



**Stage 2 - Detailed Site
Contamination Investigation,
Acid Sulfate Soil
Assessment and Preliminary
Water Quality Monitoring
Report**

**Lot 4 RP817122 Shoal Point,
Mackay, Queensland**

**Prepared for
Sunland Group Limited**

November, 2004



Originating office:

**Suite 12, Riverwalk One
Robina Town Centre Drive, Q4230
PO Box 4115, Robina Q4230
Telephone 07 5578 9944
Facsimile 07 5578 9945
gsrobina@bigpond.com**

Also at Kawana and Ballina

Table of Contents

1. Introduction	3
1.1 Background	3
1.2 Scope of works	4
2. Site description	5
2.1 Property description	5
2.2 Geology, hydrogeology and soils	5
2.3 Soil classification and distribution	7
2.3.1 Anthroposols	7
2.3.2 Hydrosols	7
2.3.3 Dermosols	7
2.4 Topography and drainage	8
2.5 Vegetation	8
2.6 Current and historical land use	8
2.7 Surrounding land use	9
3. Subsurface investigations	10
3.1 Stage 2 – Detailed site contamination investigation	10
3.2 Acid sulfate soil investigation	10
3.3 Preliminary water quality monitoring	11
4. Stage 2 – Detailed Site Contamination Investigation	12
4.1 Investigation threshold levels	12
4.2 Results and discussion	12
4.3 Quality assurance	13
4.4 Dip bath liquid & groundwater	14
4.5 Conclusion and recommendations	15
5. Acid Sulfate Soil Investigation	16
5.1 Screening results	16
5.2 Analytical results	25
5.3 Discussion and recommendations	26
6. Water quality monitoring	27
6.1 Groundwater	28
6.1.1 pH	28
6.1.2 Electrical conductivity	28
6.1.3 Suspended solids / turbidity	28
6.1.4 Chloride: Sulfate ratio	28
6.2 Surface waters	28
7. Statutory declaration	29
Appendix A. Drawings	30
Appendix B. Land title, registered plan & smart map	31
Appendix C. Soil borelogs	32
Appendix D. Certificates of analysis, quality control reports and chain of custody documentation	33
Appendix E. Acid Sulfate Management Plan	34

1. Introduction

1.1 Background

Gilbert and Sutherland Pty Ltd was commissioned by Sunland Group Limited to undertake a Stage 2 – Detailed Site Contamination Investigation, an Acid Sulfate Soil Assessment and Preliminary Water Quality Monitoring within the bounds of Lot 4 RP817122, Shoal Point, Mackay, Queensland. The total area of the site is approximately 96.78 hectares. Sunland Group Limited proposes to develop the northern portion of the site (approximately 60 hectares) for low to medium density housing. The location of the site is shown on Drawing GJ0389.1.1 (Appendix A).

The investigations were undertaken in accordance with:

- the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland¹;
- State Planning Policy 2/02²;
- the Soil Management Guidelines³; and
- the Murray-Darling Basin Groundwater Sampling Guidelines⁴.

The aims of the investigations were to:

- identify past and present potentially contaminating land use activities;
- determine the type and distribution of potential soil contaminants within the vicinity of a livestock dip located at the site;
- determine the distribution and severity of acid sulfate acid soils at the site;
- provide site specific options for the management of potentially contaminated soils and acid sulfate soils in view of proposed disturbances, and
- provide site specific options for managing groundwater and surface water discharge.

¹ Queensland Government Department of Environment. 1998. Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, May 1998.

² Department of Natural Resources and Mines. State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils (SPP 2/02). Natural Resources Sciences - Department of Natural Resources and Mines. Indooroopilly, Queensland.

³ Dear, S. E. Dobos, S. K. Moore, N. G. Watling, K. M. and Ahern, C. R. 2002. Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines. Version 3.7, November 2002. Department of Natural Resources and Mines, Indooroopilly, Queensland.

⁴ Murray-Darling Basin Commission, 1997, Murray-Darling Basin Groundwater Sampling Guidelines, MDBC Technical Report No 3, Technical Report Series, Groundwater Working Group, Murray Darling Basin Commission, August 1997.



1.2 Scope of works

The scope of work undertaken by Gilbert and Sutherland was as follows:

- Historical review of land use based on a site inspection and review of aerial photographs.
- Drilling of twenty-three (23) boreholes across areas of the site below 5m Australian Height Datum (AHD). All boreholes were drilled to a minimum depth of 1m below the possible depth of disturbance. Samples were recovered from each borehole at 0.25m depth intervals and screen tested (pH_F & pH_{FOX}) for acid sulfate potential. A selection of these samples was also tested using the Chromium Reducible Sulfur (S_{CR}) and Total Actual Acidity (TAA) methods;
- Drilling of twenty-two (22) boreholes around the disused livestock dip. Representative soil samples were recovered at various depth intervals from each of the boreholes and analysed for organochlorine and organophosphorus pesticides, arsenic and lead. Two (2) samples of dip bath liquid were recovered and analysed for arsenic, lead and organochlorine and organophosphorus pesticides;
- Three (3) piezometers were installed across the site to determine the variability in groundwater depth and to provide a route for the recovery of groundwater samples. Three (3) groundwater samples were recovered from the piezometers on 30.10.04 and analysed for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate. One of the three piezometers was installed adjacent to the livestock dip and was additionally analysed for arsenic, lead and organochlorine and organophosphorus pesticides;
- To establish background water quality conditions for the site and adjacent waters, four (4) surface water samples were recovered on 30.10.04 and were subsequently analysed for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate.



2. Site description

2.1 Property description

The current land title, registered plan and smart map for the property were obtained from the Queensland Government Department of Natural Resources, Mines and Energy and are presented in Appendix B. The survey plan for the property is shown on Drawing GJ0389.1.2 (Appendix A).

A summary of the relevant property details is provided in Table 2.1.1.

Table 2.1.1. Summary of relevant property details.

Description	Information
Land title	Lot 4 RP817122 County of Carlisle, Parish of Bassett and Local Authority of Pioneer.
Location	Hodges Road, Shoal Point, Queensland.
Area	8.928 hectares
Registered owner	Arabesque Pty Ltd
Local Government	Mackay City Council (formerly Pioneer Shire Council)
Current land zoning	Rural
Environmental Management Register & Contaminated Land Register	<p>Lot 4 RP817122 is included on the Environmental Management Register for the following Notifiable Activity pursuant to section 374 of the <i>Environmental Protection Act 1994</i>:</p> <p>LIVESTOCK DIP OR SPRAY RACE OPERATIONS – operating a livestock dip or spray race operation.</p> <p>Lot 4 RP817122 is not included on the Contaminated Land Register.</p>

2.2 Geology, hydrogeology and soils

A review of the 1:250,000 Geological Series Sheet SF 55-8 (Mackay) map indicates that the site is underlain by Late Devonian to Early Carboniferous rocks of the Campwyn Beds and comprise of intermediate, basic and acid volcanics, siltstone, sandstone, conglomerate and limestone.

Various materials were intercepted in the boreholes constructed during the Stage 2 – Detailed Site Contamination Investigation and Acid Sulfate Soil Assessment. These materials included:

- fill (sand and silty sand);
- alluvium (sand, silty sand, clayey sand and sandy clay);
- residual (sandy and gravelly light to heavy clays); and
- rock (extremely weathered basalt).



Detailed soil borelogs are attached in Appendix C. Soil sampling and profile descriptions were undertaken in accordance with the Australian Soil and Land Survey Field Handbook (McDonald et al, 1990⁵) with the soils classified according to the Australian Soil Classification (Isbell, 1996)⁶.

The soil moisture content ranged from dry to wet. Groundwater was intercepted in the majority of the constructed boreholes. A summary of the groundwater depths recorded during the investigations is provided in Table 2.2.1.

Table 2.2.1. Summary of groundwater depths recorded in boreholes and piezometers.

Borehole/Piezometer	Borehole depth (m)	Depth (m) encountered below near surface level	Steady level N.S.L. (m)	Date observed
Acid Sulfate Soil Assessment				
BH1	3.5	2.0	-	28.09.04
BH2	4.0	2.5	-	28.09.04
BH3	9.0	2.5	-	28.09.04
BH4	2.5	1.4	-	28.09.04
BH5	2.0	1.0	-	29.09.04
BH6	9.0	2.2	-	28.09.04
BH7	3.5	2.4	-	28.09.04
BH8	3.0	2.2	-	28.09.04
BH9	2.5	1.15	-	28.09.04
BH10	2.25	1.1	-	28.09.04
BH11	7.5	1.2	-	29.09.04
BH12	1.5	1.0	-	29.19.04
BH13 / SP1	2.5	0.5	0.18	28.09.04
BH14	1.5	0.5	-	29.09.04
BH15	4.5	1.6	-	29.09.04
BH16	1.5	0.25	-	29.09.04
BH17	0.5	Not observed	-	29.09.04
BH18	4.5	0.5	-	29.09.04
BH19 / SP2	2.5	1.1	1.4	30.09.04
BH20	3.0	0.2	-	30.09.04
BH21	1.0	Not observed	-	30.09.04
BH22	1.5	Not observed	-	30.09.04
BH23	2.6	Not observed	-	30.09.04
Stage 2 – Detailed Site Contamination Investigation				
BHA	1.5	Not observed	-	30.09.04
BHB	1.5	Not observed	-	30.09.04
BHC / SP3	4.5	3.0	2.6	30.09.04
BHD	1.5	Not observed	-	30.09.04
BHE	1.5	Not observed	-	30.09.04
BHF	3.0	Not observed	-	30.09.04
BHG	4.0	3.0	-	30.09.04
BHH	2.5	Not observed	-	30.09.04
BHI	1.0	Not observed	-	30.09.04
BHJ	3.5	3.1	-	30.09.04
BHK	1.0	Not observed	-	30.09.04
BHL	3.0	2.5	-	30.09.04
BHM	3.0	2.6	-	30.09.04
BHN	3.0	2.6	-	30.09.04
BHO	0.1	Not observed	-	01.10.04
BHP	0.1	Not observed	-	01.10.04
BHQ	0.1	Not observed	-	01.10.04
BHR	0.1	Not observed	-	01.10.04
BHS	0.1	Not observed	-	01.10.04
BHT	0.1	Not observed	-	01.10.04
BHU	0.1	Not observed	-	01.10.04
BHV	0.1	Not observed	-	01.10.04

⁵ McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S. 1990. Australian Soil and Land Survey. Inkata Press Propriety Limited. Melbourne.

⁶ Isbell, R.F. 1996. The Australian Soil Classification. CSIRO. Australia.



2.3 Soil classification and distribution

Three (3) main soil orders were identified within the investigation area of the site including Anthrosols, Hydrosols and Dermosols. A brief description of the characteristics of these soil orders is given below (Isbell, 1996) and the approximate distribution of these soil orders is shown on Drawing GJ0389.1.3 (Appendix A).

2.3.1 Anthrosols

These soils result from human activities which have caused a profound modification, mixing, truncation or burial of the original horizons, or the creation of new soil parent materials. As these soils were likely to have been placed by earthmoving equipment, they were further classified into the sub-order of "Spolic Anthrosols".

Anthrosols were identified across the northern portion of the site, burying what would have naturally been Hydrosols. Anthrosols extended to a maximum depth of 3.1m (below near surface level) and were identified in boreholes, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 19 and in boreholes A to V.

2.3.2 Hydrosols

These are soils that are saturated in the major part of the solum for at least two to three months in most years and are often floodplain soils, however, at the subject site the hydrosols occur due to low elevation and proximity to the coast.

One Sub-order and Group of hydrosols was encountered on the site being Sulfuric Supratidal Hydrosols. Supratidal Hydrosols are defined on the basis of infrequent tidal inundation, usually limited to spring or king tides and, the presence of a saline water table at shallow depths. As these soils typically contained sulfuric materials in the upper 1.5m of the profile, they were further classified into the sub-order of "Sulfuric Supratidal Hydrosols" These soils were identified in boreholes, 11, 12, 14, 16, 17, 18, 20 and 22.

2.3.3 Dermosols

These are soils with structured B2 horizons and lacking strong texture contrast between the A and B horizons. These soils were further classified into the sub-order "Brown Dermosols", based on the dominant colour class in the major part of the upper 0.5m of the B2 horizon being brown. These soils were identified in boreholes, 21 and 23 and where observed elsewhere in the more elevated portions of the site and during the geotechnical investigation.



2.4 Topography and drainage

The site elevation ranges from <3m AHD to 30m AHD. The northern and southern portions of the site are generally low lying (<5m AHD) and are poorly to moderately drained. The middle portion of the site contains several peaks which range in elevation from 10m to 30m AHD and is moderately to well drained. Much of the stormwater runoff would drain into an estuary located to the west of the site. The estuary is well vegetated with mangroves.

2.5 Vegetation

The site has been extensively cleared of native vegetation. Small clusters of trees (remnant and regrowth species) remain within the north-east corner of the site, on some of the elevated peaks and around the boundaries between the low-lying and gently inclined areas of the site. Short grass cover is abundant across most areas of the site. The southern and western boundaries of the site are bound by mangroves.

2.6 Current and historical land use

The site has historically been used for livestock grazing and contains several houses and small sheds. The location of these structures is shown on Drawing GJ0389.1.4 (Appendix A). It is possible that some asbestos containing materials have been used to construct the houses. **It is recommended that a qualified person investigate the houses prior to them being demolished.** The sheds have most likely been used for the storage of motor vehicles, agricultural machinery and livestock feeds.

A livestock dip is located on the property adjacent to a large storage shed and is shown on Drawing GJ0389.1.4 (Appendix A). **The property is recorded on the Environmental Management Register for spray race or livestock dip use.** During preliminary discussions, our client has indicated that dipping operations ceased at the property approximately 15 – 20 years ago. At the time of the site investigation, the large storage shed was being used as a hanger for two (2) light aircraft. No fuel or oil storage was evident in the shed.

The northern portion of the site has been extensively filled and contains an aircraft runway. Whilst the site was previously used for livestock grazing, there were no livestock on the property at the time of the site investigation. No fuel tanks (above and below ground) were identified on the property. With exception to the livestock dip, the large storage shed (which may have been used to store dip chemicals and the potential use of asbestos materials in the dwellings, there is no evidence of past or present potentially contaminating landuse activities associated with this property.



2.7 Surrounding land use

The surrounding land use is summarised as follows:

- The site is bound to the north by Sand Bay and the South Pacific Ocean,
- The site is bound to the South and east by rural property.
- The site is bound to the west by Vacant Crown Land. This land contains a "Fish Habitat Reserve" and is densely vegetated with mangroves.

Published on DES Disclosure Log
RTI Act 2009



3. Subsurface investigations

3.1 Stage 2 – Detailed site contamination investigation

Twenty-two (22) boreholes were drilled around the disused livestock dip to determine the type, distribution and concentration of potential contaminants in the soil. The borehole locations are shown on Drawing GJ0389.1.4 (Appendix A). Thirty-one (31) soil samples representative of the fill and natural soils were recovered from each of the boreholes at varying depth intervals. The samples were recovered using a Standard Penetrometer Test (SPT) sampler. The samples were analysed by Australian Laboratory Services Environmental Brisbane (ALS)⁷ for arsenic, lead and organochlorine and organophosphorus pesticides.

3.2 Acid sulfate soil investigation

Given the probability of encountering saturated materials across the low lying areas of the site, a sampling program was devised which attempted to recover soil samples in an undisturbed manner. To achieve this, sampling was undertaken using a 4WD truck mounted drilling rig equipped with a SPT sampler. Twenty-three (23) boreholes were drilled using this method within areas of the site below 5m AHD. The boreholes were drilled between 28.09.04 and 30.09.04. The borehole locations are shown on Drawing GJ0389.1.2 (Appendix A). The boreholes were drilled to a minimum depth of approximately 1m below the possible depth of soil disturbance.

A total of one-hundred and seventy (170) soil samples were recovered during the acid investigation. The samples were recovered from each soil horizon or a minimum of one sample per 0.25m in accordance with the SPP 2/02 Guideline. Upon recovery, the samples were stored in an insulated container and forwarded to ALS for screen testing and subsequent laboratory analysis. All one-hundred and seventy (170) soil samples recovered were screen tested (pH_F & pH_{FOX}) for acid sulfate potential by ALS.

Additional analysis using the Chromium Reducible Sulfur (S_{CR}) using the Chromium Reducible Sulfur ($S_{CR} \%$) method (Method 22B)⁸ of Sullivan *et al* (1998)⁹ and Total Actual Acidity (TAA) method was undertaken for a selection of representative samples indicated by screen testing to exhibit acid sulfate potential. The Chromium Reducible Sulfur method utilises chromium reduction to quantify the level of reduced inorganic sulfur compounds and, unlike the POCAS method, is essentially unaffected by

⁷ ALS is located at 32 Shand Street, Stafford, Queensland, 4053.

