: Part 1 Classifying Waste. If practical during construction, we would recommend that fill soils in the upper parts of the soil profile be kept separate to underlying natural soils as these generally have a higher likelihood of being impacted.

11.7 Acid Sulfate Soil Issues

Some sections of the proposed pipeline extend through areas mapped as having a low probability of acid sulfate soil occurrence. Field observations generally correlated well with the acid sulfate soil risk map. Field screening and laboratory results generally indicated that ASS are not likely to be present at the majority of the site. Based on the results of this assessment it is considered that ASS are likely to be encountered along the lower lying parts of the pipeline route located in Lot 2 and Lot 5 and in the vicinity of creek crossings at CTP09 and CTP12. ASS may also be encountered sporadically up to the intersection with Fletchers Lane and could be located in old paleochanels. It is unlikely that ASS would be intersected in the pipeline construction based on the proposed excavation depths along the majority of Railway Street and Fletchers and Pestells Lane. We recommend that the previous ASSMP (Report Ref: ENVIWOLL00187AB-R02, dated 26 March 2009) prepared for the proposed packing plant (lot 2 and 5) be extended to incorporate other sections of the proposed pipeline where ASS could be intersected.

12 LIMITATIONS

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

Should any site conditions be encountered during construction that vary significantly from those discussed in this report, Coffey Environments should be advised and appropriate action taken.

This report does not address issues relating to potentially hazardous building materials or services, which may be present on the site.

13 REFERENCES

1. Central Mapping Authority (1986) 1:25,000 Berry Topographic Map 9130-3-N. Second Edition.
2. Health Council (2005) Management of Asbestos in the Non-Occupational Environment
3. NEPC (1999), *National Environment Protection (Assessment of Site Contamination) Measure*
4. NSW Department of Conservation and Land Management (1993) 1:100,000 Kiama Soil landscape Series Sheet, No 9028 First Edition
5. NSW Department of Mines (1952) 1:250,000 Wollongong Geological Series Sheet No. S1 56-9, First Edition
6. NSW EPA (1997), Guidelines for Consultants Reporting on Contaminated Sites ISBN07310 3892 4.
7. NSW DEC (2006), *Guidelines for the NSW Auditor Scheme 2nd Ed*. ISBNo0-7313 0177 3
8. NSW Acid Sulfate Soil Management Advisory Committee (August 1998) Acid Sulfate Soil Manual
9. Standards Australia (2007) AS3798-2007 Guidelines on earthworks for commercial and residential developments, Sydney: Standards Australia
10. ASS Management plan (ASSMP) was subsequently developed for Lots 2 and 5 (Report Ref: ENVIWOLL00187AB-R02, dated 26 March 2009).
11. Coffey preliminary environmental site assessment and geotechnical investigation (Report Ref: ENVIUNAN00111AA, dated 25 June 2008)

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

Important information about Coffey Environmental Report

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

Your report has been written for a specific purpose

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

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

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

Scope of Investigations

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

Subsurface conditions can change Interpretation of factual data

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

Interpretation of factual data

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

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Your report will only give preliminary recommendations

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

Your report is prepared for specific purposes and persons

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

Interpretation by other professionals

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

Data should not be separated from the report

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

Contact Coffey for additional assistance

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

Responsibility

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

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

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

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

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

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

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SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Report

Interpretation by other design professionals

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

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.
Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

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

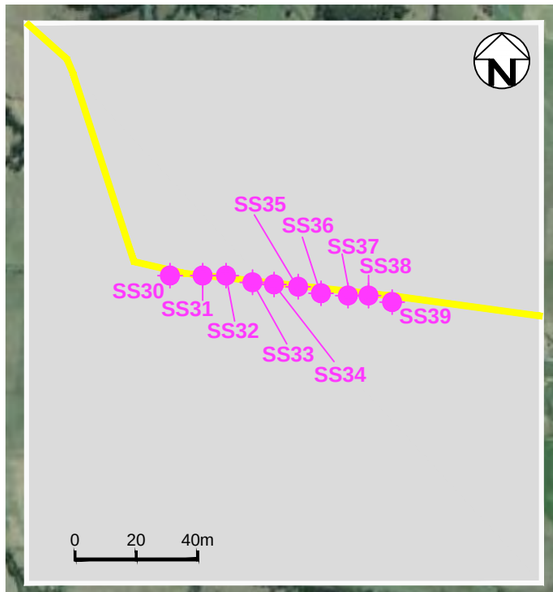
Responsibility

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

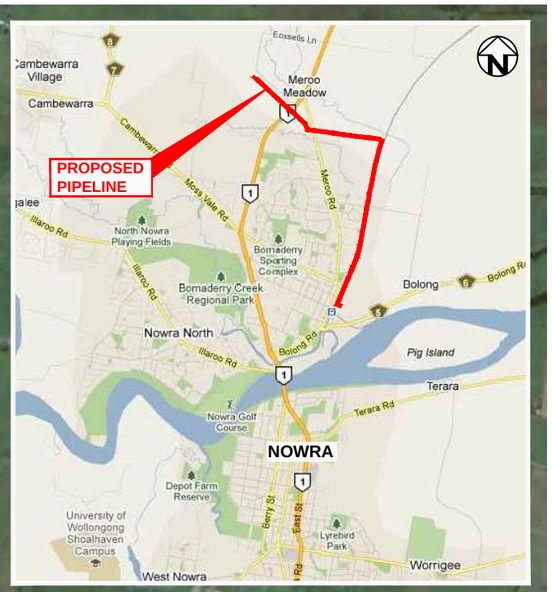
* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.

Figures

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW



DETAIL 1



LOCALITY MAP

CTP26
CTP25
PESTELLS LANE
CTP24
CTP23
CTP22
SEE DETAIL 1
CTP21
CTP20
CTP19
FLETCHERS LANE
CTP18
SS17
CTP17
MEROO ROAD
SS16
CTP16
SS15
CTP15
SS14
CTP14
SS13
CTP13
SS12
CTP12
PRINCES HIGHWAY
SS11
CTP11
SS10
CTP10
SS09
CTP09
SS08
CTP08
SS07
CTP07
SS06
CTP06
RAILWAY STREET
CBH05/SS05
CBH04/SS04
CBH03/SS03
CBH02/SS02
CBH01/SS01
SEE FIGURE 1C
SHOALHAVEN RIVER
PIG ISLAND

LEGEND

- PROPOSED PIPELINE
- BOREHOLE LOCATION
- TEST PIT LOCATION
- SOIL SAMPLE LOCATION

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 6.0.1
AERIAL IMAGE É: SINCLAIR KNIGHT MERZ 2011

revision	description	drawn	approved	date

200 0 200 600 1000

Horizontal Scale (metres) 1:20 000

drawn	CA/AW
approved	CA
date	28/07/11
scale	AS SHOWN
original size	A3

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SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

client: MANILDRA GROUP PTY LTD

project: ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPLINE, BOMADERRY, NSW

title: PROPOSED PIPELINE ROUTE WITH COFFEY TEST LOCATIONS

project no: ENAUWOLL04006AA-R01

figure no: FIGURE 1

PLOT DATE: 28/10/2011 12:18 PM DWG FILE: F:\GEOTECHNICS\1PROJECTS\OTHER OFFICE 1\OBS\WOLLONGONG\ENAUWOLL04006AA\FIGURES\ENAUWOLL04006AA_FIGURE 1.DWG

PLOT DATE: 28/05/2011 12:25 PM DWG FILE: F:\GEOTECHNICS\11PROJECT SO\THER OFFICE JOBS\WOLLONGONG\ENAUWOLL04006AA\FIGURES\ENAUWOLL04006AA_FIGURE 1A-B-C.DWG

revision	description	drawn	approved	date

N

100 0 100 300 500

Horizontal Scale (metres) 1:10 000

drawn	CA/AW
approved	CA
date	28/07/11
scale	AS SHOWN
original size	A3

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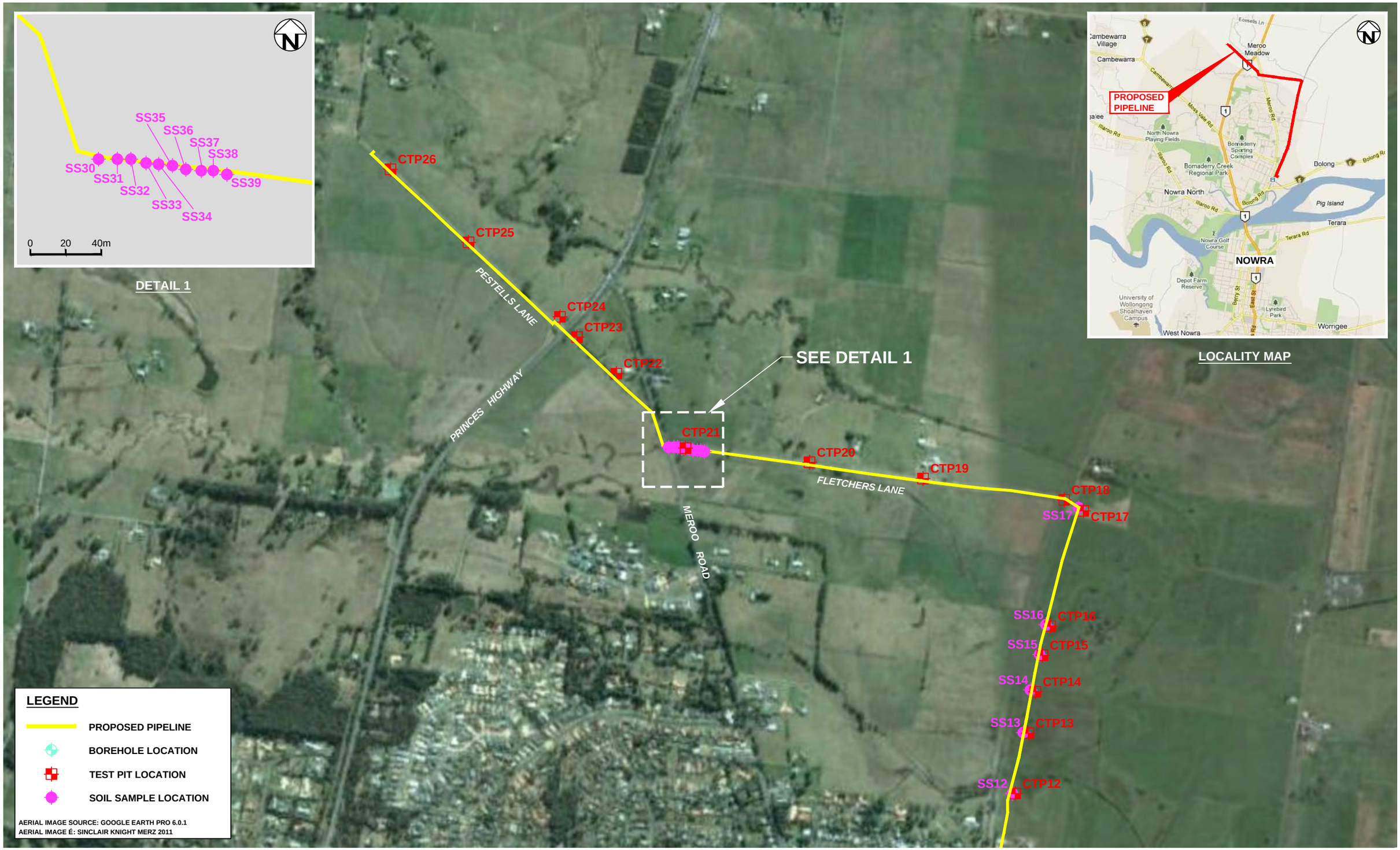
client: MANILDRA GROUP PTY LTD

project: ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPLINE, BOMADERRY, NSW

title: PROPOSED PIPELINE ROUTE WITH COFFEY TEST LOCATIONS - SHEET 1 OF 2

project no: ENAUWOLL04006AA-R01

figure no: FIGURE 1A



PLOT DATE: 28/2/2011 12:24 PM DWG FILE: F:\GEOTECH\NCS\1 PROJECTS\OTHER OFFICE JOBS\WOLLONGONG\ENAUWOLL04006AA\FIGURES\ENAUWOLL04006AA_FIGURE 1A-B.DWG

revision	description	drawn	approved	date

N

100 0 100 300 500

Horizontal Scale (metres) 1:10 000

drawn	CA/AW
approved	CA
date	28/07/11
scale	AS SHOWN
original size	A3

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SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

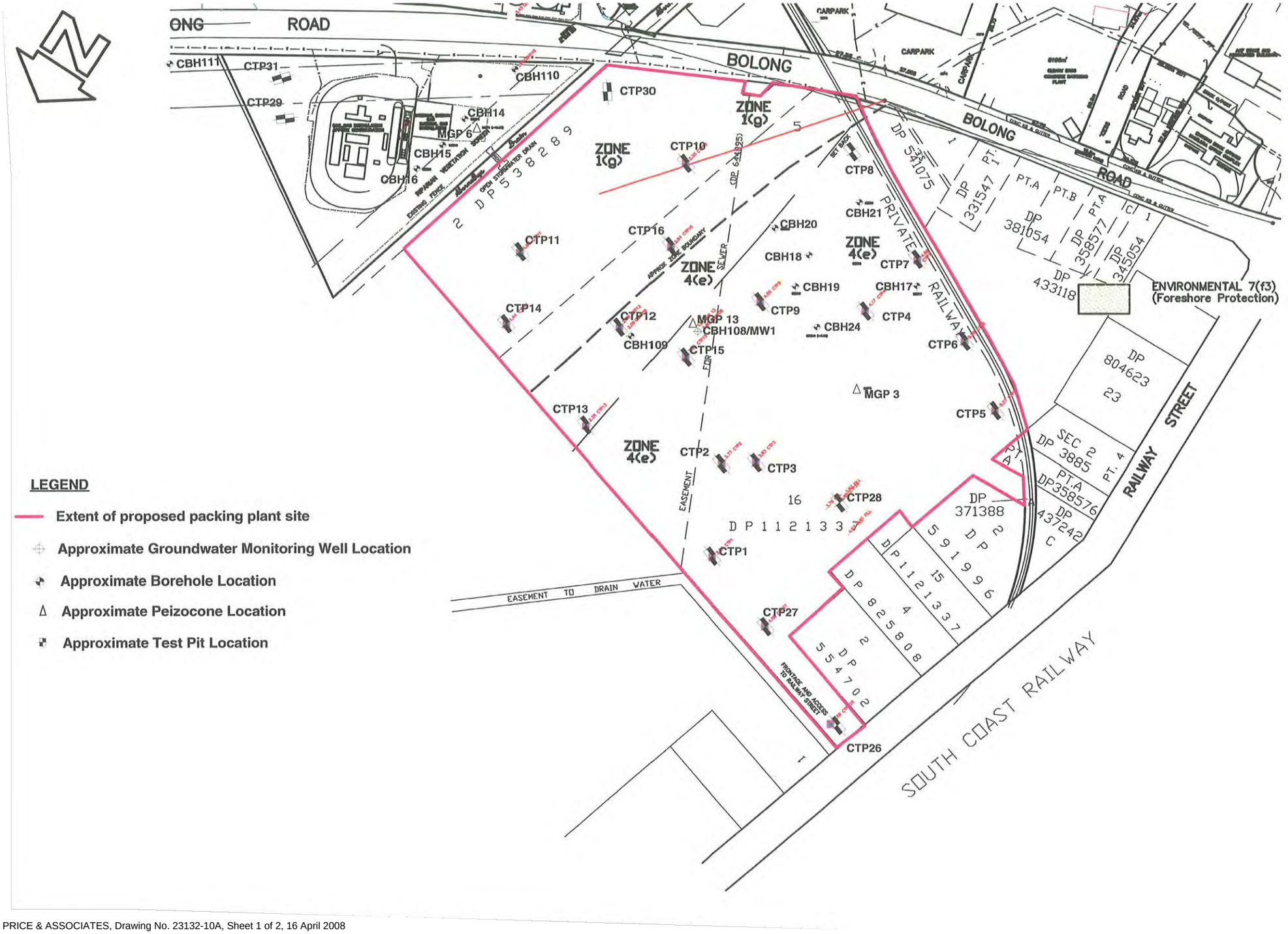
client: MANILDRA GROUP PTY LTD

project: ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPLINE, BOMADERRY, NSW

title: PROPOSED PIPELINE ROUTE WITH COFFEY TEST LOCATIONS - SHEET 2 OF 2

project no: ENAUWOLL04006AA-R01

figure no: FIGURE 1B



LEGEND

- Extent of proposed packing plant site
- Approximate Groundwater Monitoring Well Location
- Approximate Borehole Location
- Approximate Peizocone Location
- Approximate Test Pit Location

REFERENCE: ALAN PRICE & ASSOCIATES, Drawing No. 23132-10A, Sheet 1 of 2, 16 April 2008
COFFEY REPORT ENVIUNAN00111AA-R02, FIGURE 12B - 24 JUNE 2008

revision	description	drawn	approved	date

N

100 0 100 300 500

Horizontal Scale (metres) 1:10 000

drawn	CA/AW
approved	CA
date	27/07/11
scale	AS SHOWN
original size	A3

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

client: MANILDRA GROUP PTY LTD

project: ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPLINE, BOMADERRY, NSW

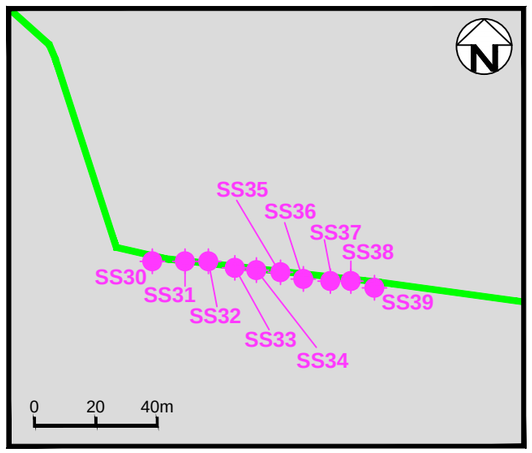
title: APPROXIMATE SAMPLING LOCATIONS CARRIED OUT IN PREVIOUS COFFEY INVESTIGATION

project no: ENAUWOLL04006AA-R01

figure no: FIGURE 1C

PLOT DATE: 27/12/2011 2:12 PM DWG FILE: F:\GEOTECHNICS\LPROJECTS\OTHER OFFICE JOBS\WOLLONGONG\ENAUWOLL\04006AA\FIGURES\ENAUWOLL04006AA FIGURE 1A-1B-C.DWG

Map Class Description	Depth to Acid Sulfate Soil Materials	
HIGH PROBABILITY High probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has been suitable for the formation of acid sulfate soil materials. Acid sulfate soil materials are widespread or sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.
		At or near the ground surface.
		Within 1 metre of the ground surface.
		Between 1 and 3 metres below the ground surface.
		Greater than 3 metres below the ground surface.*
LOW PROBABILITY Low probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has generally not been suitable for the formation of acid sulfate soil materials. Soil materials are often Pleistocene in age. Acid sulfate soil materials, if present, are sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.
		At or near the ground surface.
		Within 1 metre of the ground surface.
		Between 1 and 3 metres below the ground surface.
		Greater than 3 metres below the ground surface.*
NO KNOWN OCCURRENCE Acid sulfate soils are not known or expected to occur in these environments.		No known occurrences of acid sulfate soil materials.

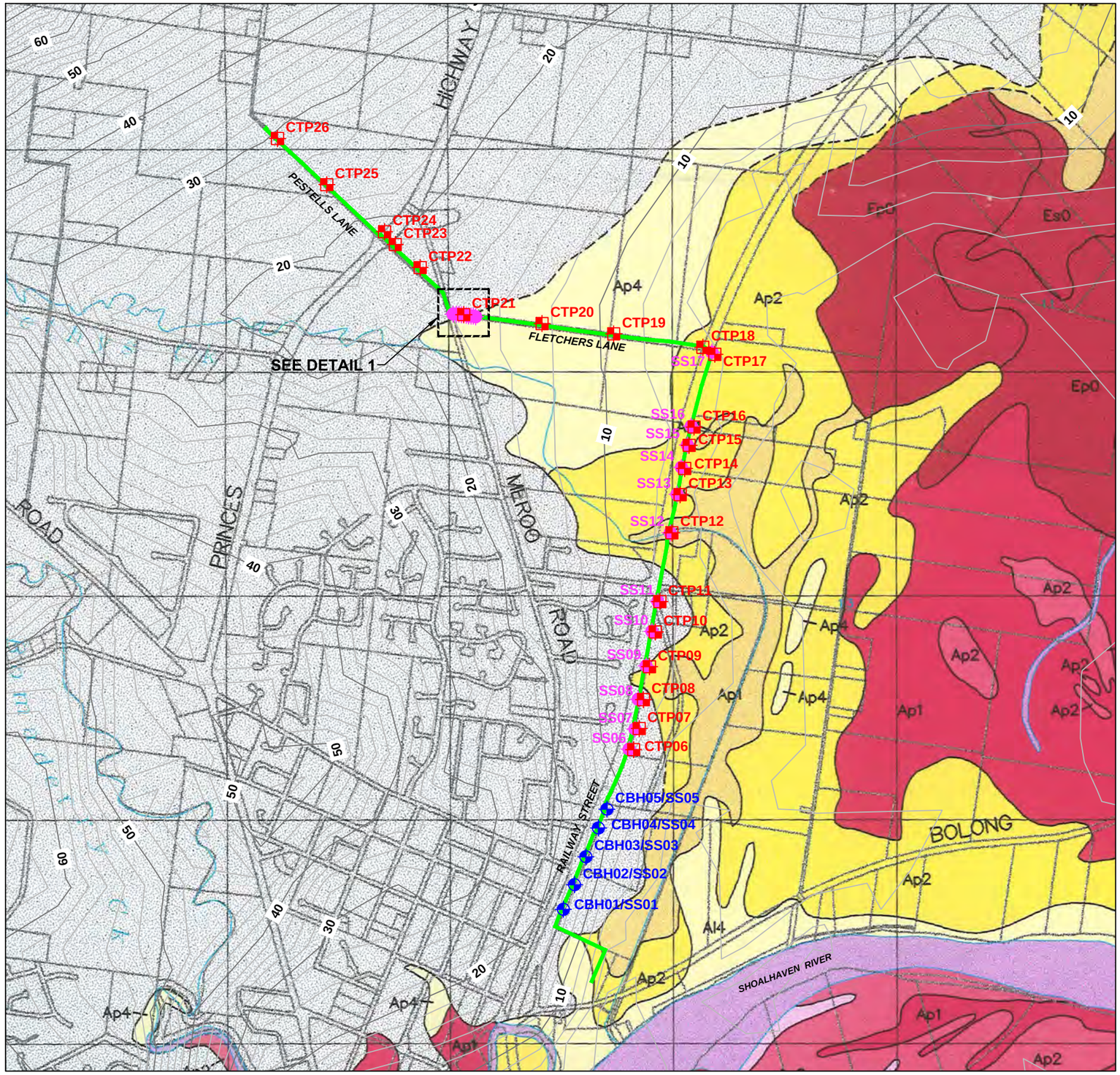


DETAIL 1

LEGEND

- PROPOSED PIPELINE
- BOREHOLE LOCATION
- TEST PIT LOCATION
- SOIL SAMPLE LOCATION

REFERNCE: BURRIER/BERRY 1:25 000 ACID SOIL RISK MAP (1997) EDITION 2, PREPARED BY THE NSW DEPARTMENT OF LAND AND WATER CONSERVATION (DLWC)



revision	description	drawn	approved	date

N

200 0 200 600 1000

Horizontal Scale (metres) 1:20 000

drawn	CA/AW
approved	CA
date	28/07/11
scale	AS SHOWN
original size	A3

coffey environments

SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

client:	MANILDRA GROUP PTY LTD
project:	ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPLINE, BOMADERRY, NSW
title:	PROPOSED PIPELINE ROUTE WITH 1:25000 BURRIER/BERRY ASS RISK MAP
project no:	ENAUWOLL04006AA-R01
figure no:	FIGURE 2

PLOT DATE: 28/8/2011 12:28 PM DWG FILE: F:\GEOTECH\NCS\LPROJECT\SOTHER OFFICE JOBS\WOLLONGONG\ENAUWOLL04006AA\FIGURES\ENAUWOLL04006AA_FIGURE 2.DWG

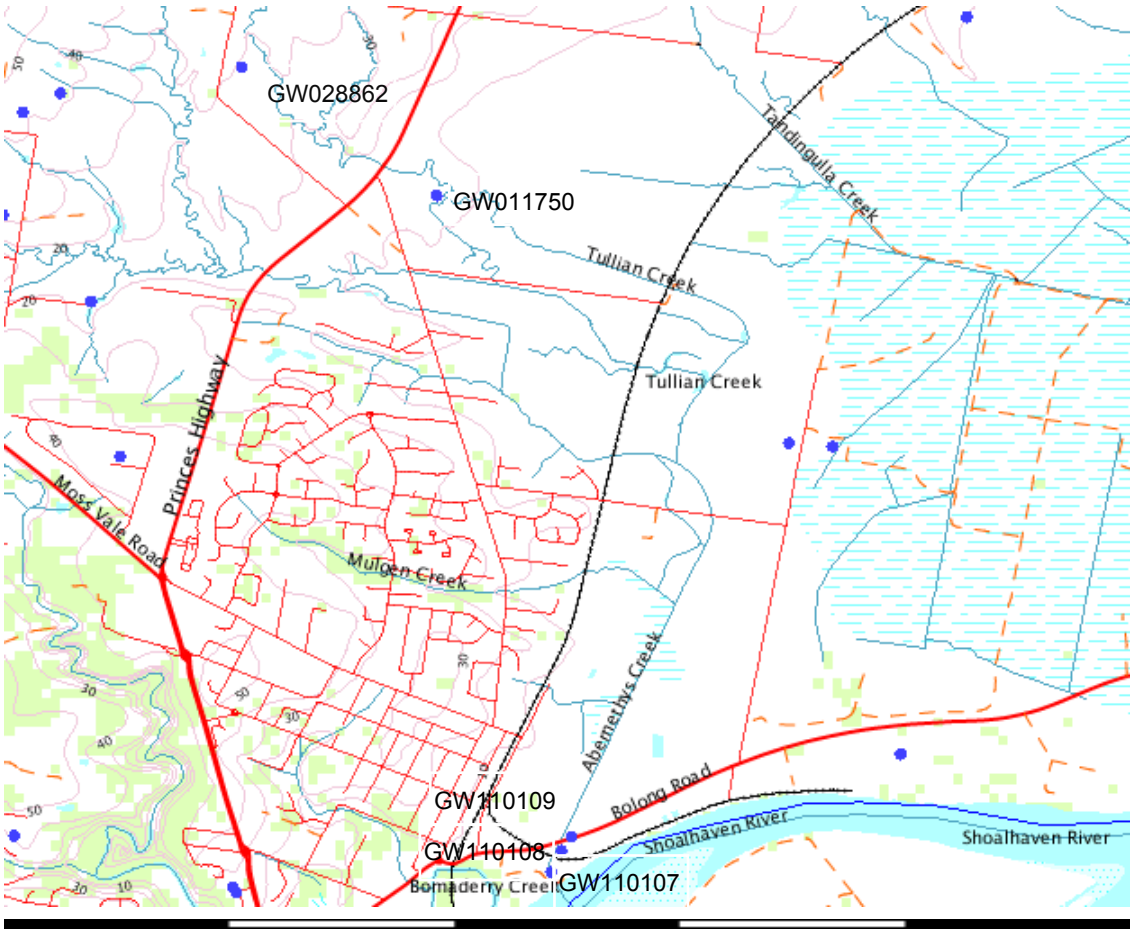
Appendix A
Site History Information and Groundwater Bore Search

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

Registered Groundwater Bores Within 500m Radius of Pipeline Route

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au

Wednesday, July 13, 2011



0 5 Km

Legend

Symbol	Layer	Custodian
	Cities and large towns renderImage: Cannot build image from features	
Cowra	Populated places renderImage: Cannot build image from features	
	Towns	
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	
Primary/arterial road Motorway/freeway Railway Runway Contour Background	Topographic base map	

Office of Environment & Heritage

You are here: Home > Contaminated land > Record of notices

Search results

Your search for: LGA: Shoalhaven City Council

Matched 4 notices relating to 2 sites.