⁸ The Chromium Reducible Sulfur (CRS) technique utilises the conversion of inorganic S to H_2S by a hot CrCl_2 solution. The H_2S generated is trapped in a zinc acetate solution and may be quantified by iodometric titration (Sullivan *et al*, 1998)⁵. CRS is an alternative to the Peroxide Oxidisable Sulfur ($S_{POS} \%$) method of the POCAS technique and unlike $S_{POS} \%$ is not subject to significant interference from sulfur in either organic matter or sulfate minerals (Sullivan *et al*, 1998).

⁹ Sullivan, L.A., Bush, R., McConchie, D., Lancaster, G., Clark, M., Norris, N., Southon, R. and Saenger, P. (1998) Chromium Reducible Sulfur S_{CR} – Method 22B. Miscellaneous Research Methods section 4.9 in NSW Acid Sulfate Soil Manual (1998).



sulfur in an organic form or from sulfate minerals. This method is a suitable test to determine whether the oxidisable sulfur is from organic material or if it is from pyrite and therefore PASS. As a conservative measure, a selection of samples not displaying acid sulfate potential were also analysed using these methods. A total of forty-eight (48) samples were analysed using the S_{CR} and TAA methods.

3.3 Preliminary water quality monitoring

Three (3) piezometers (SP1, SP2 & SP3) were installed across the site to determine groundwater depth and to provide an indication of background groundwater quality conditions. The location of the piezometers is shown on Drawing GJ0389.1.2 (Appendix A). One (1) round of groundwater monitoring was undertaken on 30.10.04. The recovered groundwater samples were analysed by ALS for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate. One of the piezometers (SP3) was installed adjacent to the livestock dip. Additional analysis for arsenic, lead and organochlorine and organophosphorus pesticides was undertaken on the groundwater sample recovered from SP3.

To provide an indication of the quality of surface waters, four (4) surface water samples were recovered on 30.10.04 and analysed for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate. The surface water sampling locations are shown on Drawing GJ0389.1.2 (Appendix A).



4. Stage 2 – Detailed Site Contamination Investigation

4.1 Investigation threshold levels

The Level (A) investigation threshold levels from Table 9.1 (Appendix 9) of the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* have been adopted to determine the suitability of the soil for residential use. The investigation threshold levels are shown in Table 4.1.

Table 4.1 Level (A) investigation thresholds for contaminants in soils.

Analyte	Background levels (mg/kg)	HILs (mg/kg)
Metals/Metalloids		
Arsenic	1 - 50	100
Lead	1 - 200	300
Organics		
Aldrin + Dieldrin	-	10
Chlordane	-	50
DDT & derivatives	-	200
Heptachlor	-	10

4.2 Results and discussion

The analytical results of samples recovered from around the livestock dip are shown in Table 4.2.1. The certificates of analysis, quality control report and chain of custody documentation are attached in Appendix D.

Table 4.2.1 Summary of analytical results (mg/kg).

Borehole No.	Sample depth (m)	As	Pb	Aldrin + Dieldrin	Chlordane (total)	DDT & derivatives	Heptachlor (total)
A	0.0-0.1	4	4	<0.1	<0.1	<0.3	<0.1
	0.3-0.5	5	8	<0.1	<0.1	<0.3	<0.1
B	0.0-0.1	4	3	<0.1	<0.1	<0.3	<0.1
	0.3-0.5	6	5	<0.1	<0.1	<0.3	<0.1
C	0.0-0.1	4	3	<0.1	<0.1	<0.3	<0.1
	0.3-0.5	6	8	<0.1	<0.1	<0.3	<0.1
	3.0-3.2	6	2	<0.1	<0.1	<0.3	<0.1
D	0.0-0.1	3	3	<0.1	<0.1	<0.3	<0.1
E	0.0-0.1	5	3	<0.1	<0.1	<0.3	<0.1
F	0.0-0.1	3	3	<0.1	<0.1	<0.3	<0.1
	2.8-3.0	8	1	<0.1	<0.1	<0.3	<0.1
G	0.0-0.1	5	3	<0.1	<0.1	<0.3	<0.1
H	0.0-0.1	6	3	<0.1	<0.1	<0.3	<0.1
	2.0-2.2	7	1	<0.1	<0.1	<0.3	<0.1
I	0.0-0.1	5	4	<0.1	<0.1	<0.3	<0.1
J	0.0-0.1	6	4	<0.1	<0.1	<0.3	<0.1
	3.1-3.3	6	1	<0.1	<0.1	<0.3	<0.1
K	0.0-0.1	5	3	<0.1	<0.1	<0.3	<0.1
L	0.0-0.1	3	6	<0.1	<0.1	<0.3	<0.1
M	0.0-0.1	6	24	<0.1	<0.1	<0.3	<0.1
	2.6-2.8	3	1	<0.1	<0.1	<0.3	<0.1
N	0.0-0.1	4	9	<0.1	<0.1	<0.3	<0.1
	2.8-3.0	4	1	<0.1	<0.1	<0.3	<0.1
O	0.0-0.1	3	2	<0.1	<0.1	<0.35	<0.1
P ¹	0.0-0.1	6	2	<0.1	<0.1	<0.37	<0.1
Q	0.0-0.1	4	35	<0.1	<0.1	<0.3	<0.1
R	0.0-0.1	6	4	<0.1	<0.1	<0.3	<0.1



Borehole No.	Sample depth (m)	As	Pb	Aldrin + Dieldrin	Chlordane (total)	DDT & derivatives	Heptachlor (total)
S	0.0-0.1	3	2	<0.1	<0.1	<0.3	<0.1
T	0.0-0.1	3	5	<0.1	<0.1	<0.3	<0.1
U	0.0-0.1	5	11	<0.1	<0.1	<0.3	<0.1
V	0.0-0.1	6	79	<0.24	<0.24	8.07	<0.24
Minimum concentration		3	1	<0.1	<0.1	<0.3	<0.1
Maximum concentration		8	79	<0.24	<0.24	8.07	<0.24
Fill							
Natural							

(1) Duplicate of BHO (0.0-0.1m)

The analytical results for fill and natural soils are summarised below.

- **Arsenic** — the concentration ranged from an estimated 3mg/kg to 8mg/kg. None of these samples exceeded the Level (A) investigation threshold of 100mg/kg.
- **Lead** — the concentration ranged from an estimated 1mg/kg to 79mg/kg. None of these samples exceeded the Level (A) investigation threshold of 300mg/kg.
- **Aldrin & Dieldrin** — the combined concentrations were below the analytical detection limits (<0.1 & <0.24) for all samples. None of these samples exceeded the Level (A) investigation threshold of 10mg/kg.
- **Chlordane** — the concentration was below the analytical detection limits (<0.1 & <0.24) for all samples. None of these samples exceeded the Level (A) investigation threshold of 50mg/kg.
- **DDT & derivatives** — the combined concentrations ranged from below the analytical detection limit (<0.3) to 8.07mg/kg. None of these samples exceeded the Level (A) investigation threshold of 200mg/kg.
- **Heptachlor** — the concentration was below the analytical detection limits (<0.1 & <0.24) for all samples. None of these samples exceeded the Level (A) investigation threshold of 10mg/kg.

4.3 Quality assurance

In order to verify the replication of the results, the relative percentage difference (RPD) was calculated for one (1) duplicate soil sample. An RPD result of less than 20% was taken to be satisfactory. The results are shown in Table 4.3.1.

Table 4.3.1 Duplicate sample results.

Analyte	Sample identification	Original results (mg/kg)	Duplicate result (mg/kg)	Relative Percent Difference (%)
Arsenic	BHV (0.0-0.1m)	3	6	67
Lead		2	2	0
Aldrin+dieldrin		<0.1	<0.1	0
Chlordane		<0.1	<0.1	0
DDT & derivatives		<0.35	<0.37	6
Heptachlor		<0.1	<0.1	0



The low concentration of arsenic in the duplicate sample results in a high RPD of 67% despite the difference in the reported concentration being insignificant when compared to the investigation threshold. Given that the concentration is so low and well below the investigation threshold, the ALS results for all parameters are considered satisfactory.

Four duplicate soil samples were analysed by ALS for the parameters of arsenic and lead. The relative percent differences for these samples ranged from 0.0 to 51.45% for arsenic and 0.0 to 7.8% for lead. These results are shown on page 4/18 in the Quality Control Report attached in Appendix D.

4.4 Dip bath liquid & groundwater

The National Environmental Protection Measure (NEPM) Schedule B (1) *Guideline on the Investigation Levels for Soil and Groundwater* was used to assess the suitability of the dip bath liquid for discharge onsite and to determine if use of the livestock dip had contaminated adjacent groundwater. The analytical results are shown in Table 4.4.1. The certificates of analysis, quality control report and chain of custody documentation are attached in Appendix D.

Table 4.4.1 Analytical results for dip bath liquid and groundwater.

Sample no.	Matrix	Arsenic (mg/L)	Lead (mg/L)	Aldrin (ng/L)	Chlordane (ng/L)	Dieldrin (ng/L)	DDT (ng/L)	Heptachlor (ng/L)
Dip Bath Liquid (A)	Water	0.001	<0.001	<500	<1000	<500	<2000	<1000
Dip Bath Liquid (B)	Water	0.004	<0.001	<500	<1000	<500	<2000	<1000
SP3 (Sample 2)	Water	0.046	<0.001	<500	<1000	<500	<2000	<1000
Groundwater NEPM GIL ¹ (irrigation)		0.1	0.2	-	-	-	-	-
Groundwater NEPM GIL (freshwaters)		0.05	0.005	10	4	2	1	10

(1) Groundwater Investigation Levels.

The analytical results are summarised below.

- **Arsenic** — the estimated dip bath liquid concentration ranged from 0.001mg/kg to 0.004mg/kg. The estimated groundwater concentration was 0.046mg/L. None of these samples exceeded the GILs established for groundwater used for irrigation (0.1mg/L) and groundwater contacting freshwater ecosystems (0.05mg/L).
- **Lead** — the estimated concentrations of dip bath liquid and groundwater samples were below the analytical detection limit of <0.001mg/kg. None of these samples exceeded the GILs established for groundwater used for irrigation (0.2mg/L) and groundwater contacting freshwater ecosystems (0.005 mg/L).



- **Aldrin** — the analytical detection limit attained (500ng/L) was greater than the GIL established for groundwater contacting freshwater ecosystems (10ng/L). No GIL for Aldrin is available for groundwater used for irrigation.
- **Chlordane** — the analytical detection limit attained (1000ng/L) was greater than the GIL established for groundwater contacting freshwater ecosystems (4ng/L). No GIL for chlordane is available for groundwater used for irrigation.
- **Dieldrin** — the analytical detection limit attained (500ng/L) was greater than the GIL established for groundwater contacting freshwater ecosystems (2ng/L). No GIL for dieldrin is available for groundwater used for irrigation.
- **DDT** — the analytical detection limit achieved (2000ng/L) was greater than the GIL established for groundwater contacting freshwater ecosystems (1ng/L). No GIL for DDT is available for groundwater used for irrigation.
- **Heptachlor** — the analytical detection limit achieved (1000ng/L) was greater than the GIL established for groundwater contacting freshwater ecosystems (10ng/L). No GIL for heptachlor is available for groundwater used for irrigation.

4.5 Conclusion and recommendations

The targeted analyte concentrations complied with the Level (A) investigation thresholds for contaminants in soils for all samples analysed. The soil samples analysed were considered to be representative of the fill and natural soils in the vicinity of the livestock dip. The natural soils were predominantly saturated due to being recovered from below the standing groundwater table.

The concentrations of lead, aldrin, chlordane, dieldrin, DDT and heptachlor in the dip bath liquid and groundwater sample were below the analytical detection limits of ALS. The concentrations of arsenic and lead in the dip bath liquid and the groundwater sample were below the GILs established for groundwater used for irrigation and groundwater contacting freshwater ecosystems. Based on these results, we consider that the dip bath liquid is suitable for discharge onsite, provided that the liquid does not contact marine and freshwaters and is not used to water livestock or irrigate crops. To minimise the impact on the surrounding environment, it may be appropriate to employ a licenced waste contractor to remove this liquid.

The findings of this investigation indicate that "in relation to land contamination issues", the site is suitable for residential use. Furthermore, it is considered that following the removal of the dip, the site could be removed from the Environmental Management Register for the notifiable activity relating to "livestock dip or spray race operations". It is recommended that all existing site dwellings be inspected for asbestos prior to demolition. The inspection should be conducted by a suitably qualified person.



5. Acid Sulfate Soil Investigation

5.1 Screening results

The screening results are shown in Table 5.1.1 and the certificates of analysis, quality control report and chain of custody sheets are attached in Appendix D.

A soil with an initial pH (pH_F) of less than 4 is generally considered (Dear *et al.* 2002)⁸ to be an actual acid sulfate soil (AASS). A soil exhibiting a pH after oxidation (pH_{FOX}) of less than 3 is generally considered (Dear *et al.* 2002) to be a potential acid sulfate soil (PASS). Reaction rate was additionally recorded by ALS. The scale used by ALS ranges from one (1) to five (5), with an increased severity noted by the use of a higher number. Reaction rates of greater than 3 are often characteristic of PASS.

Initial pH values (pH_F) for **fill** ranged from 4.4 to 8.8. The pH determined after oxidation (pH_{FOX}) for **fill** ranged from 1.9 to 6.9. Nineteen (19) of the eighty (80) **fill** samples screened exhibited a pH_{FOX} of <3 , indicating that the soil represented by these nineteen samples is likely to be PASS. Fifteen (15) of the nineteen (19) samples exhibiting a pH_{FOX} result of less than <3 were subsequently analysed using the Chromium Reducible Sulfur method. The results of this analysis are discussed in section 5.2. Three (3) **fill** samples which exhibited a pH_{FOX} of >3 were also analysed using this method. The total number of **fill** samples analysed using the Chromium Reducible Sulfur method was eighteen (18).

Initial pH values (pH_F) for **natural soils** ranged from 3.5 to 8.8. The pH determined after oxidation (pH_{FOX}) for **natural soils** ranged from 1.0 to 8.5. Forty-four (44) of the ninety (90) **natural soil** samples screened exhibited a pH_{FOX} of <3 , indicating that the soil represented by these forty-four samples is likely to be PASS. Twenty-seven (27) of the forty-four (44) samples exhibiting a pH_{FOX} result of less than <3 were subsequently analysed using the Chromium Reducible Sulfur method. The results of this analysis are discussed in section 5.2. Three (3) **natural soil** samples which exhibited a pH_{FOX} of >3 were also analysed using this method. The total number of **natural soil** samples analysed using the Chromium Reducible Sulfur method was thirty (30).