Search Again

Refine Search

Suburb	Address	Site Name	Notices related to this site
Nowra	Lamonds Lane	Nowra Gasworks	2 current
Nowra East	Kalandar Street	Nowra Mobil Service Station	2 current

Page 1 of 1

18 July 2011

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, July 13, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW011750

Works Details (top)

GROUNDWATER NUMBER	GW011750
LIC-NUM	10BL004565
AUTHORISED-PURPOSES	DOMESTIC FARMING STOCK
INTENDED-PURPOSES	GENERAL USE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	12.10
DRILLED-DEPTH (metres)	12.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MAYLANDS
GWMA	603 - SYDNEY BASIN
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	215 - SHOALHAVEN RIVER
AREA-DISTRICT	
CMA-MAP	9028-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6143898.00
EASTING	281222.00
LATITUDE	34 49' 25"
LONGITUDE	150 36' 28"
GS-MAP	0075C4

AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	9

Licensed (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	35 751258

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	(Unknown)	0.00	3.30	152			(Unknown)
1	1	Casing	(Unknown)	0.00	12.10	127			Seated on Bottom
1	1	Opening	Slots	0.00	3.30	152		1	Mechanically Slotted; SL: 0mm; A: 0mm
1	1	Opening	Slots	0.00	12.10	127		2	Mechanically Slotted; SL: 0mm; A: 0mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
1.20	1.20	0.00	Unconsolidated	0.00		0.05			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	12.19	12.19	Gravel Alluvial Water Supply		

should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, July 13, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW028862

Works Details (top)

GROUNDWATER NUMBER	GW028862
LIC-NUM	10BL023183
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Well
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Hand Dug
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	1.80
DRILLED-DEPTH (metres)	1.80
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	603 - SYDNEY BASIN
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	215 - SHOALHAVEN RIVER
AREA-DISTRICT	
CMA-MAP	9028-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6144585.00
EASTING	280316.00
LATITUDE	34 49' 2"
LONGITUDE	150 35' 53"
GS-MAP	0075C4

AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	9

Licensed (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	44 751258

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Timber	0.30	0.30	914			(Unknown)

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.82	1.82	Alluvium Water Supply		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, July 13, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW110107

Works Details (top)

GROUNDWATER NUMBER	GW110107
LIC-NUM	10BL602979
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Well
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2009-05-07
FINAL-DEPTH (metres)	6.00
DRILLED-DEPTH (metres)	6.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	SHOALHAVEN STARCHES PLANT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	4.02
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6140174.00
EASTING	281832.00
LATITUDE	34 51' 27"
LONGITUDE	150 36' 49"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	62//1078788

Licensed (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	62 1078788

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	6.00	100			Auger - Solid Flight
1	1	Casing	(Unknown)	0.00	3.00	50			Welded
1	1	Opening	Slots - Horizontal	3.00	6.00	50			(Unknown) Casing - Machine Slotted
1		Annulus	Waterworn/Rounded	2.80	6.00				Graded; GS: 0-2mm

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.07	0.07	ASPHALT		
0.07	0.50	0.43	FILL,GRAVEL,SAND		
0.50	6.00	5.50	SAND / CLAY		

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, July 13, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW110108

Works Details (top)

GROUNDWATER NUMBER	GW110108
LIC-NUM	10BL602979
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Well
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2009-05-08
FINAL-DEPTH (metres)	4.50
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	SHOALHAVEN STARCHES PLANT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	0.64
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6140292.00
EASTING	281877.00
LATITUDE	34 51' 23"
LONGITUDE	150 36' 51"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	1//838753

Licensed (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	62 1078788

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.50	100			Auger - Solid Flight
1	1	Casing	PVC Class 15	0.00	1.50	50			Welded - Collar
1	1	Opening	Slots - Horizontal	1.50	4.50	50			PVC Class 15
1		Annulus	Waterworn/Rounded	1.30	4.50				Graded; GS: 0-2mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
0.00	0.00	0.00		0.64					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.09	0.09	ASPHALT		
0.09	1.05	0.96	FILL.SANDY GRAVEL		
1.05	4.50	3.45	SAND		

(DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, July 13, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW110109

Works Details (top)

GROUNDWATER NUMBER	GW110109
LIC-NUM	10BL602979
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Well
WORK-STATUS	
CONSTRUCTION-METHOD	Auger - Solid Flight
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2009-05-08
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	4.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	SHOALHAVEN STARCHES PLANT
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.27
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6140372.00
EASTING	281920.00
LATITUDE	34 51' 20"
LONGITUDE	150 36' 52"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	1//838753

Licensed (top)

COUNTY	CAMDEN
PARISH	BUNBERRA
PORTION-LOT-DP	62 1078788

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00	100			Auger - Solid Flight
1	1	Casing	PVC Class 15	0.00	1.00	50			Welded
1	1	Opening	Slots - Horizontal	1.00	4.00	50			PVC Class 15; Casing - Machine Slotted
1		Annulus	Waterworn/Rounded	0.80	4.00				Graded; GS: 0-2mm

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
0.00	0.00	0.00		1.27					

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.14	0.14	ASPHALT		
0.14	0.40	0.26	FILL,SANDY CLAY		
0.40	4.00	3.60	SILTY SAND AND SILTY CLAY		

A2 AERIAL PHOTOGRAPH REVIEW

A review of aerial photographs dating back to 1961, was conducted by Coffey Environments for the proposed pipeline route.

TABLE A2 – AERIAL PHOTOGRAPH REVIEW

DATE	OBSERVATIONS
21/9/1961 (black & white)	Lot 5 DP825808 and Lot 2 DP825808 appear to be vacant and grassed. Railway Street is apparent in the photo and there are some structures/developments on either side (possibly commercial/industrial), some lots to the east are vacant. The remainder of the proposed pipeline route to the north appears to be vacant/rural landuses.
29/12/1974 (black & white)	Lot 5 DP825808 and Lot 2 DP825808 appear to be vacant and grassed. Railway Street is apparent in the photo and there some structures/developments on either side (possibly commercial/industrial), some lots to the east are vacant. The remainder of the proposed pipeline route to the north appears to be vacant/rural landuses.
26/06/1979 (black & white)	Lot 5 DP825808 and Lot 2 DP825808 appear to be vacant and grassed. Railway Street is apparent in the photo and there some structures/developments on either side (possibly commercial/industrial), some lots to the east are vacant. There appears to be some disturbance east of Railway Street The remainder of the proposed pipeline route to the north appears to be vacant/rural landuses.
February 1993 (colour)	Lot 5 DP825808 and Lot 2 DP825808 appear to be vacant and grassed. Railway Street is apparent in the photo and there some structures/developments on either side (possibly commercial/industrial), some lots to the east are vacant. There appears to be some disturbance east of Railway Street which includes part of the sewerage treatment plant and at the north eastern end of railway street. The remainder of the proposed pipeline route to the north appears to be vacant/rural landuses.
24/03/2002 (Colour)	Lot 5 DP825808 and Lot 2 DP825808 appear to be vacant and grassed. Development in Railway Street is apparent and appears medium dense in the colour photo and there some structures/developments on either side (possibly commercial/industrial), some lots to the east are vacant. There appears to be some disturbance at the northeast of Railway Street The remainder of the proposed pipeline route to the north appears to be vacant/rural landuses.

A search of the NSW OEH website did not show any listings of sites within the Bomaderry area.

Two phone interviews were conducted on the 18 July 2011 with Steve Thompson and Ron Arthur, who are responsible for rural properties located between Railway Street and Fletchers lane, Bomaderry. The interview was aimed at identifying potential areas of concern as a result of contaminating activities or events which may not have been recorded by the OEH database but may have had the potential to have an impact on the proposed pipeline route.

Steve Thompson indicated that he was not aware of any contaminating activities or large events occurring in the study area besides common agricultural practices.

Ron Arthur who has lived in the area for the last 20 years indicated that he has mechanically sprayed the weeds in his paddocks using the chemical Bromide in the past. He also indicated that the old rail yard located to the south of Cambewarra Road on the western side of Railway Street was known to have stored railway sleepers treated with copper arsenic in the past.

Appendix B
Site Photographs

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

Photo 1 – Looking South-East Along Pestells Lane.
The existing Eastern Gas Pipeline Transfer Station is shown to the left of frame

Photo 2 – Looking North-West Along Pestells Lane (SCC Owned Services Corridor)

drawn	**CA**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**MF**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**14/07/2011**			
scale	**NTS**		title: **SITE PHOTO 1/PHOTO 2 SHOWING THE PROPOSED ROUTE**	
original size	**A4**		project no: **ENAUWOLL04006AA**	Photo Plate: **1**

Photo 3 – Looking East Along Fletchers Lane.

Photo 4 – Looking South Along SCC Owned Service Corridor and Manildra Owned Land

drawn	**CA**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**MF**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**14/07/2011**			
scale	**NTS**		title: **SITE PHOTO 3/PHOTO 4 SHOWING THE PROPOSED ROUTE**	
original size	**A4**		project no: **ENAUWOLL04006AA**	Photo Plate: **2**

Photo 5 – Looking South Along SCC Owned Service Corridor from CTP14 .

Photo 6 – Looking North Along SCC Owned Service Corridor. Existing Gas Pipeline is Present at this location.

drawn	**CA**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**MF**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**14/07/2011**			
scale	**NTS**		title: **SITE PHOTO 5/PHOTO 6 SHOWING THE PROPOSED ROUTE**	
original size	**A4**		project no: **ENAUWOLL04006AA**	Photo Plate: **3**

Photo 7 – Looking South Along Railway Street with CTP03 approximately located 50m in front of silver car.

Photo 8 – Looking south along Railway Street. Gas Pipeline is proposed on western side (truck side) of road

drawn	**CA**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**MF**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**14/07/2011**			
scale	**NTS**		title: **SITE PHOTO 7/PHOTO 8 SHOWING THE PROPOSED ROUTE**	
original size	**A4**		project no: **ENAUWOLL04006AA**	Photo Plate: **4**

Appendix C
Engineering Logs of Boreholes and Test Pits

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

coffey

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

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

CLASSIFICATION SYMBOL & SOIL NAME

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

PARTICLE SIZE DESCRIPTIVE TERMS

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

MOISTURE CONDITION

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

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

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

CONSISTENCY OF COHESIVE SOILS

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

DENSITY OF GRANULAR SOILS

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

MINOR COMPONENTS

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

SOIL STRUCTURE

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

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

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

TRANSPORTED SOILS

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

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit w_L less than 35%. • Medium plasticity – w_L between 35% and 50%. • High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

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

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

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Rock Description Explanation Sheet (1 of 2)

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

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

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

SUBSTANCE DESCRIPTIVE TERMS:

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

CLASSIFICATION OF WEATHERING PRODUCTS

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

Notes on Weathering:

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

ROCK SUBSTANCE STRENGTH TERMS

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

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index $I_{s(50)}$. The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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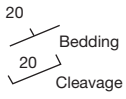
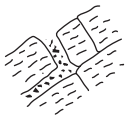
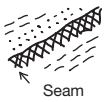
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			 (Note 2)
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			 (Note 2)
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

Notes on Defects:

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

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

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

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

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

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

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Engineering Log - Borehole

Borehole No.	***CBH01***
Sheet	1 of 1
Office Job No.:	***ENAUWOLL04006AA***
Client:	***MANILDRA GROUP***
Date started:	***16.6.2011***
Principal:	
Date completed:	***16.6.2011***
Project:	***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***
Logged by:	***CA***
Borehole Location:	***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***
Checked by:	***SM***

drill model and mounting:	MUSTANG BOBCAT	Easting:	281607	slope:	-90°	R.L. Surface:	NOT MEASURED
hole diameter:	200 mm	Northing	6140780	bearing:	N/A	datum:	WGS84 (Approx)

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
NDD		N		E					**FILL; Clayey Sandy GRAVEL:** Fine to coarse grained, brown, gravel is crushed basalt roadbase.	M	VD		FILL; ROAD SHOULDER
									FILL; Clayey GRAVEL: Fine to coarse grained, orange/brown, well cemented.	D			FILL; OLD ROAD SURFACE
						0.5		SC	**Clayey SAND:** Fine to coarse grained, pale yellow/pale brown with some iron strained orange/brown pockets, and a trace of fine grained sub-rounded gravel.	M	MD		ALLUVIAL SOIL
				E		1.0							
						1.5							
ADT			▶					CL	**Sandy CLAY:** Medium plasticity, orange/brown, with some fine to coarse grained sub-angular to sub-rounded highly weathered sandstone gravel.	>Wp	F		
						2.0							
						2.5							
						3.0			Borehole CBH01 terminated at 2.6m				CBH01 Terminated at 2.6m on steady progress

method

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

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

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

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF BOREHOLE CBH01**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **5**

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Engineering Log - Borehole

Borehole No.	***CBH02***
Sheet	1 of 1
Office Job No.:	***ENAUWOLL04006AA***
Client:	***MANILDRA GROUP***
Date started:	***16.6.2011***
Principal:	
Date completed:	***16.6.2011***
Project:	***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***
Logged by:	***CA***
Borehole Location:	***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***
Checked by:	***SM***

drill model and mounting:	MUSTANG BOBCAT	Easting:	281657	slope:	-90°	R.L. Surface:	NOT MEASURED
hole diameter:	200 mm	Northing	6140890	bearing:	N/A	datum:	WGS84 (Approx)

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
NDD		N	NONE OBSERVED	E					**FILL; Clayey Sandy GRAVEL:** Fine to coarse grained, orange/brown.	M	VD		FILL; ROAD SHOULDER
									FILL; Clayey GRAVEL: Fine to coarse grained, pale yellow/pale brown, well compacted, with some sand.	D/M			FILL: OLD ROAD SURFACE
						0.5		GC	**Sandy Clayey GRAVEL:** Fine to coarse grained, sub-angular sandstone gravel, fine to medium grained sand.	D			RESIDUAL SOIL
ADV						1.0			**SANDSTONE:** Fine to medium grained, iron stained orange/brown, medium strength.				HIGHLY WEATHERED SANDSTONE
									Borehole CBH02 terminated at 1m				CBH02 Terminated at 1.0m on V-Bit refusal
						1.5							
						2.0							
						2.5							
						3.0							

method

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

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

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

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF BOREHOLE CBH02**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **6**

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Engineering Log - Borehole

Borehole No.	***CBH03***
Sheet	1 of 1
Office Job No.:	***ENAUWOLL04006AA***
Client:	***MANILDRA GROUP***
Date started:	***16.6.2011***
Principal:	
Date completed:	***16.6.2011***
Project:	***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***
Logged by:	***CA***
Borehole Location:	***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***
Checked by:	***SM***

drill model and mounting:	MUSTANG BOBCAT	Easting:	281708	slope:	-90°	R.L. Surface:	NOT MEASURED
hole diameter:	200 mm	Northing	6141014	bearing:	N/A	datum:	WGS84 (Approx)

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
NDD		N	NONE OBSERVED	E		0.5		SC	**Clayey SAND:** Fine to medium grained, orange/brown, with some roots and fine to coarse grained angular highly weathered sandstone gravel.	M	MD		RESIDUAL SOIL
ADV									**SANDSTONE:** Fine to medium grained, iron stained red/brown, medium strength. Borehole CBH03 terminated at 0.55m				HIGHLY WEATHERED SANDSTONE CBH03 Terminated at 0.55m on refusal

1.0 1.5 2.0 2.5 3.0

method

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

*bit shown by suffix e.g. ADT

support

M mud N nil
C casing

penetration

1 2 3 4 no resistance ranging to refusal

water

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

notes, samples, tests

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

classification symbols and soil description
based on unified classification system

moisture

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

consistency/density index

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

BOREHOLE ENAUWOLL04006AA - LOGS.GPJ COFFEY.GDT 29.7.11

Form GEO 5.3 Issue 3 Rev.2

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF BOREHOLE CBH03**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **7**

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Engineering Log - Borehole

Borehole No.	***CBH04***
Sheet	1 of 1
Office Job No.:	***ENAUWOLL04006AA***
Client:	***MANILDRA GROUP***
Date started:	***16.6.2011***
Principal:	
Date completed:	***16.6.2011***
Project:	***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***
Logged by:	***CA***
Borehole Location:	***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***
Checked by:	***SM***

drill model and mounting:	MUSTANG BOBCAT	Easting:	218764	slope:	-90°	R.L. Surface:	NOT MEASURED
hole diameter:	200 mm	Northing	6141143	bearing:	N/A	datum:	WGS84 (Approx)

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
NDD		N		E		0.5			**FILL; Sandy Clayey GRAVEL:** Fine to coarse grained, orange/brown with some sandstone cobbles and boulders up to 350mm diameter.	D/M	VD		FILL: ROAD BASE
						1.0		SC	**Clayey SAND:** Fine to medium grained, dark brown, with some silt, with a trace of roots.	D	MD		ALLUVIAL SOIL
ADV			▶			1.5		CL	**Sandy CLAY:** Low to medium plasticity, pale yellow/pale brown, and a trace of fine grained gravel.	Wp	F/St	×	
						2.0		CH	**Sandy CLAY:** High plasticity, iron stained orange/brown to red/brown, with some fine to coarse grained angular highly weathered sandstone gravel.	>Wp	F	×	RESIDUAL SOIL
						2.5			Borehole CBH04 terminated at 2.6m				CBH04 Terminated at 2.6m on steady progress with V-Bit
						3.0							

method

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

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

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

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF BOREHOLE CBH04**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **8**

coffey environments

Engineering Log - Borehole

Borehole No.	***CBH05***
Sheet	1 of 1
Office Job No.:	***ENAUWOLL04006AA***
Client:	***MANILDRA GROUP***
Date started:	***16.6.2011***
Principal:	
Date completed:	***16.6.2011***
Project:	***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***
Logged by:	***CA***
Borehole Location:	***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***
Checked by:	***SM***

drill model and mounting:	MUSTANG BOBCAT	Easting:	281802	slope:	-90°	R.L. Surface:	NOT MEASURED
hole diameter:	200 mm	Northing	6141227	bearing:	N/A	datum:	WGS84 (Approx)

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
NDD		N	NONE OBSERVED	e		0.0			**TOPSOIL; Clayey GRAVEL:** Fine to coarse grained, brown, with some silt.	W	MD		TOPSOIL/FILL
								CL	**Sandy CLAY:** Medium plasticity, orange/brown, with some fine to coarse grained angular sandstone gravel, and a trace of roots.	<Wp	St		RESIDUAL SOIL
						0.5							
						1.0							
ADV								GC	**Sandy Clayey GRAVEL:** Fine to coarse grained, orange/brown, with some cobbles.	M	VD		EXTREMELY WEATHERED MATERIAL
						1.5			**SANDSTONE:** Fine to medium grained, orange/brown, medium strength.				HIGHLY WEATHERED SANDSTONE
									Borehole CBH05 terminated at 1.5m				CBH05 Terminated at 1.5m due to refusal on sandstone
						2.0							
						2.5							
						3.0							

method

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

support

M mud N nil
C casing

penetration

1 2 3 4 — no resistance ranging to refusal

water

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

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

BOREHOLE ENAUWOLL04006AA - LOGS.GPJ COFFEY.GDT 29.7.11

Form GEO 5.3 Issue 3 Rev.2

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF BOREHOLE CBH05**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **9**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP06**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: **MANILDRA GROUP**

Date started: **21.6.2011**

Principal:

Date completed: **21.6.2011**

Project: **CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT**

Logged by: **CA**

Test pit location: **PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541**

Checked by: **SM**

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 281921 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6141493 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOIL; Gravelly CLAY:** Low plasticity, brown, fine to coarse grained angular gravel, with some roots and fine to medium grained sand.	<Wp	St		TOPSOIL FILL
					0.5		CL	**Sandy CLAY:** Medium plasticity, orange with iron stained red/brown pockets, with some fine to coarse grained angular sandstone gravel, and a trace of roots.	Wp	VSt	×	RESIDUAL SOIL
					1.0							
					1.5		CL/CH	**CLAY:** Medium to high plasticity, pale grey with iron stained orange/brown to red/brown pockets, with some silt and fine to coarse grained angular sandstone gravel.	<Wp	H	600 ×	EXTREMELY WEATHERED MATERIAL
					2.0							
					2.5							End on slow progress
					3.0			Test pit CTP06 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration (1 2 3 4) — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP06**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **10**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP07**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: **MANILDRA GROUP**

Date started: **21.6.2011**

Principal:

Date completed: **21.6.2011**

Project: **CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT**

Logged by: **CA**

Test pit location: **PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541**

Checked by: **SM**

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 281946 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6141587 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOIL; Clayey SAND:** Fine to medium grained, brown, with some roots.	M	MD		TOPSOIL
							CH	**Sandy CLAY:** High plasticity, orange/brown, with some fine roots.	Wp	St		RESIDUAL SOIL
					0.5						×	
					1.0			...Some fine to coarse grained angular sandstone gravel at 1.2m.	<Wp	H		
					1.5							×
							CL	**Sandy CLAY:** Low plasticity, grey, iron strained red/brown, with some highly weathered sandstone gravel.				EXTREMELY WEATHERED MATERIAL
					2.0			**SANDSTONE:** Fine to medium grained, iron stained red/brown, medium strength.				HIGHLY WEATHERED SANDSTONE
								Test pit CTP07 terminated at 2m				End on refusal
					2.5							
					3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP07**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **11**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP08**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: **MANILDRA GROUP**

Date started: **21.6.2011**

Principal:

Date completed: **21.6.2011**

Project: **CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT**

Logged by: **CA**

Test pit location: **PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541**

Checked by: **SM**

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 281965 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6141716 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E		N			0.0			**TOPSOIL; Sandy CLAY/Clayey SAND:** Fine to medium grained, brown, with some roots.	M	MD		TOPSOIL
							CH	**Sandy CLAY:** High plasticity, pale brown/pale yellow, fine to medium grained sand, with some roots and silt.	Wp	F		ALLUVIAL SOIL
				ASS	0.5				>Wp			
				ASS	1.0		CL	**Sandy CLAY:** Medium plasticity, iron stained red/brown with grey pockets, fine to medium grained sand, with a trace of roots.	Wp	VSt	×	RESIDUAL SOIL
					1.5							
					2.0				<Wp	H	×	
					2.5							End on steady progress
					3.0			Test pit CTP08 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP08**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **12**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP09**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***21.6.2011***

Principal:

Date completed: ***21.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 281992 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6141863 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N							**TOPSOIL; Sandy CLAY:** High plasticity, brown, fine to medium grained sand, with some roots.	>Wp	S		TOPSOIL
								CH	**CLAY:** High plasticity, dark grey/black, with some silt and fine grained sand, and a trace of roots.				ALLUVIAL/ESTUARINE SOIL? Slight SO_4 odour
				ASS		0.5						X	
			▶										Test pit wall falling in under own weight at 0.6m
				ASS		1.0							
								CL	**CLAY:** Medium plasticity, pale yellow/pale brown, with some fine grained sand, and a trace of roots.				
				ASS		1.5		SC	**Clayey SAND:** Fine to medium grained, grey, with a trace of silt.	W	MD		
				ASS		2.0							
						2.5							End on steady progress
									Test pit CTP09 terminated at 2.5m				
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP09**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **13**

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP10***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04006AA***

Client: ***MANILDRA GROUP***

Date started: ***21.6.2011***

Principal:

Date completed: ***21.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282018 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6142018 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N				0.5			**TOPSOIL; Sandy CLAY:** Low to medium plasticity, pale yellow/brown, fine to medium grained sand, with some roots.	M	MD		TOPSOIL
						1.0		CL	**Sandy CLAY:** Medium plasticity, red/orange, with some silt, and a trace of roots and fine to coarse grained angular sandstone gravel.	<Wp	St	x	RESIDUAL
			Seepage			1.5		CL	**Sandy Gravelly CLAY:** Medium plasticity, orange/brown with some pale yellow/pale brown pockets and fine to medium grained highly weathered sandstone gravel.		H		EXTREMELY WEATHERED MATERIAL
						2.0						x	
						2.5							End on slow progress
						3.0			Test pit CTP10 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP10**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **14**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP11**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***21.6.2011***

Principal:

Date completed: ***21.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282038 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6142154 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED			0.5			**TOPSOIL; Sandy CLAY:** Low plasticity, brown, with some roots.	<Wp	F		TOPSOIL
								CL	**Sandy CLAY:** Medium plasticity, iron stained orange/brown, with some fine to coarse grained angular sandstone gravel, and a trace of roots.		VSt	×	RESIDUAL SOIL
						1.0					H	×	
								CL	**Sandy CLAY:** Medium plasticity, orange/brown wtih grey pockets, and some fine to coarse grained angular sandstone gravel.				EXTREMELY WEATHERED MATERIAL
						1.5			**SANDSTONE:** Fine to medium grained, red/brown, low to medium strength.				HIGHLY WEATHERED SANDSTONE
									Test pit CTP11 terminated at 1.7m				End on very slow progress
						2.0							
						2.5							
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP11**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **15**

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP12***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04006AA***

Client: ***MANILDRA GROUP***

Date started: ***21.6.2011***

Principal:

Date completed: ***21.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282092 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6142461 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N				0.0			**TOPSOIL; CLAY:** High plasticity, brown, with some silt and roots.	>Wp	S		TOPSOIL
			▶	ASS		0.5		CH	**Sandy CLAY:** High plasticity, brown, with some silt, and a trace of roots.			×	ALLUVIAL/ESTUARINE SOIL
				ASS		1.0							
				ASS		1.5		CH	**Sandy CLAY:** High plasticity, grey, fine grained sand, and some silt.		St	×	
				ASS		2.0						×	
						2.5							End on steady progress
						3.0			Test pit CTP12 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration (1 2 3 4)
- no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP12**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **16**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP13**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***22.6.2011***

Principal:

Date completed: ***22.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282129 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6242631 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOIL; CLAY:** High plasticity, brown, with some roots and silt and a trace of fine grained sand.	Wp	VSt	×	TOPSOIL
				ASS	0.5							
							CH	**CLAY:** High plasticity, brown to grey with some iron stained orange/brown pockets, some silt, and a trace of roots.	<Wp/Wp		×	ALLUVIAL SOIL
				ASS	1.0							
					1.5							
				ASS								
					2.0						×	
				ASS								
					2.5							End on slow progress
								Test pit CTP13 terminated at 2.5m				
					3.0							

Sketch

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

support
S shoring N nil

penetration
1 2 3 4 — no resistance ranging to refusal

water
water level on date shown
water inflow
water outflow

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP13**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **17**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP14**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***22.6.2011***

Principal:

Date completed: ***22.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282149 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6142748 m | datum: WGS84 (Approx)

excavation information						material substance					
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOIL; CLAY:** High plasticity, brown, with some silt and roots.	Wp	S		TOPSOIL
				ASS	0.5		CH	**CLAY:** High plasticity, brown with some orange pockets, and some silt, and a trace of roots.		VSt	×	ALLUVIAL SOIL
				ASS	1.0		CH	**CLAY:** High plasticity, orange/brown and grey, wtih some fine to medium grained sand and silt.	<Wp/Wp		×	
				ASS	1.5							
					2.0						×	
					2.5							End on steady progress
					3.0			Test pit CTP14 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	**MANILDRA GROUP PTY LTD**
approved	**CA**		project:	**ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**
date	**19/07/2011**			
scale	**NTS**		title:	**PHOTO OF TEST PIT CTP14**
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **18**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP15**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***22.6.2011***

Principal:

Date completed: ***22.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282169 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6142851 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material — soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOIL; CLAY:** High plasticity, black/dark grey, with some silt and roots, and a trace of fine grained sand.	<Wp	St		TOPSOIL
				ASS	0.5		CH	**CLAY:** High plasticity, grey with some iron stained orange/brown pockets, with a trace of roots, fine grained sand and fine to coarse grained angular gravel.	Wp	VSt	×	ALLUVIAL SOIL
				ASS	1.0				<Wp		×	
					1.5						×	
					2.0					H	×	
					2.5							End on slow progress
					3.0			Test pit CTP15 terminated at 2.5m				

Sketch

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

support
- S shoring
- N nil

penetration (1 2 3 4) — no resistance ranging to refusal

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

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

classification symbols and soil description based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	**MANILDRA GROUP PTY LTD**
approved	**CA**		project:	**ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**
date	**19/07/2011**		title:	**PHOTO OF TEST PIT CTP15**
scale	**NTS**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **19**
original size	**A4**			

coffey environments

Engineering Log - Excavation

Excavation No. **CTP16**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***22.6.2011***

Principal:

Date completed: ***22.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: N-S | Easting: 282191 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6142933 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N			0.0			**TOPSOIL; CLAY:** High plasticity, brown, with some roots.	<Wp	F		TOPSOIL
				ASS	0.5		CH	**CLAY:** High plasticity, grey with some iron stained orange/brown pockets, with a trace of roots and fine to coarse grained sub-angular gravel.	Wp	VSt		ALLUVIAL SOIL
				ASS	1.0						x	
				ASS	1.5							
				ASS	2.0		CH	**Sandy CLAY:** High plasticity, grey with orange/brown pockets, with a trace of roots and fine to coarse grained sub-angular gravel.	>Wp	St	x	
			▶		2.5							End on steady progress
					3.0			Test pit CTP16 terminated at 2.5m				

Sketch

method

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

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

TESTPIT ENAUWOLL04006AA - LOGS.GPJ COFFEY.GDT 29.7.11

Form GEO 5.2 Issue 3 Rev.2

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP16**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **20**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP17**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***22.6.2011***

Principal:

Date completed: ***22.6.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: 282284 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6143258 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED		0.0			**TOPSOL; CLAY:** Medium plasticity, brown, with some fine grained roots.	Wp	F		TOPSOIL
				ASS	0.5		CH	**CLAY:** High plasticity, brown with some orange pockets, with a trace of fine grained sand, roots and fine to coarse grained gravel.	<Wp	VSt	×	ALLUVIAL SOIL
				ASS	1.0						×	
				ASS	1.5							
					2.0						×	
					2.5							End on steady progress
					3.0			Test pit CTP17 terminated at 2.5m				

Sketch

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

support
S shoring N nil

penetration
1 2 3 4 no resistance ranging to refusal

water
water level on date shown
water inflow
water outflow

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP17**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **21**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP18**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 282230 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6143289 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED	E		0.5			**TOPSOIL; CLAY:** Medium plasticity, brown, with some roots and silt, with a trace of fine to medium grained sand and fine to coarse grained angular gravel.	<Wp	St	×	TOPSOIL
				ASS				CL	**CLAY:** Medium plasticity, brown/grey with some iron stained orange/brown pockets, wth some roots and fine to medium grained sand, and a trace of silt.	<Wp/Wp	VSt	×	ALLUVIAL SOIL
						1.0						×	
				ASS		1.5						×	
								CH	**CLAY:** High plasticity, iron stained orange/brown with grey pockets, some fine to medium grained sand, and a trace of fine to medium grained sub-angular ironstone gravel.	Wp	St/VSt	×	
				ASS		2.0						×	
				ASS		2.5						×	
						3.0			Test pit CTP18 terminated at 2.6m				CTP18 Terminated at 2.6m on steady progress

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	**MANILDRA GROUP PTY LTD**
approved	**CA**		project:	**ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**
date	**19/07/2011**			
scale	**NTS**		title:	**PHOTO OF TEST PIT CTP18**
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **22**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP19**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 281832 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6143349 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED	E					**TOPSOIL; Sandy CLAY:** Medium to high plasticity, brown, with some silt and roots, and a trace of fine grained gravel.	<Wp	St		TOPSOIL
				ASS		0.5		CH	**CLAY:** High plasticity, grey to dark grey mottled pale orange/pale brown, with some roots and fine to medium grained sand.	Wp			ALLUVIAL SOIL
				ASS		1.0							
				ASS		1.5		CH	**Sandy CLAY;** High plasticity, grey with orange/brown iron stained pockets, fine to medium grained sand, and some silt and roots.				
				ASS		2.0							
						2.5			Test pit CTP19 terminated at 2.5m				CTP19 Terminated at 2.5m on steady progress
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP19**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **23**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP20**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 281512 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6143395 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N							**TOPSOIL; CLAY:** Medium plasticity, brown, with some silt and roots, and a trace of fine to medium grained sand.	<Wp	F		TOPSOIL
				E				CH	**CLAY:** High plasticity, dark grey/black with some pale orange/pale brown iron stained pockets, with some silt, roots and fine to medium grained sand.	Wp	St/VSt		ALLUVIAL SOIL
				ASS		0.5							
				ASS		1.0							
			Seepage (not inflow)					CH	**Sandy CLAY:** High plasticity, grey with orange/brown pockets, fine to medium grained sand, with some roots and silt.	>Wp	F/St		
				ASS		1.5							
						2.0							
						2.5			Test pit CTP20 terminated at 2.5m				CTP20 Terminated at 2.5m on steady progress
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP20**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **24**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP21**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 281162 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6143435 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED	E		0.5			**FILL; Sandy Gravelly CLAY:** Low plasticity, brown, fine to coarse grained sandstone and basalt gravel, with some roots.	<Wp	VSt		TOPSOIL FILL
				ASS		1.0		CH	**CLAY:** High plasticity, brown/orange, with some fine roots and some fine to medium grained sand, with a trace of silt.		H	×	ALLUVIAL SOIL
				ASS		1.5		CL	**Sandy CLAY:** Medium plasticity, mottled orange/brown/grey, with a trace of fine roots and fine to medium grained ironstone gravel.		St/VSt VSt	× ×	
						2.0					H	×	
						2.5			Test pit CTP21 terminated at 2.5m				CTP21 Terminated at 2.5m on steady progress
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP21**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **25**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP22**

Sheet 1 of 2

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280967 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2.5m long 0.45m wide | Northing: 6143645 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED	E		0.5			**TOPSOIL; CLAY:** Medium to high plasticity, brown, with some silt and roots.	Wp	F/St		TOPSOIL
								CH	**CLAY:** Medium to high plasticity, brown, with silt and roots.	Wp/>Wp	VSt	×	ALLUVIAL SOIL
						1.0		CH	**CLAY:** High plasticity, orange/brown, with some fine to medium grained sand and silt, with a trace of roots.	Wp		×	
						1.5		CL	**Sandy Gravelly CLAY:** Low to medium plasticity, mottled orange/brown, red/brown, grey and yellow, fine to coarse grained sub-angular latite gravel, fine to medium grained sand, with some sub-rounded latite cobbles, and a trace of fine roots.	<Wp	H	600 ×	
						2.0							
						2.5							
						3.0							CTP22 Terminated at 3.0m on

Test pit CTP22 terminated at 3m

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

coffey environments

Engineering Log - Excavation

Excavation No. **CTP22**

Sheet 2 of 2

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280967 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2.5m long 0.45m wide | Northing: 6143645 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
						3.5							slow progress
						4.0							
						4.5							
						5.0							
						5.5							
						6.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client:	**MANILDRA GROUP PTY LTD**
approved	**CA**		project:	**ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**
date	**19/07/2011**		title:	**PHOTO OF TEST PIT CTP22**
scale	**NTS**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **26**
original size	**A4**			

coffey environments

Engineering Log - Excavation

Excavation No. **CTP23**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: **MANILDRA GROUP**

Date started: **4.5.2011**

Principal:

Date completed: **4.5.2011**

Project: **CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT**

Logged by: **CA**

Test pit location: **PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541**

Checked by: **SM**

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280856 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2.3m long 0.45m wide | Northing: 6143748 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED			0.0			**TOPSOIL; CLAY:** Medium to high plasticity, brown, wtih some silt and roots, with a trace of fine to medium grained sand.	Wp	St		TOPSOIL
				E				CL/CH	**CLAY:** Medium to high plasticity, brown, with some silt and roots.		St/VSt		ALLUVIAL SOIL No staining
						0.5		CH	**CLAY:** High plasticity, brown with some iron stained orange/brown pockets, with some silt, with a trace of roots and fine to medium grained sand.				
						1.0							
						1.5							
								CL	**Sandy CLAY:** Medium plasticity, mottled grey, orange/brown, brown and dark grey, with some fine to medium grained angular ironstone gravel, and a trace of fine roots.	<Wp	H		
						2.0							
						2.5			Test pit CTP23 terminated at 2.5m				CTP23 Terminated at 2.5m on steady progress
						3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP23**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **27**

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP24***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04006AA***

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280808 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6143805 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED	E		0.5			**TOPSOIL; CLAY:** Medium to high plasticity, brown, wtih some silt and roots, with a trace of fine grained gravel and fine to medium grained sand.	<Wp/Wp	St		TOPSOIL
								CL	**CLAY:** Medium plasticity, pale orange/pale brown, with some silt and fine to medium grained sand, and a trace of roots.	Wp	H		ALLUVIAL SOIL
						1.0					VSt		
						1.5					St/VSt		
										<Wp	VSt		
						2.0		CL	**Sandy CLAY:** Medium plasticity, mottled dark grey, orange/brown and brown, with a trace of fine roots and fine to medium grained angular ironstone gravel.		H		
						2.5			Test pit CTP24 terminated at 2.5m				CTP24 Terminated at 2.5m on steady progress
						3.0							

Sketch

method

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

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

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

classification symbols and soil description

based on unified classification system

moisture

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP24**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **28**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP25**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: ***MANILDRA GROUP***

Date started: ***4.5.2011***

Principal:

Date completed: ***4.5.2011***

Project: ***CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT***

Logged by: ***CA***

Test pit location: ***PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541***

Checked by: ***SM***

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280550 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6144015 m | datum: WGS84 (Approx)

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
E		N	NONE OBSERVED						**FILL; CLAY:** Medium to high plasticity, brown, with some roots and silt, with a trace of fine to medium grained sand and fine to medium grained gravel.	<Wp	St		TOPSOIL FILL (road cuttings)
				E		0.5		CH	**CLAY:** High plasticity, brown, with some silt, and a trace of fine to medium grained sand and roots.	>Wp	VSt		ALLUVIAL SOIL
						1.0					St/VSt		
						1.5		CL	**Sandy CLAY:** Medium plasticity, mottled dark grey, orange, red/brown and yellow, with a trace of fine roots.	<Wp	H		
						2.0							
						2.5							
						3.0			Test pit CTP25 terminated at 2.5m				CTP25 Terminated at 2.5m on steady progress

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP25**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **29**

coffey environments

Engineering Log - Excavation

Excavation No. **CTP26**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04006AA**

Client: **MANILDRA GROUP**

Date started: **4.5.2011**

Principal:

Date completed: **4.5.2011**

Project: **CONTAMIN, ASS, GEOTECH + GWATER ASSESSMENT**

Logged by: **CA**

Test pit location: **PROPOSED GAS PIPELINE, BOMADERRY, NSW, 2541**

Checked by: **SM**

equipment type and model: 7T CAT BACKHOE | Pit Orientation: E-W | Easting: 280330 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.45m wide | Northing: 6144221 m | datum: WGS84 (Approx)

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
E		N	NONE OBSERVED	E	0.0			**FILL; Sandy Gravelly CLAY:** Medium plasticity, brown, fine to coarse grained angular basalt/siltstone, fine to coarse grained sand, and some roots.	<Wp	VSt	×	FILL: ROAD SHOULDER
				E	0.5		CL/CH	**CLAY:** Medium to high plasticity, mottled orange/brown and grey, with some fine roots and fine grained sand, and a trace of fine to medium grained angular ironstone gravel and silt.			×	ALLUVIAL SOIL
				E	1.0						×	
					1.5		CL	**Sandy CLAY:** Medium plasticity, mottled dark grey, orange, red/brown and yellow, with a trace of fine roots.		H	×	
					2.0						550 ×	
					2.5			Test pit CTP26 terminated at 2.5m				CTP26 Terminated at 2.5m on steady progress
					3.0							

Sketch

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

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

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

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

classification symbols and soil description
based on unified classification system

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

consistency/density index

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

TESTPIT ENAUWOLL04006AA - LOGS.GPJ COFFEY.GDT 29.7.11

Form GEO 5.2 Issue 3 Rev.2

drawn	**RB**	coffey environments SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	client: **MANILDRA GROUP PTY LTD**	
approved	**CA**		project: **ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION PROPOSED GAS PIPELINE BOMADERRY NSW**	
date	**19/07/2011**			
scale	**NTS**		title: **PHOTO OF TEST PIT CTP26**	
original size	**A4**		project no: **ENAUWOLL04006AA-AA**	Photo Plate: **30**

Appendix D
Results of Soil Vapour Testing

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

Coffey Environments Pty Ltd
ACN 090 522 759 ABN 45 090 522 759

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

job no.:
ENAUWOLL 04006AA

Photoionisation Detector Results

Client:	MANILDRA GROUP	**Office:**	WOLLONGONG
Principal:		**Date:**	4/05/2011 and 14/06/2011
Project:	CONTAMINATION, GEOTECHNICAL AND ACID SULFATE SOIL ASSESSM	**By:**	CA
Location:	PROPOSED GAS PIPELINE, BOMADERRY, NSW 2541	**Checked by:**	
PID Serial Number:	MINI RAE 2000 110-008460	**Lamp Voltage:**	10.6eV
Last checked/calibrated:		**0ppm Calibration:**	
Calibration gas type/concentration:	Isobutylene/100ppm	**100ppm Calibration:**	

Location Number	Test	Bore or sample probe depth (m)	Duration (mins)	Background Reading (ppm)	last reading (ppm)	Maximum Reading (ppm)	Notes
CTP26	HS	0.1-0.2	1	0.0	0.6	9.5	No odour/no staining
CTP26	HS	1.0-1.1	1	0.0	0.4	0.7	No odour/no staining
CTP25	HS	0.3-0.4	1	0.4	0.4	0.4	No odour/no staining
CTP24	HS	0.2-0.3	1	0.0	0.2	0.3	No odour/no staining
CTP23	HS	0.3-0.4	1	0.0	0.1	0.1	No odour/no staining
CTP22	HS	0.1-0.2	1	0.0	0.0	0.0	No odour/no staining
CTP21	HS	0.1-0.2	1	0.0	0.2	0.2	No odour/no staining
CTP20	HS	0.2-0.3	1	0.0	1.2	1.5	No odour/no staining
CTP19	HS	0.2-0.3	1	0.0	0.2	0.2	No odour/no staining
CTP18	HS	0.2-0.3	1	0.0	0.1	0.2	No odour/no staining
SS03	HS	0.0-0.1	1	0.0	0.8	5.3	No odour/no staining
SS06	HS	0.0-0.1	1	0.0	4	8	No odour/no staining
SS15	HS	0.0-0.1	1	0.2	6	7.7	No odour/no staining
SS11	HS	0.0-0.1	1	0.0	1.4	4.7	No odour/no staining
SS08	HS	0.0-0.1	1	0.0	1.5	3	No odour/no staining
SS16	HS	0.0-0.1	1	0.0	1.4	1.4	No odour/no staining
SS10	HS	0.0-0.1	1	0.0	1.3	1.5	No odour/no staining
SS05	HS	0.0-0.1	1	0.0	3	3	No odour/no staining
SS17	HS	0.0-0.1	1	0.0	1.2	2	No odour/no staining
SS04	HS	0.0-0.1	1	0.0	1.5	1.7	No odour/no staining
SS12	HS	0.0-0.1	1	0.0	0.6	0.7	No odour/no staining
SS09	HS	0.0-0.1	1	0.0	0.4	0.6	No odour/no staining
SS13	HS	0.0-0.1	1	0.0	0.9	1	No odour/no staining
SS14	HS	0.0-0.1	1	0.0	1	1.3	No odour/no staining
SS07	HS	0.0-0.1	1	0.0	1.4	1.4	No odour/no staining
SS02	HS	0.0-0.1	1	0.0	0.5	0.6	No odour/no staining

*Fill in the test type as follows:-
BH ( ) = soil gas probe sample
HS ( ) = headspace sample

Coffey Environments Pty Ltd
ACN 090 522 759 ABN 45 090 522 759

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

job no.:
ENAUWOLL 04006AA

Photoionisation Detector Results

Client:	MANILDRA GROUP	**Office:**	WOLLONGONG
Principal:		**Date:**	4/05/2011 and 14/06/2011
Project:	CONTAMINATION, GEOTECHNICAL AND ACID SULFATE SOIL ASSESSM	**By:**	CA
Location:	PROPOSED GAS PIPELINE, BOMADERRY, NSW 2541	**Checked by:**	
PID Serial Number:	MINI RAE 2000 110-008460	**Lamp Voltage:**	10.6eV
Last checked/calibrated:		**0ppm Calibration:**	
Calibration gas type/concentration:	Isobutylene/100ppm	**100ppm Calibration:**	

Location Number	Test	Bore or sample probe depth (m)	Duration (mins)	Background Reading (ppm)	last reading (ppm)	Maximum Reading (ppm)	Notes
SS01	HS	0.0-0.1	1	0.0	0.8	0.8	No odour/no staining

*Fill in the test type as follows:-
BH ( ) = soil gas probe sample
HS ( ) = headspace sample

Appendix E
Laboratory Reports – Chemical Testing

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

TABLE E1:
SUMMARY OF LABORATORY RESULTS FOR SOIL SAMPLES
Heavy Metals, TPH, BTEX, PAH, OCP, OPP, PCB and Asbestos
(All results in mg/kg)

Sample ID			SS01	SS02	SS03	QA11 (Duplicate of SS03/0.0-0.1m)	SS04	SS05	SS06	SS11	SS12	SS15	SS17	CTP19	CTP20	CTP21	CTP23	CTP25	CTP26	QA01 (Duplicate of CTP26/0.4-0.5m)	SS30	SS31	SS32	SS33	SS34
Media			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date of Sampling	HIL (NEHF F)	EIL	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	09-Jun-11	04-May-11	04-May-11	04-May-11	04-May-11	04-May-11	04-May-11	04-May-11	25-Jul-11	25-Jul-11	25-Jul-11	25-Jul-11	25-Jul-11
Unit			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Depth (m)			0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.2-0.3	0.2-0.3	0.1-0.2	0.3-0.4	0.3-0.4m	0.4-0.5m	0.4-0.5m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m
HEAVY METALS																									
Arsenic	500 [1]	20 [1]	<3	4	3	<3	4	3	17	4	4	4	4	4	4	4	<3	5	<3	3	-	-	-	-	-
Cadmium	100 [1]	3 [1]	<0.3	<0.3	0.5	0.4	<0.3	<0.3	0.8	<0.3	<0.3	<0.3	<0.3	0.3	0.3	0.4	0.3	0.4	<0.3	<0.3	-	-	-	-	-
Chromium	600,000 [1a]	400 [1a]	22	50	26	11	14	18	30	14	18	12	16	17	21	17	11	22	9.3	9.8	-	-	-	-	-
Copper	5,000 [1]	100 [1]	82	110	13	11	25	54	31	3	35	26	36	21	8.5	56	12	7.8	13	15	-	-	-	-	-
Lead	1,500 [1]	600 [1]	17	17	65	76	25	22	16	8	34	28	17	14	11	97	13	10	9.7	9.9	-	-	-	-	-
Nickel	3,000 [1]	60 [1]	6.4	17	1.2	1	4.3	5.8	9.5	1.1	7.5	7.6	8.6	9.3	3.2	4.4	4.7	2.5	7.4	11	-	-	-	-	-
Zinc	35,000 [1]	200 [1]	96	110	72	43	45	62	89	12	70	130	100	54	19	63	27	17	31	42	-	-	-	-	-
Mercury	75 [1b]	1 [1b]	<0.05	<0.05	0.16	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS																									
C6 - C9 Fraction	65 [2]		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-
C10 - C14 Fraction			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-
C15 - C28 Fraction			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	-	-	-	-
C29 - C36 Fraction			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	-	-	-	-
Total C10-C36	1,000 [2]		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
BTEX																									
Benzene	1 [2]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Toluene	130 [2]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Ethylbenzene	50 [2]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Total Xylene	25 [2]		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS																									
Benzo(a)pyrene	5 [1]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Total PAH	100 [1]		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
ORGANOCHLORINE PESTICIDES																									
Heptachlor	50 [1]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
Chlordane	250 [1]		<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	<0.2	<0.2	-	-	-	-	-
Aldrin + Dieldrin	50 [1]		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
DDT + DDE + DDD	1,000 [1]		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
Other OCP			<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
ORGANOPHOSPHOROUS PESTICIDES																									
Total OPP	-		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
POLYCHLORINATED BIPHENYLS																									
Total PCB	50 [1]		<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	-	-	-	-	-
ASBESTOS	ND [3]		ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	**Chrysotile asbestos detected**	ND	ND	ND	-	ND	ND	ND	ND	ND

NOTES:

Bold Concentration exceeds the Human Health Investigation Levels (HIL)

Bold Concentration exceeds the Environmental Investigation Levels (EIL)

[1] Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme 2nd Edition and NEPM (1999).

[a] Based on Chromium III

[b] Based on Inorganic Mercury

[2] Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

[3] On the advice of the NSW Department of Health, the NSW EPA have advised NSW Site Auditors (Site Auditors Meeting 1 March 2000) that "no asbestos in the soil at the surface is permitted". The phrase 'at the surface' has not been defined.

ND Not Detected

- Not Analysed

LOR Limits of Reporting
See original laboratory reports for detection limits

TABLE E1:

SUMMARY OF LABORATORY RESULTS FOR SOIL SAMPLES

Heavy Metals, TPH, BTEX, PAH, OCP, OPP, PCB and Asbestos

(All results in mg/kg)

Sample ID			SS35	SS36	SS37	SS38	SS39
Media			Soil	Soil	Soil	Soil	Soil
Date of Sampling	HIL (NEHF F)	EIL	25-Jul-11	25-Jul-11	25-Jul-11	25-Jul-11	25-Jul-11
Unit			Soil	Soil	Soil	Soil	Soil
Depth (m)			0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m
HEAVY METALS							
Arsenic	500 [1]	20 [1]	-	-	-	-	-
Cadmium	100 [1]	3 [1]	-	-	-	-	-
Chromium	600,000 [1a]	400 [1a]	-	-	-	-	-
Copper	5,000 [1]	100 [1]	-	-	-	-	-
Lead	1,500 [1]	600 [1]	-	-	-	-	-
Nickel	3,000 [1]	60 [1]	-	-	-	-	-
Zinc	35,000 [1]	200 [1]	-	-	-	-	-
Mercury	75 [1b]	1 [1b]	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS							
C6 - C9 Fraction	65 [2]		-	-	-	-	-
C10 - C14 Fraction			-	-	-	-	-
C15 - C28 Fraction			-	-	-	-	-
C29 - C36 Fraction			-	-	-	-	-
Total C10-C36	1,000 [2]		-	-	-	-	-
BTEX							
Benzene	1 [2]		-	-	-	-	-
Toluene	130 [2]		-	-	-	-	-
Ethylbenzene	50 [2]		-	-	-	-	-
Total Xylene	25 [2]		-	-	-	-	-
POLYCYCLIC AROMATIC HYDROCARBONS							
Benzo(a)pyrene	5 [1]		-	-	-	-	-
Total PAH	100 [1]		-	-	-	-	-
ORGANOCHLORINE PESTICIDES							
Heptachlor	50 [1]		-	-	-	-	-
Chlordane	250 [1]		-	-	-	-	-
Aldrin + Dieldrin	50 [1]		-	-	-	-	-
DDT + DDE + DDD	1,000 [1]		-	-	-	-	-
Other OCP			-	-	-	-	-
ORGANOPHOSPHOROUS PESTICIDES							
Total OPP	-		-	-	-	-	-
POLYCHLORINATED BIPHENYLS							
Total PCB	50 [1]		-	-	-	-	-
ASBESTOS	ND [3]		ND	ND	ND	ND	ND

NOTES:

Bold Concentration exceeds the Human Health Investigation Levels (HIL)

Bold Concentration exceeds the Environmental Investigation Levels (EIL)

[1] Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme 2nd Edition and NEPM (1999).

[a] Based on Chromium III

[b] Based on Inorganic Mercury

[2] Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

[3] On the advice of the NSW Department of Health, the NSW EPA have advised NSW Site Auditors (Site Auditors Meeting 1 March 2000) that “no asbestos in the soil at the surface is permitted”. The phrase ‘at the surface’ has not been defined.

ND Not Detected

- Not Analysed

LOR Limits of Reporting

See original laboratory reports for detection limits

ANALYTICAL REPORT

19 May 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Manuel Fernandez**

Your Reference: ENAUWOLL04006AA

Our Reference: SE87472 Samples: 15 Soils
Received: 6/5/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Ravee Sivasubramaniam
Asbestos Signatory

Ly Kim Ha
Organics Signatory
Organics Signatory

Huong Crawford
Metals Signatory

SGS Australia Pty Ltd
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BTEX in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted (BTEX)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed (BTEX)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Benzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3
BTEX Surrogate (%)	%	108	104	96	107	103

BTEX in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011	SE87472-14 TRIP BLANK Soil -	SE87472-15 TRIP SPIKE Soil -
Date Extracted (BTEX)		13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed (BTEX)		13/05/2011	13/05/2011	13/05/2011	13/05/2011
Benzene	mg/kg	<0.1	<0.1	<0.1	90%
Toluene	mg/kg	<0.1	<0.1	<0.1	93%
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1	96%
Total Xylenes	mg/kg	<0.3	<0.3	<0.3	97%
BTEX Surrogate (%)	%	101	102	102	104

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TRH C6-C9 by P/T ONLY- in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	 SE87472-14 TRIP BLANK Soil -
Date Extracted (TRH C6-C9 PT)		13/05/2011
Date Analysed (TRH C6-C9 PT)		13/05/2011
TRH C_6 - C_9 P&T	mg/kg	<20

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TRH in soil with C6-C9 by P/T Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted (TRH C6-C9 PT)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed (TRH C6-C9 PT)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed (TRH C10-C36)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20	<20	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50	<50	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50	<50	<50	<50

TRH in soil with C6-C9 by P/T Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted (TRH C6-C9 PT)		13/05/2011	13/05/2011
Date Analysed (TRH C6-C9 PT)		13/05/2011	13/05/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20
Date Extracted (TRH C10-C36)		13/05/2011	13/05/2011
Date Analysed (TRH C10-C36)		13/05/2011	13/05/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50

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PAHs in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	110	114	78	107	127
2-Fluorobiphenyl	%	108	126	75	100	107
p -Terphenyl-*d14*	%	120	118	79	104	96

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PAHs in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted		13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011
Naphthalene	mg/kg	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2
Nitrobenzene-d5	%	114	122
2-Fluorobiphenyl	%	106	119
p -Terphenyl-*d14*	%	110	112

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OC Pesticides in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	127	124	129	127	127

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OC Pesticides in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted		13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
o,p-DDE	mg/kg	<0.1	<0.1
alpha-Endosulfan	mg/kg	<0.1	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1	<0.1
trans-Nonachlor	mg/kg	<0.1	<0.1
p,p-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
o,p-DDD	mg/kg	<0.1	<0.1
o,p-DDT	mg/kg	<0.1	<0.1
beta-Endosulfan	mg/kg	<0.1	<0.1
p,p-DDD	mg/kg	<0.1	<0.1
p,p-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Endrin Ketone	mg/kg	<0.1	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	126	127

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OP Pesticides in Soil by GCMS Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Dichlorvos	mg/kg	<1	<1	<1	<1	<1
Dimethoate	mg/kg	<1	<1	<1	<1	<1
Diazinon	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	108	126	108	104	106
d14-p-Terphenyl (Surr)	%	120	118	116	124	126

OP Pesticides in Soil by GCMS Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted		13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011
Dichlorvos	mg/kg	<1	<1
Dimethoate	mg/kg	<1	<1
Diazinon	mg/kg	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	112	118
d14-p-Terphenyl (Surr)	%	126	128

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PCBs in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1262	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1268	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PCB	mg/kg	<0.90	<0.90	<0.90	<0.90	<0.90
PCB_Surrogate 1	%	127	124	129	127	127

PCBs in Soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted		13/05/2011	13/05/2011
Date Analysed		13/05/2011	13/05/2011
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Arochlor 1262	mg/kg	<0.1	<0.1
Arochlor 1268	mg/kg	<0.1	<0.1
Total Positive PCB	mg/kg	<0.90	<0.90
PCB_Surrogate 1	%	126	127

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Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted (Metals)		16/05/2011	16/05/2011	16/05/2011	16/05/2011	16/05/2011
Date Analysed (Metals)		16/05/2011	16/05/2011	16/05/2011	16/05/2011	16/05/2011
Arsenic	mg/kg	<3	3	5	<3	4
Cadmium	mg/kg	<0.3	<0.3	0.4	0.3	0.4
Chromium	mg/kg	9.3	9.8	22	11	17
Copper	mg/kg	13	15	7.8	12	56
Lead	mg/kg	9.7	9.9	10	13	97
Nickel	mg/kg	7.4	11	2.5	4.7	4.4
Zinc	mg/kg	31	42	17	27	63

Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted (Metals)		16/05/2011	16/05/2011
Date Analysed (Metals)		16/05/2011	16/05/2011
Arsenic	mg/kg	4	4
Cadmium	mg/kg	0.3	0.3
Chromium	mg/kg	21	17
Copper	mg/kg	8.5	21
Lead	mg/kg	11	14
Nickel	mg/kg	3.2	9.3
Zinc	mg/kg	19	54

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Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Extracted (Mercury)		16/05/2011	16/05/2011	16/05/2011	16/05/2011	16/05/2011
Date Analysed (Mercury)		16/05/2011	16/05/2011	16/05/2011	16/05/2011	16/05/2011
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Extracted (Mercury)		16/05/2011	16/05/2011
Date Analysed (Mercury)		16/05/2011	16/05/2011
Mercury	mg/kg	<0.05	<0.05

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Asbestos ID in soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011
Date Analysed		17/05/2011	17/05/2011	17/05/2011	17/05/2011	17/05/2011
Sample Description		40g Soil	17g Soil,clay	30g Soil,clay	37g Soil,rocks	25g Soil,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected	No asbestos detected Organic fibres detected	Chrysotile asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

Asbestos ID in soil Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011
Date Analysed		17/05/2011
Sample Description		29g Soil,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected

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Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-1 CTP26 Soil 0.4-0.5m 4/05/2011	SE87472-2 QA01 Soil 0.4-0.5m 4/05/2011	SE87472-4 CTP25 Soil 0.3-0.4m 4/05/2011	SE87472-6 CTP23 Soil 0.3-0.4 4/05/2011	SE87472-8 CTP21 Soil 0.1-0.2 4/05/2011
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011	13/05/2011	13/05/2011
Moisture	%	21	15	18	25	15

Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE87472-9 CTP20 Soil 0.2-0.3 4/05/2011	SE87472-10 CTP19 Soil 0.2-0.3 4/05/2011	SE87472-14 TRIP BLANK Soil -
Date Analysed (moisture)		13/05/2011	13/05/2011	13/05/2011
Moisture	%	21	29	19