**Table 5.1.1** Screening and analytical results.

Depth NSL (m)	BH1					BH2					BH3				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S
0.0-0.25	5.8	2.7	2	31	0.03	6.9	4.6	2	-	-	5.6	2.9	1	4	0.03
0.25-0.5	6.7	3.7	1	-	-	6.6	4.7	1	-	-	5.8	2.9	2	<2	<0.02
0.5-0.75	6.6	4.3	1	-	-	6.6	4.5	1	-	-	6.0	4.3	1	-	-
0.75-1.0	6.6	4.6	1	-	-	6.6	4.0	1	-	-	5.5	4.2	1	-	-
1.0-1.25	6.7	4.8	1	<2	0.02	6.8	4.2	1	<2	<0.02	5.5	4.2	1	-	-
1.25-1.5	6.8	4.5	1	-	-	6.7	4.3	1	-	-	5.7	4.4	1	-	-
1.5-1.75	7.0	4.6	1	-	-	6.9	4.1	1	-	-	5.6	3.8	1	-	-
1.75-2.0	7.0	4.6	1	-	-	6.7	4.3	1	-	-	5.5	4.3	1	-	-
2.0-2.25	8.8	6.3	1	-	-	8.8	6.4	2	-	-	5.7	3.9	1	-	-
2.25-2.5	8.7	6.8	2	-	-	8.8	6.9	2	-	-	3.8	2.3	2	8	0.07
2.5-2.75	8.6	8.5	2	-	-	8.6	6.9	2	-	-	4.3	2.3	3	2	0.12
2.75-3.0	8.8	6.1	2	-	-	8.7	6.7	2	-	-	7.9	6.8	2	-	-
3.0-3.25	-	-	-	-	-	8.8	7.4	2	-	-	-	-	-	-	-
3.25-3.5	-	-	-	-	-	8.7	7.7	2	-	-	-	-	-	-	-

Fill
Natural

Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH4					BH5					BH6				
	pH (F)	pH (FOX)	Reaction Rate	TAA (mole H+/l)	%S	pH (F)	pH (FOX)	Reaction Rate	TAA (mole H+/l)	%S	pH (F)	pH (FOX)	Reaction Rate	TAA (mole H+/l)	%S
0.0-0.2	5.6	2.7	2	4	0.02	6.2	2.7	2	2	0.02	-	-	-	-	-
0.0-0.25	-	-	-	-	-	-	-	-	-	-	7.6	3.1	2	-	-
0.2-0.5	5.8	2.2	2	-	-	6.1	2.8	2	2	0.04	-	-	-	-	-
0.25-0.5	-	-	-	-	-	-	-	-	-	-	7.4	3.1	2	-	-
0.5-0.75	5.6	2.1	2	<2	<0.02	5.6	3.8	1	-	-	6.6	3.8	2	-	-
0.75-1.0	6.0	3.9	1	-	-	7.5	3.9	1	-	-	6.5	3.8	2	-	-
1.0-1.25	6.2	4.0	1	-	-	4.4	2.2	4	-	-	5.4	4.5	2	-	-
1.25-1.5	-	-	-	-	-	4.1	2.0	1	-	-	5.3	4.5	1	-	-
1.4-1.75	8.2	6.8	2	-	-	-	-	-	-	-	-	-	-	-	-
1.5-1.75	-	-	-	-	-	-	-	-	-	-	5.4	4.1	1	-	-
1.5-2.0	-	-	-	-	-	5.9	2.3	3	<2	0.09	-	-	-	-	-
1.75-2.0	8.2	6.9	2	-	-	7.6	6.4	2	-	-	5.3	3.7	1	-	-
2.0-2.25	8.6	7.1	2	-	-	-	-	-	-	-	5.2	3.9	1	-	-
2.25-2.5	-	-	-	-	-	-	-	-	-	-	4.8	3.8	1	-	-
2.5-2.7	-	-	-	-	-	-	-	-	-	-	5.3	1.9	4	21	0.51
2.7-2.9	-	-	-	-	-	-	-	-	-	-	6.3	1.6	4	-	-
2.9-3.25	-	-	-	-	-	-	-	-	-	-	6.2	2.0	4	-	-
3.25-3.5	-	-	-	-	-	-	-	-	-	-	6.1	1.7	4	-	-
3.5-3.75	-	-	-	-	-	-	-	-	-	-	5.7	1.8	4	20	0.49

Fill
Natural

Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH7					BH8					BH9				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S
0.0-0.25	5.8	3.4	2	-	-	6.0	2.6	3	-	-	4.5	1.9	3	20	<0.02
0.25-0.5	5.3	3.5	1	-	-	6.3	3.6	1	-	-	4.4	2.7	1	-	-
0.5-0.75	5.2	3.5	1	-	-	6.3	3.7	1	-	-	4.6	2.7	1	-	-
0.75-1.0	5.1	4.1	1	-	-	6.4	4.3	1	-	-	5.1	3.0	1	4	<0.02
1.0-1.15	-	-	-	-	-	-	-	-	-	-	6.4	3.8	4	-	-
1.0-1.25	5.1	4.3	2	-	-	6.3	4.2	1	-	-	-	-	-	-	-
1.15-1.5	-	-	-	-	-	-	-	-	-	-	6.9	3.8	2	-	-
1.25-1.5	5.2	4.3	2	-	-	6.3	4.0	1	-	-	-	-	-	-	-
1.5-1.75	5.3	4.3	2	-	-	6.2	3.5	1	-	-	5.5	1.5	4	99	0.84
1.75-2.0	5.3	4.0	2	-	-	6.5	3.6	2	-	-	5.7	1.5	4	-	-
2.0-2.25	5.1	4.0	1	-	-	6.3	4.2	1	-	-	5.7	1.6	4	10	0.02
2.25-2.4	-	-	-	-	-	6.6	4.3	1	-	-	-	-	-	-	-
2.25-2.5	4.9	3.8	4	-	-	-	-	-	-	-	6.6	1.7	4	-	-
2.5-2.6	7.2	2.1	4	36	0.62	-	-	-	-	-	-	-	-	-	-
2.6-3.0	5.1	1.4	4	-	-	-	-	-	-	-	-	-	-	-	-
3.0-3.25	6.3	1.8	4	-	-	-	-	-	-	-	-	-	-	-	-
3.25-3.5	6.0	2.0	4	<2	0.19	-	-	-	-	-	-	-	-	-	-

Fill
Natural

Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH10					BH11					BH12				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H+/l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H+/l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H+/l)	%S
0.0-0.15	-	-	-	-	-	5.3	2.6	3	21	0.03	-	-	-	-	-
0.0-0.2	5.5	2.2	3	19	0.05	-	-	-	-	-	7.0	3.9	2	-	-
0.15-0.5	-	-	-	-	-	5.3	2.2	3	12	0.03	-	-	-	-	-
0.2-0.5	5.5	2.6	3	108	1.14	-	-	-	-	-	7.1	4.2	1	-	-
0.5-0.75	6.0	3.4	1	-	-	6.3	3.8	1	-	-	7.0	4.0	1	-	-
0.75-0.9	-	-	-	-	-	6.4	4.0	1	-	-	-	-	-	-	-
0.75-1.0	5.7	3.5	1	-	-	-	-	-	-	-	6.8	3.9	1	-	-
1.1-1.25	3.9	1.8	4	60	0.32	-	-	-	-	-	-	-	-	-	-
1.25-1.5	6.0	1.6	4	59	0.71	-	-	-	-	-	-	-	-	-	-
1.6-1.75	3.9	2.1	4	31	0.44	-	-	-	-	-	-	-	-	-	-
1.75-2.0	4.1	2.0	4	-	-	-	-	-	-	-	-	-	-	-	-
2.0-2.25	4.2	2.1	4	19	0.37	-	-	-	-	-	-	-	-	-	-

Fill
Natural

Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH13					BH14					BH15				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S
0.0-0.2	5.6	3.0	3	-	-	4.4	2.3	3	36	0.02	-	-	-	-	-
0.0-0.25	-	-	-	-	-	-	-	-	-	-	4.9	3.4	1	-	-
0.2-0.5	6.0	2.6	3	-	-	4.1	2.0	3	-	-	-	-	-	-	-
0.25-0.5	-	-	-	-	-	-	-	-	-	-	5.8	2.6	3	16	0.09
0.5-0.75	3.9	1.6	4	151	1.84	-	-	-	-	-	5.1	3.4	1	-	-
0.5-0.85	-	-	-	-	-	3.5	1.7	4	196	0.78	-	-	-	-	-
0.75-1.0	4.3	1.8	4								5.8	3.7	1	-	-
1.0-1.25	5.5	1.8	4								6.9	4.6	1	-	-
1.25-1.5	-	-	-								6.9	4.3	1	-	-

Fill
Natural


Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH16					BH17					BH18				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S
0.0-0.1	-	-	-	-	-	-	-	-	-	-	5.4	2.5	1	11	0.05
0.0-0.25	6.2	2.3	3	4	0.12	6.2	2.8	2	6	0.02	-	-	-	-	-
0.1-0.25	-	-	-	-	-	-	-	-	-	-	6.4	3.5	1	-	-
0.2-0.5	6.7	3.2	3	-	-	-	-	-	-	-	-	-	-	-	-
0.25-0.5	-	-	-	-	-	6.6	3.2	2	-	-	6.3	3.8	1	-	-
0.5-0.75	-	-	-	-	-	-	-	-	-	-	5.7	1.0	2	99	1.34
0.5-0.8	5.8	1.7	4	34	1.08	-	-	-	-	-	-	-	-	-	-
0.75-1.0	-	-	-	-	-	-	-	-	-	-	5.8	2.0	2	-	-
0.8-1.0	5.3	1.9	4	41	1.36	-	-	-	-	-	-	-	-	-	-
1.0-1.3	-	-	-	-	-	-	-	-	-	-	5.5	1.5	4	126	1.57

Fill
Natural



Table 5.1.1. Screening and analytical results (continued).

Depth NSL (m)	BH19					BH20					BH21				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H ⁺ /l)	%S
0.0-0.2	-	-	-	-	-	6.7	2.5	3	<2	0.03	-	-	-	-	-
0.0-0.25	5.9	2.4	1	9	0.03	-	-	-	-	-	7.2	3.8	3	-	-
0.2-0.5	-	-	-	-	-	6.8	4.6	2	<2	0.02	-	-	-	-	-
0.25-0.5	5.6	2.2	1	16	0.08	-	-	-	-	-	7.3	3.9	3	-	-
0.5-0.75	-	-	-	-	-	-	-	-	-	-	8.3	8.2	3	-	-
0.5-0.8	5.2	3.0	1	-	-	6.8	6.1	3	-	-	-	-	-	-	-
0.75-1.0	-	-	-	-	-	-	-	-	-	-	8.3	8.3	3	-	-
0.75-1.1	5.1	2.9	1	6	0.03	-	-	-	-	-	-	-	-	-	-
0.8-1.0	-	-	-	-	-	7.1	4.5	3	-	-	-	-	-	-	-
1.25-1.5	4.9	1.5	4	134	1.21	-	-	-	-	-	-	-	-	-	-
1.5-1.75	4.0	1.1	4	-	-	-	-	-	-	-	-	-	-	-	-
1.75-2.0	5.5	1.6	4	-	-	-	-	-	-	-	-	-	-	-	-
2.0-2.25	6.2	1.6	4	86	1.20	-	-	-	-	-	-	-	-	-	-

Fill
Natural

Table 5.1.1. Screening and analytical results (continued)

Depth NSL (m)	BH22					BH23				
	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H+/l)	%S	pH _(F)	pH _(FOX)	Reaction Rate	TAA (mole H+/l)	%S
0.0-0.3	5.7	3.4	3	11	<0.02	7.0	5.0	4	-	-
0.3-0.5	-	-	-	-	-	7.1	4.3	4	-	-
0.4-0.6	7.3	4.0	2	-	-	-	-	-	-	-
0.55-0.75	-	-	-	-	-	7.9	8.4	4	-	-
0.6-0.75	8.0	8.0	4	-	-	-	-	-	-	-
0.75-1.0	7.9	8.2	4	-	-	7.8	8.2	4	-	-

Fill
Natural

5.2 Analytical results

The analytical results are presented in Table 5.1.1 and the certificates of analysis, quality control report and chain of custody documentation are attached in Appendix D.

The analytical results show that a number of the **fill** samples recovered exhibited acid sulfate potential with %S concentrations ranging from <0.02 to 1.14%S. TAA values for the fill samples from <2 to 108 moles H⁺/t, indicating existing acidity in a number of fill samples. A majority of the **natural soil** samples recovered also exhibited acid sulfate potential with %S concentrations ranging from <0.02 to 1.84%S. TAA values for the natural samples analysed ranged from <2 to 196 moles H⁺/t.

Texture-based acid sulfate soil action criteria have been established to determine when disturbed soil requires management. The action criteria are shown in Table 5.2.1.

Table 5.2.1. Action level thresholds for soil treatment.

Type of material	Action criteria if more than 1000 tonnes of material is disturbed.	
Texture range (McDonald <i>et al.</i> 1990)	Equivalent sulfur (%S) (oven-dry basis)	Equivalent acidity (mol H ⁺ /tonne) (oven-dry basis)
Coarse texture	0.03	18
Medium texture	0.03	18
Fine texture	0.03	18

The Soil Management Guidelines specify that for developments proposing to excavate more than 1000 tonnes of material, the %S action level of 0.03 should be applied for all types of material (Dear *et al.* 2002). The action level of 18 mol H⁺/tonne should be applied to acid sulfate soils containing existing acidity.

As discussed, the analytical results demonstrate that both fill and natural soils (below 5m AHD) display acid sulfate characteristics. Actual and potential acid sulfate soils were associated with fill materials consisting of grey brown fine to medium grained silty sand topsoils and the underlying yellow orange brown fine to coarse grained sands. Whilst the colour and texture of fill material was relatively consistent across the site, a number of the fill samples did **not** display acid sulfate characteristics. Actual and potential acid sulfate soils were generally associated with natural materials consisting of grey fine to medium grained sands, silty sands, clayey sands and sandy clays.

The actual and potential acid sulfate soils are present above and below the observed groundwater levels. The presence of actual acid sulfate soils below the observed groundwater levels is likely to be due to fluctuations in groundwater level (due to tidal influences) causing the periodic oxidation of these soils.



5.3 Discussion and recommendations

Based on the findings of this investigation, it is likely that fill and natural (alluvial) soils disturbed below 5m AHD will require lime treatment to neutralise actual and potential acidity. Based on the proposed design, it is understood that additional fill (up to 1.5m) would be placed over the site to raise the development level. This is likely to result in minimal disturbance to in-situ actual and potential acid sulfate soils. However, it is anticipated that topsoil stripping and excavation for services would result in the exposure of some of these soils. By utilising recognised management practices, it is considered that actual and potential acid sulfate soils could be managed without compromising the integrity of the surrounding environment. Lime treatment rates and management options are discussed within the Acid Sulfate Management Plan (ASMP) attached in Appendix E.

Published on DES Disclosure Log
RTI Act 2009

6. Water quality monitoring

Three (3) piezometers (SP1, SP2 & SP3) were installed to determine groundwater depth and to provide an indication of background groundwater quality conditions. One (1) round of groundwater monitoring was undertaken on 30.10.04. The recovered groundwater samples were analysed by ALS for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate.

To provide an indication of the quality of surface waters, four (4) surface water samples were recovered on 30.10.04 and analysed for pH, electrical conductivity, turbidity, total suspended solids, iron (total and dissolved), aluminium (total and dissolved), alkalinity, chloride, sulfate, manganese and carbonate.

A summary of the groundwater and surface water quality results are shown in Table 6.1 and Table 6.2 respectively. The certificates of analysis and chain of custody documentation are attached in Appendix D.

Table 6.1. Summary of groundwater quality results for 30.10.04.

Parameter	Piezometer		
	SP1	SP2	SP3
pH	7.05	8.05	8.14
Electrical Conductivity ($\mu\text{S}/\text{cm}^2$)	11,200	24,400	630
Suspended Solids (mg/L)	18,900	53,500	5,000
Turbidity (NTU)	14,400	36,000	3,700
Carbonate Alkalinity as CaCO_3 (mg/L)	<1	<1	<1
Total Alkalinity as CaCO_3 (mg/L)	226	586	174
Sulfate as SO_4^{2-} (mg/L)	2,260	2,320	64
Chloride (mg/L)	2,700	9,350	64
Chloride:Sulfate	~1:1	~4:1	1:1
Dissolved Iron (mg/L)	49.4	0.03	0.06
Total Iron (mg/L)	380	536	65.3
Dissolved Aluminium (mg/L)	0.10	0.13	0.09
Total Aluminium (mg/L)	165	<0.01	29.3
Dissolved Manganese (mg/L)	1.67	2.71	0.034
Depth to groundwater in metres (NSL)	0.18	1.4	2.6

Table 6.2. Summary of surface water quality results for 30.10.04.

Parameter	Surface water location			
	SW1 (Dam)	SW2 (Estuary)	SW3 (Dam)	SW4 (Ocean)
pH	8.03	7.84	8.95	8.06
Electrical Conductivity ($\mu\text{S}/\text{cm}^2$)	2,548	50,500	7,080	43,400
Suspended Solids (mg/L)	196	42	18	26
Turbidity (NTU)	95	6.5	10	5.1
Carbonate Alkalinity as CaCO_3 (mg/L)	<1	<1	73	<1
Total Alkalinity as CaCO_3 (mg/L)	214	207	338	120
Sulfate as SO_4^{2-} (mg/L)	142	3,650	911	3,100
Chloride (mg/L)	604	24,500	1,810	24,700
Dissolved Iron (mg/L)	<0.01	0.13	<0.01	<0.05
Total Iron (mg/L)	4.72	0.27	0.54	0.26
Dissolved Aluminium (mg/L)	0.05	<0.01	0.08	<0.01
Total Aluminium (mg/L)	2.65	0.58	0.41	0.35
Dissolved Manganese (mg/L)	0.005	<0.001	0.005	<0.001

A brief interpretation of the results for a selection of the above parameters is provided below.



6.1 Groundwater

6.1.1 pH

The pH of groundwater water was recorded as 7.05 (SP1), 8.05 (SP2) and 8.14 (SP3). If dewatering of groundwater is required (i.e. for installation of underground services), then the pH should be between the range of 6.5-8.5 prior to its release to the adjacent natural waters. The pH of groundwater discharge should be monitored by a suitably qualified person.

6.1.2 Electrical conductivity

The electrical conductivity of groundwater was recorded as 11,200 (SP1), 24,400 (SP2) and $367\mu\text{S}/\text{cm}^2$ (SP3). Due to the variations in concentration for this parameter between, it is recommended that additional testing of groundwater be undertaken prior to groundwaters being released to surface waters or used for irrigation.

6.1.3 Suspended solids / turbidity

The suspended solid concentrations and turbidity levels of groundwater samples recovered were very elevated. Pre-discharge treatment of groundwater for suspended solids and turbidity is likely to be required if dewatering of groundwater is undertaken at the site.

6.1.4 Chloride: Sulfate ratio

In seawater, the ratio of $\text{Cl}:\text{SO}_4^{2-}$ on mass balance is 7.2:1. Elevated levels of sulfate ions relative to chloride ions can provide a good indication of the presence of acid sulfate soils (Ahern *et al.* 1998)¹⁰. The Chloride: Sulfate ratio determined for the groundwater samples recovered from SP1 & SP3, were <4:1 (trigger ratio), which further indicates the presence of acid sulfate soils.

6.2 Surface waters

Two (2) surface water samples (SW1 and SW3) were recovered from dams, for comparison with adjacent natural waters. The natural waters were sampled from the adjacent estuary located to the west of the site and from the South Pacific Ocean which is located to the north of the site.

Several differences between the quality of dam and natural waters were identified. Based on the elevated suspended solids and turbidity results obtained for SW1, it is likely that dam water would require pre-treatment prior to being discharged to the adjacent natural waters. Further testing of dam waters should be undertaken prior to being released to the adjacent natural waters or used for irrigation supply.

¹⁰ Ahern, C. R., Blunden, B. and Stone, Y. 1998. Acid Sulfate Soils Manual 1998. Acid Sulfate Soil Management Advisory Committee, Wollongbar. NSW. Australia.



7. Statutory declaration

(INVESTIGATOR AND PREPARER OF DETAILED INVESTIGATION REPORT)

Address of Sites Investigated: Lot 4 RP817122 Hodges Road, Shoal Point, Queensland.
 Real Property Descriptions: Lot 4 RP817122
 Title of Report: Stage 2 – Detailed Site Contamination, Acid Sulfate Soil Assessment and Preliminary Water Quality Monitoring Report
 Lot 4 RP817122 Shoal Point, Mackay, Queensland, November 2004.

sch4p4(6) Personal information of Gilbert and Sutherland Pty Ltd, PO Box 4115 Robina Queensland 4230, do solemnly and sincerely declare that;

I was the investigator and preparer of the Detailed Site Investigation report described above;

- I am a member of the Environment Institute of Australia and my qualifications and experience are relevant to this investigation;
- I have not knowingly included any false, misleading or incomplete information in the report;
- I have not knowingly failed to reveal any relevant information or document to any administering authority; and

I certify that:

- The report addresses the relevant matters for the investigation and is factually correct; and
- The opinions expressed in it are honestly and reasonably held.

And I make this solemn declaration conscientiously believing the same to be true and by the virtue of the provisions of the *Oaths Act 1867*.

Signature

sch4p4(6) Personal information

Name:

Declared at

Robina

the 30th

day of

November

2004

sch4p4(6) Personal information

Before me

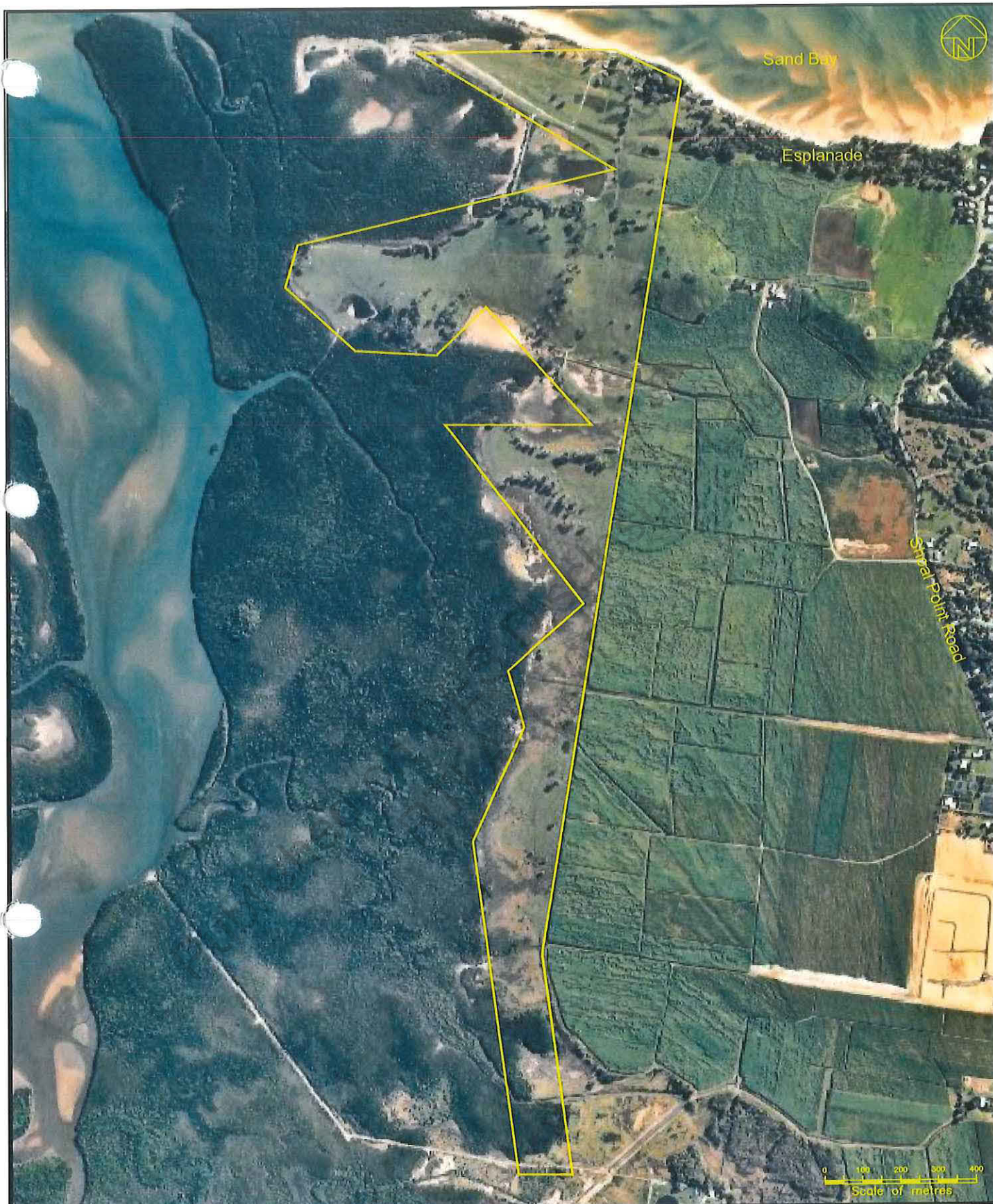
Solicitor

Witness (~~Justice of the Peace~~/Commissioner for Declarations)



Appendix A. Drawings

Published on DES Disclosure Log
RTI Act 2009



Gilbert & Sutherland
— Specialist Soil and Water Scientists —



12, Riverwalk One
140 Robina Town Centre Drive, Robina, Qld. 4226
Phone 55789944 Mobile (6) Personal information Fax 55789945

PROJECT

SUNLAND GROUP LIMITED
SHOAL POINT, MACKAY
SITE LOCATION

FIGURED DIMENSIONS TO
BE READ IN PREFERENCE
TO SCALING.

APPROVED

FILE

SCALE AS SHOWN

DRAWN 19.11.04

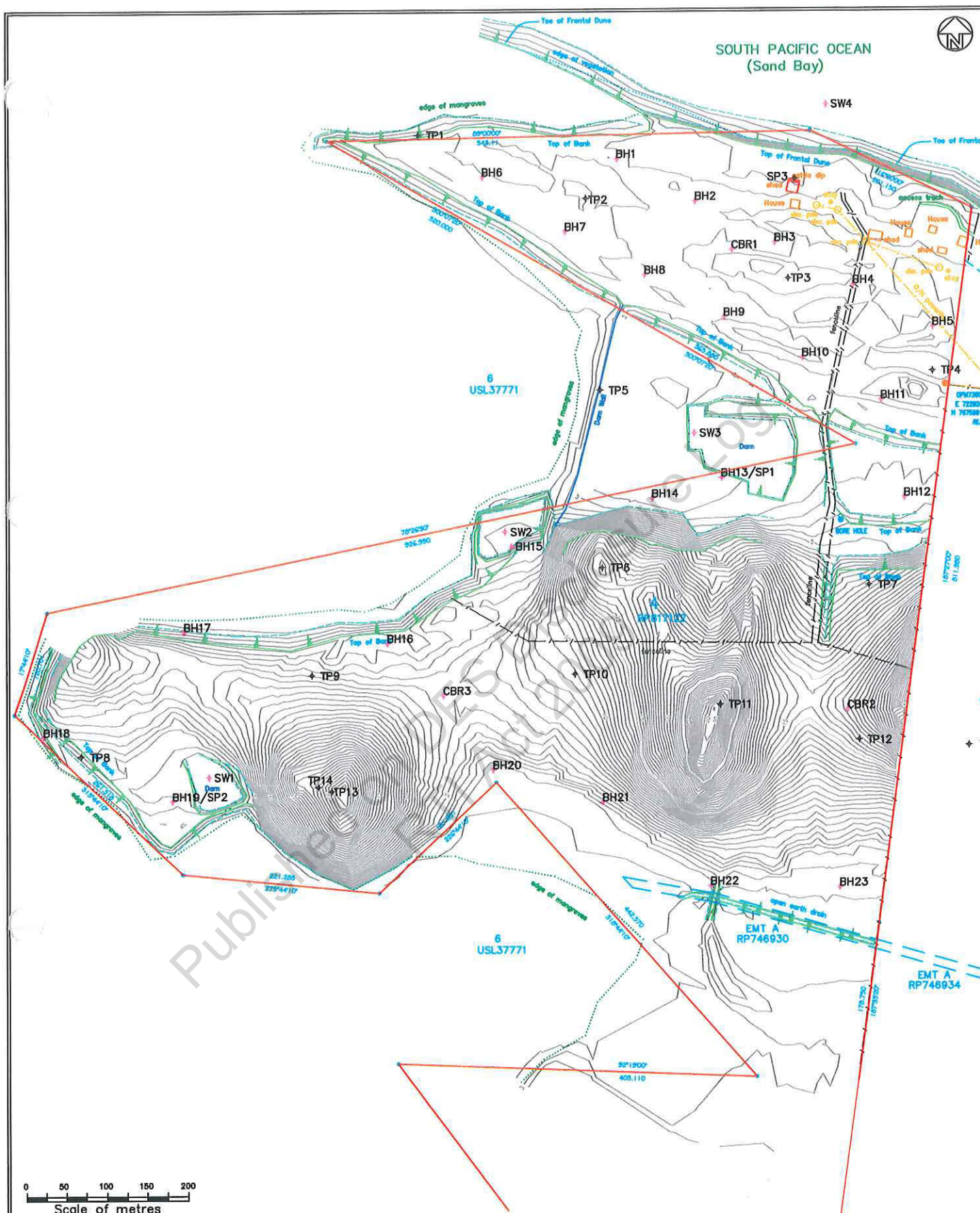
CHECKED

CHECKED

DRAWING No.

Page 31 of 211

GJ0389.1.1



Gilbert & Sutherland
Specialist Soil and Water Scientists



12, Riverwalk One
140 Robina Town Centre Drive, Robina, Qld. 4226
Phone 55789944 Mobile (6) Personal information Fax 55789945

PROJECT

SUNLAND GROUP LIMITED

SHOAL POINT, MACKAY

SURVEY PLAN / BOREHOLE LOCATIONS

FIGURED DIMENSIONS TO
BE READ IN PREFERENCE
TO SCALING.

APPROVED

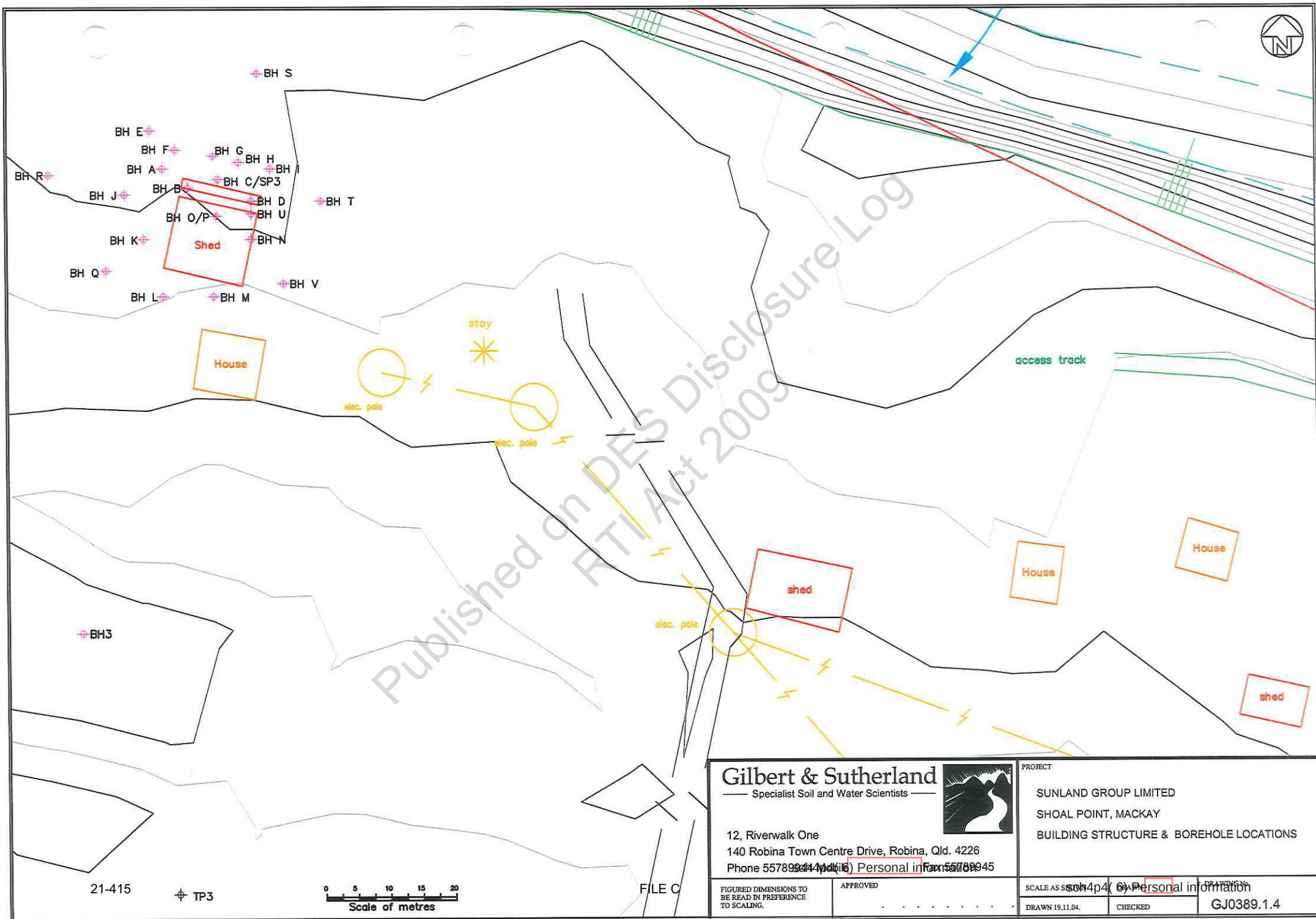
FILE C

SCALE AS SHOWN sch 466 Personal information Page 32 of 211

DRAWN 19.11.04.