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Method ID	Methodology Summary
AN410	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
AN403	Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C_6-C_9, C_{10}-C_{14}, C_{15}-C_{28} and C_{29}-C_{36}, in accordance with the Australian Institute of Petroleum (AIP). Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the elluent solvents. The GC/FID method is not well suited to the analysis of refined high boiling point materials (i.e. lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol (if care to control volatility is taken). This method will detect naturally occurring hydrocarbons, lipids, organic acids, phenols and PAHs if they are present at sufficient levels, dependant on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN422	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
AN400	The determination of organochlorine (OC) and organophosphorus (OP) pesticides and polychlorinated biphenyls (PCBs) in soils, sludges and groundwater. (Based on USEPA methods 3510, 3550, 8140 and 8080.)
AN420	Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates, and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD/FID technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN320	
AN312	After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. This method complies with AS4964-2004: Method for the Qualitative Identification of Asbestos in Bulk Samples.
AN002	

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QUALITY CONTROL BTEX in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (BTEX)				13/05/11	SE87472-6	13/05/2011 || 13/05/2011	SE87472-8	13/05/11
Date Analysed (BTEX)				13/05/11	SE87472-6	13/05/2011 || 13/05/2011	SE87472-8	13/05/11
Benzene	mg/kg	0.1	AN410	<0.1	SE87472-6	<0.1 || <0.1	SE87472-8	114%
Toluene	mg/kg	0.1	AN410	<0.1	SE87472-6	<0.1 || <0.1	SE87472-8	120%
Ethylbenzene	mg/kg	0.1	AN410	<0.1	SE87472-6	<0.1 || <0.1	SE87472-8	123%
Total Xylenes	mg/kg	0.3	AN410	<0.3	SE87472-6	<0.3 || <0.3	SE87472-8	118%
BTEX Surrogate (%)	%	0	AN410	121	SE87472-6	107 || 100 || RPD: 7	SE87472-8	106%

QUALITY CONTROL TRH C6-C9 by P/T ONLY- in Soil	UNITS	LOR	METHOD	Blank
Date Extracted (TRH C6-C9 PT)				13/05/11
Date Analysed (TRH C6-C9 PT)				13/05/11
TRH C_6 - C_9 P&T	mg/kg	20	AN410	<20

QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)				13/05/11	SE87472-6	13/05/2011 || 13/05/2011	SE87472-8	13/05/11
Date Analysed (TRH C6-C9 PT)				13/05/11	SE87472-6	13/05/2011 || 13/05/2011	SE87472-8	13/05/11
TRH C_6 - C_9 P&T	mg/kg	20	AN410	<20	SE87472-6	<20 || <20	SE87472-8	111%
Date Extracted (TRH C10-C36)				13/05/2011	SE87472-6	13/05/2011 || 13/05/2011	[NR]	[NR]
Date Analysed (TRH C10-C36)				13/05/2011	SE87472-6	13/05/2011 || 13/05/2011	[NR]	[NR]
TRH C_{10} - C_{14}	mg/kg	20	AN403	<20	SE87472-6	<20 || [N/T]	[NR]	[NR]
TRH C_{15} - C_{28}	mg/kg	50	AN403	<50	SE87472-6	<50 || [N/T]	[NR]	[NR]
TRH C_{29} - C_{36}	mg/kg	50	AN403	<50	SE87472-6	<50 || [N/T]	[NR]	[NR]

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QUALITY CONTROL PAHs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				13/05/11	SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/11
Date Analysed				13/05/11	SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/11
Naphthalene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	92%
Acenaphthylene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	91%
Acenaphthene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	104%
Fluorene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Phenanthrene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	96%
Anthracene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	105%
Fluoranthene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	96%
Pyrene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	105%
Benzo[*a*]anthracene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Chrysene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Benzo[*b*]fluoranthene	mg/kg	0.1	AN422	<0.1	SE87472-1	<0.1 || <0.1	[NR]	[NR]
Benzo[*k*]fluoranthene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Benzo[*a*]pyrene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	LCS	90%
Indeno[*123-cd*]pyrene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Dibenzo[*ah*]anthracene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Benzo[*ghi*]perylene	mg/kg	0.1	AN422	<0.10	SE87472-1	<0.10 || <0.10	[NR]	[NR]
Total PAHs (sum)	mg/kg	1.6	AN422	<2	SE87472-1	<2 || <2	[NR]	[NR]
Nitrobenzene-d5	%	0	AN422	121	SE87472-1	110 || 114 || RPD: 4	LCS	127%
2-Fluorobiphenyl	%	0	AN422	110	SE87472-1	108 || 122 || RPD: 12	LCS	127%
p -Terphenyl-*d*14	%	0	AN422	114	SE87472-1	120 || 110 || RPD: 9	LCS	112%

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QUALITY CONTROL OC Pesticides in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				13/05/2011	SE87472-2	13/05/2011 || 13/05/2011	LCS	13/05/2011
Date Analysed				13/05/2011	SE87472-2	13/05/2011 || 13/05/2011	LCS	13/05/2011
HCB	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
gamma-BHC (Lindane)	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Heptachlor	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	127%
Aldrin	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	112%
beta-BHC	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
delta-BHC	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	111%
Heptachlor Epoxide	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
o,p-DDE	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
alpha-Endosulfan	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
trans-Chlordane *(gamma)*	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
cis-Chlordane *(alpha)*	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
trans-Nonachlor	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDE	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Dieldrin	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	110%
Endrin	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	123%
o,p-DDD	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
o,p-DDT	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
beta-Endosulfan	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDD	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDT	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	LCS	118%
Endosulfan Sulphate	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Methoxychlor	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Endrin Ketone	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	0	AN400	117	SE87472-2	124 || 129 || RPD: 4	LCS	123%

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QUALITY CONTROL OP Pesticides in Soil by GCMS	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				13/05/2011	SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/2011
Date Analysed				13/05/2011	SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/2011
Dichlorvos	mg/kg	1	AN420	<1	SE87472-1	<1 || <1	LCS	90%
Dimethoate	mg/kg	1	AN420	<1	SE87472-1	<1 || <1	[NR]	[NR]
Diazinon	mg/kg	0.5	AN420	<0.5	SE87472-1	<0.5 || <0.5	LCS	89%
Fenitrothion	mg/kg	0.2	AN420	<0.2	SE87472-1	<0.2 || <0.2	[NR]	[NR]
Malathion	mg/kg	0.2	AN420	<0.20	SE87472-1	<0.20 || <0.20	[NR]	[NR]
Chlorpyrifos-ethyl	mg/kg	0.2	AN420	<0.2	SE87472-1	<0.2 || <0.2	LCS	100%
Parathion-ethyl	mg/kg	0.2	AN420	<0.2	SE87472-1	<0.2 || <0.2	[NR]	[NR]
Bromofos-ethyl	mg/kg	0.2	AN420	<0.2	SE87472-1	<0.2 || <0.2	[NR]	[NR]
Methidathion	mg/kg	0.5	AN420	<0.5	SE87472-1	<0.5 || <0.5	[NR]	[NR]
Ethion	mg/kg	0.2	AN420	<0.2	SE87472-1	<0.2 || <0.2	LCS	90%
Azinphos-methyl	mg/kg	0.2	AN420	<0.20	SE87472-1	<0.20 || <0.20	[NR]	[NR]
2-fluorobiphenyl (Surr)	%	0	AN420	82	SE87472-1	108 || 122 || RPD: 12	LCS	108%
d14-p-Terphenyl (Surr)	%	0	AN420	94	SE87472-1	120 || 110 || RPD: 9	LCS	114%

QUALITY CONTROL PCBs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				13/05/2011	SE87472-2	13/05/2011 || 13/05/2011	SE87472-4	13/05/2011
Date Analysed				13/05/2011	SE87472-2	13/05/2011 || 13/05/2011	SE87472-4	13/05/2011
Arochlor 1016	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1260	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	SE87472-4	80%
Arochlor 1262	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1268	mg/kg	0.1	AN400	<0.1	SE87472-2	<0.1 || <0.1	[NR]	[NR]
Total Positive PCB	mg/kg	0.9	AN400	<0.90	SE87472-2	<0.90 || <0.90	[NR]	[NR]
PCB_Surrogate 1	%	0	AN400	117	SE87472-2	124 || 129 || RPD: 4	SE87472-4	129%

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QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				16/05/2011	[NT]	[NT]	LCS	16/05/2011
Date Analysed (Metals)				16/05/2011	[NT]	[NT]	LCS	16/05/2011
Arsenic	mg/kg	3	AN320	<3	[NT]	[NT]	LCS	92%
Cadmium	mg/kg	0.3	AN320	<0.3	[NT]	[NT]	LCS	99%
Chromium	mg/kg	0.3	AN320	<0.3	[NT]	[NT]	LCS	100%
Copper	mg/kg	0.5	AN320	<0.5	[NT]	[NT]	LCS	94%
Lead	mg/kg	1	AN320	<1	[NT]	[NT]	LCS	97%
Nickel	mg/kg	0.5	AN320	<0.5	[NT]	[NT]	LCS	100%
Zinc	mg/kg	0.5	AN320	<0.5	[NT]	[NT]	LCS	97%

QUALITY CONTROL Mercury Cold Vapor/Hg Analyser	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Mercury)				16/05/11	SE87472-1	16/05/2011 || 16/05/2011	SE87472-2	16/05/11
Date Analysed (Mercury)				16/05/11	SE87472-1	16/05/2011 || 16/05/2011	SE87472-2	16/05/11
Mercury	mg/kg	0.05	AN312	<0.05	SE87472-1	<0.05 || <0.05	SE87472-2	104%

QUALITY CONTROL Asbestos ID in soil	UNITS	LOR	METHOD	Blank
Date Analysed				[NT]

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

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

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QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)		SE87472-1	13/05/2011 || 13/05/2011	[NR]	[NR]
Date Analysed (TRH C6-C9 PT)		SE87472-1	13/05/2011 || 13/05/2011	[NR]	[NR]
Date Extracted (TRH C10-C36)		SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/2011
Date Analysed (TRH C10-C36)		SE87472-1	13/05/2011 || 13/05/2011	LCS	13/05/2011
TRH C_{10} - C_{14}	mg/kg	SE87472-1	<20 || <20	LCS	87%
TRH C_{15} - C_{28}	mg/kg	SE87472-1	<50 || <50	LCS	84%
TRH C_{29} - C_{36}	mg/kg	SE87472-1	<50 || <50	LCS	85%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Sampled by the client

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

No respirable fibres detected using trace analysis technique.
Sample # 8 : 1-2mm length fibre bundle hand picked and found loose in sample.
Asbestos analysed by Approved Identifier Yusuf Kuthpudin.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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SAMPLE RECEIPT ADVICE (SRA)

12 May 2011

Client Details			Laboratory Details		
Requested By	:	**Manuel Fernandez**			
Client	:	Coffey Environments Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Manuel Fernandez	Manager	:	Edward Ibrahim
Address	:	118 Auburn Street Wollongong NSW 2500	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	manuel_fernandez@coffey.com	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4201 1400	Telephone	:	61 2 8594 0400
Facsimile	:	02 4201 1401	Facsimile	:	61 2 8594 0499
Project	:	ENAUWOLL04006AA	Report No	:	**SE87472**
Order Number	:	28763	No. of Samples	:	15
Samples	:	15 Soils	Due Date	:	17/05/2011

Date Instructions Received	:	11/05/2011
Sample Receipt Date	:	6/5/11

Samples received in good order	:	YES	Samples received in correct containers	:	YES
Samples received without headspace	:	YES	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice Pack
Sample containers provided by	:	SGS	Samples clearly Labelled	:	YES
Turnaround time requested	:	Standard	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

Extra samples CTP03(0.2-0.3) and QA02(0.1-0.2) received.

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

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Member of the SGS Group (SGS SA)

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE87472
Project : ENAUWOLL04006AA

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	Metals Prep, soil 8 HM	BTEX in Soil	TRH C6-C9 by P/T ONLY- in Soil	TRH in soil with C6-C9 by P/T	PAHs in Soil	OC Pesticides in Soil	OP Pesticides in Soil by GCMS	PCBs in Soil	Metals in Soil by ICP-OES	Mercury Cold Vapor/Hg Analyser	Asbestos ID in soil	Hold sample-NO test required	Moisture
1	CTP26	X	X		X	X	X	X	X	X	X	X		X
2	QA01	X	X		X	X	X	X	X	X	X			X
3	CTP26												X	
4	CTP25	X	X		X	X	X	X	X	X	X	X		X
5	CTP24												X	
6	CTP23	X	X		X	X	X	X	X	X	X	X		X
7	CTP22												X	
8	CTP21	X	X		X	X	X	X	X	X	X	X		X
9	CTP20	X	X		X	X	X	X	X	X	X	X		X
10	CTP19	X	X		X	X	X	X	X	X	X	X		X
11	CTP18												X	
12	CTP03												X	
13	QA02												X	
14	TRIP BLANK		X	X										X
15	TRIP SPIKE		X											

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd
Project : ENAUWOLL04006AA

Report No : SE87472

Sample No.	Description
1	CTP26
2	QA01
3	CTP26
4	CTP25
5	CTP24
6	CTP23
7	CTP22
8	CTP21
9	CTP20
10	CTP19
11	CTP18
12	CTP03
13	QA02
14	TRIP BLANK
15	TRIP SPIKE

COC received 11/5/11 @ 8:57 am

coffey

Chain of Custody

No: 28163

Laboratory Quotation / Order No:

Job No: ENAUBLICH0604 Sheet 1 of

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL UNIT 16, 33 Maddox St, Alexandria 2015	Sampled by: CHRIS APPELKAMP	Consigning Officer: CA Date Dispatched: 5/5/2011
Attention: SAMPLE RECEIPT	Project Manager: (report results to) CHRIS APPELKAMP & MANUEL FERNANDEZ	Courier Service: M & B Consignment Note No: 359735

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CHRIS APPELKAMP	5/5/2011			6/5	2

Comments	Sample Matrix	Container Type and Preservative	Sample No.		Date Sampled	Analyses Required: PAHs	TPHs/BTEX	MAHs = BTEX	Metals: *	[illegible]	TRH/BTEX	[illegible]	OCP	PCB	ASBESTOS	SVOC (OCP, PCB, PAH)	C6 - C9/BTEX	BTEX	Hold		Sample Condition on Receipt
0.4 - 0.5m	Soil	250g jar	CTP26	1	4/5/2011		/		/						/	/					
0.4 - 0.5m	"	"	QA01	2	4/5/2011		/		/							/			/		
0.1 - 0.2m	"	Zip Bag	CTP26	3	4/5/2011				/						/	/					
0.3 - 0.4m	"	250g jar / zip	CTP25	4	4/5/2011		/		/						/	/					
0.2 - 0.3m		" " "	CTP24	5	4/5/2011														/		
0.3 - 0.4		250g jar / zip	CTP23	6	4/5/2011		/		/						/	/					
0.1 - 0.2		" "	CTP22	7	4/5/2011														/		
0.1 - 0.2		"	CTP21	8	4/5/2011		/		/						/	/					
QA/QA 0.2-0.3		"	CTP20	9	4/5/2011		/		/						/	/					
0.2 - 0.3		" "	CTP19	10	4/5/2011		/		/						/	/					
0.2 - 0.3		"	CTP18	11	4/5/2011																
			TRIP SPIKE	15																	
			TRIP BLANK	14																	
0.1 - 0.2			CTP03	12																	
0.1 - 0.2			QA02	13																	

SGS

Received 6/5/11

Samples intact

Cooler Pack

Temperature on receipt

Storage Location

SUPERZINC

4, 13, Asb

SES 7472

Special Laboratory Instructions: * (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)

Detection Limits: Standard.

Turnaround Required: Standard.

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

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

6422/09-06

ANALYTICAL REPORT

21 June 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Chris Appelkamp**

Your Reference: ENAUWOLL04006AA

Our Reference: SE88232 Samples: 20 Soil, 1 Water
Received: 14/06/2011

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Ravee Sivasubramaniam
Asbestos Signatory

Ly Kim Ha
Organics Signatory

Huong Crawford
Metals Signatory

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BTEX in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-5 QA11 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011
Date Extracted (BTEX)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (BTEX)		17/06/2011	17/06/2011	17/06/2011	17/06/2011	17/06/2011
Benzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3
BTEX Surrogate (%)	%	96	105	98	99	91

BTEX in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-7 SS05 0.0m - 0.10m Soil 9/06/2011	SE88232-8 SS06 0.0m - 0.10m Soil 9/06/2011	SE88232-14 SS11 0.0m - 0.10m Soil 9/06/2011	SE88232-15 SS12 0.0m - 0.10m Soil 9/06/2011	SE88232-18 SS15 0.0m - 0.10m Soil 9/06/2011
Date Extracted (BTEX)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (BTEX)		17/06/2011	17/06/2011	17/06/2011	17/06/2011	17/06/2011
Benzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3
BTEX Surrogate (%)	%	95	94	100	91	87

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BTEX in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Extracted (BTEX)		16/06/2011
Date Analysed (BTEX)		17/06/2011
Benzene	mg/kg	<0.1
Toluene	mg/kg	<0.1
Ethylbenzene	mg/kg	<0.1
Total Xylenes	mg/kg	<0.3
BTEX Surrogate (%)	%	79

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OC Pesticides in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-5 QA11 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011
Date Extracted		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	101	110	119	112	125

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OC Pesticides in Soil Our Reference:	UNITS	SE88232-7	SE88232-8	SE88232-14	SE88232-15	SE88232-18
Your Reference	----------	SS05	SS06	SS11	SS12	SS15
Depth	----------	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		9/06/2011	9/06/2011	9/06/2011	9/06/2011	9/06/2011
Date Extracted		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
o,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-Endosulfan	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
p,p-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	123	111	114	124	113

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OC Pesticides in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Extracted		16/06/2011
Date Analysed		16/06/2011
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
Aldrin	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
o,p-DDE	mg/kg	<0.1
alpha-Endosulfan	mg/kg	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1
trans-Nonachlor	mg/kg	<0.1
p,p-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
o,p-DDD	mg/kg	<0.1
o,p-DDT	mg/kg	<0.1
beta-Endosulfan	mg/kg	<0.1
p,p-DDD	mg/kg	<0.1
p,p-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Endrin Ketone	mg/kg	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	120

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PCBs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-5 QA11 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011
Date Extracted		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1262	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1268	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PCB	mg/kg	<0.90	<0.90	<0.90	<0.90	<0.90
PCB_Surrogate 1	%	101	110	119	112	125

PCBs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-7 SS05 0.0m - 0.10m Soil 9/06/2011	SE88232-8 SS06 0.0m - 0.10m Soil 9/06/2011	SE88232-14 SS11 0.0m - 0.10m Soil 9/06/2011	SE88232-15 SS12 0.0m - 0.10m Soil 9/06/2011	SE88232-18 SS15 0.0m - 0.10m Soil 9/06/2011
Date Extracted		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1262	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1268	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PCB	mg/kg	<0.90	<0.90	<0.90	<0.90	<0.90
PCB_Surrogate 1	%	123	111	114	124	113

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PCBs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Extracted		16/06/2011
Date Analysed		16/06/2011
Arochlor 1016	mg/kg	<0.1
Arochlor 1221	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Arochlor 1262	mg/kg	<0.1
Arochlor 1268	mg/kg	<0.1
Total Positive PCB	mg/kg	<0.90
PCB_Surrogate 1	%	120

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Metals in Soil by ICP-OES						
Our Reference:	UNITS	SE88232-2	SE88232-3	SE88232-4	SE88232-5	SE88232-6
Your Reference	----------	SS01	SS02	SS03	QA11	SS04
Depth	----------	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		9/06/2011	9/06/2011	9/06/2011	9/06/2011	9/06/2011
Date Extracted (Metals)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (Metals)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Arsenic	mg/kg	<3	4	3	<3	4
Cadmium	mg/kg	<0.3	<0.3	0.5	0.4	<0.3
Chromium	mg/kg	22	50	26	11	14
Copper	mg/kg	82	110	13	11	25
Lead	mg/kg	17	17	65	76	25
Nickel	mg/kg	6.4	17	1.2	1.0	4.3
Zinc	mg/kg	96	110	72	43	45

Metals in Soil by ICP-OES						
Our Reference:	UNITS	SE88232-7	SE88232-8	SE88232-14	SE88232-15	SE88232-18
Your Reference	----------	SS05	SS06	SS11	SS12	SS15
Depth	----------	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m	0.0m - 0.10m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		9/06/2011	9/06/2011	9/06/2011	9/06/2011	9/06/2011
Date Extracted (Metals)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (Metals)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Arsenic	mg/kg	3	17	4	4	4
Cadmium	mg/kg	<0.3	0.8	<0.3	<0.3	<0.3
Chromium	mg/kg	18	30	14	18	12
Copper	mg/kg	54	31	3.0	35	26
Lead	mg/kg	22	16	8	34	28
Nickel	mg/kg	5.8	9.5	1.1	7.5	7.6
Zinc	mg/kg	62	89	12	70	130

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Metals in Soil by ICP-OES Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Extracted (Metals)		16/06/2011
Date Analysed (Metals)		16/06/2011
Arsenic	mg/kg	4
Cadmium	mg/kg	<0.3
Chromium	mg/kg	16
Copper	mg/kg	36
Lead	mg/kg	17
Nickel	mg/kg	8.6
Zinc	mg/kg	100

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Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-5 QA11 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011
Date Extracted (Mercury)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (Mercury)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Mercury	mg/kg	<0.05	<0.05	0.16	0.16	<0.05

Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-7 SS05 0.0m - 0.10m Soil 9/06/2011	SE88232-8 SS06 0.0m - 0.10m Soil 9/06/2011	SE88232-14 SS11 0.0m - 0.10m Soil 9/06/2011	SE88232-15 SS12 0.0m - 0.10m Soil 9/06/2011	SE88232-18 SS15 0.0m - 0.10m Soil 9/06/2011
Date Extracted (Mercury)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Date Analysed (Mercury)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	0.07

Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Extracted (Mercury)		16/06/2011
Date Analysed (Mercury)		16/06/2011
Mercury	mg/kg	<0.05

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Asbestos ID in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011	SE88232-7 SS05 0.0m - 0.10m Soil 9/06/2011
Date Analysed		20/06/2011	20/06/2011	20/06/2011	20/06/2011	20/06/2011
Sample Description		37g Soil,rocks	40g Soil,rocks	62g Soil,rocks	35g Soil,rocks	30g Soil,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

Asbestos ID in soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-8 SS06 0.0m - 0.10m Soil 9/06/2011	SE88232-14 SS11 0.0m - 0.10m Soil 9/06/2011	SE88232-15 SS12 0.0m - 0.10m Soil 9/06/2011	SE88232-18 SS15 0.0m - 0.10m Soil 9/06/2011	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Analysed		20/06/2011	20/06/2011	20/06/2011	20/06/2011	20/06/2011
Sample Description		20g Soil,rocks	38g Soil,rocks	24g Soil,rocks	15g Clay,rocks	19g clay,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

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OC Pesticides in Water Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-1 R01 - Water 9/06/2011
Date Extracted		15/06/2011
Date Analysed		15/06/2011
HCB	µg/L	<0.2
alpha-BHC	µg/L	<0.2
gamma-BHC(Lindane)	µg/L	<0.2
Heptachlor	µg/L	<0.2
Aldrin	µg/L	<0.2
beta-BHC	µg/L	<0.2
delta-BHC	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
o,p-DDE	µg/L	<0.2
alpha-Endosulfan	µg/L	<0.2
trans-Chlordane	µg/L	<0.2
cis-Chlordane	µg/L	<0.2
trans-Nonachlor	µg/L	<0.2
p,p-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
o,p-DDD	µg/L	<0.2
o,p-DDT	µg/L	<0.2
beta-Endosulfan	µg/L	<0.2
p,p-DDD	µg/L	<0.2
p,p-DDT	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Endrin Ketone	µg/L	<0.2
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	64

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Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	 SE88232-1 R01 - Water 9/06/2011
Date Extracted (Metals-ICPMS)		15/06/2011
Date Analysed (Metals-ICPMS)		15/06/2011
Arsenic	µg/L	<1
Cadmium	µg/L	<0.1
Chromium	µg/L	<1
Copper	µg/L	<1
Lead	µg/L	<1
Nickel	µg/L	<1
Zinc	µg/L	37

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Mercury Cold Vapor/Hg Analyser		
Our Reference:	UNITS	SE88232-1
Your Reference	----------	R01
Depth	----------	-
Sample Matrix		Water
Date Sampled		9/06/2011
Date Extracted (Mercury)		16/06/2011
Date Analysed (Mercury)		16/06/2011
Mercury (Dissolved)	mg/L	<0.0001

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Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-2 SS01 0.0m - 0.10m Soil 9/06/2011	SE88232-3 SS02 0.0m - 0.10m Soil 9/06/2011	SE88232-4 SS03 0.0m - 0.10m Soil 9/06/2011	SE88232-5 QA11 0.0m - 0.10m Soil 9/06/2011	SE88232-6 SS04 0.0m - 0.10m Soil 9/06/2011
Date Analysed (moisture)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Moisture	%	3	3	13	12	23

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-7 SS05 0.0m - 0.10m Soil 9/06/2011	SE88232-8 SS06 0.0m - 0.10m Soil 9/06/2011	SE88232-14 SS11 0.0m - 0.10m Soil 9/06/2011	SE88232-15 SS12 0.0m - 0.10m Soil 9/06/2011	SE88232-18 SS15 0.0m - 0.10m Soil 9/06/2011
Date Analysed (moisture)		16/06/2011	16/06/2011	16/06/2011	16/06/2011	16/06/2011
Moisture	%	16	33	19	40	47

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE88232-20 SS17 0.0m - 0.10m Soil 9/06/2011
Date Analysed (moisture)		16/06/2011
Moisture	%	49

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Method ID	Methodology Summary
AN410	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
AN400	The determination of organochlorine (OC) and organophosphorus (OP) pesticides and polychlorinated biphenyls (PCBs) in soils, sludges and groundwater. (Based on USEPA methods 3510, 3550, 8140 and 8080.)
AN320	Determination of elements by ICP-OES following appropriate sample preparation / digestion process. Based on USEPA 6010C / APHA 21st Edition, 3120B.
AN312	After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. This method complies with AS4964-2004: Method for the Qualitative Identification of Asbestos in Bulk Samples.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN002	

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QUALITY CONTROL BTEX in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (BTEX)				16/06/11	[NT]	[NT]	LCS	16/06/11
Date Analysed (BTEX)				17/06/11	[NT]	[NT]	LCS	17/06/11
Benzene	mg/kg	0.1	AN410	<0.1	[NT]	[NT]	LCS	123%
Toluene	mg/kg	0.1	AN410	<0.1	[NT]	[NT]	LCS	123%
Ethylbenzene	mg/kg	0.1	AN410	<0.1	[NT]	[NT]	LCS	124%
Total Xylenes	mg/kg	0.3	AN410	<0.3	[NT]	[NT]	LCS	122%
BTEX Surrogate (%)	%	0	AN410	100	[NT]	[NT]	LCS	105%

QUALITY CONTROL OC Pesticides in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
Date Analysed				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
HCB	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
gamma-BHC (Lindane)	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Heptachlor	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	128%
Aldrin	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	117%
beta-BHC	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
delta-BHC	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	106%
Heptachlor Epoxide	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
o,p-DDE	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
alpha-Endosulfan	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
trans-Chlordane *(gamma)*	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
cis-Chlordane *(alpha)*	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
trans-Nonachlor	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDE	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Dieldrin	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	114%
Endrin	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	127%
o,p-DDD	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
o,p-DDT	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
beta-Endosulfan	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDD	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
p,p-DDT	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-3	120%

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QUALITY CONTROL OC Pesticides in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Endosulfan Sulphate	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Methoxychlor	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Endrin Ketone	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	0	AN400	91	SE88232-2	101 || 100 || RPD: 1	SE88232-3	122%

QUALITY CONTROL PCBs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-4	16/06/2011
Date Analysed				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-4	16/06/2011
Arochlor 1016	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1260	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	SE88232-4	127%
Arochlor 1262	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1268	mg/kg	0.1	AN400	<0.1	SE88232-2	<0.1 || <0.1	[NR]	[NR]
Total Positive PCB	mg/kg	0.9	AN400	<0.90	SE88232-2	<0.90 || <0.90	[NR]	[NR]
PCB_Surrogate 1	%	0	AN400	91	SE88232-2	101 || 100 || RPD: 1	SE88232-4	117%

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QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
Date Analysed (Metals)				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
Arsenic	mg/kg	3	AN320	<3	SE88232-2	<3 || <3	SE88232-3	91%
Cadmium	mg/kg	0.3	AN320	<0.3	SE88232-2	<0.3 || <0.3	SE88232-3	87%
Chromium	mg/kg	0.3	AN320	<0.3	SE88232-2	22 || 28 || RPD: 24	SE88232-3	103%
Copper	mg/kg	0.5	AN320	<0.5	SE88232-2	82 || 66 || RPD: 22	SE88232-3	100%
Lead	mg/kg	1	AN320	<1	SE88232-2	17 || 15 || RPD: 12	SE88232-3	89%
Nickel	mg/kg	0.5	AN320	<0.5	SE88232-2	6.4 || 5.8 || RPD: 10	SE88232-3	105%
Zinc	mg/kg	0.5	AN320	<0.5	SE88232-2	96 || 86 || RPD: 11	SE88232-3	98%