CHECKED

GJ0389.1.2





Appendix B. Land title, registered plan & smart map

Published on DES Disclosure Log
RTI Act 2009

CURRENT TITLE SEARCH
NATURAL RESOURCES & MINES, QUEENSLAND

Request No: 112270653
Search Date: 09/11/2004 2:11 pm

Title Reference: 50044594
Date Created: 12/01/1995

Previous Title: 20575056

REGISTERED OWNER

Dealing No: 700399674 14/12/1994

ARABESQUE PTY LTD A.C.N. 010 335 305

ESTATE AND LAND

Estate in Fee Simple

LOT 4 REGISTERED PLAN 817122
County of CARLISLE Parish of BASSETT
Local Government: MACKAY CITY

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 10689035 (POR 448)
2. EASEMENT IN GROSS No 601575448 (T574338J) 19/12/1991
BURDENING THE LAND
TO COUNCIL OF THE SHIRE OF PIONEER
OVER EASEMENT C ON RP835224
3. EASEMENT IN GROSS No 601575449 (T574339M) 19/12/1991
BURDENING THE LAND
TO COUNCIL OF THE SHIRE OF PIONEER
OVER EASEMENT B ON RP746930
4. EASEMENT IN GROSS No 601575450 (T574340W) 19/12/1991
BURDENING THE LAND
TO COUNCIL OF THE SHIRE OF PIONEER
OVER EASEMENT A ON RP746930
5. MORTGAGE No 700347449 17/11/1994 at 08:42
to
WESTPAC BANKING CORPORATION
6. CAVEAT No 707877592 08/07/2004 at 16:46
GIRROMA PTY LTD A.C.N. 103 698 460

ADMINISTRATIVE ADVICES - NIL
UNREGISTERED DEALINGS - NIL

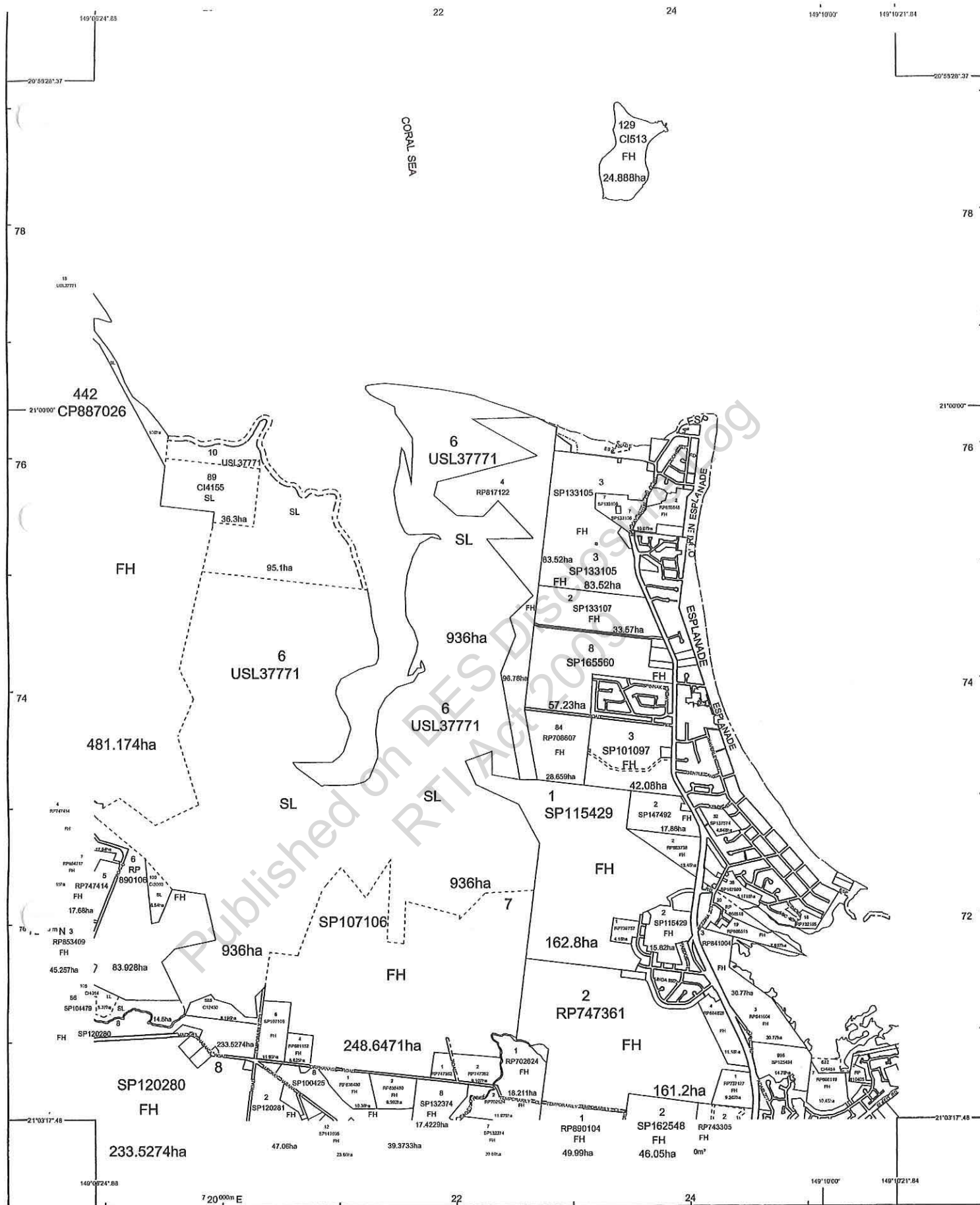
CERTIFICATE OF TITLE ISSUED - No

Page 1/-



Appendix C. Soil borelogs

Published on DES Disclosure Log
RTI Act 2009



STANDARD MAP NUMBER
8755-41444



21-415

SUBJECT PARCEL DESCRIPTION

DC08	4/19/17122
Lot/Plan	06.76ha
Area/Volume	FIREHOLD
Tenure	MACRAY CITY
Local Government	SHOAL POINT
Locality	BASSETT
Parish	CARLISLE
County	12/61626
Parcel/Segment	

CLIENT SERVICE STANDARDS

PRINTED (dd/mm/yyyy) 10/11/2004

DC08 08/11/2004 (Lots with an area less than 10000 square metres are not shown)

Users of the information recorded in this document (the Information) accept all responsibility and risk associated with the use of the Information and should seek independent professional advice in relation to dealings with property.

Despite Department of Natural Resources, Mines and Energy (DRMME)'s best efforts, DRMME makes no representations or warranties in relation to the Information, and, to the extent permitted by law, exclude or limit all warranties relating to correctness, accuracy, reliability, completeness or currency and all liability for any direct, indirect and consequential costs, losses, damages and expenses incurred in any way (including but not limited to that arising from negligence) in connection with the Information.

For further information on SmartMap products visit <http://www.nrm.qld.gov.au/property/mapping/olnmap>

SmartMap

An External Product of
SmartMap Information Services
Based upon an extraction from the
Digital Cadastral Data Base



Queensland
Government

Page Natural Resources,
Mines and Energy

(c) The State of Queensland,
Natural Resources, Mines and Energy, 2004.

Release

CURRENT TITLE SEARCH

NATURAL RESOURCES & MINES, QUEENSLAND

Request No: 112270653

Search Date: 09/11/2004 2:11 pm

Title Reference: 50044594

Date Created: 12/01/1995

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

COPYRIGHT THE STATE OF QUEENSLAND (NATURAL RESOURCES & MINES) [2004]

Requested By: CITEC CONFIRM

Published on DES Disclosure Log
RTI Act 2009

Page 2/2

Borehole: BH1

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland

Specialist Soil & Water Scientists

Northing: 7676247.00

Easting: 722556.00

RL (m):

Depth: 3.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays							Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA		TPA						
				SILTY SAND , (fill) fine to coarse grained, grey-brown to yellow-brown, trace to with silt, with fine roots & wood fragments throughout, dry.													1	2			400	800	1200	1600	2000
.5				SAND , (fill) fine to coarse grained, yellow-brown, dry to moist.																					.5
1.0				SAND , (fill) fine to coarse grained, yellow-brown, charcoal fragments throughout, dry to moist.																					1.0
1.5				SAND , (fill) fine to coarse grained, yellow-brown, charcoal fragments throughout, moist.																					1.5
2.0				SAND , (fill) fine to coarse grained, yellow-brown, charcoal fragments throughout, moist to wet.																					2.0
2.5				SAND , (natural?) fine to coarse grained, grey-yellow to orange-brown, abundant shells throughout, wet.																					2.5
3.0				SAND , (natural) fine to medium grained, grey, trace of shell fragments throughout, wet.																					3.0
3.5									Borehole terminated at 3.5 metres.																3.5
4.0																									4.0
4.5																									4.5

21415

FILE C

Page 42 of 211

21-415

FILE C

Page 42 of 211

Borehole: BH2

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676199.00

Easting: 722644.00

RL (m):

Depth: 4.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA					
																1	2		400	800	1200	1600	2000	
0.5				SAND , (fill) fine to coarse grained, pale yellow-brown, trace of silt, trace of fine roots throughout, dry.																				0.5
1.0				SAND , (fill) fine to coarse grained, pale yellow orange brown, trace of silt, dry to moist.																				1.0
1.5																								1.5
2.0				SAND , (fill) fine to coarse grained, pale yellow-orange to grey, shells throughout, moist.																				2.0
2.5				SAND , (natural?) fine to coarse grain, pale yellow-orange to grey, shells throughout, wet.																				2.5
3.0																								3.0
3.5				SAND , (natural) fine to medium grained, grey, trace of shells throughout, wet.					Borehole terminated at 4.0 metres.															3.5
4.0																								4.0
4.5																								4.5

21415

FILE C

Page 43 of 211

21-415

FILE C

Page 43 of 211

Borehole: BH3

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676152.00

Easting: 722733.00

RL (m):

Depth: 9.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA	TPA						
																1	2		400	800	1200	1600	2000	
0.5				SAND , (fill) fine to coarse grained, yellow brown, trace of fine roots, dry to moist.																				0.5
1.0				SAND , (fill) fine to coarse grained, yellow brown, dry to moist.					SPT (1.5m) 3, 4, 4 N = 8															1.0
1.5																								1.5
2.0																								2.0
2.5				SAND , (natural) fine to coarse grained, grey, trace of fine shell fragments throughout, moist to very moist.					SPT (3.0m) 3, 4, 5 N = 9															2.5
3.0				SAND , (natural) fine to coarse grained, grey, trace of fine shell fragments throughout, with trace of fine to medium sized sub-rounded gravel, moist to very moist.					SPT (4.5m) 5, 6, 6 N = 12															3.0
3.5																								3.5
4.0				SAND , (natural) fine to coarse grained, trace of fine to medium sized sub-rounded gravel, grey, abundant shell fragments throughout, wet.					SPT (6.0m) 3, 1, 2 N = 3															4.0
4.5				SAND , (natural) fine to medium grained, grey, trace of fine shell fragments throughout, wet.					U50 (7.5m) PP = 450	FILE C														4.5
21-415																								

Page 44 of 211

Borehole: BH3

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676152.00

Easting: 722733.00

RL (m):

Depth: 9.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)						
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA					
																1	2		400	800	1200	1600	2000		
5.0				SAND , (natural) fine to medium grained, grey, trace of fine shell fragments throughout, wet.					U50 (7.5m) PP = 450																5.0
5.5																									5.5
6.0																									6.0
6.5				SANDY MEDIUM CLAY , (alluvium) medium plasticity, fine grained sand, grey to green-grey, moist to very moist.																					6.5
7.0																									7.0
7.5																									7.5
8.0				SANDY MEDIUM CLAY , (residual) fine grained sand, green grey with orange brown motteling, with fine sized sub-angular gravel throughout, moist.				Borehole terminated at 9.0 metres.	SPT (9.0m) 6, 10, 12 N = 22																8.0
8.5																									8.5
9.0																									9.0

21-415

FILE C

Page 45 of 211

21-415

FILE C

Page 45 of 211

Borehole: BH4

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676104.00

Easting: 722821.00

RL (m):

Depth: 2.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA				
																1	2		400	800	1200	1600	2000	
0.5				SILTY SAND , (fill) fine to medium grained, grey-brown, fine roots throughout, dry.																				0.5
1.0				SAND , (fill) fine to coarse grained, yellow orange, dry to moist.																				1.0
1.5				SAND , (fill) fine to coarse grained, yellow orange, dry to moist.																				1.5
2.0				SAND , (fill) fine to coarse grained, yellow orange-brown, abundant fine shells throughout, very moist to wet.																				2.0
2.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				2.5
3.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				3.0
3.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				3.5
4.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				4.0
4.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				4.5
5.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				5.0
5.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				5.5
6.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				6.0
6.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				6.5
7.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				7.0
7.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				7.5
8.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				8.0
8.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				8.5
9.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				9.0
9.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				9.5
10.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				10.0
10.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				10.5
11.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				11.0
11.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				11.5
12.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				12.0
12.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				12.5
13.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				13.0
13.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				13.5
14.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				14.0
14.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				14.5
15.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				15.0
15.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				15.5
16.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				16.0
16.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				16.5
17.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				17.0
17.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				17.5
18.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				18.0
18.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				18.5
19.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				19.0
19.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				19.5
20.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				20.0
20.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				20.5
21.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				21.0
21.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				21.5
22.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				22.0
22.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				22.5
23.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				23.0
23.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				23.5
24.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				24.0
24.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				24.5
25.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				25.0
25.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				25.5
26.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				26.0
26.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				26.5
27.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				27.0
27.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				27.5
28.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				28.0
28.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				28.5
29.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				29.0
29.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				29.5
30.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				30.0
30.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				30.5
31.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				31.0
31.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				31.5
32.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				32.0
32.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				32.5
33.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				33.0
33.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				33.5
34.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				34.0
34.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				34.5
35.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				35.0
35.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				35.5
36.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				36.0
36.5				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				36.5
37.0				SAND , (natural) fine to coarse grained, grey, abundant shells throughout, wet.																				37.0
37.5																								

21-415

FILE C

Page 46 of 211

Borehole: BH5

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676056.00

Easting: 722910.00

RL (m):

Depth: 2.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)										
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al 1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA								
																1	2		400	800	1200	1600	2000				
.5 1.0 1.5 2.0				SILTY SAND , (fill) fine to coarse grained, grey-brown, trace of fine roots throughout, trace of fine shell fragments, dry.																					.5		
				SILTY SAND , (fill) fine to coarse grained, grey-brown, dry.																							
				SAND , (fill) fine to medium grained, yellow brown, trace of shell fragments throughout, dry-moist.																							
				SAND , (natural) medium grained, grey, trace of fine shell fragments throughout, moist to wet.																							
				SAND , (natural) medium grained, grey, trace of fine shell fragments throughout, wet.																							
2.0				SAND , (natural) fine to coarse grained, grey, trace of fine shell fragments throughout, wet.					Borehole terminated at 2.0 metres.																2.0		
2.5																									2.5		
3.0																									3.0		
3.5																									3.5		
4.0																									4.0		
4.5																									4.5		

21-415

FILE C

Page 47 of 211

21-415

FILE C

Page 47 of 211

Borehole: BH6

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676227.00

Easting: 722405.00

RL (m):

Depth: 9.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)								
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA						
																1	2		400	800	1200	1600	2000		
0.5				SAND , (fill) fine to coarse grained, yellow brown, trace of silt, trace of fine roots throughout, dry to moist.																					0.5
1.0				SAND , (fill) fine to coarse grained, yellow brown, trace of silt, dry to moist.					SPT (0.6m) 1, 2, 2 N=4																1.0
1.5																									1.5
2.0				SAND , (fill) fine to coarse grained, grey yellow orange brown, moist.					SPT (1.5m) 2, 2, 3 N = 5																2.0
2.5				SAND , (fill) fine to coarse grained, orange brown, trace of fine sized rounded gravel, wet.																					2.5
3.0				SANDY MEDIUM CLAY , (natural) fine to medium grained, dark grey, trace of organics throughout, slight organic odour, wet.																					3.0
				CLAYEY SAND , (natural) fine to coarse grained, dark grey, trace of organics with silt, strong organic odour, wet.					U50 (3.0m) NIL RECOVERY																3.0
3.5				SILTY SAND , (natural) fine to medium grained, grey, trace of shell fragments throughout, wet.					SPT (3.5m) 4, 5, 7 N = 12																3.5
4.0																									4.0
4.5				SAND , (natural) fine grained, grey, trace of silt, wet.					SPT (4.5m) 1, 3, 6 N = 9																4.5

21-415

FILE C

Page 48 of 211

21-415

FILE C

Page 48 of 211

Borehole: BH6

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676227.00

Easting: 722405.00

RL (m):

Depth: 9.00

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)								
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA						
																1	2		400	800	1200	1600	2000		
5.0				SAND , (natural) fine grained, grey, trace of silt, wet.					SPT (4.5m) 1, 3, 6 N = 9																5.0
5.5																									5.5
6.0				SAND , (natural) fine grained, grey, trace of silt, trace of organics (alternate bands) and fine to medium sized rounded gravel, wet.					SPT (6.0m) 5, 7, 6 N = 13																6.0
6.5																									6.5
				SAND , (natural) fine to coarse grained, grey, wet.																					
7.0				SAND , (natural) fine to coarse grained, grey, with wood fragments throughout, wet.																					
				SANDY CLAYEY GRAVEL , (residual) fine sized angular gravel, grey orange brown, medium clay fines, fine to coarse grained sand, moist.																					7.0
7.5																									
				CLAYEY GRAVEL , fine to medium sized angular gravel, grey orange brown, medium clay fines, moist.					SPT (7.5m) 20/140																7.5
8.0																									
																									
8.5				EXTREMELY WEATHERED SILTSTONE , orange brown with light grey mottles, moist.				Borehole terminated at 9.0 metres.	SPT (9.0m) 20/75																8.5
9.0																									
																									9.0

21-415

FILE C

Page 49 of 211

21415

FILE C

Page 49 of 211

Borehole: BH7

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676165.00

Easting: 722498.00

RL (m):

Depth: 3.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA					
																1	2		400	800	1200	1600	2000	
0.5				SAND , (fill) fine to coarse grained, yellow orange brown, trace of fine roots, dry.																				0.5
1.0				SAND , (fill) fine to coarse grained, yellow brown, dry to moist.																				1.0
1.5																								1.5
2.0				SAND , (fill) fine to coarse grained, yellow brown, moist.																				2.0
2.5				SAND , (fill) fine to medium grained, yellow brown, wet.																				2.5
3.0				SAND , (natural) fine to medium grained, grey, trace of silt, wet.																				3.0
3.5				CLAYEY SAND , (natural) fine to medium grained, dark grey, trace of organics throughout, wet.																				3.5
4.0				SILTY SAND , (natural) fine to medium grained, grey, trace of fine shell fragments throughout, wet.																				4.0
4.5																								4.5

21-415

FILE C

Page 50 of 211

21-415

FILE C

Page 50 of 211

Client: Sunland Group

Gilbert & Sutherland
Specialist Soil & Water Scientists

Depth: 3.00

Logged By: CAB

[illegible]

Borehole: BH9

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676068.00

Easting: 722676.00

RL (m):

Depth: 2.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA	TPA								
				SILTY SAND , (fill) fine to medium grained, grey brown, trace of roots throughout, trace of wood fragments, dry.													1	2				400	800	1200	1600	2000
.5				SAND , (fill) fine to medium grained, yellow orange brown, trace of silt, dry.																						
1.0				CLAYEY SAND , (natural) fine to medium grained, grey to dark grey , trace of organics, wet.																						
1.5				CLAYEY SAND , (natural) fine to medium grained, grey to dark grey, with organics, wet.																						
2.0				CLAYEY SAND , (natural) fine to medium grained, grey brown, abundant organics, wet.																						
2.5				CLAYEY SAND , (natural) fine to medium grained, grey, trace of organics, wet.					Borehole terminated at 2.5 metres.																	
3.0																										
3.5																										
4.0																										
4.5																										

21-415

FILE C

Page 52 of 211

21-415

FILE C

Page 52 of 211

Borehole: BH10

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7676022.00

Easting: 722764.00

RL (m):

Depth: 2.25

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA					
																1	2		400	800	1200	1600	2000	
.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5				SILTY SAND , (fill) fine to medium grained, grey, trace of fine roots throughout, dry.																				
				SAND , (fill) fine to medium grained, grey to light grey, trace of silt, dry.																				
				SAND , (fill) fine to medium grained, grey to light yellow grey, moist.																				
				CLAYEY SAND , (natural) fine to medium grained, grey to dark grey, trace of organics throughout, wet.																				
				SILTY SAND , (natural) fine to medium grained, grey, trace of fine shell fragments throughout, wet.																				
														</										

21-415

FILE C

Page 53 of 211

Borehole: BH11

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland

Specialist Soil & Water Scientists

Northing: 7675974.00

Easting: 722852.00

RL (m):

Depth: 7.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)								
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al'1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA						
																1	2		400	800	1200	1600	2000		
0.5				SILTY SAND , (natural) fine grained, dark grey, trace of fine roots throughout, dry.					SPT (0.6m) 2, 4, 4 N=8																0.5
1.0				SAND , (natural) fine to medium grained, grey to light grey, trace of silt, dry.																					1.0
1.5				SAND , (natural) fine to coarse grained, grey to orange brown mottles, moist.					SPT (1.5m) 2, 2, 3 N=5																1.5
2.0				SAND , (natural) fine to coarse grained, grey to orange brown mottles, wet.																					2.0
2.5				SAND , (natural) fine to coarse grained, dark grey to grey, wet.																					2.5
3.0				SILTY SAND , (natural) fine to medium grained, grey, trace of fine shell fragments throughout, wet.																					3.0
3.5				SILTY SAND , (natural) fine to medium grained, grey, trace of fine sized angular gravel, trace of fine shell fragments throughout, wet																					3.5
4.0				SILTY HEAVY CLAY , (natural) grey to grey green with occasional orange brown mottles, trace fine shell fragments throughout, trace fine grained sand, moist.					SPT (3.0m) 1, 1, 2 N = 3																4.0
4.5				HEAVY CLAY , (residual) grey with orange brown mottles, with fine sized angular gravel throughout, trace of fine to medium grained sand, moist.					U50 (4.5m) pp 250-300																4.5

21415

FILE C

Page 54 of 211

21415

FILE C

Page 54 of 211

Borehole: BH11

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland

Specialist Soil & Water Scientists

Northing: 7675974.00

Easting: 722852.00

RL (m):

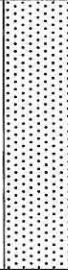
Depth: 7.50

Drilled By: Suth Expl

Start Date: 28.09.04

Completion Date: 28.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays										Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA	TPA										
5.0				HEAVY CLAY , (residual) grey with orange brown mottles, with fine sized angular gravel throughout, trace of fine to medium grained sand, moist.					U50 (4.5m) pp 250-300								1	2					400	800	1200	1600	2000	5.0
5.5																											5.5	
6.0				SILTY HEAVY CLAY , orange brown with grey mottling, trace fine sized angular gravel and fine to medium grained sand throughout, moist.					SPT (6.0m) 11, 13, 20 N = 33																		6.0	
6.5																											6.5	
7.0				SILTY HEAVY CLAY , orange brown with grey mottling, trace fine sized angular gravel (extremely weathered siltstone) and fine to medium grained sand throughout, moist.					SPT (7.5m) 9, 13, 20 N = 33																		7.0	
7.5								Borehole terminated at 7.5 metres.																			7.5	
8.0																											8.0	
8.5																											8.5	
9.0																											9.0	

21-415

FILE C

Page 55 of 211

21-415

FILE C

Page 55 of 211

Borehole: BH12

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing: 7675864.00

Easting: 722878.00

RL (m):

Depth: 1.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA					
																1	2	400	800	1200	1600	2000		
.5				SILTY SAND , (natural) fine to medium grained, dark grey, fine roots throughout, moist.																				
				SILTY SAND , (natural) fine to medium grained, grey with orange yellow lenses, moist.																				
				SAND , (natural) fine to medium grained, light grey with orange mottles, moist.																				
				SAND , (natural) fine to medium grained, light grey with orange mottles, very moist.																				
				SAND , (natural) fine to medium grained, grey, trace of fine shell fragments, wet.																				
1.0				SAND , (natural) fine to medium grained with silt, trace of fine shell fragments, wet.					Borehole terminated at 1.5 metres.															
1.5																								
2.0																								
2.5																								
3.0																								
3.5																								
4.0																								
4.5																								

21-415

FILE C

Page 56 of 211

21-415

FILE C

Page 56 of 211

Borehole: BH13

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675887.00

Easting: 722673.00

RL (m):

Depth: 2.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA	TPA						
																1	2		400	800	1200	1600	2000	
.5				SANDY MEDIUM CLAY , (fill) fine to medium grained sand, grey with orange brown mottles, trace of roots throughout, moist.																				
				SANDY HEAVY CLAY , (natural) fine to medium grained sand, grey, trace of organics, moist to very moist.																				
				SANDY LIGHT MEDIUM CLAY , (natural) fine to medium grained sand, grey to dark grey, abundant organics, wet.																				
				SANDY MEDIUM CLAY , (natural) fine to medium grained, grey to dark grey, abundant organics, wet.																				
				CLAYEY SAND , (natural) fine to medium grained, dark grey, abundant organics, wet.																				
1.0				CLAYEY SAND , (natural) fine to medium grained, dark grey, trace of organics and fine to coarse angular gravel, wet.																				
1.5				SANDY LIGHT CLAY , (residual) fine to medium grained sand, grey yellow brown mottles, trace organics, very moist.					Borehole terminated at 2.5 metres.															
2.0																								
2.5																								
3.0																								
3.5																								
4.0																								
4.5																								

21-415

FILE C

Page 57 of 211

21-415

FILE C

Page 57 of 211

Borehole: BH14

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675864.00

Easting: 722595.00

RL (m):

Depth: 1.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)								
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al/1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA							
																1	2		400	800	1200	1600	2000				
.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5				SANDY MEDIUM CLAY , (natural) fine to medium grained sand, dark brown, trace of fine roots and organics throughout, moist.																							
				SANDY MEDIUM CLAY , (natural) fine to medium grained sand, dark brown, trace of fine roots and organics throughout, very moist.																							
				CLAYEY SAND , (natural) fine to medium grained sand, dark brown, trace of fine roots and organics throughout, wet.																							
				GRAVELLY SILTY CLAY , (natural) fine to medium grained with fine to coarse sized angular gravel, thin medium clay bands, moist to wet.																							
				GRAVELLY SILTY CLAY , (residual) fine sized angular gravel throughout, grey yellow brown, moist.				Borehole terminated at 1.5 metres.																			

21-415

FILE C

Page 58 of 211

Borehole: BH15

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675810.00

Easting: 722437.00

RL (m):

Depth: 4.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling			Soil Description					ASS Interpretation		Assays							Depth NSL(m)						
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %			TPA	TPA				
																1	2		400	800	1200	1600	2000	
0.5				SILTY SAND , (Fill) fine grained, grey to pale yellow brown, trace of silt, moist.																				0.5
1.0				SAND , (natural) fine grained, grey to pale yellow brown, trace of silt, moist.																				1.0
1.5				SAND , (natural) fine to medium grained, grey, trace of silt, moist.					SPT (1.5m) 4, 3, 5 N = 8															1.5
2.0				SAND , (natural) fine to medium grained, grey, trace of silt, wet.																				2.0
2.5				SAND , (natural) fine to medium grained, grey, trace of silt, occasional bands of gravel, wet.																				2.5
3.0				SAND , (natural) fine to medium grained, grey, trace of silt, occasional bands of gravel, wet.																				3.0
3.5				CLAYEY SAND , (natural) fine to coarse grained, yellow orange brown, trace of silt, moist.					SPT (3.0m) 14, 20/130															3.5
4.0				EXTREMELY WEATHERED BASALT				Borehole terminated at 4.5 metres.	SPT (4.5m) 20/120															4.0
4.5																								4.5
			21415							FILE C														

Published under RTI Act 2009

Page 59 of 211

Borehole: BH16

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675702.00

Easting: 722297.00

RL (m):

Depth: 1.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling			Soil Description					ASS Interpretation		Assays							Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA		TPA				
																1	2	400	800	1200	1600	2000	
0.5				CLAYEY SAND , (natural) fine to coarse grained sand, dark grey, trace of fine to medium sized sub-rounded gravel, fine roots and occasional organics throughout, moist to wet.																			0.5
1.0				CLAYEY SAND , (natural) fine to medium grained sand, dark grey, fine roots and occasional organics throughout, moist to wet.																			1.0
1.5				SILTY SAND , (natural) fine to medium grained sand, grey green, with fine to medium sized sub-rounded gravel, occasional organics and roots throughout, wet.																			1.5
				SANDY LIGHT CLAY , yellow grey orange mottles, fine to medium grained sand, moist.				Borehole terminated at 1.5 metres.															1.5
2.0																							2.0
2.5																							2.5
3.0																							3.0
3.5																							3.5
4.0																							4.0
4.5																							4.5

21-415

FILE C

Page 60 of 211

21-415

FILE C

Page 60 of 211

Borehole: BH17

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675716.00

Easting: 722069.00

RL (m):

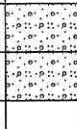
Depth: 0.50

Drilled By: Suth Expl

Start Date: 29.09.04

Completion Date: 29.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA				
																1	2		400	800	1200	1600	2000	
0.5				SILTY SAND, (natural) fine to medium grained, dark grey, trace of fine to coarse sized rounded gravel, trace of fine roots, occasional cobbles throughout, moist.																				0.5
1.0				SILTY SAND, (natural) fine to medium grained, dark grey, fine to coarse sized rounded gravel, occasional light clay lenses, trace of fine roots, moist.				Borehole terminated at 0.5 metres in cobbles.																1.0
1.5																								1.5
2.0																								2.0
2.5																								2.5
3.0																								3.0
3.5																								3.5
4.0																								4.0
4.5																								4.5

21-415

FILE O

Page 61 of 211

21-415

FILE C

Page 61 of 211

Client: Sunland Group

Depth: 4.50

Logged By: CAB

Borehole: BH19

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675525.00

Easting: 722056.00

RL (m):

Depth: 2.50

Drilled By: Suth Expl

Start Date: 30.09.04

Completion Date: 30.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)						
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA					
																1	2		400	800	1200	1600	2000		
0.5				SILTY SAND , (natural) fine to medium grained, dark grey, trace of fine roots throughout, moist.																					0.5
1.0				SAND , (natural) fine to medium grained, grey orange with brown mottles, moist to very moist.																					1.0
1.5				MEDIUM HEAVY CLAY , (natural) dark grey, with fine to medium grained sand, with organics and wood fragments throughout, wet.																					1.5
2.0				SANDY MEDIUM CLAY , (natural) fine to medium grained sand, dark grey, with organics throughout, wet.																					2.0
2.5				GRAVELLY MEDIUM CLAY , grey yellow orange brown, fine to coarse sized angular gravel, with fine to coars grained sand, moist.																					2.5
3.0																									3.0
3.5																									3.5
4.0																									4.0
4.5																									4.5

21-415

FILE C

Page 63 of 211

21-415

FILE C

Page 63 of 211

Borehole: BH20

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675559.00

Easting: 722416.00

RL (m):

Depth: 3.00

Drilled By: Suth Expl

Start Date: 30.09.04

Completion Date: 30.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description							ASS Interpretation		Assays								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %	TPA	TPA						
																1	2	400	800	1200	1600	2000		
0.5				GRAVELLY MEDIUM CLAY , (natural) soft to firm, orange brown, fine to medium sized angular gravel, with fine to medium grained sand, moist to wet.																				0.5
				GRAVELLY LIGHT CLAY , (natural) soft, grey orange brown, fine to medium sized angular gravel, with fine to coarse grained sand, wet.																				
1.0				GRAVELLY LIGHT CLAY , (natural) firm, grey orange brown, fine to medium sized angular gravel, with fine to coarse grained sand, wet.					U50 (0.6m) PP= >600															1.0
1.5				SANDY MEDIUM CLAY , (residual) grey green with orange brown mottles, fine to coarse grained sand, trace fine to medium sized angular gravel, moist.					SPT (1.5m) 20/130															1.5
2.0				SANDY LIGHT CLAY , grey yellow brown, fine to coarse grained sand, with fine to coarse sized angular gravel, occasional weather basit lenses throughout, moist.																				2.0
2.5				EXTREMELY WEATHERED BASALT				Borehole terminated at 3.0 metres.	SPT (3.0m) 19 20/130															2.5
3.0																								3.0
3.5																								3.5
4.0																								4.0
4.5																								4.5

21 415

FILE C

Page 64 of 211

21-415

FILE C

Page 64 of 211

Borehole: BH21

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675522.00

Easting: 722539.00

RL (m):

Depth: 1.00

Drilled By: Suth Expl

Start Date: 30.09.04

Completion Date: 30.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et al 1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA		TPA				
																1	2		400	800	1200	1600	2000	
0.5				SILTY GRAVELLY LIGHT CLAY , dark grey, fine to medium sized angular gravel, trace fine roots and silt throughout, moist.																				0.5
1.0				GRAVELLY LIGHT CLAY , yellow brown, fine to coarse sized angular gravel, with fine to coarse grained sand, occasional lenses of extremely weathered basalt throughout, moist.				Borehole terminated at 1.0 metres.																1.0
1.5																								1.5
2.0																								2.0
2.5																								2.5
3.0																								3.0
3.5																								3.5
4.0																								4.0
4.5																								4.5

21 415

FILE C

Page 65 of 211

21 415

FILE C

Page 65 of 211

Borehole: BH22

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675427.00

Easting: 722660.00

RL (m):

Depth: 1.50

Drilled By: Suth Expl

Start Date: 30.09.04

Completion Date: 30.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays										Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA					
																1	2		400	800	1200	1600	2000	
0.5				SILTY GRAVELLY SAND , brown, fine to medium grained sand, fine to coarse sized angular gravel, trace fine roots throughout, moist																				
				GRAVEL , fine to coarse sized angular gravel, grey brown, trace silt, moist.																				
				GRAVELLY MEDIUM CLAY , (residual) orange brown, fine to coarse sized angular gravel, with fine to medium grained sand throughout, moist.																				
				GRAVELLY MEDIUM CLAY , orange brown, fine to coarse sized angular gravel, with fine to coarse grained sand, trace silt, moist.																				
1.0				GRAVELLY MEDIUM CLAY , orange brown, fine to coarse sized angular gravel, with fine to coarse grained sand, trace silt, with fine bands of extremely weathered basalt throughout, moist.																				
1.5									Borehole terminated at 1.5 metres.															
2.0																								
2.5																								
3.0																								
3.5																								
4.0																								
4.5																								