QUALITY CONTROL Mercury Cold Vapor/Hg Analyser	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Mercury)				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
Date Analysed (Mercury)				16/06/2011	SE88232-2	16/06/2011 || 16/06/2011	SE88232-3	16/06/2011
Mercury	mg/kg	0.05	AN312	<0.05	SE88232-2	<0.05 || <0.05	SE88232-3	100%

QUALITY CONTROL Asbestos ID in soil	UNITS	LOR	METHOD	Blank
Date Analysed				[NT]

QUALITY CONTROL OC Pesticides in Water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				15/06/2011	[NT]	[NT]	LCS	15/06/2011
Date Analysed				15/06/2011	[NT]	[NT]	LCS	15/06/2011
HCB	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
gamma-BHC(Lindane)	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
Heptachlor	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	94%
Aldrin	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	86%
beta-BHC	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
delta-BHC	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	76%

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QUALITY CONTROL OC Pesticides in Water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Heptachlor Epoxide	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
o,p-DDE	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Endosulfan	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
trans-Chlordane	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
cis-Chlordane	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
trans-Nonachlor	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
p,p-DDE	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
Dieldrin	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	76%
Endrin	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	87%
o,p-DDD	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
o,p-DDT	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
beta-Endosulfan	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
p,p-DDD	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
p,p-DDT	µg/L	0.2	AN400	<0.2	[NT]	[NT]	LCS	87%
Endosulfan Sulphate	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
Methoxychlor	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Ketone	µg/L	0.2	AN400	<0.2	[NT]	[NT]	[NR]	[NR]
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	0	AN400	97	[NT]	[NT]	LCS	97%

QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals-ICPMS)				15/06/2011	[NT]	[NT]	LCS	15/06/2011
Date Analysed (Metals-ICPMS)				15/06/2011	[NT]	[NT]	LCS	15/06/2011
Arsenic	µg/L	1	AN318	<1	[NT]	[NT]	LCS	94%
Cadmium	µg/L	0.1	AN318	<0.1	[NT]	[NT]	LCS	103%
Chromium	µg/L	1	AN318	<1	[NT]	[NT]	LCS	94%
Copper	µg/L	1	AN318	<1	[NT]	[NT]	LCS	98%
Lead	µg/L	1	AN318	<1	[NT]	[NT]	LCS	100%
Nickel	µg/L	1	AN318	<1	[NT]	[NT]	LCS	98%
Zinc	µg/L	1	AN318	<1	[NT]	[NT]	LCS	99%

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QUALITY CONTROL Mercury Cold Vapor/Hg Analyser	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Mercury)				16/06/2011	[NT]	[NT]	LCS	16/06/2011
Date Analysed (Mercury)				16/06/2011	[NT]	[NT]	LCS	16/06/2011
Mercury (Dissolved)	mg/L	0.0001	AN312	<0.0001	[NT]	[NT]	LCS	109%

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

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

QUALITY CONTROL OC Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted		SE88232-20	16/06/2011 || 16/06/2011
Date Analysed		SE88232-20	16/06/2011 || 16/06/2011
HCB	mg/kg	SE88232-20	<0.1 || <0.1
alpha-BHC	mg/kg	SE88232-20	<0.1 || <0.1
gamma-BHC (Lindane)	mg/kg	SE88232-20	<0.1 || <0.1
Heptachlor	mg/kg	SE88232-20	<0.1 || <0.1
Aldrin	mg/kg	SE88232-20	<0.1 || <0.1
beta-BHC	mg/kg	SE88232-20	<0.1 || <0.1
delta-BHC	mg/kg	SE88232-20	<0.1 || <0.1
Heptachlor Epoxide	mg/kg	SE88232-20	<0.1 || <0.1

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QUALITY CONTROL OC Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
o,p-DDE	mg/kg	SE88232-20	<0.1 || <0.1
alpha-Endosulfan	mg/kg	SE88232-20	<0.1 || <0.1
trans-Chlordane *(gamma)*	mg/kg	SE88232-20	<0.1 || <0.1
cis-Chlordane *(alpha)*	mg/kg	SE88232-20	<0.1 || <0.1
trans-Nonachlor	mg/kg	SE88232-20	<0.1 || <0.1
p,p-DDE	mg/kg	SE88232-20	<0.1 || <0.1
Dieldrin	mg/kg	SE88232-20	<0.1 || <0.1
Endrin	mg/kg	SE88232-20	<0.1 || <0.1
o,p-DDD	mg/kg	SE88232-20	<0.1 || <0.1
o,p-DDT	mg/kg	SE88232-20	<0.1 || <0.1
beta-Endosulfan	mg/kg	SE88232-20	<0.1 || <0.1
p,p-DDD	mg/kg	SE88232-20	<0.1 || <0.1
p,p-DDT	mg/kg	SE88232-20	<0.1 || <0.1
Endosulfan Sulphate	mg/kg	SE88232-20	<0.1 || <0.1
Endrin Aldehyde	mg/kg	SE88232-20	<0.1 || <0.1
Methoxychlor	mg/kg	SE88232-20	<0.1 || <0.1
Endrin Ketone	mg/kg	SE88232-20	<0.1 || <0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	SE88232-20	120 || 123 || RPD: 2

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QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted		SE88232-20	16/06/2011 || 16/06/2011
Date Analysed		SE88232-20	16/06/2011 || 16/06/2011
Arochlor 1016	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1221	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1232	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1242	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1248	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1254	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1260	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1262	mg/kg	SE88232-20	<0.1 || <0.1
Arochlor 1268	mg/kg	SE88232-20	<0.1 || <0.1
Total Positive PCB	mg/kg	SE88232-20	<0.90 || <0.90
PCB_Surrogate 1	%	SE88232-20	120 || 123 || RPD: 2

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QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (Metals)		SE88232-20	16/06/2011 || 16/06/2011
Date Analysed (Metals)		SE88232-20	16/06/2011 || 16/06/2011
Arsenic	mg/kg	SE88232-20	4 || 3 || RPD: 29
Cadmium	mg/kg	SE88232-20	<0.3 || <0.3
Chromium	mg/kg	SE88232-20	16 || 16 || RPD: 0
Copper	mg/kg	SE88232-20	36 || 37 || RPD: 3
Lead	mg/kg	SE88232-20	17 || 17 || RPD: 0
Nickel	mg/kg	SE88232-20	8.6 || 8.6 || RPD: 0
Zinc	mg/kg	SE88232-20	100 || 100 || RPD: 0

QUALITY CONTROL Mercury Cold Vapor/Hg Analyser	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (Mercury)		SE88232-20	16/06/2011 || 16/06/2011
Date Analysed (Mercury)		SE88232-20	16/06/2011 || 16/06/2011
Mercury	mg/kg	SE88232-20	<0.05 || <0.05

QUALITY CONTROL BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (BTEX)		SE88232-6	16/06/2011 || 16/06/2011
Date Analysed (BTEX)		SE88232-6	17/06/2011 || 17/06/2011
Benzene	mg/kg	SE88232-6	<0.1 || <0.1
Toluene	mg/kg	SE88232-6	<0.1 || <0.1
Ethylbenzene	mg/kg	SE88232-6	<0.1 || <0.1
Total Xylenes	mg/kg	SE88232-6	<0.3 || <0.3
BTEX Surrogate (%)	%	SE88232-6	91 || 95 || RPD: 4

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Sampled by the client

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

No respirable fibres detected using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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SAMPLE RECEIPT ADVICE (SRA)

15 June 2011

Client Details			Laboratory Details		
Requested By	:	**Chris Appelkamp**			
Client	:	Coffey Environments Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Chris Appelkamp	Manager	:	Edward Ibrahim
Address	:	118 Auburn Street Wollongong NSW 2500	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	chris_appelkamp@coffey.com	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4201 1400	Telephone	:	61 2 8594 0400
Facsimile	:	02 4201 1401	Facsimile	:	61 2 8594 0499
Project	:	ENAUWOLL04006AA	Report No	:	**SE88232**
Order Number	:	28718-28719	No. of Samples	:	21
Samples	:	20 Soil, 1 Water	Due Date	:	21/06/2011

Date Instructions Received	:	10/06/2011
Sample Receipt Date	:	14/06/2011

Samples received in good order	:	YES	Samples received in correct containers	:	YES
Samples received without headspace	:	YES	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice
Sample containers provided by	:	SGS	Samples clearly Labelled	:	YES
Turnaround time requested	:	Standard	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

Samples received 14/6/11 @ 2:00pm

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

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Member of the SGS Group (SGS SA)

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE88232
Project : ENAUWOLL04006AA

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	Metals Prep & Inorganics - All	BTEX in Soil	OC Pesticides in Soil	PCBs in Soil	Metals in Soil by ICP-OES	Mercury Cold Vapor/Hg Analyser	Asbestos ID in soil	OC Pesticides in Water	Trace HM (ICP-MS)-Dissolved	Mercury Cold Vapor/Hg Analyser	Hold sample-NO test required	Moisture
1	R01	x							X	X	X		
2	SS01	x	X	X	X	X	X	X					X
3	SS02	x	X	X	X	X	X	X					X
4	SS03	x	X	X	X	X	X	X					X
5	QA11	x	X	X	X	X	X						X
6	SS04	x	X	X	X	X	X	X					X
7	SS05	x	X	X	X	X	X	X					X
8	SS06	x	X	X	X	X	X	X					X
9	SS07											X	
10	SS08											X	
11	QA12											X	
12	SS09											X	
13	SS10											X	
14	SS11	x	X	X	X	X	X	X					X
15	SS12	x	X	X	X	X	X	X					X
16	SS13											X	
17	SS14											X	
18	SS15	x	X	X	X	X	X	X					X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE88232
Project : ENAUWOLL04006AA

Sample No.	Description	Metals Prep & Inorganics - All	BTEX in Soil	OC Pesticides in Soil	PCBs in Soil	Metals in Soil by ICP-OES	Mercury Cold Vapor/Hg Analyser	Asbestos ID in soil	OC Pesticides in Water	Trace HM (ICP-MS)-Dissolved	Mercury Cold Vapor/Hg Analyser	Hold sample-NO test required	Moisture
19	SS16											X	
20	SS17	x	X	X	X	X	X	X					X
21	QA10											X	

Sample No.	Description
1	R01
2	SS01
3	SS02
4	SS03
5	QA11
6	SS04
7	SS05
8	SS06
9	SS07
10	SS08
11	QA12
12	SS09
13	SS10
14	SS11
15	SS12
16	SS13

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd
Project : ENAUWOLL04006AA

Report No : SE88232

Sample No.	Description
17	SS14
18	SS15
19	SS16
20	SS17
21	QA10

COC received 14/6/11 @ 1:40pm

coffey

Chain of Custody

No: 28718

Laboratory Quotation / Order No:

Job No: ENAUWOLLONGBAP Sheet 1 of 2

Dispatch to: SGS ENVIRONMENTAL (Address & Phone No.) UNIT 16, 33 Mooldex St Alexandria 2015	Sampled by: CHRIS APPELKAMP	Consigning Officer: Date Dispatched:
Attention: SAMPLE RECEIPT	Project Manager: (report results to) CHRIS APPELKAMP	Courier Service: MTB Consignment Note No: 367039

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CHRIS APPELKAMP	9/6/2011	1700	R.C	14/6/11	2:00pm

Comments	Sample Matrix	Container Type and Preservative	Sample No.		Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals *	Benzene	Toluene	Ethylbenzene	Xylenes	OCP	PCB	ASBESTOS	Sample Condition on Receipt
trawl Rinsate	Water	2x1L glass & 1x metals	R01	1	9/6/2011				/								
0.0m - 0.10m	Soil	1x250g jar, 1x asbestos	SS01	2					/	/	/	/		/	/	/	
			SS02	3					/	/	/	/		/	/	/	
			SS03	4					/	/	/	/		/	/	/	
		(No asbestos)	QA11	5					/	/	/	/		/	/	/	
			SS04	6					/	/	/	/		/	/	/	
			SS05	7					/	/	/	/		/	/	/	
			SS06	8					/	/	/	/		/	/	/	
			SS07	9													
			SS08	10													
		(No asbestos)	QA12	11													
			SS09	12													
			SS10	13													
			SS11	14					/	/	/	/		/	/	/	
			SS12	15					/	/	/	/		/	/	/	
			SS13	16													
			SS14	17													

SGS 14/6/11 2:00 pm

Coolers Intact ✓ Cooler Pack ✓ Temperature on Receipt: 2 °C

WIMS, 5798-SE288232 799 ASS.

Special Laboratory Instructions: * (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)

Detection Limits:

Turnaround Required:

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

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

042209-06

coffey

Chain of Custody

No: 28719

Laboratory Quotation / Order No:

Job No: ENAWA04666AA Sheet 2 of 2

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL UNIT 16, 33 Maddox St Alexandria 2015	Sampled by: CHRIS APPELKAMP	Consigning Officer: Date Dispatched:
Attention: Sample Receipt	Project Manager: (report results to) Chris Appelkamp	Courier Service: M+B Consignment Note No: 367039

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Chris Appelkamp	9/6/11	1700		14/6/11	9:00 am

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals *	Benzene	Toluene	Ethylbenzene	OCP	PCB	Asbestos						Sample Condition on Receipt
0.0 – 0.1m	SOIL	1x250g jar/asbestos	SS15 18	9/6/2011				/	/	/	/	/	/	/						
↓	↓		SS16 19	↓																
↓	↓	(NO asbestos)	SS17 20					/	/	/	/	/	/	/						
↓	↓		QA10 21	↓																

Special Laboratory Instructions: * As per sheet (1)

Detection Limits:

Turnaround Required:

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

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

04220/9-06

ANALYTICAL REPORT

1 July 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Manuel Fernandez**

Your Reference: ENAUWOLL04006AA

Our Reference: SE88475 Samples: 26 Soils
Received: 23/6/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Huong Crawford
Metals Signatory

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pH_{FOX} / $pH_{Field(1:2soil:30\%\ peroxide)}$						
Our Reference:	UNITS	SE88475-1	SE88475-3	SE88475-4	SE88475-5	SE88475-6
Your Reference	----------	CTP08	CTP09	CTP09	CTP09	CTP09
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.5-0.7m	0.5-0.7m	1.0-1.2m	1.5-1.7m	2.0-2.2m
Date Sampled		21/06/2011	21/06/2011	21/06/2011	21/06/2011	21/06/2011
Date Extracted (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_{FOX} (1:2soil:30%peroxide)	pH Units	4.6	4.1	4.6	4.7	4.7
Date Extracted- (pH 1:2 soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_F (1:2 soil:water)	pH Units	5.3	5.6	5.3	5.2	5.2
Field pH reaction		X	X	X	X	X

pH_{FOX} / $pH_{Field(1:2soil:30\%\ peroxide)}$						
Our Reference:	UNITS	SE88475-7	SE88475-8	SE88475-9	SE88475-10	SE88475-15
Your Reference	----------	CTP12	CTP12	CTP12	CTP12	CTP14
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Depth		0.5-0.7m	1.0-1.2m	1.5-1.7m	2.0-2.2m	0.5-0.7
Date Sampled		21/06/2011	21/06/2011	21/06/2011	21/06/2011	22/06/2011
Date Extracted (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_{FOX} (1:2soil:30%peroxide)	pH Units	3.6	3.1	3.2	3.0	4.0
Date Extracted- (pH 1:2 soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_F (1:2 soil:water)	pH Units	5.1	4.2	4.2	4.0	4.8
Field pH reaction		X	X	X	X	X

pH_{FOX} / $pH_{Field(1:2soil:30\%\ peroxide)}$						
Our Reference:	UNITS	SE88475-17	SE88475-20	SE88475-21	SE88475-22	SE88475-23
Your Reference	----------	CTP14	CTP16	CTP16	CTP16	CTP16
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Depth		1.5-1.7	0.5-0.7	1.0-1.2	1.5-1.7	2.0-2.2
Date Sampled		22/06/2011	22/06/2011	22/06/2011	22/06/2011	22/06/2011
Date Extracted (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: H_2O_2)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_{FOX} (1:2soil:30%peroxide)	pH Units	3.9	4.5	4.8	5.1	5.3
Date Extracted- (pH 1:2 soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
Date Analysed (pH 1:2 Soil: Water)*		30/06/2011	30/06/2011	30/06/2011	30/06/2011	30/06/2011
pH_F (1:2 soil:water)	pH Units	4.4	5.1	5.3	5.7	5.9
Field pH reaction		X	XX	X	X	X

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pH_{FOX} / $pH_{Field(1:2soil:30\%\ peroxide)}$		
Our Reference:	UNITS	SE88475-24
Your Reference	----------	CTP17
Sample Matrix	----------	Soil
Depth		0.5-0.7
Date Sampled		22/06/2011
Date Extracted (pH 1:2 Soil: H_2O_2)*		30/06/2011
Date Analysed (pH 1:2 Soil: H_2O_2)*		30/06/2011
pH_{FOX} (1:2soil:30%peroxide)	pH Units	3.6
Date Extracted- (pH 1:2 soil: Water)*		30/06/2011
Date Analysed (pH 1:2 Soil: Water)*		30/06/2011
pH_F (1:2 soil:water)	pH Units	5.6
Field pH reaction		XXX

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Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE88475-1 CTP08 Soil 0.5-0.7m 21/06/2011	SE88475-3 CTP09 Soil 0.5-0.7m 21/06/2011	SE88475-4 CTP09 Soil 1.0-1.2m 21/06/2011	SE88475-5 CTP09 Soil 1.5-1.7m 21/06/2011	SE88475-6 CTP09 Soil 2.0-2.2m 21/06/2011
Date Analysed (moisture)		28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011
Moisture	%	23	41	38	15	15

Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE88475-7 CTP12 Soil 0.5-0.7m 21/06/2011	SE88475-8 CTP12 Soil 1.0-1.2m 21/06/2011	SE88475-9 CTP12 Soil 1.5-1.7m 21/06/2011	SE88475-10 CTP12 Soil 2.0-2.2m 21/06/2011	SE88475-15 CTP14 Soil 0.5-0.7 22/06/2011
Date Analysed (moisture)		28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011
Moisture	%	34	33	25	38	22

Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE88475-17 CTP14 Soil 1.5-1.7 22/06/2011	SE88475-20 CTP16 Soil 0.5-0.7 22/06/2011	SE88475-21 CTP16 Soil 1.0-1.2 22/06/2011	SE88475-22 CTP16 Soil 1.5-1.7 22/06/2011	SE88475-23 CTP16 Soil 2.0-2.2 22/06/2011
Date Analysed (moisture)		28/06/2011	28/06/2011	28/06/2011	28/06/2011	28/06/2011
Moisture	%	18	23	25	20	20

Moisture Our Reference: Your Reference Sample Matrix Depth Date Sampled	UNITS ---------- ----------	SE88475-24 CTP17 Soil 0.5-0.7 22/06/2011
Date Analysed (moisture)		28/06/2011
Moisture	%	30

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Method ID	Methodology Summary
AN104	pH's are measured on soil sample extracted with both deionised water and 30% hydrogen peroxide to assess the likelihood of acid sulphate soil. NOTE: Rate of Reaction: X - Slight Reaction XX - Moderate Reaction XXX - High Reaction XXXX - Very vigorous, gas evolution and heat generation.
AN002	

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Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia
t +61 (0)2 8594 0400 f + 61 (0)2 8594 0499 www.au.sgs.com

QUALITY CONTROL pH_{FOX} / $pH_{Field(1:2soil:30\%}$ peroxide)	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (pH 1:2 Soil: H_2O_2)*				[NT]	SE88475-22	30/06/2011 || 30/06/2011
Date Analysed (pH 1:2 Soil: H_2O_2)*				[NT]	SE88475-22	30/06/2011 || 30/06/2011
pH_{FOX} (1:2soil:30%peroxide)	pH Units		AN104	[NT]	SE88475-22	5.1 || 5.1 || RPD: 0
Date Extracted- (pH 1:2 soil: Water)*				[NT]	SE88475-22	30/06/2011 || 30/06/2011
Date Analysed (pH 1:2 Soil: Water)*				[NT]	SE88475-22	30/06/2011 || 30/06/2011
pH_F (1:2 soil:water)	pH Units		AN104	[NT]	SE88475-22	5.7 || 5.8 || RPD: 2
Field pH reaction			AN104	[NT]	SE88475-22	X || X

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

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	[NT]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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SAMPLE RECEIPT ADVICE (SRA)

30 June 2011

Client Details			Laboratory Details		
Requested By	:	**Manuel Fernandez**			
Client	:	Coffey Environments Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Manuel Fernandez	Manager	:	Edward Ibrahim
Address	:	118 Auburn Street Wollongong NSW 2500	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	manuel_fernandez@coffey.com	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4201 1400	Telephone	:	61 2 8594 0400
Facsimile	:	02 4201 1401	Facsimile	:	61 2 8594 0499
Project	:	ENAUWOLL04006AA	Report No	:	**SE88475**
Order Number	:	28721-2	No. of Samples	:	26
Samples	:	26 Soils	Due Date	:	30/06/2011

Date Instructions Received	:	24/06/2011
Sample Receipt Date	:	23/6/11

Samples received in good order	:	YES	Samples received in correct containers	:	YES
Samples received without headspace	:	N/A	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice
Sample containers provided by	:	Customer	Samples clearly Labelled	:	YES
Turnaround time requested	:	Standard	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

ASS Screening is pH Fox

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

SGS Australia Pty Ltd | Unit 16, 33 Maddox Street Alexandria New South Wales 2015 t+61 (0)2 8594 0400 f+61 (0)2 85940499 www.au.sgs.com
Member of the SGS Group (SGS SA)

Client : Coffey Environments Pty Ltd Report No : SE88475
Project : ENAUWOLL04006AA

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	pHFOX/F-1:2soil:30%peroxide*	Hold sample-NO test required	Moisture
1	CTP08	X	X		X
2	CTP08			X	
3	CTP09	X	X		X
4	CTP09	X	X		X
5	CTP09	X	X		X
6	CTP09	X	X		X
7	CTP12	X	X		X
8	CTP12	X	X		X
9	CTP12	X	X		X
10	CTP12	X	X		X
11	CTP13			X	
12	CTP13			X	
13	CTP13			X	
14	CTP13			X	
15	CTP14	X	X		X
16	CTP14			X	
17	CTP14	X	X		X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE88475
Project : ENAUWOLL04006AA

Sample No.	Description	No Prep Required	pHFOX/F-1:2soil:30%peroxide*	Hold sample-NO test required	Moisture
18	CTP15			X	
19	CTP15			X	
20	CTP16	X	X		X
21	CTP16	X	X		X
22	CTP16	X	X		X
23	CTP16	X	X		X
24	CTP17	X	X		X
25	CTP17			X	
26	CTP17			X	

Sample No.	Description
1	CTP08
2	CTP08
3	CTP09
4	CTP09
5	CTP09
6	CTP09
7	CTP12
8	CTP12
9	CTP12
10	CTP12

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd
Project : ENAUWOLL04006AA

Report No : SE88475

Sample No.	Description
11	CTP13
12	CTP13
13	CTP13
14	CTP13
15	CTP14
16	CTP14
17	CTP14
18	CTP15
19	CTP15
20	CTP16
21	CTP16
22	CTP16
23	CTP16
24	CTP17
25	CTP17
26	CTP17

coc received 24/6/11 @3:49 pm

coffey

Chain of Custody

Laboratory Quotation / Order No:

Job No: ENAUWOLLO4006044

No: 28721

Sheet 1 of 2

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL	Sampled by: Chris Appelkamp	Consigning Officer: Date Dispatched: 23/6/2011
Attention: Sample Receipt	Project Manager: (report results to) Manuel Fernandez	Courier Service: M+B Consignment Note No:

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CHRIS APPELKAMP	23/6/4		K.C	23/6	9:00

	Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals:	ASS Screening	Sample Condition on Receipt
1	0.5 - 0.7m	Soil	Bag/glad wrap	CTP08	21/6/11					/	
2	1.0 - 1.2m			" "							
3	0.5 - 0.7m			CTP09						/	
4	1.0 - 1.2m			" "						/	
5	1.5 - 1.7m			" "						/	
6	2.0 - 2.2m			" "						/	
7	0.5 - 0.7m			CTP12						/	
8	1.0 - 1.2m			" "						/	
9	1.5 - 1.7m			" "						/	
10	2.0 - 2.2m			" "						/	
11	0.5 - 0.7			CTP13	22/6/11						
12	1.0 - 1.2			" "	" "						
13	1.5 - 1.7			" "	" "						
14	2.0 - 2.2			" "	" "						
15	0.5 - 0.7			CTP14	22/6/11					/	
16	1.0 - 1.2			" "	" "						
17	1.5 - 1.7			" "	" "					/	

SGS Received 23/6/11 K.C 9:00

Samples intact
Cooler Pack
Temperature on Receipt 3.9
Storage Location
SE 88475

Special Laboratory Instructions:

Detection Limits:

Turnaround Required: Result by 30/6

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

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

042203-06

coffey

Chain of Custody

No: 28722

Laboratory Quotation / Order No: Job No: ENAUWOL04006A/4 Sheet 2 of 2

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL UNIT 16, 33 Maddox St, Alexandria.	Sampled by: Chris Appelkamp	Consigning Officer: Date Dispatched: 23/6/2011
Attention: Sample Receipt	Project Manager: (report results to) Manuel Fernandez	Courier Service: M+B Consignment Note No:

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Chris Appelkamp	23/6/11		K.L	23/6	9:00am

	Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs + BTEX	Metals	ASS Screening	Sample Condition on Receipt
18	0.5 - 0.7	SOIL	Bag/glad wrap	CTP15	22/6/11						
19	1.0 - 1.2			" "	"						
20	0.5 - 0.7			CTP16	"					/	
21	1.0 - 1.2			" "	"					/	
22	1.5 - 1.7			" "	"					/	
23	2.0 - 2.2			" "	"					/	
24	0.5 - 0.7			CTP17	"					/	
25	1.0 - 1.2			" "	"						
26	1.5 - 1.7			" "	"						

Special Laboratory Instructions:

Detection Limits:

Turnaround Required: Result by 30/6.

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

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

AU.SampleReceipt.Sydney (Sydney)

From: Blackman, Daniel (Sydney)
Sent: Tuesday, 28 June 2011 9:42 AM
To: AU.SampleReceipt.Sydney (Sydney)
Cc: chris_appelkamp@coffey.com
Subject: SE88475 - ENAUWOLL04006AA

Following instruction from Chris Appelkamp the customer project number is now corrected to ENAUWOLL04006AA in line with the project number on page 2 of the CoC. No need to re-issue the SRA.

Regards,
Daniel Blackman
Environmental Services
Client Services Officer

SGS Australia Pty Ltd
Unit 16, 33 Maddox St
Alexandria, NSW, 2015
Phone: +61 (0)2 8594 0400
Fax: +61 (0)2 8594 0499
E-mail: daniel.blackman@sgs.com

Appendix F
Laboratory Reports – Acid Sulfate Soil Testing

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

TABLE F1:
SUMMARY OF ASS LABORATORY RESULTS FOR ASS SAMPLES

Sample ID		CTP08	CTP09	CTP09	CTP09	CTP09	CTP12	CTP12	CTP12	CTP12	CTP14	CTP14	CTP16	CTP16	CTP16	CTP16	CTP16	CTP17	CTP18	CTP18
Unit		ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL
Texture Category		FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE
Date of Sampling																				
Depth (m)	Action Criteria	0.5-0.7m	0.5-0.7m	1.0-1.2m	1.5-1.7m	2.0-2.2m	0.5-0.7m	1.0-1.2m	1.5-1.7m	2.0-2.2m	0.5-0.7	1.5-1.7	0.5-0.7	1.0-1.2	1.5-1.7	1.5-1.7	2.0-2.2	0.5-0.7	0.5-0.6	1.0-1.1
pH_F		5.3	5.6	5.3	5.2	5.2	5.1	4.2	4.2	4.0	4.8	4.4	5.1	5.3	5.7	5.8	5.9	5.6	6.3	5.6
pH_{FOX}		4.6	4.1	4.6	4.7	4.7	3.6	3.1	3.2	3	4	3.9	4.5	4.8	5.1	5.1	5.3	3.6	3.4	3.4
pH Shift		0.7	1.5	0.7	0.5	0.5	1.5	1.1	1.0	1.0	0.8	0.5	0.6	0.5	0.6	0.7	0.6	2.0	2.9	2.2
Observed Reaction		X	X	X	X	X	X	X	X	X	X	X	XX	X	X	X	X	XXX	X	X
pH KCl		-	4.30	-	-	-	-	4	4.20	3.90	-	4	4.1	-	-	-	-	4.6	-	-
TAA (moles H+/ tonne)*	18 [1]	-	**160**	-	-	-	-	**150**	**81**	**180**	-	**74**	**62**	-	-	-	-	**66**	-	-
S KCl (%)		-	<0.005	-	-	-	-	0.008	0.017	0.016	-	0.074	<0.005	-	-	-	-	NA	-	-
Scr (%)	0.03-18 [1]	-	0.034	-	-	-	-	0.012	0.008	0.015	-	<0.005	<0.005	-	-	-	-	0.006	-	-

Sample ID		CTP18	CTP18	CTP18	CTP18	CTP19	CTP19	CTP19	CTP19	CTP20	CTP20	CTP20	CTP21	CTP21	CTP21
Unit		ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL	ALLUVIAL
Texture Category		FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE	FINE
Date of Sampling															
Depth (m)	Action Criteria	1.0-1.1	1.5-1.6	2.0-2.1	2.5-2.6	0.5-0.6	1.0-1.1	1.5-1.6	2.0-2.1	0.5-0.6	1.0-1.1	1.5-1.6	0.5-0.6	0.5-0.6	1.0-1.1
pH_F		5.6	5.5	5.2	5.3	6	6.5	6.4	6.3	6.7	6.4	6.7	5.5	5.6	5.4
pH_{FOX}		3.4	3.8	3.9	3.9	2.8	2.8	3.2	5.5	3.4	4.2	5	5.2	5.3	3.8
pH Shift		2.2	1.7	1.3	1.4	3.2	3.7	3.2	0.8	3.3	2.2	1.7	0.3	0.3	1.6
Observed Reaction		X	X	X	X	X	X	X	XXXX	X	X	X	X	XXXX	XXXX
pH KCl		-	-	-	-	-	4.7	4.8	4.90	4.8	-	-	-	5.1	-
TAA (moles H+/ tonne)*	18 [1]	-	-	-	-	-	**42**	**34**	**26**	**47**	-	-	-	17	-
S KCl (%)		-	-	-	-	-	NA	NA	NA	NA	-	-	-	NA	-
Scr (%)	0.03-18 [1]	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	-

NOTES:

Bold Concentration exceeds ASSMAC (1998) action level

[1] Based on ASSMAC (1998) Acid Sulfate Soil Manual dependant upon soil texture category.