21-415

FILE C

Page 66 of 211

21-415

FILE C

Page 66 of 211

Borehole: BH23

Project: GJ0389

Client: Sunland Group

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: 7675425.00

Easting: 722805.00

RL (m):

Depth: 2.60

Drilled By: Suth Expl

Start Date: 30.09.04

Completion Date: 30.09.04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						ASS Interpretation		Assays						Depth NSL(m)								
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Aust. Soil Class.	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Assigned Category	Representative Strata	Sample ID	pH(Field)	pH(FieldOx)	S(pos) %	S(pos) %		TPA	TPA						
																1	2		400	800	1200	1600	2000		
.5				SANDY MEDIUM CLAY , (natural/residual) grey orange brown mottle, fine to medium grained sand, moist.																					.5
				SANDY HEAVY CLAY , grey orange brown mottle, fine to medium grained sand, trace silt, trace fine sized angular gravel throughou, moist.																					
1.0				GRAVELLY MEDIUM CLAY , grey orange brown with dark grey mottles, fine to medium sized sub-angular basalt gravel throughout, fine to medium grained sand, moist.					U50 (0.6m) PP= >600																1.0
1.5				GRAVELLY MEDIUM CLAY , grey yellow brown, fine to medium sized sub-angular basalt gravel throughout, fine to medium grained sand, moist.																					1.5
2.0				GRAVELLY MEDIUM CLAY , grey yellow orange mottles, fine to medium sized angular gravel, trace fine to medium grained sand, moist.					SPT (1.5m) 7, 5, 8 N= 13																2.0
				GRAVELLY MEDIUM CLAY , grey yellow orange mottles, fine to medium sized angular gravel, trace fine to medium grained sand, with alternating bands of gravel throughout, moist.																					
2.5				GRAVELLY LIGHT CLAY , pale brown yellow, fine to coarse sized angular gravel, trace of fine to medium grained sand, moist.				Borehole terminated at 2.6 metres (T.C bit refusal).	SPT (2.6m) 20/85																2.5
3.0																									3.0
3.5																									3.5
4.0																									4.0
4.5																									4.5

21-415

FILE C

Page 67 of 211

21-415

FILE C

Page 67 of 211

Borehole: BHA

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: Easting: RL (m):

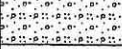
Depth: 1.50

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results					Depth NSL(m)
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et al 1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)	
												1 2 3 4 5 6 7 8	
.5				SILTY SAND, (Fill) Fine to medium grained. Grey brown. Fine to coarse angular gravel throughout. Occasional cobbles. Roots throughout. Dry									.5
1.0				SAND, (Fill) Fine to medium grained. Yellow orange brown. Moist.				Borehole terminated @ 1.5m.					1.0
1.5													1.5
2.0													2.0
2.5													2.5
3.0													3.0
3.5													3.5
4.0													4.0

21415

FILE C

Page 68 of 211

Borehole: BHB

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 1.50

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Trace of fine roots throughout. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Dry																
.5																				.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				

Page 69 of 214

21-415

FILE C

Page 69 of 211

Borehole: BHC

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland Specialist Soil & Water Scientists

Northing: Easting: RL (m):

Depth: 4.50

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Drilling			Soil Description					Testing Results								Depth NSL(m)				
Depth NSL(m)	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey Brown. Trace of fine roots throughout. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Dry																
.5				SAND , (Fill) Fine to medium grained. Yellow orange brown. Moist																.5
1.0																				1.0
1.5				SILTY SAND , (Natural) Fine to medium grained. Yellow orange brown. Fine shell fragments throughout. Moist.																1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0								Borehole terminated @ 4.5m.												4.0
21-415																				

Published on DES Disclosure Log
RTI Act 2009

FILE C

Page:70 of 211

21415

FILE C

Page 70 of 211

Borehole: BHD

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Drilled By: SE

Easting:

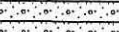
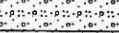
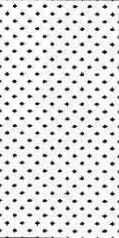
Start Date: 30/09/04

RL (m):

Completion Date: 30/09/04

Depth: 1.50

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Trace of fine roots throughout. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Dry																
0.5																				
1.0				SAND , (Fill) Fine to medium grained. Yellow orange brown Moist.				Borehole terminated @ 1.5m.												
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				
21-415																				
FILE C																				

Published on DES Disclosure Log
RTI Act 2009

Page 71 of 211

21-415

FILE C

Page 71 of 211

Borehole: BHE

Project: GJ0389-1

Client: Sunland Group

Soil Class **Gilbert & Sutherland**
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

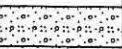
Depth: 1.50

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Fine to coarse angular gravel throughout. Occasional cobbles. Roots throughout. Occasional organic matter.																
0.5				SAND , (Fill) Fine to medium grained. Pale yellow brown. Dry																
1.0				SAND , (Fill) Fine to medium grained. Brown yellow orange. Moist.				Borehole terminated @ 1.5m.												
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				
21-415																				
FILE C																				

Page 72 of 211

21-415

FILE C

Page 72 of 211

Borehole: BHF

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results					Depth NSL(m)
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)	
												1 2 3 4 5 6 7 8	
				SILTY SAND, (Fill) Fine to medium grained. Grey. Trace of fine roots. Dry									
				SILTY SAND, (Fill) Fine to medium grained. Grey. Trace of roots. Moist									
.5													.5
1.0													1.0
1.5				SAND, (Fill) Fine to coarse grained. Yellow orange brown. Moist									1.5
2.0													2.0
2.5													2.5
3.0				SAND, (Fill) Fine to medium grained. Yellow orange brown. Trace of fine shells throughout. Moist				Borehole terminated @ 3.0m.					3.0
3.5													3.5
4.0													4.0

21-415

FILE C

Page 73 of 211

Borehole: BHG

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

Depth: 4.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
.5				SILTY SAND , (Fill) Fine to medium grained. Grey. Trace of fine roots. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Grey. Trace of roots. Moist																
1.0																				
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				

Borehole: BHH

Project: GJ0389-1

Client: Sunland Group

Soil Class **Gilbert & Sutherland**
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

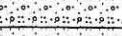
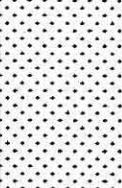
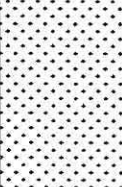
Depth: 2.50

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey. Trace of fine roots throughout. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Grey. Dry																
.5																				
1.0																				
1.5				SAND , (Fill) Fine to medium grained. Yellow orange brown. Moist.				Borehole terminated @ 2.5m.												
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				

21-415

FILE C

Page 75 of 211

21-415

FILE C

Page 75 of 211

Borehole: BHI

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 1.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et al 1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4		5	6	7	8
				SILTY SAND , (Fill) Fine to medium grained. Grey. Trace of fine roots throughout. Dry																
				SILTY SAND , (Fill) Fine to medium grained. Grey. Dry																
0.5				SAND , (Fill) Fine to medium grained. Yellow orange brown. Moist.				Borehole terminated @ 1.0m.												
1.0																				
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				
21-415																FILE C				
																Page 76 of 211				

Borehole: BHJ

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Drilled By: SE

Easting:

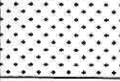
Start Date: 30/09/04

RL (m):

Completion Date: 30/09/04

Depth: 3.10

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Fine to coarse sized angular gravel throughout. Dry																
				SAND , (Fill) Fine to medium grained. Yellow brown. Trace of silt. Moist																
				SAND , (Fill) Fine to medium grained. Yellow brown. Moist																
				SAND , (Natural) Fine to coarse grained. Grey yellow. Trace of fine shell fragments throughout. Wet.					Borehole terminated @ 3.5m.											

21-415

FILE C

Page 77 of 211

21-415

FILE C

Page 77 of 211

Borehole: BHK

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

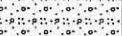
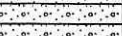
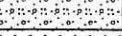
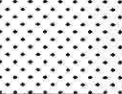
Depth: 1.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)									
												1	2	3	4	5	6	7	8		
.5				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Fine roots throughout. Dry																	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Dry																	
				SILTY SAND , (Fill) Fine to medium grained. Pale grey yellow brown																	
				SAND , (Fill) Fine to coarse grained. Yellow orange. Moist.																	
1.0								Borehole terminated @ 1.0m.													
1.5																					
2.0																					
2.5																					
3.0																					
3.5																					
4.0																					

21415

FILE C

Page 78 of 214

21415

FILE C

Page 78 of 211

Borehole: BHL

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)									
												1	2	3	4	5	6	7	8		
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Fine roots throughout. Dry																	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Dry																	
.5				SAND , (Natural) Fine to coarse grained. Yellow orange. Moist																.5	
1.0																					1.0
1.5																					1.5
2.0																					2.0
2.5				SAND , (Natural) Fine to coarse grained. Grey. Trace of fine shell fragments throughout. Wet.																2.5	
3.0																					3.0
3.5																					3.5
4.0																					4.0
21-415																					
FILE C																					
Page 79 of 211																					

Borehole: BHM

Project: GJ0389-1

Client: Sunland Group

Soil Class **Gilbert & Sutherland**
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

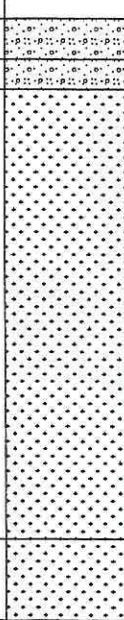
Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)										
												1	2	3	4	5	6	7	8			
.5				SILTY SAND , (Fill) Gravelly, Fine to medium grained. Grey brown. Fine to medium sized angular gravel. Trace of fine roots. Dry																		
				SILTY SAND , (Fill) Fine to medium grained. Pale grey yellow																		
1.0																						
1.5																						
2.0																						
2.5																						
3.0																						
3.5																						
4.0																						
							</															

21-415

FILE C

Page 80 of 211

Borehole: BHN

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Gravely, Fine to medium grained. Grey brown. Fine to medium sized angular gravel. Trace of fine roots. Dry																
				SILTY SAND , (Fill) Fine to coarse sized angular gravel throughout occasionally cobbles. Dry																
.5																				.5
1.0																				1.0
1.5				SAND , (Fill) Fine to coarse grained. Yellow orange brown. Moist																1.5
2.0																				2.0
2.5																				2.5
3.0				SAND , (Fill) Fine to medium grained. Grey. Trace of fine shell fragments throughout. Wet				Borehole terminated @ 3.0m.												3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 81 of 211																				

Borehole: BHL

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)				
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)									
												1	2	3	4	5	6	7	8		
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Fine roots throughout. Dry																	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Dry																	
.5				SAND , (Natural) Fine to coarse grained. Yellow orange. Moist																.5	
1.0																					1.0
1.5																					1.5
2.0																					2.0
2.5				SAND , (Natural) Fine to coarse grained. Grey. Trace of fine shell fragments throughout. Wet.																2.5	
3.0																					3.0
3.5																					3.5
4.0																					4.0
21-415																					
FILE C																					
Page 82 of 211																					

Borehole: BHM

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

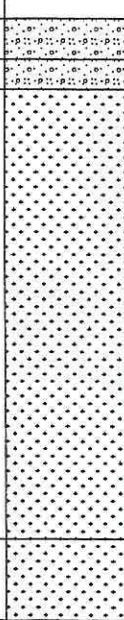
Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)					
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)										
												1	2	3	4	5	6	7	8			
.5				SILTY SAND , (Fill) Gravely. Fine to medium grained. Grey brown. Fine to medium sized angular gravel. Trace of fine roots. Dry																		
				SILTY SAND , (Fill) Fine to medium grained. Pale grey yellow																		
1.0																						
1.5				SAND , (Fill) Fine to coarse grained. Yellow orange. Moist																		
2.0																						
2.5																						
3.0				SAND , (Natural) Fine to coarse grained. Yellow orange. Wet				Borehole terminated @ 3.0m.														
3.5																						
4.0																						

21-415

FILE C

Page 83 of 211

21-415

FILE C

Page 83 of 211

Borehole: BHN

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 3.00

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description					Testing Results					Depth NSL(m)
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et al 1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)	
												1 2 3 4 5 6 7 8	
				SILTY SAND, (Fill) Gravely, Fine to medium grained. Grey brown. Fine to medium sized angular gravel. Trace of fine roots. Dry									
.5				SILTY SAND, (Fill) Fine to coarse sized angular gravel throughout occasionally cobbles. Dry									
1.0													
1.5				SAND, (Fill) Fine to coarse grained. Yellow orange brown. Moist									
2.0													
2.5													
3.0				SAND, (Fill) Fine to medium grained. Grey. Trace of fine shell fragments throughout. Wet				Borehole terminated @ 3.0m.					
3.5													
4.0													
21-415													
FILE C													
Page 84 of 211													

Borehole: BHO

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5		6	7	8
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
0.5																		0.5		
1.0																		1.0		
1.5																		1.5		
2.0																		2.0		
2.5																		2.5		
3.0																		3.0		
3.5																		3.5		
4.0																		4.0		
21-415																				
FILE C																				
Page 85 of 211																				

Borehole: BHP

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5		6	7	8
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
.5																				.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 86 of 211																				

Borehole: **BHQ**

Project: **GJ0389-1**

Client: **Sunland Group**

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: **0.10**

Drilled By: **SE**

Start Date: **30/09/04**

Completion Date: **30/09/04**

Logged By: **CAB**

Depth NSL(m)	Drilling		Soil Description					Testing Results					Depth NSL(m)							
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
0.5																				0.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 87 of 211																				

Borehole: BHR

Project: GJ0389-1

Client: Sunland Group

Soil Class **Gilbert & Sutherland**
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
0.5																				0.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 88 of 211																				

Borehole: BHS

Project: GJ0389-1

Client: Sunland Group

Soil Class **Gilbert & Sutherland**
Specialist Soil & Water ScientistsNorthing: Easting: RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
.5																				.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 89 of 211																				

Borehole: BHT

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5		6	7	8
				SILTY SAND (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
0.5																				
1.0																				
1.5																				
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				

21-415

FILE C

Page 90 of 211

21-415

FILE C

Page 90 of 211

Borehole: BHU

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results				Depth NSL(m)
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.					
0.5													0.5
1.0													1.0
1.5													1.5
2.0													2.0
2.5													2.5
3.0													3.0
3.5													3.5
4.0													4.0
21-415													
FILE C													
Page 91 of 211													

Borehole: BHV

Project: GJ0389-1

Client: Sunland Group

Soil Class

Gilbert & Sutherland
Specialist Soil & Water Scientists

Northing:

Easting:

RL (m):

Depth: 0.10

Drilled By: SE

Start Date: 30/09/04

Completion Date: 30/09/04

Logged By: CAB

Depth NSL(m)	Drilling		Soil Description						Testing Results								Depth NSL(m)			
	Depth RL(m)	Method	Graphic Log	Soil Description (as per McDonald et.al1990)	Revised Standard Colour	Depositional Environment	Accessories	Additional Comments	Sample ID	Emerson Class	pH(Field)	pH(Field)								
												1	2	3	4	5	6	7	8	
				SILTY SAND , (Fill) Fine to medium grained. Grey brown. Roots throughout. Trace of fine to coarse sized angular gravel throughout with occasional cobbles. Dry.				Borehole terminated @ 0.1m.												
0.5																				0.5
1.0																				1.0
1.5																				1.5
2.0																				2.0
2.5																				2.5
3.0																				3.0
3.5																				3.5
4.0																				4.0
21-415																				
FILE C																				
Page 92 of 211																				



Appendix D. Certificates of analysis, quality control reports and chain of custody documentation

Published on DES Disclosure Log
RTI Act 2009



ALS Environmental

CERTIFICATE OF ANALYSIS

Client : GILBERT & SUTHERLAND PTY LTD
Contact : sch4p4(6) Personal information
Address : P O BOX 4115 ROBINA QLD AUSTRALIA 4230

Laboratory : ALS Environmental Brisbane
Contact : sch4p4(6) Personal information
Address : 32 Shand Street Stafford QLD Australia 4053

Page : 1 of 53
Work order : EB0406047

Project : GJ0389-1
Order number : - Not provided -
C-O-C number : - Not provided -
Site : - Not provided -

Quote number : EB20040159

Date received : 5 Oct 2004
Date issued : 29 Oct 2004

E-mail : gsrobina@bigpond.com
Telephone : (07)5578-9944
Facsimile : (07)5578-9945

E-mail : sch4p4(6) Personal information@alsenviro.com
Telephone : 61-7-32437222
Facsimile : 61-7-32437259

No. of samples
Received : 257
Analysed : 215

This final report was issued on Friday, October 29, 2004 for the ALSE work order reference EB0406047 and supersedes any previous reports with this reference.