\- Not Analysed

pH_F Field pH (measured as received at the laboratory)

pH_{FOX} pH after oxidation with hydrogen peroxide

$_{TAA}$ Total Actual Acidity

$_{S\ KCL}$ Potasium chloride extractable sulfur

$_{Scr}$ Chromium reducible sulfur

* Depends on soil texture category

x Slight Reaction

xx Moderate Reaction

xxx High Reaction

xxxx Very Vigorous, gas evolution and heat generation, commonly greater than 80%

LABORATORY REPORT COVERSHEET

Date: 17 May 2011

To: Coffey Environmental Pty Ltd
118 Auburn St
WOOLONGONG NSW 2500

Attention: Chris Appelkamp

Your Reference: ENAUWOLL04006AA
Laboratory Report No: CE71935

Samples Received: 10/05/2011
Samples / Quantity: 14 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Dicker
Manager
CAIRNS

Anthony Nilsson
Operations Manager
CAIRNS

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

PH Field Our Reference Your Reference Type of Sample Date Sampled	Units	CE71935-1 CTP 21 0.5-0.6 Soil 4/05/2011	CE71935-2 CTP 21 1.0-1.1 Soil 4/05/2011	CE71935-3 CTP 20 0.5-0.6 Soil 4/05/2011
Date Extracted		16/05/2011	16/05/2011	16/05/2011
Date Analysed		16/05/2011	16/05/2011	16/05/2011
pH $_{F}$ #	pH Units	5.5	5.4	6.7
pH $_{FOx}$ #	pH Units	5.2	3.8	3.4
Field pH reaction #		XXXX	X	X

PH Field Our Reference Your Reference Type of Sample Date Sampled	Units	CE71935-4 CTP 20 1.0-1.1 Soil 4/05/2011	CE71935-5 CTP 20 1.5-1.6 Soil 4/05/2011	CE71935-6 CTP 19 0.5-0.6 Soil 4/05/2011
Date Extracted		16/05/2011	16/05/2011	16/05/2011
Date Analysed		16/05/2011	16/05/2011	16/05/2011
pH $_{F}$ #	pH Units	6.4	6.7	6.0
pH $_{FOx}$ #	pH Units	4.2	5.0	2.8
Field pH reaction #		X	X	X

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

PH Field Our Reference Your Reference Type of Sample Date Sampled	Units	CE71935-7 CTP 19 1.0-1.1 Soil 4/05/2011	CE71935-8 CTP 19 1.5-1.6 Soil 4/05/2011	CE71935-9 CTP 19 2.0-2.1 Soil 4/05/2011
Date Extracted		16/05/2011	16/05/2011	16/05/2011
Date Analysed		16/05/2011	16/05/2011	16/05/2011
pH $_{F}$ #	pH Units	6.5	6.4	6.3
pH $_{FOx}$ #	pH Units	2.8	3.2	5.5
Field pH reaction #		X	X	XXXX

PH Field Our Reference Your Reference Type of Sample Date Sampled	Units	CE71935-10 CTP 18 0.5-0.6 Soil 4/05/2011	CE71935-11 CTP 18 1.0-1.1 Soil 4/05/2011	CE71935-12 CTP 18 1.5-1.6 Soil 4/05/2011
Date Extracted		16/05/2011	16/05/2011	16/05/2011
Date Analysed		16/05/2011	16/05/2011	16/05/2011
pH $_{F}$ #	pH Units	6.3	5.6	5.5
pH $_{FOx}$ #	pH Units	3.4	3.4	3.8
Field pH reaction #		X	X	X

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

PH Field Our Reference Your Reference Type of Sample Date Sampled	Units	CE71935-13 CTP 18 2.0-2.1 Soil 4/05/2011	CE71935-14 CTP 18 2.5-2.6 Soil 4/05/2011
Date Extracted		16/05/2011	16/05/2011
Date Analysed		16/05/2011	16/05/2011
pH $_{F}$ #	pH Units	5.2	5.3
pH $_{FOx}$ #	pH Units	3.9	3.9
Field pH reaction #		X	X

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD
PH Field			
Date Extracted			
Date Analysed			
pH $_{F}$ #	pH Units	0.1	AN101
pH $_{FOx}$ #	pH Units	0.1	AN101
Field pH reaction #			Other

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate
Date Extracted		[NT]	CE71935-1	16/05/2011 || 16/05/2011
Date Analysed		[NT]	CE71935-1	16/05/2011 || 16/05/2011
pH $_{F}$ #	pH Units	[NT]	CE71935-1	5.5 || 5.6 || RPD: 2
pH $_{FOx}$ #	pH Units	[NT]	CE71935-1	5.2 || 5.3 || RPD: 2
Field pH reaction #		[NT]	CE71935-1	XXXX || XXXX

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

QUALTY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate
Date Extracted		[NT]	CE71935-11	16/05/2011 || 16/05/2011
Date Analysed		[NT]	CE71935-11	16/05/2011 || 16/05/2011
pH $_{F}$ #	pH Units	[NT]	CE71935-11	5.6 || 5.6 || RPD: 0
pH $_{FOx}$ #	pH Units	[NT]	CE71935-11	3.4 || 3.4 || RPD: 0
Field pH reaction #		[NT]	CE71935-11	X || X

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

NOTES:
LOR - Limit of Reporting.
NOTE: Rate of Reaction:
X - Slight Reaction
XX - Moderate Reaction
XXX - High Reaction
XXXX - Very vigorous, gas evolution and heat generation, commonly >80^{o}

Analysis Date: Between 10/05/11 **and** 17/05/11

SGS Terms and Conditions are available at www.au.sgs.com

LABORATORY REPORT COVERSHEET

Date: 4 July 2011

To: Coffey Environmental Pty Ltd
118 Auburn St
WOOLONGONG NSW 2500

Attention: Chris Appelkamp

Your Reference: ENAUWOLL04006AA
Laboratory Report No: CE71935B

Samples Received: 10/05/2011
Samples / Quantity: 5 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Dicker
Manager
CAIRNS

Anthony Nilsson
Operations Manager
CAIRNS

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935B
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample Date Sampled Depth	Units	CE71935B-1 CTP 21 0.5-0.6 Soil 4/05/2011	CE71935B-3 CTP 20 0.5-0.6 Soil 4/05/2011	CE71935B-7 CTP 19 1.0-1.1 Soil 4/05/2011
Date Extracted		30/06/2011	30/06/2011	30/06/2011
Date Analysed		31/06/11	31/06/11	31/06/11
Moisture	% w/w	16	29	24
pH KCl	pH Units	5.1	4.8	4.7
s-TAA pH 6.5	% w/w S	0.03	0.08	0.07
TAA pH 6.5	mole H^+/t	17	47	42
Chromium Reducible Sulfur (S_{CR})	% w/w	<0.005	<0.005	<0.005
a-Chromium Reducible Sulfur	mole H^+ / t	<5	<5	<5
S_{HCl}	% w/w	NA	NA	NA
S KCl	% w/w	NA	NA	NA
S NAS	% w/w	NA	NA	NA
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	NA	NA	NA
s-ANC_{BT}	% w/w S	NA	NA	NA
a-ANC_{BT}	mole H^+ / t	NA	NA	NA
s-Net Acidity	% w/w S	0.03	0.08	0.07
a-Net Acidity	mole H^+/t	19	50	44
Liming Rate	kg $CaCO_3$/tonne	1.4	3.8	3.3
Verification s-Net Acidity	% w/w S	NA	NA	NA
a-Net Acidity without ANC	mole H^+/t	19	50	44
Liming Rate without ANC	kg $CaCO_3$/tonne	1.4	3.8	3.3

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935B
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample Date Sampled Depth	Units	CE71935B-8 CTP 19 1.5-1.6 Soil 4/05/2011	CE71935B-9 CTP 19 2.0-2.1 Soil 4/05/2011
Date Extracted		30/06/2011	30/06/2011
Date Analysed		31/06/11	31/06/11
Moisture	% w/w	21	18
pH KCl	pH Units	4.8	4.9
s-TAA pH 6.5	% w/w S	0.05	0.04
TAA pH 6.5	mole H^+/t	34	26
Chromium Reducible Sulfur (S_{CR})	% w/w	<0.005	<0.005
a-Chromium Reducible Sulfur	mole H^+ / t	<5	<5
S_{HCl}	% w/w	NA	NA
S KCl	% w/w	NA	NA
S NAS	% w/w	NA	NA
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	NA	NA
s-ANC_{BT}	% w/w S	NA	NA
a-ANC_{BT}	mole H^+ / t	NA	NA
s-Net Acidity	% w/w S	0.06	0.04
a-Net Acidity	mole H^+/t	35	27
Liming Rate	kg $CaCO_3$/tonne	2.6	2.0
Verification s-Net Acidity	% w/w S	NA	NA
a-Net Acidity without ANC	mole H^+/t	35	27
Liming Rate without ANC	kg $CaCO_3$/tonne	2.6	2.0

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935B

PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD
Chromium Suite - Acid Base Accounting			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
s-TAA pH 6.5	% w/w S	0.01	AS4969.2 / AN219
TAA pH 6.5	mole H^+/t	5	AS4969.2 / AN219
Chromium Reducible Sulfur (S_{CR})	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H^+ / t	5	AS4969.7
S_{HCl}	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	0.1	AN214
s-ANC_{BT}	% w/w S	0.01	AS4969.13 / AN214
a-ANC_{BT}	mole H^+ / t	5	AS4969.13 / AN214
s-Net Acidity	% w/w S	0.01	Calculation
a-Net Acidity	mole H^+/t	5	Calculation
Liming Rate	kg $CaCO_3$/tonne	0.1	AS4969.14 / AN220
Verification s-Net Acidity	% w/w S		Calculation
a-Net Acidity without ANC	mole H^+/t	5	Calculation
Liming Rate without ANC	kg $CaCO_3$/tonne	0.1	ASSMAC_23H

CLIENT: Coffey Environmental Pty Ltd **Laboratory Report No:** CE71935B
PROJECT: ENAUWOLL04006AA

LABORATORY REPORT

NOTES:
LOR - Limit of Reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%
If using Liming Material <100% NV, then Liming Rate can be adusted as follows:
Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material
Bulk Density of Material of 1g/cm3 assumed.
If Bulk Density differs from 1g/cm3 then Liming rate can be adjusted as follows:
Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density
Geneva Legal Comment

ISO 17025

Analysis Date: **Between** 30/06/11 **and** 4/07/11

SAMPLE RECEIPT ADVICE (SRA)

30 June 2011

Client Details			Laboratory Details		
Client	:	Coffey Environmental Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Chris Appelkamp	Manager	:	Jon Dicker
Address	:	118 Auburn St WOOLONGONG NSW 2500	Address	:	Unit 2, 58 Comport St Portsmith QLD 4870
Email	:	chris_appelkamp@coffey.com	Email	:	Shey.Goddard@SGS.com
Telephone	:	02 4201 1400	Telephone	:	61 7 4035 5111
Facsimile	:	02 4201 1401	Facsimile	:	61 7 4035 5122
Project	:	ENAUWOLL04006AA	Report No	:	**CE71935-B**
Order Number	:		No. of Samples	:	14
Samples	:	5 Soils	Due Date	:	7/07/2011

Date Instructions Received	:	30/06/2011
Sample Receipt Date	:	10/05/2011
Requested By	:	Chris Appelkamp

Samples received in good order	:	Yes	Samples received in correct containers	:	Yes
Samples received without headspace	:	NA	Sufficient quantity supplied	:	Yes
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice Bricks
Sample containers provided by	:	Other	Samples clearly Labelled	:	Yes
Turnaround time requested	:	Standard	Completed documentation received	:	Yes, Chain of Custody Received

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

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

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Member of SGS Group

Client : Coffey Environmental Pty Ltd Report No : CE71935-B
Project : ENAUWOLL04006AA

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's interpretation of the customer supplied Chain of Custody.
Please indicate ASAP of your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a lowercase x in the table below indicates some testing has not been requested in the package.

Sample No.	Description	Chromium Suite - Acid Base Acc
1	CTP 21 0.5-0.6	X
3	CTP 20 0.5-0.6	X
7	CTP 19 1.0-1.1	X
8	CTP 19 1.5-1.6	X
9	CTP 19 2.0-2.1	X

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Member of SGS Group

Nilsson, Anthony (Cairns)

From: Manuel Fernandez [Manuel_Fernandez@coffey.com]
Sent: Friday, 24 June 2011 4:05 PM
To: Nilsson, Anthony (Cairns)
Cc: Chris Appelkamp
Subject: Additional Analysis

CE71935 A

Hi Anthony,

We would like to get some additional analysis on samples previously analysed by your laboratory (SGS Ref: CE71935, Coffey Ref: ENAUWOLL04006AA – received by SGS 10/5/2011) as follows:

Chromium reducible sulfur suite (including Skcl if there is any TAA, irrespective of pH):
1 CTP21 0.5-0.6
3 CTP20 0.5-0.6
7 CTP19 1.0-1.1
8 CTP19 1.5-1.6
4 CTP19 2.0-2.1

Kind Regards
MANUEL FERNANDEZ
Business Manager - Wollongong
Senior Associate Environmental Engineer

Coffey Environments
118 Auburn Street Wollongong NSW 2500 Australia
T +61 2 4201 1400 F +61 2 4201 1401 M +61 401 106 772
coffey.com

Rdi checked in 30/6/11

LABORATORY REPORT COVERSHEET

Date: 8 July 2011

To: Coffey Geotechnics
118 Auburn St
WOLLONGONG NSW 2500

Attention: Mr Edward Ibrahim

Your Reference: ENAUWOLL04006AA SE88475A
Laboratory Report No: CE72868

Samples Received: 6/07/2011
Samples / Quantity: 7 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Dicker
Manager
CAIRNS

Anthony Nilsson
Operations Manager
CAIRNS

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868
PROJECT: ENAUWOLL04006AA SE88475A

LABORATORY REPORT

-------- Our Reference Your Reference Type of Sample	Units	CE72868-1 SE88475A-3 Soil	CE72868-2 SE88475A-8 Soil	CE72868-3 SE88475A-9 Soil
Date Extracted		6/07/2011	6/07/2011	6/07/2011
Date Analysed		7/07/2001	7/07/2001	7/07/2001
Chromium Reducible Sulfur (SCR)	% w/w	0.034	0.012	0.008
a-Chromium Reducible Sulfur	mole H^+ / t	21	7.5	<5

-------- Our Reference Your Reference Type of Sample	Units	CE72868-4 SE88475A-10 Soil	CE72868-5 SE88475A-17 Soil	CE72868-6 SE88475A-20 Soil
Date Extracted		6/07/2011	6/07/2011	6/07/2011
Date Analysed		7/07/2001	7/07/2001	7/07/2001
Chromium Reducible Sulfur (SCR)	% w/w	0.015	<0.005	<0.005
a-Chromium Reducible Sulfur	mole H^+ / t	9.4	<5	<5

-------- Our Reference Your Reference Type of Sample	Units	CE72868-7 SE88475A-24 Soil
Date Extracted		6/07/2011
Date Analysed		7/07/2001
Chromium Reducible Sulfur (SCR)	% w/w	0.006
a-Chromium Reducible Sulfur	mole H^+ / t	<5

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868

PROJECT: ENAUWOLL04006AA SE88475A

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD

Date Extracted			
Date Analysed			
Chromium Reducible Sulfur (S_{CR})	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H^+ / t	5	AS4969.7

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868
PROJECT: ENAUWOLL04006AA SE88475A

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate	Spike	CMS Recovery
Date Extracted		-	CE72868-1	6/07/2011 || 6/07/2011	Batch Spike	-
Date Analysed		-	CE72868-1	7/07/2001 || 7/07/2001	Batch Spike	-
Chromium Reducible Sulfur (S_{CR})	% w/w	-	CE72868-1	0.034 || 0.042 || RPD: 21	Batch Spike	105%
a-Chromium Reducible Sulfur	mole H^+ / t	-	CE72868-1	21 || 26 || RPD: 21	Batch Spike	-

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868
PROJECT: ENAUWOLL04006AA SE88475A

LABORATORY REPORT

NOTES:

LOR - Limit of Reporting.

The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%
If using Liming Material <100% NV, then Liming Rate can be adusted as follows:
Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material
Bulk Density of Material of 1g/cm3 assumed.
If Bulk Density differs from 1g/cm3 then Liming rate can be adjusted as follows:
Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density
Geneva Legal Comment

ISO 17025

Analysis Date: **Between** 6/07/11 **and** 8/07/11

Disclaimer:
SGS and the authors have prepared this document in good faith,
consulting with Ahern CR, McElnea AE, Sullivan LA (2004)
Acid Sulphate Soils Laboratory Methods Guidelines,
Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Qld Aust.
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LABORATORY REPORT COVERSHEET

Date: 13 July 2011

To: Coffey Geotechnics
118 Auburn St
WOLLONGONG NSW 2500

Attention: Chris Appelkamp

Your Reference: SE88475B - ENAUWOLL04006AA - Additional Analysis
Laboratory Report No: CE72868A

Samples Received: 6/07/2011
Samples / Quantity: 7 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Dicker
Manager
CAIRNS

Anthony Nilsson
Operations Manager
CAIRNS

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ABN 44 000 964 278
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CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A

PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample	Units	CE72868A-1 CTP09_0.5-0.7m Soil	CE72868A-2 CTP12_1.0-1.2m Soil	CE72868A-3 CTP12_1.5-1.7m Soil
Date Extracted		6/07/2011	6/07/2011	6/07/2011
Date Analysed		7/07/2011	7/07/2011	7/07/2011
Moisture	% w/w	[NT]	[NT]	[NT]
pH KCl	pH Units	4.3	4.0	4.2
s-TAA pH 6.5	% w/w S	0.26	0.23	0.13
TAA pH 6.5	mole H^+/t	160	150	81
Chromium Reducible Sulfur (SCR)	% w/w	0.034	0.012	0.008
a-Chromium Reducible Sulfur	mole H^+ / t	21	7.5	<5
SHCl	% w/w	0.013	0.018	0.010
S KCl	% w/w	<0.005	0.008	0.017
S NAS	% w/w	0.013	0.0099	<0.005
Acid Neutralisation Capacity ANCBT	% $CaCO_3$	NA	NA	NA
s-ANCBT	% w/w S	NA	NA	NA
a-ANCBT	mole H^+ / t	NA	NA	NA
s-Net Acidity	% w/w S	0.30	0.25	0.13
a-Net Acidity	mole H^+/t	190	160	82
Liming Rate	kg $CaCO_3$/tonne	14	12	6.2
Verification s-Net Acidity	% w/w S	0.03	NA	NA
a-Net Acidity without ANC	mole H^+/t	190	160	82
Liming Rate without ANC	kg $CaCO_3$/tonne	14	12	6.2

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A

PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample	Units	CE72868A-4 CTP12_2.0-2.2m Soil	CE72868A-5 CTP14_1.5-1.7m Soil	CE72868A-6 CTP16_0.5-0.7m Soil
Date Extracted		6/07/2011	6/07/2011	6/07/2011
Date Analysed		7/07/2011	7/07/2011	7/07/2011
Moisture	% w/w	[NT]	[NT]	[NT]
pH KCl	pH Units	3.9	4.0	4.1
s-TAA pH 6.5	% w/w S	0.29	0.12	0.10
TAA pH 6.5	mole H^+/t	180	74	62
Chromium Reducible Sulfur (S_{CR})	% w/w	0.015	<0.005	<0.005
a-Chromium Reducible Sulfur	mole H^+ / t	9.4	<5	<5
S_{HCl}	% w/w	0.028	0.086	0.011
S KCl	% w/w	0.016	0.074	<0.005
S NAS	% w/w	0.012	0.011	0.008
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	NA	NA	NA
s-ANC_{BT}	% w/w S	NA	NA	NA
a-ANC_{BT}	mole H^+ / t	NA	NA	NA
s-Net Acidity	% w/w S	0.32	0.13	0.11
a-Net Acidity	mole H^+/t	200	81	68
Liming Rate	kg $CaCO_3$/tonne	15	6.1	5.1
Verification s-Net Acidity	% w/w S	NA	NA	NA
a-Net Acidity without ANC	mole H^+/t	200	81	68
Liming Rate without ANC	kg $CaCO_3$/tonne	15	6.1	5.1

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A

PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

Chromium Suite - Acid Base Accounting Our Reference Your Reference Type of Sample	Units	CE72868A-7 CTP17_0.5-0.7m Soil
Date Extracted		6/07/2011
Date Analysed		7/07/2011
Moisture	% w/w	[NT]
pH KCl	pH Units	4.6
s-TAA pH 6.5	% w/w S	0.11
TAA pH 6.5	mole H^+/t	66
Chromium Reducible Sulfur (S_{CR})	% w/w	0.006
a-Chromium Reducible Sulfur	mole H^+ / t	<5
S_{HCl}	% w/w	NA
S KCl	% w/w	NA
S NAS	% w/w	NA
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	NA
s-ANC_{BT}	% w/w S	NA
a-ANC_{BT}	mole H^+ / t	NA
s-Net Acidity	% w/w S	0.11
a-Net Acidity	mole H^+/t	70
Liming Rate	kg $CaCO_3$/tonne	5.3
Verification s-Net Acidity	% w/w S	NA
a-Net Acidity without ANC	mole H^+/t	70
Liming Rate without ANC	kg $CaCO_3$/tonne	5.3

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A

PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD
Chromium Suite - Acid Base Accounting			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
s-TAA pH 6.5	% w/w S	0.01	AS4969.2 / AN219
TAA pH 6.5	mole H^+/t	5	AS4969.2 / AN219
Chromium Reducible Sulfur (S_{CR})	% w/w	0.005	AS4969.7
a-Chromium Reducible Sulfur	mole H^+ / t	5	AS4969.7
S_{HCl}	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	0.1	AN214
s-ANC_{BT}	% w/w S	0.01	AS4969.13 / AN214
a-ANC_{BT}	mole H^+ / t	5	AS4969.13 / AN214
s-Net Acidity	% w/w S	0.01	Calculation
a-Net Acidity	mole H^+/t	5	Calculation
Liming Rate	kg $CaCO_3$/tonne	0.1	AS4969.14 / AN220
Verification s-Net Acidity	% w/w S		Calculation
a-Net Acidity without ANC	mole H^+/t	5	Calculation
Liming Rate without ANC	kg $CaCO_3$/tonne	0.1	ASSMAC_23H

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A

PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate	Spike	CMS Recovery
Date Extracted		-	CE72868A-1	6/07/2011 || 6/07/2011	Batch Spike	-
Date Analysed		-	CE72868A-1	7/07/2011 || 7/07/2011	Batch Spike	-
Moisture	% w/w	-	[NT]	[NT]	Batch Spike	-
pH KCl	pH Units	5.8	CE72868A-1	4.3 || 4.3 || RPD: 0	Batch Spike	-
s-TAA pH 6.5	% w/w S	-	CE72868A-1	0.26 || 0.25 || RPD: 4	Batch Spike	-
TAA pH 6.5	mole H^+/t	-	CE72868A-1	160 || 160 || RPD: 0	Batch Spike	93%
Chromium Reducible Sulfur (S_{CR})	% w/w	-	CE72868A-1	0.034 || 0.042 || RPD: 21	Batch Spike	105%
a-Chromium Reducible Sulfur	mole H^+ / t	-	CE72868A-1	21 || 26 || RPD: 21	Batch Spike	-
S_{HCl}	% w/w	-	CE72868A-1	0.013 || 0.013 || RPD: 0	Batch Spike	102%
S KCl	% w/w	-	CE72868A-1	<0.005 || <0.005	Batch Spike	115%
S NAS	% w/w	-	CE72868A-1	0.013 || 0.011 || RPD: 17	Batch Spike	-
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	-	CE72868A-1	NA || NA	Batch Spike	-
s-ANC_{BT}	% w/w S	-	CE72868A-1	NA || NA	Batch Spike	-
a-ANC_{BT}	mole H^+ / t	-	CE72868A-1	NA || NA	Batch Spike	-
s-Net Acidity	% w/w S	-	CE72868A-1	0.30 || 0.30 || RPD: 0	Batch Spike	-
a-Net Acidity	mole H^+/t	-	CE72868A-1	190 || 190 || RPD: 0	Batch Spike	-
Liming Rate	kg $CaCO_3$/tonne	-	CE72868A-1	14 || 14 || RPD: 0	Batch Spike	-
Verification s-Net Acidity	% w/w S	-	CE72868A-1	0.03 || 0.04 || RPD: 29	Batch Spike	-
a-Net Acidity without ANC	mole H^+/t	-	CE72868A-1	190 || 190 || RPD: 0	Batch Spike	-
Liming Rate without ANC	kg $CaCO_3$/tonne	-	CE72868A-1	14 || 14 || RPD: 0	Batch Spike	-

CLIENT: Coffey Geotechnics **Laboratory Report No:** CE72868A
PROJECT: SE88475B - ENAUWOLL04006AA - Additional Analysis

LABORATORY REPORT

NOTES:

LOR - Limit of Reporting.

The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%
If using Liming Material <100% NV, then Liming Rate can be adusted as follows:
Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material
Bulk Density of Material of 1g/cm3 assumed.
If Bulk Density differs from 1g/cm3 then Liming rate can be adjusted as follows:
Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density
Geneva Legal Comment

ISO 17025

Analysis Date: **Between** 11/07/11 **and** 13/07/11

Disclaimer:
SGS and the authors have prepared this document in good faith,
consulting with Ahern CR, McElnea AE, Sullivan LA (2004)
Acid Sulphate Soils Laboratory Methods Guidelines,
Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Qld Aust.
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SAMPLE RECEIPT ADVICE (SRA)

12 July 2011

Client Details			**Laboratory Details**		
Requested By	:	**Chris Appelkamp**			
Client	:	Coffey Environments Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Manuel Fernandez	Manager	:	Edward Ibrahim
Address	:	118 Auburn Street Wollongong NSW 2500	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	manuel_fernandez@coffey.com	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4201 1400	Telephone	:	61 2 8594 0400
Facsimile	:	02 4201 1401	Facsimile	:	61 2 8594 0499
Project	:	ENAUWOLL04006AA-Chromium Suite-Additional Anal	Report No	:	**SE88475B**
Order Number	:	28721-2	No. of Samples	:	26
Samples	:	7 Soils	Due Date	:	13/07/2011

Date Instructions Received	:	11/07/2011
Sample Receipt Date	:	23/6/11

Samples received in good order	:	Samples received in correct containers	:
Samples received without headspace	:	Sufficient quantity supplied	:
Upon receipt sample temperature	:	Cooling Method	:
Sample containers provided by	:	Samples clearly Labelled	:
Turnaround time requested	:	Completed documentation received	:

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

Full Chromium Suite:- Subcontracted to SGS Cairns

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

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Member of the SGS Group (SGS SA)

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE88475B
Project : ENAUWOLL04006AA-Chromium Suite-Additional Analysis

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	Chromium Suite - Acid Base Acc
3	CTP09	X	X
8	CTP12	X	X
9	CTP12	X	X
10	CTP12	X	X
17	CTP14	X	X
20	CTP16	X	X
24	CTP17	X	X

Sample No.	Description
3	CTP09
8	CTP12
9	CTP12
10	CTP12
17	CTP14
20	CTP16

SAMPLE RECEIPT ADVICE (SRA) - continued

Client	:	Coffey Environments Pty Ltd	Report No	:	SE88475B
Project	:	ENAUWOLL04006AA-Chromium Suite-Additional Analysis			

Sample No.	Description
24	CTP17

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST
(FOR INTERLAB WORK)

Receiving Laboratory: SGS CAIRNS.

Initiating Laboratory: SGS Sydney - Alexandria
Initiating Contact: Angela Mamalicos (au.samplereceipt.sydney@sgs.com)
Send Results to:- edward.ibrahim@sgs.com and ~~lugie.serjeant@sgs.com~~ Hong.crawford@sgs.com

Final Report Required: Yes / No / NATA	Prelim Report Due: / / am/pm 13/7/2011.	Special Prices Apply: Yes / No — as agreed with Hong Crawford.	
Send To: Us / Client	Final Report Due: / / am/pm	Quote No:	Client:**
Address To: Us / Client* (Address As Below)	Matrix	Preservation Method	Analysis Required / Remarks

SGS Job No: SE88475B	Client Job No: ENAUWOLL0400 6AA – Additional Analysis	Water	Soil			Ice	Acid	Other	None	Chromium Suite										Remarks
Sample No.	Sample No. Date sampled																			FULL Chromium Suite.
SE88475B-3	CTP09_0.5-0.7m 21/6/2011		X							X										
-8	CTP12_1.0-1.2m 21/6/2011		X							X										(Refer to email attached.
-9	CTP12_1.5-1.7m 21/6/2011		X							X										
-10	CTP12_2.0-2.2m 21/6/2011		X							X										
-17	CTP14_1.5-1.7m 22/6/2011		X							X										
-20	CTP16_0.5-0.7m 22/6/2011		X							X										
-24	CTP17_0.5-0.7m 22/6/2011		X							X										COURIER SERVICE: Australian Air Express
																				CONSIGNMENT No:

Relinquished By: Angela Mamalicos	Date/Time: 11/7/2011	Received By:	Date/Time

NOTES: Client Address: Attention: Chris Appelkamp
Coffey Environments Pty Ltd.
118 Auburn street
Wollongong NSW 2500.

*** Special Prices, Quotes, Clients **MUST BE** Referred To.

AU.SampleReceipt.Sydney (Sydney)

From: Crawford, Huong (Sydney)
Sent: Monday, 11 July 2011 5:33 PM
To: AU.SampleReceipt.Sydney (Sydney)
Cc: chris_appelkamp@coffey.com
Subject: RE: Results for registration 'SE88475A - ENAUWOLL04006AA - Additional Analysis'

Hi Angale/Emily,

As per my discussion with Chris, please, re-book the above job in for full Chromium suite, Cairns has agreed to get the results out by COB 13/07/11.

Thanks.

Kind Regards,

Huong Crawford

Environmental Services
Production Manager

SGS Australia Pty Ltd
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Phone: +61 (0)2 8594 0403
Fax: + 61 (0)2 8594 0499
E-mail: Huong.Crawford@sgs.com
Web: www.au.sgs.com

From: Chris Appelkamp [mailto:Chris_Appelkamp@coffey.com]
Sent: Monday, 11 July 2011 2:11 PM
To: Crawford, Huong (Sydney)
Subject: RE: Results for registration 'SE88475A - ENAUWOLL04006AA - Additional Analysis'

Hi Huong,
I am wondering where the rest of the results from the Scr% suite are?

CHRIS APPELKAMP
Project Engineering Geologist
Coffey Geotechnics
Wollongong Office
118 Auburn Street, Wollongong NSW 2500 Australia
T (+61) (2) 42011400 F (+61) (2) 42011401 M 0410 221 767
coffey.com

From: Crawford, Huong (Sydney) [mailto:Huong.Crawford@sgs.com]
Sent: Monday, 11 July 2011 1:01 PM
To: Manuel Fernandez
Cc: Chris Appelkamp
Subject: Results for registration 'SE88475A - ENAUWOLL04006AA - Additional Analysis'

Hi Manuel & Chris,

Please, find attached the report for SE88475A.

Regards,

Huong

ANALYTICAL REPORT

29 July 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Chris Appelkamp**

Your Reference: ENAUWOLL04006AA

Our Reference: SE89065 Samples: 20 Soils
Received: 26/07/2011

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Ravee Sivasubramaniam
Asbestos Signatory

Ly Kim Ha
Organics Signatory
Organics Signatory

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TRH in soil with C6-C9 by P/T Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-1 SS01 0.0m-0.1m Soil 25/07/2011	SE89065-2 QA12 0.0m-0.1m Soil 25/07/2011	SE89065-3 SS02 0.0m-0.1m Soil 25/07/2011	SE89065-4 SS03 0.0m-0.1m Soil 25/07/2011	SE89065-5 QA11 0.0m-0.1m Soil 25/07/2011
Date Extracted (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20	<20	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50	<50	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50	<50	<50	<50

TRH in soil with C6-C9 by P/T Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-6 SS04 0.0m-0.1m Soil 25/07/2011	SE89065-7 SS05 0.0m-0.1m Soil 25/07/2011	SE89065-8 SS06 0.0m-0.1m Soil 25/07/2011	SE89065-9 SS07 0.0m-0.1m Soil 25/07/2011	SE89065-10 SS08 0.0m-0.1m Soil 25/07/2011
Date Extracted (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20	<20	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50	<50	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50	<50	<50	<50

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TRH in soil with C6-C9 by P/T Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-11 SS09 0.0m-0.1m Soil 25/07/2011	SE89065-12 SS10 0.0m-0.1m Soil 25/07/2011	SE89065-13 SS11 0.0m-0.1m Soil 25/07/2011	SE89065-14 SS12 0.0m-0.1m Soil 25/07/2011	SE89065-15 SS13 0.0m-0.1m Soil 25/07/2011
Date Extracted (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20	<20	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50	<50	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50	<50	<50	<50

TRH in soil with C6-C9 by P/T Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-16 SS14 0.0m-0.1m Soil 25/07/2011	SE89065-17 SS15 0.0m-0.1m Soil 25/07/2011	SE89065-18 SS16 0.0m-0.1m Soil 25/07/2011	SE89065-19 SS17 0.0m-0.1m Soil 25/07/2011
Date Extracted (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C6-C9 PT)		27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_6 - C_9 P&T	mg/kg	<20	<20	<20	<20
Date Extracted (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed (TRH C10-C36)		27/07/2011	27/07/2011	27/07/2011	27/07/2011
TRH C_{10} - C_{14}	mg/kg	<20	<20	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	<50	<50	<50
TRH C_{29} - C_{36}	mg/kg	<50	<50	190	<50

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PAHs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-1 SS01 0.0m-0.1m Soil 25/07/2011	SE89065-2 QA12 0.0m-0.1m Soil 25/07/2011	SE89065-3 SS02 0.0m-0.1m Soil 25/07/2011	SE89065-4 SS03 0.0m-0.1m Soil 25/07/2011	SE89065-5 QA11 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	92	92	90	90	88
2-Fluorobiphenyl	%	76	80	76	78	76
p -Terphenyl-*d14*	%	84	80	82	84	82

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PAHs in Soil Our Reference:	UNITS	SE89065-6	SE89065-7	SE89065-8	SE89065-9	SE89065-10
Your Reference	----------	SS04	SS05	SS06	SS07	SS08
Depth	----------	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		25/07/2011	25/07/2011	25/07/2011	25/07/2011	25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	96	90	86	90	90
2-Fluorobiphenyl	%	84	78	74	74	76
p -Terphenyl-*d14*	%	84	84	78	78	78

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PAHs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-11 SS09 0.0m-0.1m Soil 25/07/2011	SE89065-12 SS10 0.0m-0.1m Soil 25/07/2011	SE89065-13 SS11 0.0m-0.1m Soil 25/07/2011	SE89065-14 SS12 0.0m-0.1m Soil 25/07/2011	SE89065-15 SS13 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	94	88	88	86	80
2-Fluorobiphenyl	%	78	76	76	74	74
p -Terphenyl-*d14*	%	74	78	74	76	76

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PAHs in Soil Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-16 SS14 0.0m-0.1m Soil 25/07/2011	SE89065-17 SS15 0.0m-0.1m Soil 25/07/2011	SE89065-18 SS16 0.0m-0.1m Soil 25/07/2011	SE89065-19 SS17 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[*b*]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo[*k*]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[*a*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Indeno[*123-cd*]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2
Nitrobenzene-d5	%	82	84	84	82
2-Fluorobiphenyl	%	78	76	78	74
p -Terphenyl-*d14*	%	80	78	86	82

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OP Pesticides in Soil by GCMS Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-1 SS01 0.0m-0.1m Soil 25/07/2011	SE89065-2 QA12 0.0m-0.1m Soil 25/07/2011	SE89065-3 SS02 0.0m-0.1m Soil 25/07/2011	SE89065-4 SS03 0.0m-0.1m Soil 25/07/2011	SE89065-5 QA11 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Dichlorvos	mg/kg	<1	<1	<1	<1	<1
Dimethoate	mg/kg	<1	<1	<1	<1	<1
Diazinon	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	76	80	76	78	76
d14-p-Terphenyl (Surr)	%	84	80	82	84	82

OP Pesticides in Soil by GCMS Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-6 SS04 0.0m-0.1m Soil 25/07/2011	SE89065-7 SS05 0.0m-0.1m Soil 25/07/2011	SE89065-8 SS06 0.0m-0.1m Soil 25/07/2011	SE89065-9 SS07 0.0m-0.1m Soil 25/07/2011	SE89065-10 SS08 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Dichlorvos	mg/kg	<1	<1	<1	<1	<1
Dimethoate	mg/kg	<1	<1	<1	<1	<1
Diazinon	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	84	78	74	74	76
d14-p-Terphenyl (Surr)	%	84	84	78	78	78

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OP Pesticides in Soil by GCMS Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-11 SS09 0.0m-0.1m Soil 25/07/2011	SE89065-12 SS10 0.0m-0.1m Soil 25/07/2011	SE89065-13 SS11 0.0m-0.1m Soil 25/07/2011	SE89065-14 SS12 0.0m-0.1m Soil 25/07/2011	SE89065-15 SS13 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Dichlorvos	mg/kg	<1	<1	<1	<1	<1
Dimethoate	mg/kg	<1	<1	<1	<1	<1
Diazinon	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	78	76	76	74	74
d14-p-Terphenyl (Surr)	%	74	78	74	76	76

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OP Pesticides in Soil by GCMS Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-16 SS14 0.0m-0.1m Soil 25/07/2011	SE89065-17 SS15 0.0m-0.1m Soil 25/07/2011	SE89065-18 SS16 0.0m-0.1m Soil 25/07/2011	SE89065-19 SS17 0.0m-0.1m Soil 25/07/2011
Date Extracted		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Date Analysed		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Dichlorvos	mg/kg	<1	<1	<1	<1
Dimethoate	mg/kg	<1	<1	<1	<1
Diazinon	mg/kg	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2
Bromofos-ethyl	mg/kg	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl	mg/kg	<0.20	<0.20	<0.20	<0.20
2-fluorobiphenyl (Surr)	%	78	76	78	74
d14-p-Terphenyl (Surr)	%	80	78	86	82

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Asbestos ID in soil Our Reference:	UNITS	SE89065-20	SE89065-21	SE89065-22	SE89065-23	SE89065-24
Your Reference	----------	SS30	SS31	SS32	SS33	SS34
Depth	----------	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		25/07/2011	25/07/2011	25/07/2011	25/07/2011	25/07/2011
Date Analysed		28/07/2011	28/07/2011	28/07/2011	28/07/2011	28/07/2011
Sample Description		70g Soil,rocks	98g Soil,rocks	70g Soil,rocks	68g Soil,rocks	55g Soil,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

Asbestos ID in soil Our Reference:	UNITS	SE89065-25	SE89065-26	SE89065-27	SE89065-28	SE89065-29
Your Reference	----------	SS35	SS36	SS37	SS38	SS39
Depth	----------	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m	0.0m-0.1m
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		25/07/2011	25/07/2011	25/07/2011	25/07/2011	25/07/2011
Date Analysed		28/07/2011	28/07/2011	28/07/2011	28/07/2011	28/07/2011
Sample Description		54g Soil,rocks	70g Soil,rocks	58g Soil,rocks	78g Soil,rocks	63g Soil,rocks
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

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Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-1 SS01 0.0m-0.1m Soil 25/07/2011	SE89065-2 QA12 0.0m-0.1m Soil 25/07/2011	SE89065-3 SS02 0.0m-0.1m Soil 25/07/2011	SE89065-4 SS03 0.0m-0.1m Soil 25/07/2011	SE89065-5 QA11 0.0m-0.1m Soil 25/07/2011
Date Analysed (moisture)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Moisture	%	7	11	9	17	18

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-6 SS04 0.0m-0.1m Soil 25/07/2011	SE89065-7 SS05 0.0m-0.1m Soil 25/07/2011	SE89065-8 SS06 0.0m-0.1m Soil 25/07/2011	SE89065-9 SS07 0.0m-0.1m Soil 25/07/2011	SE89065-10 SS08 0.0m-0.1m Soil 25/07/2011
Date Analysed (moisture)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Moisture	%	22	12	30	31	51

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-11 SS09 0.0m-0.1m Soil 25/07/2011	SE89065-12 SS10 0.0m-0.1m Soil 25/07/2011	SE89065-13 SS11 0.0m-0.1m Soil 25/07/2011	SE89065-14 SS12 0.0m-0.1m Soil 25/07/2011	SE89065-15 SS13 0.0m-0.1m Soil 25/07/2011
Date Analysed (moisture)		27/07/2011	27/07/2011	27/07/2011	27/07/2011	27/07/2011
Moisture	%	48	28	25	28	44

Moisture Our Reference: Your Reference Depth Sample Matrix Date Sampled	UNITS ---------- ----------	SE89065-16 SS14 0.0m-0.1m Soil 25/07/2011	SE89065-17 SS15 0.0m-0.1m Soil 25/07/2011	SE89065-18 SS16 0.0m-0.1m Soil 25/07/2011	SE89065-19 SS17 0.0m-0.1m Soil 25/07/2011
Date Analysed (moisture)		27/07/2011	27/07/2011	27/07/2011	27/07/2011
Moisture	%	37	42	72	47

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Method ID	Methodology Summary
AN410	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
AN403	Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C_6-C_9, C_{10}-C_{14}, C_{15}-C_{28} and C_{29}-C_{36}, in accordance with the Australian Institute of Petroleum (AIP). Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the elluent solvents. The GC/FID method is not well suited to the analysis of refined high boiling point materials (i.e. lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol (if care to control volatility is taken). This method will detect naturally occurring hydrocarbons, lipids, organic acids, phenols and PAHs if they are present at sufficient levels, dependant on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN422	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode. Based on USEPA 8270 and 8310.
AN420	Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates, and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD/FID technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. This method complies with AS4964-2004: Method for the Qualitative Identification of Asbestos in Bulk Samples.
AN002	

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QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)				27/7/2011	SE89065-5	27/07/2011 || 27/07/2011	SE89065-16	27/7/2011
Date Analysed (TRH C6-C9 PT)				27/7/2011	SE89065-5	27/07/2011 || 27/07/2011	SE89065-16	27/7/2011
TRH C_6 - C_9 P&T	mg/kg	20	AN410	<20	SE89065-5	<20 || <20	SE89065-16	103%
Date Extracted (TRH C10-C36)				27/07/2011	SE89065-5	27/07/2011 || 27/07/2011	[NR]	[NR]
Date Analysed (TRH C10-C36)				27/07/2011	SE89065-5	27/07/2011 || 27/07/2011	[NR]	[NR]
TRH C_{10} - C_{14}	mg/kg	20	AN403	<20	SE89065-5	<20 || [N/T]	[NR]	[NR]
TRH C_{15} - C_{28}	mg/kg	50	AN403	<50	SE89065-5	<50 || [N/T]	[NR]	[NR]
TRH C_{29} - C_{36}	mg/kg	50	AN403	<50	SE89065-5	<50 || [N/T]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				27/7/2011	SE89065-1	27/07/2011 || 27/07/2011	SE89065-3	27/7/2011
Date Analysed				27/7/2011	SE89065-1	27/07/2011 || 27/07/2011	SE89065-3	27/7/2011
Naphthalene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	78%
Acenaphthylene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	89%
Acenaphthene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	74%
Fluorene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Phenanthrene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	73%
Anthracene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	103%
Fluoranthene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	84%
Pyrene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	87%
Benzo[*a*]anthracene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Chrysene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Benzo[*b*]fluoranthene	mg/kg	0.1	AN422	<0.1	SE89065-1	<0.1 || <0.1	[NR]	[NR]
Benzo[*k*]fluoranthene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Benzo[a]pyrene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	SE89065-3	82%
Indeno[*123-cd*]pyrene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Dibenzo[*ah*]anthracene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Benzo[*ghi*]perylene	mg/kg	0.1	AN422	<0.10	SE89065-1	<0.10 || <0.10	[NR]	[NR]
Total PAHs (sum)	mg/kg	1.6	AN422	<2	SE89065-1	<2 || <2	[NR]	[NR]
Nitrobenzene-d5	%	0	AN422	98	SE89065-1	92 || 90 || RPD: 2	SE89065-3	92%

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QUALITY CONTROL PAHs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
2-Fluorobiphenyl	%	0	AN422	82	SE89065-1	76 || 80 || RPD: 5	SE89065-3	84%
p -Terphenyl-*d* 14	%	0	AN422	86	SE89065-1	84 || 78 || RPD: 7	SE89065-3	106%

QUALITY CONTROL OP Pesticides in Soil by GCMS	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				27/7/2011	SE89065-1	27/07/2011 || 27/07/2011	SE89065-4	27/7/2011
Date Analysed				27/7/2011	SE89065-1	27/07/2011 || 27/07/2011	SE89065-4	27/7/2011
Dichlorvos	mg/kg	1	AN420	<1	SE89065-1	<1 || <1	SE89065-4	79%
Dimethoate	mg/kg	1	AN420	<1	SE89065-1	<1 || <1	[NR]	[NR]
Diazinon	mg/kg	0.5	AN420	<0.5	SE89065-1	<0.5 || <0.5	SE89065-4	78%
Fenitrothion	mg/kg	0.2	AN420	<0.2	SE89065-1	<0.2 || <0.2	[NR]	[NR]
Malathion	mg/kg	0.2	AN420	<0.20	SE89065-1	<0.20 || <0.20	[NR]	[NR]
Chlorpyrifos-ethyl	mg/kg	0.2	AN420	<0.2	SE89065-1	<0.2 || <0.2	SE89065-4	101%
Parathion-ethyl	mg/kg	0.2	AN420	<0.2	SE89065-1	<0.2 || <0.2	[NR]	[NR]
Bromofos-ethyl	mg/kg	0.2	AN420	<0.2	SE89065-1	<0.2 || <0.2	[NR]	[NR]
Methidathion	mg/kg	0.5	AN420	<0.5	SE89065-1	<0.5 || <0.5	[NR]	[NR]
Ethion	mg/kg	0.2	AN420	<0.2	SE89065-1	<0.2 || <0.2	SE89065-4	103%
Azinphos-methyl	mg/kg	0.2	AN420	<0.20	SE89065-1	<0.20 || <0.20	[NR]	[NR]
2-fluorobiphenyl (Surr)	%	0	AN420	82	SE89065-1	76 || 80 || RPD: 5	SE89065-4	78%
d14-p-Terphenyl (Surr)	%	0	AN420	86	SE89065-1	84 || 78 || RPD: 7	SE89065-4	84%

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QUALITY CONTROL Asbestos ID in soil	UNITS	LOR	METHOD	Blank
Date Analysed				[NT]

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	[NT]

QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)		SE89065-15	27/07/2011 || 27/07/2011	[NR]	[NR]
Date Analysed (TRH C6-C9 PT)		SE89065-15	27/07/2011 || 27/07/2011	[NR]	[NR]
TRH C_6 - C_9 P&T	mg/kg	SE89065-15	<20 || <20	[NR]	[NR]
Date Extracted (TRH C10-C36)		SE89065-15	27/07/2011 || 27/07/2011	SE89065-2	27/07/2011
Date Analysed (TRH C10-C36)		SE89065-15	27/07/2011 || 27/07/2011	SE89065-2	27/07/2011
TRH C_{10} - C_{14}	mg/kg	SE89065-15	<20 || [N/T]	SE89065-2	94%
TRH C_{15} - C_{28}	mg/kg	SE89065-15	<50 || [N/T]	SE89065-2	100%
TRH C_{29} - C_{36}	mg/kg	SE89065-15	<50 || [N/T]	SE89065-2	108%

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QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted		SE89065-1 1	27/07/2011 ‖ 27/07/2011
Date Analysed		SE89065-1 1	27/07/2011 ‖ 27/07/2011
Naphthalene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Acenaphthylene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Acenaphthene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Fluorene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Phenanthrene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Anthracene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Fluoranthene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Pyrene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Benzo[*a*]anthracene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Chrysene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Benzo[*b*]fluoranthene	mg/kg	SE89065-1 1	<0.1 ‖ <0.1
Benzo[*k*]fluoranthene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Benzo[a]pyrene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Indeno[*123-cd*]pyrene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Dibenzo[*ah*]anthracene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Benzo[*ghi*]perylene	mg/kg	SE89065-1 1	<0.10 ‖ <0.10
Total PAHs (sum)	mg/kg	SE89065-1 1	<2 ‖ <2
Nitrobenzene-d5	%	SE89065-1 1	94 ‖ 92 ‖ RPD: 2
2-Fluorobiphenyl	%	SE89065-1 1	78 ‖ 78 ‖ RPD: 0
p -Terphenyl-*d14*	%	SE89065-1 1	74 ‖ 76 ‖ RPD: 3

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QUALITY CONTROL OP Pesticides in Soil by GCMS	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted		SE89065-1 1	27/07/2011 ‖ 27/07/2011
Date Analysed		SE89065-1 1	27/07/2011 ‖ 27/07/2011
Dichlorvos	mg/kg	SE89065-1 1	<1 ‖ <1
Dimethoate	mg/kg	SE89065-1 1	<1 ‖ <1
Diazinon	mg/kg	SE89065-1 1	<0.5 ‖ <0.5
Fenitrothion	mg/kg	SE89065-1 1	<0.2 ‖ <0.2
Malathion	mg/kg	SE89065-1 1	<0.20 ‖ <0.20
Chlorpyrifos-ethyl	mg/kg	SE89065-1 1	<0.2 ‖ <0.2
Parathion-ethyl	mg/kg	SE89065-1 1	<0.2 ‖ <0.2
Bromofos-ethyl	mg/kg	SE89065-1 1	<0.2 ‖ <0.2
Methidathion	mg/kg	SE89065-1 1	<0.5 ‖ <0.5
Ethion	mg/kg	SE89065-1 1	<0.2 ‖ <0.2
Azinphos-methyl	mg/kg	SE89065-1 1	<0.20 ‖ <0.20
2-fluorobiphenyl (Surr)	%	SE89065-1 1	78 ‖ 78 ‖ RPD: 0
d14-p-Terphenyl (Surr)	%	SE89065-1 1	74 ‖ 76 ‖ RPD: 3

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QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)		SE89065-1	27/07/2011 || 27/07/2011
Date Analysed (TRH C6-C9 PT)		SE89065-1	27/07/2011 || 27/07/2011
TRH C_6 - C_9 P&T	mg/kg	SE89065-1	<20 || [N/T]
Date Extracted (TRH C10-C36)		SE89065-1	27/07/2011 || 27/07/2011
Date Analysed (TRH C10-C36)		SE89065-1	27/07/2011 || 27/07/2011
TRH C_{10} - C_{14}	mg/kg	SE89065-1	<20 || <20
TRH C_{15} - C_{28}	mg/kg	SE89065-1	<50 || <50
TRH C_{29} - C_{36}	mg/kg	SE89065-1	<50 || <50

QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)		SE89065-11	27/07/2011 || 27/07/2011
Date Analysed (TRH C6-C9 PT)		SE89065-11	27/07/2011 || 27/07/2011
TRH C_6 - C_9 P&T	mg/kg	SE89065-11	<20 || [N/T]
Date Extracted (TRH C10-C36)		SE89065-11	27/07/2011 || 27/07/2011
Date Analysed (TRH C10-C36)		SE89065-11	27/07/2011 || 27/07/2011
TRH C_{10} - C_{14}	mg/kg	SE89065-11	<20 || <20
TRH C_{15} - C_{28}	mg/kg	SE89065-11	<50 || <50
TRH C_{29} - C_{36}	mg/kg	SE89065-11	<50 || <50

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Sampled by the client

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

No respirable fibres detected using trace analysis technique.

No Asbestos Fibres Detected at the LOR of 0.01% w/w.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

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Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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SAMPLE RECEIPT ADVICE (SRA)

26 July 2011

Client Details			Laboratory Details		
Requested By	:	**Chris Appelkamp**			
Client	:	Coffey Environments Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Chris Appelkamp	Manager	:	Edward Ibrahim
Address	:	118 Auburn Street Wollongong NSW 2500	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	chris_appelkamp@coffey.com	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 4201 1400	Telephone	:	61 2 8594 0400
Facsimile	:	02 4201 1401	Facsimile	:	61 2 8594 0499
Project	:	ENAUWOLL04006AA	Report No	:	**SE89065**
Order Number	:	28723-28724	No. of Samples	:	29
Samples	:	20 Soils	Due Date	:	29/07/2011

Date Instructions Received	:	26/07/2011
Sample Receipt Date	:	26/07/2011

Samples received in good order	:	YES	Samples received in correct containers	:	YES
Samples received without headspace	:	YES	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice
Sample containers provided by	:	Other Lab	Samples clearly Labelled	:	YES
Turnaround time requested	:	3 Days	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

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

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Member of the SGS Group (SGS SA)

Client : Coffey Environments Pty Ltd Report No : SE89065
Project : ENAUWOLL04006AA

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.
Please indicate ASAP if your request differs from these details.
Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.
Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	TRH in soil with C6-C9 by P/T	PAHs in Soil	OP Pesticides in Soil by GCMS	Asbestos ID in soil	Moisture
1	SS01	X	X	X	X		X
2	QA12	X	X	X	X		X
3	SS02	X	X	X	X		X
4	SS03	X	X	X	X		X
5	QA11	X	X	X	X		X
6	SS04	X	X	X	X		X
7	SS05	X	X	X	X		X
8	SS06	X	X	X	X		X
9	SS07	X	X	X	X		X
10	SS08	X	X	X	X		X
11	SS09	X	X	X	X		X
12	SS10	X	X	X	X		X
13	SS11	X	X	X	X		X
14	SS12	X	X	X	X		X
15	SS13	X	X	X	X		X
16	SS14	X	X	X	X		X
17	SS15	X	X	X	X		X
18	SS16	X	X	X	X		X

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd Report No : SE89065
Project : ENAUWOLL04006AA

Sample No.	Description	No Prep Required	TRH in soil with C6-C9 by P/T	PAHs in Soil	OP Pesticides in Soil by GCMS	Asbestos ID in soil	Moisture
19	SS17	X	X	X	X		X
20	SS30					X	
21	SS31					X	
22	SS32					X	
23	SS33					X	
24	SS34					X	
25	SS35					X	
26	SS36					X	
27	SS37					X	
28	SS38					X	
29	SS39					X	

Sample No.	Description
1	SS01
2	QA12
3	SS02
4	SS03
5	QA11
6	SS04
7	SS05
8	SS06
9	SS07

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Coffey Environments Pty Ltd
Project : ENAUWOLL04006AA

Report No : SE89065

Sample No.	Description
10	SS08
11	SS09
12	SS10
13	SS11
14	SS12
15	SS13
16	SS14
17	SS15
18	SS16
19	SS17
20	SS30
21	SS31
22	SS32
23	SS33
24	SS34
25	SS35
26	SS36
27	SS37
28	SS38
29	SS39

coffey

Chain of Custody

No: 28723

Laboratory Quotation / Order No:

Job No: ENAWB0104006AA Sheet 1 of 2

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL	Sampled by: Chris Appelkamp	Consigning Officer: CA Date Dispatched: 25/7/11
Attention: Sample Receipt	Project Manager: (report results to) Chris Appelkamp + Manuel Fernandez	Courier Service: M+B Consignment Note No: 400615

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Chris Appelkamp	25/7/11	5pm		26/07	12:00

Comments	Sample Matrix	Container Type and Preservative	Sample No.		Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals:	OPP	Sample Condition on Receipt
0.0m - 0.1m	Soil	250g Jar	SS01	1	25/7/11	✓	✓			✓	
			QA12	2		✓	✓			✓	
			SS02	3		✓	✓			✓	
			SS03	4		✓	✓			✓	
			QA11	5		✓	✓			✓	
			SS04	6		✓	✓			✓	
			SS05	7		✓	✓			✓	
			SS06	8		✓	✓			✓	
			SS07	9		✓	✓			✓	
			SS08	10		✓	✓			✓	
			SS09	11		✓	✓			✓	
			SS10	12		✓	✓			✓	
			SS11	13		✓	✓			✓	
			SS12	14		✓	✓			✓	
			SS13	15		✓	✓			✓	
			SS14	16		✓	✓			✓	
			SS15	17		✓	✓			✓	

SGS
Received 26/07/11
By SS
Time ..... 12:00 pm
Samples Intact (yes)
Ice/Cooler Pack ..... (yes)
Temperature on Receipt 4°C
Storage Location 6 rack - 9, ASB
SE 89065

Special Laboratory Instructions:

Detection Limits: Standard.

Turnaround Required: 3 days (booked in on Friday).

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

6422010/9 (96)

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

No: 28724

Coffey

Chain of Custody

Laboratory Quotation / Order No:

Job No: EW0400GWA Sheet 2 of 2

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL	Sampled by: CHRIS Appelkamp	Consigning Officer: CA Date Dispatched: 25/7/11
Attention: Sample Receipt	Project Manager: (report results to) CHRIS Appelkamp / Manuel Fernandez	Courier Service: M+B Consignment Note No: 400615

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CA	25/7/11	5pm		26/07	12.00

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	PAHs	TPHs	MAHs = BTEX	Metals: Asbestos	OPP	Sample Condition on Receipt
0.0–0.1	Soil		18 SS16	25/7/11	/	/			/	
	↓	Soil Zip Bag	19 SS17		/	/			/	
			20 SS30					/		
			21 SS31					/		
			22 SS32					/		
			23 SS33					/		
			24 SS34					/		
			25 SS35					/		
			26 SS36					/		
			27 SS37					/		
			28 SS38					/		
			29 SS39					/		
			30							

26/07/11 S.S 12:00 PM 4°C

SE89065

Special Laboratory Instructions:

Detection Limits: Standard.

Turnaround Required: 3 days (mid day Fri)

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

64220/9-06

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

Appendix G
Data Validation Reports

ACID SULFATE SOIL, CONTAMINATION AND GEOTECHNICAL INVESTIGATION
BOMADERRY NSW

Table E2: Relative Percentage Difference for Soil Samples

Batch	SE87472			SE88232		
	Primary Sample Conc. (mg/kg)	Duplicate Sample Conc. (mg/Kg)	RPD (%)	Primary Sample Conc. (mg/kg)	Duplicate Sample Conc. (mg/Kg)	RPD (%)
Sample No.	CTP26	QA01		SS03	QA11	
Depth (m)	0.4-0.5	0.4-0.5		0.0-0.1		
Analyte						
HEAVY METALS						
Arsenic	<3	3	NA	3	<3	NA
Cadmium	<0.3	<0.3	NA	0.5	0.4	22.22
Chromium	9.3	9.8	5.24	26	11	**81.08**
Copper	13	15	14.29	13	11	16.67
Lead	9.7	9.9	2.04	65	76	15.60
Nickel	7.4	11	39.13	1.2	1	18.18
Zinc	31	42	30.14	72	43	**50.43**
Mercury	<0.05	<0.05	NA	0.16	0.16	0.00
TOTAL PETROLEUM HYDROCARBONS						
C6 - C9 Fraction	<20	<20	NA	NA	NA	NA
C10 - C14 Fraction	<20	<20	NA	NA	NA	NA
C15 - C28 Fraction	<50	<50	NA	NA	NA	NA
C29 - C36 Fraction	<50	<50	NA	NA	NA	NA
Total C10-C36	<LOR	<LOR	NA	NA	NA	NA
BTEX						
Benzene	<0.1	<0.1	NA	<0.1	<0.1	NA
Toluene	<0.1	<0.1	NA	<0.1	<0.1	NA
Ethylbenzene	<0.1	<0.1	NA	<0.1	<0.1	NA
Total Xylene	<0.3	<0.3	NA	<0.3	<0.3	NA
POLYCYCLIC AROMATIC HYDROCARBONS						
Benzo(a)pyrene	<0.1	<0.1	NA	NA	NA	NA
Total PAH	<LOR	<LOR	NA	NA	NA	NA
ORGANOCHLORINE PESTICIDES						
Heptachlor	<0.1	<0.1	NA	<0.1	<0.1	NA
Chlordane	<0.2	<0.2	NA	<0.2	<0.2	NA
Aldrin + Dieldrin	<LOR	<LOR	NA	<LOR	<LOR	NA
DDT + DDE + DDD	<LOR	<LOR	NA	<LOR	<LOR	NA
Other OCP	<LOR	<LOR	NA	<LOR	<LOR	NA
ORGANOPHOSPHOROUS PESTICIDES						
Total OPP	<LOR	<LOR	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS						
Total PCB	<LOR	<LOR	NA	<LOR	<LOR	NA
ASBESTOS	ND	-	NA	NA	NA	NA

Notes:

Bold RPD exceeds control limit of 50%

ND Not Detected

\- Not Tested

LOR Limits of Reporting

NA Not Applicable

Coffey Environments Australia Pty Ltd

A.C.N. 140 765 902 A.B.N. 65 140 765 902

QA/QC DATA VALIDATION REPORT

Job No: ENAUWOLL04006AA Batch: SE87472, SE88232

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

I. SAMPLE HANDLING

	Yes	No (Comment below)
1. Were the sample **holding times** met?	☒	☐
2. Were the samples in **proper custody** between the field and reaching the laboratory?	☒	☐
3. Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

COMMENTS:

Sample Handling was: ☒ Satisfactory ☐ Unsatisfactory ☐ Partially Satisfactory

II PRECISION/ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☒	☐
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

COMMENTS:

Precision/Accuracy of the Laboratory Report	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

III. FIELD QA/QC

1. Number of Primary Samples Analysed — Soil: 16; Water: N/A

2. Number of Days of Sampling: — Soil: 2; Water: N/A

3. Number and Type of QA/QC Samples Collected:

	SOIL	WATER
Field Duplicates (at least 1 in 10 samples)	2 intra lab + 0 inter lab	N/A
Trip Spikes	1	N/A
Trip Blanks (at least 1/day or sampling event)	1	N/A
Wash Blanks (at least 1/day/matrix/equipment)	1	N/A
Other (Field Blanks, etc.)	N/A	N/A

4. FIELD DUPLICATES

	Yes	No (Comment below)
A. Were an Adequate Number of field duplicates analysed for each chemical (min. 10%)?	☒	☐
B. Were RPDs within Control Limits?		
a. Organics (< 50 % for soil; < 30% for water)	☒	☐
b. Metals/Inorganics (< 50 % for soil; < 30% for water)	☐	☒

COMMENTS:

- In batch SE88232, the RPD of 50% and 81%, above the control limit of 50%, was recorded for zinc and chromium respectively between soil duplicate pairs (See Table I1). These RPDs are considered to be attributed to the heterogeneous nature of the contaminant distribution throughout the soil/fill matrix. Some variability may be expected for these analytes.
- In batch SE88232, an inconsistency was recorded between soil duplicate pairs for arsenic (Refer to Table I1). The contaminant was detected in primary sample but was not detected in duplicate sample. This result is not considered significant as concentrations were close to the LOR.

5. TRIP BLANKS

	Yes	No (Comment below)
A. Were an adequate number of trip blanks collected?	☒	☐
B. Were the trip blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

6. TRIP SPIKES

	Yes	No (Comment below)
A. Were an adequate number of trip spikes collected?	☒	☐
B. Were the spike recoveries within control limits (60% to 110%)?	☒	☐

7. WASH BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Wash Blanks collected?	☐	☒
B. Were the Wash Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

COMMENTS:

- In batch SE87472, soil samples were either collected directly from the excavator bucket or ground surface using a clean pair of disposable gloves for each sample and therefore a wash blank sample was not necessary.

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

IV LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1. Type of QA/QC Samples

	TPH (C_6-C_9), BTEX	TPH (C_{10}-C_{36})	PAH	OCP	OPP	PCB	Metals	Asbestos
Laboratory Blanks/Reagent Blanks (at least 1 per batch)	2	1	1	2	1	2	2	N/A
Laboratory Duplicates (at least 1 per batch or 1 per 10 samples whichever is the smaller)	2	1	1	3	1	3	3	N/A
Matrix Spikes/Matrix Spike Duplicates (1 for each soil type)	1	-	-	1	-	2	2	N/A
Laboratory Control Spike	1	1	1	2	1	1	2	N/A
Surrogate (where appropriate)*	1	-	3	1	2	1	-	N/A

*Number of surrogates spikes carried out on each sample

	Yes	**No** (Comment below)
2 Were the laboratory blanks/reagents blanks free of contamination?	☒	☐
3. Were the spike recoveries within control limits?		
a. Organics (60% to 110%)	☒	☐
b. Metals/Inorganic (70% to 130%)	☒	☐
4. Were the RPDs of the laboratory duplicates within control limits?	☒	☐
5. Were the surrogate recoveries within control limits?	☒	☐

COMMENTS:

- Samples with surrogate or spike recoveries outside the upper control limit but with concentrations below the LOR have all been disregarded.

5. The laboratory internal QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

V. DATA USABILITY

1. Data Directly Usable ☒
2. Data Usable with the following corrections/modifications (see comment below) ☐
3. Data Not Usable. ☐

COMMENTS:

QA/QC Report Prepared by Alexander Williams

QA/QC Report Reviewed by: _____
(Reviewer)

Appendix H
Railcorp Requirements for Minor Underbores

GUIDENLINES FOR MINOR UNDERBORING

1. General

1.1 Purpose

The following simplified guidelines have been developed to address track and geotechnical requirements for minor underboring as a supplement to SPC 207. Minor underboring is where the work is of a size and depth such as to have negligible impact on rail tracks and other rail infrastructure. As such the monitoring and other requirements are reduced as detailed below.

1.2 Scope

This guideline only addresses the requirements for the underboring activity itself. The type of crossing (such as for water pipes and gas pipelines) may require additional assessment including of future safety and stability for example ESC 540 for Service Installations. These aspects are to be managed in accord with existing requirements.

1.3 Terms

There following terms are used in this document to describe the requirements

Sheathing:

Boring can be either sheathed where a conduit is installed as part of the boring process or unsheathed where the hole is bored first and the conduit inserted into the bored hole.

Stiff Soils

For underboring it is important to establish whether the hole will be self-supporting during the boring process. Stiff soils such as stiff clay, shale, rock will be self supporting. For these materials the hole can be bored without sheathing

2. Requirements for Minor Underboring

To utilise the simplified guidelines the following conditions must be met:

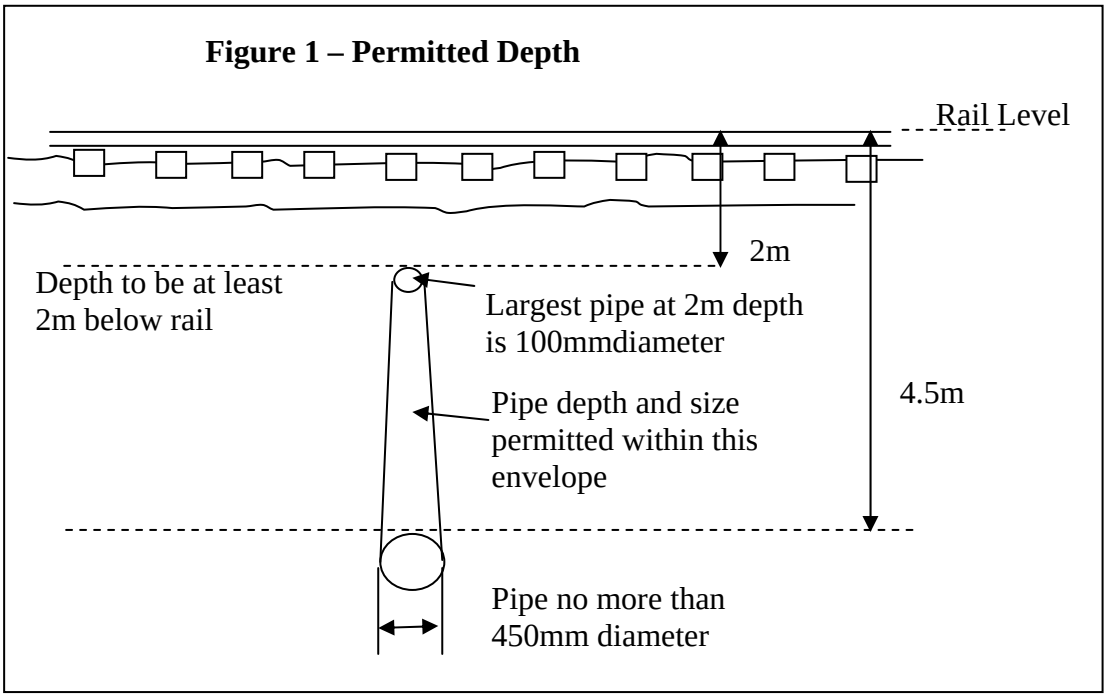
2.1 Pipe Diameter and Depth Limits

There are limits on the pipe diameter and on the depth below rail.

- The minimum depth permitted is 2m below rail level
- The maximum pipe diameter is 450mm
- Up to 100mm diameter at a minimum of 2m depth below rail
- Up to 450mm diameter at a minimum of 4.5m depth below rail
- Or any combination between 2m and 4.5m in depth within a diameter determined by linear interpolation.

See figure 1.

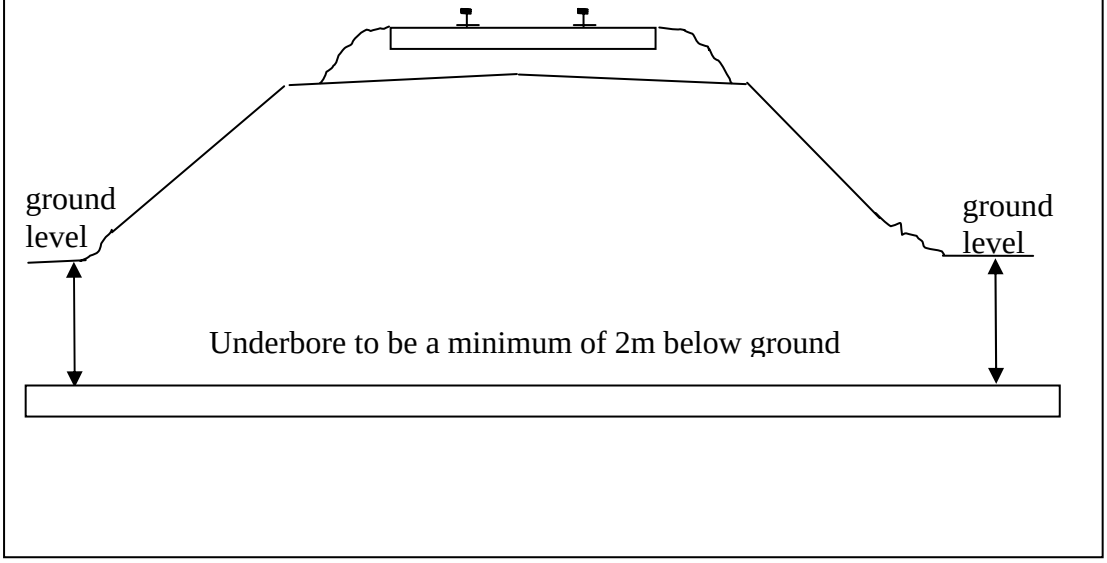
Figure 1 – Permitted Depth



2.2 Special Requirements for Embankments

Underbores must be a minimum of two metres below the natural ground level either side of an embankment. The underbore must also meet the minimum depth below rail level specified above.
See figure 2

Figure 2 – Permitted Depth at Embankments



2.3 Sheathing and Stiff Soils

Where stiff soils only are encountered in the underbore then sheathing is not required. Where soils are not stiff or where conditions are not known then only sheathed underbores are permitted.

2.4 Geotechnical Assessment

All underboring must be assessed by a geotechnical engineer. The assessment must establish:

- if the soil material can be established as stiff and will be self supporting or otherwise
- whether any additional testing, excavation is required including determination of soil characteristics
- any site features or characteristics that would bear on the prospective ground/ track settlement.

2.5 Structures

All structures, masts buildings power poles etc must be at least 2m clear horizontally from the zone of influence (45 degrees upwards from the pipe).

Note that there additional clearance requirements both vertical and horizontal depending on the particular services involved.

2.6 Proximity to Turnouts or Special Trackwork

No underboring can be carried out at any location under, or within 10m of, turnouts or special trackwork (as catchpoints, expansion switches, diamonds, slips etc.).

3. Site Work and Monitoring

It is important that there is sufficient control and supervision of the site work to ensure there is no impact on the railway. Minimum requirements are:

3.1 Boring Requirements

The boring contractor must be a substantial organisation with demonstrated experience in underboring under railways or equivalent sensitive structures. Systems and controls must be in place that ensure the boring hole follows the design path for the length of the bore. Above ground tracking equipment should be applied where the location cannot be accurately determined from the driving control.

3.2 Geotechnical Supervision

Work must be supervised by a geotechnical engineer to confirm the boring is proceeding as expected and the material being excavated is as expected. The geotechnical supervisor must also verify the completion of the work to plan including consideration of any movements detected. The geotechnical engineer must identify any potential problems or possible future unexpected settlement.

The findings must be reported to the nominated contact from the track maintenance organisation.

3.3 Site Security

Site planning must ensure that the site remains safe at all times including:
if the site has to be vacated due to suspension of the work (occurring over multiple days); or in the event of extreme weather conditions affecting the site such as heavy rain.

The boring operation must be managed so that it is not vulnerable to rain or extreme weather events including when staff are absent.

3.4 Safety Supervision

A worksite protection officer must be present (minimum PO1). The protection officer can respond to any irregularity by suspending train operation.

For lines where there are train running sensitivities it is recommended that a track assessor (minimum qualification RailCorp “Maintain Track Geometry”) is also present. The track assessor can respond to any irregularity by assessing the track and applying appropriate restrictions.

The working protection officer and the track assessor can be the same person.

3.5 Track Monitoring

The minimum monitoring required is for a precisely located paint mark on the web of each rail directly above the underbore. The vertical position of the rail is to be monitored during the underboring operation. As an alternative the top of the rail can be monitored with a survey staff but this will require appropriate track protection. Monitoring must be carried out with an accuracy of + or- 2mm by staff competent to use the relevant equipment.

Monitoring pegs must also be placed in the ground clear of ballast the on the approach to the track (and including the sides and top of any embankment) to verify that there is no unexpected ground movement.

The minor boring classification can only be sustained if the track movement due to boring is negligible (i.e. not greater than 4mm). Otherwise work must cease and track maintenance staff notified.

Monitoring is to be carried out at least hourly whilst underboring is at or near the track and at the end of the day before leaving the site. The minimum level of follow up monitoring is to be readings after one day of rail traffic.

Track maintenance staff must be notified where minor underboring has been carried out and they will monitor the track during normal patrol inspections.

3.6 Train Operations

For minor underboring carried out within these guidelines the work can be carried out under traffic. If trains are frequent monitoring should be increased to half hourly.

4. Management of Guidelines

It is envisaged that the requirements under this guideline will be managed by the relevant District Maintenance Office, relevant coordinating group (such as External Party Works) and utilising the configuration management process.

Projects meeting the requirements for minor underboring will not need to be submitted for integrity review by Chief Engineer Track, Principal Geotechnical Engineer or their delegates. Though advice can be sought if required.

ANNEXURE 10b

ANNEXURE 10b

Additional Information on Groundwater Issues

prepared by

Coffey Environments Pty Ltd
and
URS Australia

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

8 December 2011

Manildra Group
C/- Cowman Stoddart Pty Ltd
PO Box 738
NOWRA NSW 2541

Attention: Stephen Richardson

Dear Stephen

RE: ADDITIONAL INFORMATION ON HYDROGEOLOGY
PROPOSED GAS PIPLINE, BOMADERRY, NSW

Coffey Environments Australia Pty Ltd (Coffey) was requested to carry out a desktop review of hydrogeological information in relation to the proposed gas pipeline route to provide additional information to supplement the previous Coffey report (Ref: Acid Sulfate Soil, Contamination and Geotechnical Investigation – Proposed Gas Pipeline Route, Bomaderry, NSW ENAUWOLL04006AA-R01, dated 29 July 2011). We understand that this additional information was required to respond to queries following submission of the Environmental Assessment for this project.

Based on a desktop review of data obtained during the investigations mentioned above, as well as groundwater levels, bore construction details, lithology, topology, and bore yield information available from NSW DPI Office of water, an estimated daily groundwater discharge volume has been calculated for four segments (A-D) along the path of the proposed pipeline (See Table 1).

These segments have been interpreted as zones where the pipeline has indicated potential to experience localised groundwater inflow. Each zone takes into account expected depth of excavation works (assumed maximum of 2.5m), observed depth to groundwater, observed lithology, as well as observed and theoretical yields of the intersected surface aquifer. (Note that the groundwater intersections observed may be representative of perched groundwater systems, although insufficient information was available to establish this).

Coffey Environments Australia Pty Ltd ABN 65 140 765 902
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PO Box 1651 Wollongong 2500 Australia
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Table 1: Estimated Groundwater Seepage Segment Summary

Segment	From Coffey Test Location	To Coffey Test Location	Estimated Daily Groundwater Ingress (L/day)
A	CBH01	CTP05	60 - 600
B	CTP08	CTP11	48 - 480
C	CTP11	CTP13	59 - 590
D	CTP19	CTP21	20 - 200
		Estimated Total	187 - 1870

**Quoted locations taken from Coffey 2011 Assessment*

The estimated ingress rates are based on a number of assumptions including that under boring of stream crossings takes place and does not account for direct and or indirect inflow of stream water during excavation and or installation works at stream crossings.

It is noted that the likely range of groundwater to be extracted is based on limited hydrogeological information, and may be variable, depending on intersected lithology, standing groundwater levels, final excavation depths, installation specifics and weather conditions during and preceding the works.

Extracted groundwater should be sampled and tested to assess contamination status as well as salinity (TDS) for protection of beneficial use and discharge requirements.

Please do not hesitate to contact the undersigned if you have any questions in relation to this letter.

For and on behalf of Coffey Environments Australia Pty Ltd

MANUEL FERNANDEZ
Principal

URS

2 February 2012
Project No. 43167736

Manildra Group
PO Box 2541
Nowra NSW 2541

Attention: Brian Hanley
Energy and Sustainability Manager

Dear Brian

Subject: Bomaderry Lateral - Pipeline Trench Water Management Guidelines

Manildra Group's Shoalhaven Starches requested URS Australia to provide guidelines for the management of pipeline trenchwater inflows.

URS has developed propsed guidelines below, based on Coffey Environments letter to Cowman Stoddart as part of the EA review process, dated December 2011 titled: "ADDITIONAL INFORMATION ON HYDROGEOLOGY PROPOSED GAS PIPLINE, BOMADERRY, NSW".

In assessing the pipeline route geotechnical issues from bores and trenches, Coffey Environments indicated a range of estimated water inflow rates at various locations but did not address potential water quality parameters such as pH, total suspended solids (TSS) and total dissolved solids (TDS).

URS' 2009 Manildra Bomaderry Lateral FEED study and subsequent review dated March 2010, the pipeline route was assessed to identify potentially acid sulphate soil zones which may result in trench waters that may potentially require acid neutralisation treatment prior to disposal.

URS has proposed, as part of the FEED study that pipeline trench open times be limited to a minimum to avoid oxidation and potential acid formation for both excavated trench soils and any trench water in the potentially identified acid sulphate soil areas, located predominantly in the southern sections the proposed lateral pipeline route.

URS suggest any significant trench water inflows first be characterised, by measurement of pH, total suspended solids (TSS) and total dissolved solids (TDS). Any trench water inflows, if deemed excessive, after meeting test parameters to ensure qualities similar to local stormwater catchments into local receiving roadside drainage criteria, would be pumped out for the trench. Disposal as required, would be into the appropriately designed roadside settlement drains and structures used to control runoff and erosion.

Proposed guidelines for acceptance for surface discharge are proposed as below in Table 1:

Table 1; Surface Water Discharge acceptance Guidelines

Parameter	Unit	Value
pH		6-8
TDS	mg/L	7500
TSS	mg/L	400

pH

If excessive TSS is encountered, suitable haybail sediment filters would be used to reduce TSS to an acceptable level and any filtered trenchwater would be allowed to drain into the natural stormwater drainage systems as part of any stored trench excavation materials runoff and erosion controls along the pipeline route.

Should, however, the trenchwater be found to exceed the guidelines from the influence of acid sulphate soils, potentially encountered along the proposed pipeline route, trenchwater will be pumped out into a suitable IBC container, assessed and treated to meet criteria suitable for disposal into the Shoalhaven City Council trade waste sewage treatment plant criteria prior to disposal at the facility. Any required pH, TSS or TDS adjustment would be carried out as required prior to disposal.

Should any additional extraordinary pollutants be encountered as part of the excavations. The trench soils and water would be investigated and classified into the appropriate Hazardous material or Hazardous liquid waste classification and treated appropriately prior to disposal.

Yours sincerely
URS Australia Pty Ltd

Alex Horn
Principal Engineer

ANNEXURE 11

Traffic Impact Assessment

prepared by

Stapleton Transportation & Planning

ANNEXURE 11

Shoalhaven Starches, Bomaderry

Proposed Gas Pipeline

Construction Traffic Impact Assessment

December 2010 FINAL REPORT

prepared for

Shoalhaven Starches Pty Ltd

prepared By

Stapleton Transportation & Planning Pty Ltd

STAPLETON TRANSPORTATION AND PLANNING Pty Ltd

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Introduction

Shoalhaven Starches Pty Ltd (SSPL) proposes the construction of a new gas pipeline between the Shoalhaven Starches site, Bolong Road Bomaderry (the SSPL Site), and the Eastern Gas Pipeline (EGP) at Pestells Lane, Meroo Morrow (the Project).

Stapleton Transportation & Planning Pty Ltd (STAP) has been commissioned to examine the general access, traffic and parking issues associated with the construction of the gas pipeline (termed the Construction Project by STAP for ease of reference). STAP has examined the general feasibility of the Construction Project, and specifically whether the proposed route is practical when considering existing access, traffic and parking demands, and then available management strategies to minimise any potential impacts associated with the Construction Project. In this regard, potential impacts are associated with: -

- Construction vehicles travelling to and from the pipeline work-zone, essentially a 'moving' site which would progress along the route excavating a trench or boring under key roads; laying the pipe; and then remediating trenches and bore excavations.

- Construction vehicle parking adjacent to the pipeline work-zone.

- Potential localised impacts adjacent to the pipeline work-zone.

As part of our assessment, STAP has reviewed and responded to the assessment requirements/issues provided by the key consulting agencies in regard to the Construction Project; these include; -

- The **NSW Department of Planning** Director Generals Requirements (DGRs) in relation to the Preliminary Environmental Assessment, June 2010 (Preliminary EA) for the Project (Ref: MP 10 _0108) which include: -

    - *an assessment of the potential for disruption to traffic and increase in traffic movements during the construction phase, prepared in accordance with the NSW Roads and Traffic Authority's Guide to Traffic Generating Developments;*
    - *an assessment of the impacts on any road or rail infrastructure and proposed measures to mitigate these impacts*

    STAP notes that an assessment of potential impacts on road and rail infrastructure will be undertaken separately as part of the broader Environmental Assessment for the Project.

- The **RTA**s response (18/10/10) to the Preliminary EA relates specifically to the Princes Highway, and includes the following general requirements: -

    - *Use of construction methods that do not require trenching*
    - *Appropriate location of work-zones away from the road carriageway*
    - *Appropriate management of all work-zones to ensure traffic safety and efficiency*

- The **Shoalhaven City Council** (Council) response (22/10/10) to the Preliminary EA does not speak directly to any traffic issues, but in our subsequent discussions with Council (Mr Scot Well) it was generally agreed that the provision of appropriate traffic control around all work-zones would ensure a safe and efficient construction phase; and that the temporary and relatively minor construction traffic generation would not compromise existing local levels of service or capacity.

These issues are detailed further in **Section 2** below.

This Construction Traffic Impact Assessment (CTIA) does not provide detailed proposals for traffic management/control at the work-zones which would be established along the proposed Construction Project route, and be utilised to minimise any potential access, capacity and safety impacts associated with the Construction Project. STAP acknowledges (and recommends) that a detailed Construction Traffic Management Plan (CTMP) will need to be developed in consultation with Council and the RTA with reference to the appropriate Australian Standards once the final route and construction techniques are determined.

General information in regard to the Construction Project has been provided to STAP by SSPL and by Cowman Stoddart Pty Ltd, who are coordinating the Environmental Assessment for the Project on behalf of SSPL. STAP has also referenced the Preliminary EA prepared by Cowman Stoddart for the Project.

1 The Construction Project

1.1 Route

It is proposed that a new gas pipeline be constructed between the primary Shoalhaven Starches site south of Bolong Road and the Eastern Gas Pipeline at the existing Bomaderry Meter Station; the pipeline route is shown in **Figure 1.1.**

Figure 1.1 Proposed Gas Pipeline Route