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

This report contains the following information:

- Analytical results for samples submitted
- Surrogate control limits

ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY

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

Signatory

sch4p4(6) Personal information

Department

Inorganics - NATA 818 (Brisbane)
Organics - NATA 818 (Brisbane)
Inorganics - NATA 818 (Brisbane)



NATA Accredited Laboratory - 825

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 2 of 53
Issue Date : 29 Oct 2004

When moisture determination has been performed, results are reported on a dry weight basis. When a reported 'less than' result is higher than the LOR, this may be due to primary sample extracts/digestion dilution and/or insufficient sample amount for analysis. Surrogate Recovery Limits are static and based on USEPA SW846 or ALS-QWI/EN38 (in the absence of specified USEPA limits).
Abbreviations: **CAS number** = Chemical Abstract Services number, **LOR** = Limit of Reporting. # Indicates a raised LOR, * Indicates failed Surrogate Recoveries.
When date(s) are shown bracketed, these have been assumed by the laboratory for process purposes.

Analytical Results

Analytical Results

Client Sample ID :				BH1 0.0-0.25	BH1 0.25-0.5	BH1 0.5-0.75	BH1 0.75-1.0	BH1 1.0-1.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-001	EB0406047-002	EB0406047-003	EB0406047-004	EB0406047-005
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.8	6.7	6.6	6.6	6.7
pH (Fox)	0.1	pH Unit		2.7	3.7	4.3	4.6	4.8
Reaction Rate	1	—		2	1	1	1	1



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 4 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH1 2.5-2.75	BH1 2.75-3.0	BH2 0.0-0.25	BH2 0.25-0.5	BH2 0.5-0.75
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-011	EB0406047-012	EB0406047-013	EB0406047-014	EB0406047-015
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	8.6	8.8	6.9	6.6	6.6
pH (Fox)		0.1	pH Unit	8.5	6.1	4.6	4.7	4.5
Reaction Rate		1	--	2	2	2	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 5 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH2 0.75-1.0	BH2 1.0-1.25	BH2 1.25-1.5	BH2 1.5-1.75	BH2 1.75-2.0
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-016	EB0406047-017	EB0406047-018	EB0406047-019	EB0406047-020
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		6.6	6.8	6.7	6.9	6.7
pH (Fox)	0.1	pH Unit		4.0	4.2	4.3	4.1	4.3
Reaction Rate	1	--		1	1	1	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 6 of 53
Issue Date : 29 Oct 2004

Analytical Results

			Client Sample ID :	BH2 2.0-2.25	BH2 2.25-2.5	BH2 2.5-2.75	BH2 2.75-3.0	BH2 3.0-3.25
Analytical Results			Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
			Sample Date / Time :	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
			Laboratory Sample ID :					
Analyte	CAS number	LOR	Units	EB0406047-021	EB0406047-022	EB0406047-023	EB0406047-024	EB0406047-025
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		8.8	8.8	8.6	8.7	8.8
pH (Fox)	0.1	pH Unit		6.4	6.9	6.9	6.7	7.4
Reaction Rate	1	--		2	2	2	2	2

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 7 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :			BH2 3.25-3.5	BH3 0.0-0.15	BH3 0.0-0.25	BH3 0.25-0.5	BH3 0.75-1.0	
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	
Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	
Laboratory Sample ID :			EB0406047-026	EB0406047-027	EB0406047-028	EB0406047-029	EB0406047-030	
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		8.7	5.9	5.6	5.8	6.0
pH (Fox)	0.1	pH Unit		7.7	4.2	2.9	2.9	4.3
Reaction Rate	1	--		2	1	1	2	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 8 of 53
Issue Date : 29 Oct 2004

				Client Sample ID :	BH3 1.0-1.25	BH3 1.25-1.5	BH3 1.5-1.75	BH3 1.75-2.0	BH3 2.0-2.25
Analytical Results				Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
				Sample Date / Time :	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
				Laboratory Sample ID :	EB0406047-031	EB0406047-032	EB0406047-033	EB0406047-034	EB0406047-035
Analyte	CAS number	LOR	Units						
EA003 :pH (field/fox)									
pH (F)		0.1	pH Unit		5.5	5.7	5.6	5.5	5.7
pH (Fox)		0.1	pH Unit		4.2	4.4	3.8	4.3	3.9
Reaction Rate		1	—		1	1	1	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 9 of 53
Issue Date : 29 Oct 2004

Analytical Results	Client Sample ID :			BH3 2.25-2.5	BH3 2.5-2.75	BH3 2.75-3.0	BH3 3.0-3.25	BH4 0.0-0.2
	Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
	Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
	Laboratory Sample ID :			EB0406047-036	EB0406047-037	EB0406047-038	EB0406047-039	EB0406047-040
	Analyte	CAS number	LOR					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		3.8	4.3	7.9	8.3	5.6
pH (Fox)	0.1	pH Unit		2.3	2.3	6.8	7.4	2.7
Reaction Rate	1	--		2	3	2	2	2



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 10 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results	Client Sample ID :			BH4 0.2-0.5	BH4 0.5-0.75 Dark Brown	BH4 0.5-0.75 Light Brown	BH4 0.75-1.0	BH4 1.0-1.25
	Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
	Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
	Laboratory Sample ID :			EB0406047-041	EB0406047-042	EB0406047-043	EB0406047-044	EB0406047-045
	Analyte	CAS number	LOR	Units				
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.8	7.0	5.6	6.0	6.2
pH (Fox)	0.1	pH Unit		2.2	5.4	2.7	3.9	4.0
Reaction Rate	1	—		2	2	2	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 11 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :			BH4 1.4-1.75	BH4 1.75-2.0	BH4 2.0-2.25	BH5 0.0-0.2	BH5 0.2-0.5	
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	
Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	
Laboratory Sample ID :			EB0406047-046	EB0406047-047	EB0406047-048	EB0406047-049	EB0406047-050	
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		8.2	8.2	8.6	6.2	6.1
pH (Fox)	0.1	pH Unit		6.8	6.9	7.1	2.7	2.8
Reaction Rate	1	--		2	2	2	2	2

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 12 of 53
Issue Date : 29 Oct 2004

Client Sample ID :				BH5 0.5-0.75	BH5 0.75-1.0	BH5 1.0-1.25	BH5 1.25-1.5	BH5 1.5-2.0
Analytical Results	Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
	Sample Date / Time :			29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
	Laboratory Sample ID :			EB0406047-051	EB0406047-052	EB0406047-053	EB0406047-054	EB0406047-055
	Analyte	CAS number	LOR Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.6	7.5	4.4	4.1	5.9
pH (Fox)	0.1	pH Unit		3.8	3.9	2.2	2.0	2.3
Reaction Rate	1	—		1	1	4	1	3

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 13 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :			BH5 1.75-2.0	BH6 0.0-0.25	BH6 0.25-0.5	BH6 0.5-0.75	BH6 0.75-1.0
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :			29 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :			EB0406047-056	EB0406047-057	EB0406047-058	EB0406047-059	EB0406047-060
LOR	Units						
0.1	pH Unit		7.6	7.6	7.4	6.6	6.5
0.1	pH Unit		6.4	3.1	3.1	3.8	3.8
1	---		2	2	2	2	2

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 14 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH6 1.0-1.25	BH6 1.25-1.5	BH6 1.5-1.75	BH6 1.75-2.0	BH6 2.0-2.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-061	EB0406047-062	EB0406047-063	EB0406047-064	EB0406047-065
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.4	5.3	5.4	5.3	5.2
pH (Fox)	0.1	pH Unit		4.5	4.5	4.1	3.7	3.9
Reaction Rate	1	—		2	1	1	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 15 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :			BH6 2.25-2.5	BH6 2.5-2.7	BH6 2.7-2.9	BH6 2.9-3.25	BH6 3.25-3.5	
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	
Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	
Laboratory Sample ID :			EB0406047-066	EB0406047-067	EB0406047-068	EB0406047-069	EB0406047-070	
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		4.8	5.3	6.3	6.2	6.1
pH (Fox)	0.1	pH Unit		3.8	1.9	1.6	2.0	1.7
Reaction Rate	1	—		1	4	4	4	4

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 16 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH6 3.5-3.75	BH7 0.0-0.25	BH7 0.25-0.5	BH7 0.5-0.75	BH7 0.75-1.0
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-071	EB0406047-072	EB0406047-073	EB0406047-074	EB0406047-075
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.7	5.8	5.3	5.2	5.1
pH (Fox)	0.1	pH Unit		1.8	3.4	3.5	3.5	4.1
Reaction Rate	1	—		4	2	1	1	1

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 17 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH7 1.0-1.25	BH7 1.25-1.5	BH7 1.5-1.75	BH7 1.75-2.0	BH7 2.0-2.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-076	EB0406047-077	EB0406047-078	EB0406047-079	EB0406047-080
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.1	5.2	5.3	5.3	5.1
pH (Fox)	0.1	pH Unit		4.3	4.3	4.3	4.0	4.0
Reaction Rate	1	--		2	2	2	2	1

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 18 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH7 2.25-2.5	BH7 2.5-2.6	BH7 2.6-3.0	BH7 3.0-3.25	BH7 3.25-3.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-081	EB0406047-082	EB0406047-083	EB0406047-084	EB0406047-085
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		4.9	7.2	5.1	6.3	6.0
pH (Fox)	0.1	pH Unit		3.8	2.1	1.4	1.8	2.0
Reaction Rate	1	--		4	4	4	4	4

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 19 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH8 0.0-0.25	BH8 0.25-0.5	BH8 0.5-0.75	BH8 0.75-1.0	BH8 1.0-1.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-086	EB0406047-087	EB0406047-088	EB0406047-089	EB0406047-090
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		6.0	6.3	6.3	6.4	6.3
pH (Fox)	0.1	pH Unit		2.6	3.6	3.7	4.3	4.2
Reaction Rate	1	—		3	1	1	1	1

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 20 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH8 1.25-1.5	BH8 1.5-1.75	BH8 1.75-2.0	BH8 2.0-2.25	BH8 2.25-2.4
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-091	EB0406047-092	EB0406047-093	EB0406047-094	EB0406047-095
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		6.3	6.2	6.5	6.3	6.6
pH (Fox)	0.1	pH Unit		4.0	3.5	3.6	4.2	4.3
Reaction Rate	1	--		1	1	2	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 21 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results	Client Sample ID :			BH9 0.0-0.25	BH9 0.25-0.5	BH9 0.5-0.75	BH9 0.75-1.0	BH9 1.0-1.15
	Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
	Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
	Laboratory Sample ID :			EB0406047-096	EB0406047-097	EB0406047-098	EB0406047-099	EB0406047-100
	Analyte	CAS number	LOR	Units				
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		4.5	4.4	4.6	5.1	6.4
pH (Fox)	0.1	pH Unit		1.9	2.7	2.7	3.0	3.8
Reaction Rate	1	—		3	1	1	1	4

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 22 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH9 1.15-1.5	BH9 1.5-1.75 Light Brown	BH9 1.5-1.75 Dark Brown	BH9 1.75-2.0	BH9 2.0-2.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-101	EB0406047-102	EB0406047-103	EB0406047-104	EB0406047-105
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		6.9	6.3	5.5	5.7	5.7
pH (Fox)	0.1	pH Unit		3.8	1.8	1.5	1.5	1.6
Reaction Rate	1	--		2	4	4	4	4

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 23 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :

BH9 2.25-2.5

BH10 0.0-0.2

BH10 0.2-0.5

BH10 0.5-0.75

BH10 0.75-1.0

Sample Matrix Type / Description :

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

Sample Date / Time :

28 Sep 2004
15:00

28 Sep 2004
15:00

28 Sep 2004
15:00

28 Sep 2004
15:00

28 Sep 2004
15:00

Laboratory Sample ID :

EB0406047-106

EB0406047-107

EB0406047-108

EB0406047-109

EB0406047-110

Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	6.6	5.5	5.5	6.0	5.7
pH (Fox)		0.1	pH Unit	1.7	2.0	2.6	3.4	3.5
Reaction Rate		1	—	4	3	3	1	1

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 24 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :			BH10 1.1-1.25	BH10 1.25-1.5	BH10 1.6-1.75	BH10 1.75-2.0	BH10 2.0-2.25	
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	
Sample Date / Time :			28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	
Laboratory Sample ID :			EB0406047-111	EB0406047-112	EB0406047-113	EB0406047-114	EB0406047-115	
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		3.9	6.0	3.9	4.1	4.2
pH (Fox)	0.1	pH Unit		1.8	1.6	2.1	2.0	2.1
Reaction Rate	1	--		4	4	4	4	4

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 25 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH11 0.0-0.15	BH11 0.15-0.5	BH11 0.5-0.75	BH11 0.75-0.9	BH12 0.0-0.2
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-116	EB0406047-117	EB0406047-118	EB0406047-119	EB0406047-120
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.3	5.3	6.3	6.4	7.0
pH (Fox)	0.1	pH Unit		2.6	2.2	3.8	4.0	3.9
Reaction Rate	1	--		3	3	1	1	2

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 26 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :			BH12 0.2-0.5	BH12 0.5-0.75	BH12 0.75-1.0	BH13 0.0-0.2	BH13 0.2-0.5	
Sample Matrix Type / Description :			SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	
Sample Date / Time :			29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	
Laboratory Sample ID :			EB0406047-121	EB0406047-122	EB0406047-123	EB0406047-124	EB0406047-125	
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		7.1	7.0	6.8	5.6	6.0
pH (Fox)	0.1	pH Unit		4.2	4.0	3.9	3.0	2.6
Reaction Rate	1	--		1	1	1	3	3

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 27 of 53
Issue Date : 29 Oct 2004

Analytical Results				Client Sample ID :	BH13 0.5-0.75	BH13 0.75-1.0	BH13 1.0-1.25	BH14 0.0-0.2	BH14 0.2-0.5
				Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
				Sample Date / Time :	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
				Laboratory Sample ID :	EB0406047-126	EB0406047-127	EB0406047-128	EB0406047-129	EB0406047-130
Analyte	CAS number	LOR	Units						
EA003 :pH (field/fox)									
pH (F)		0.1	pH Unit	3.9	4.3	5.5	4.4	4.1	
pH (Fox)		0.1	pH Unit	1.6	1.8	1.8	2.3	2.0	
Reaction Rate		1	--	4	4	4	3	3	



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 29 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BH15 0.75-1.0	BH15 1.0-1.25	BH15 1.25-1.5	BH16 0.0-0.25	BH16 0.25-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-136	EB0406047-137	EB0406047-138	EB0406047-139	EB0406047-140
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.8	6.9	6.9	6.2	6.7
pH (Fox)	0.1	pH Unit		3.7	4.6	4.3	2.3	3.2
Reaction Rate	1	—		1	1	1	3	3

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 30 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH16 0.5-0.8	BH16 0.8-1.0	BH17 0.0-0.25	BH17 0.25-0.5	BH18 0.0-0.1
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-141	EB0406047-142	EB0406047-143	EB0406047-144	EB0406047-145
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.8	5.3	6.2	6.6	5.4
pH (Fox)	0.1	pH Unit		1.7	1.9	2.8	3.2	2.5
Reaction Rate	1	--		4	4	2	2	1

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 31 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH18 0.1-0.25	BH18 0.25-0.5	BH18 0.5-0.75	BH18 0.75-1.0	BH18 1.0-1.3
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-146	EB0406047-147	EB0406047-148	EB0406047-149	EB0406047-150
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		6.4	6.3	5.7	5.8	5.5
pH (Fox)	0.1	pH Unit		3.5	3.8	1.0	2.0	1.5
Reaction Rate	1	--		1	1	2	2	4

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 32 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BH19 0.0-0.25	BH19 0.25-0.5	BH19 0.6-0.75	BH19 0.75-1.1	BH19 1.25-1.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-151	EB0406047-152	EB0406047-153	EB0406047-154	EB0406047-155
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		5.9	5.6	5.2	5.1	4.9
pH (Fox)	0.1	pH Unit		2.4	2.2	3.0	2.9	1.5
Reaction Rate	1	--		1	1	1	1	4

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 33 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :	BH19 1.5-1.75	BH19 1.75-2.0	BH19 2.0-2.25	BH20 0.0-0.2	BH20 0.2-0.5
Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :	EB0406047-156	EB0406047-157	EB0406047-158	EB0406047-159	EB0406047-160

Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	4.0	5.5	6.2	6.7	6.8
pH (Fox)		0.1	pH Unit	1.1	1.6	1.6	2.5	4.6
Reaction Rate		1	-	4	4	4	3	2

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 34 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :	BH20 0.5-0.8	BH20 0.8-1.0	BH21 0.0-0.25	BH21 0.25-0.5	BH21 0.5-0.75
Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :	EB0406047-161	EB0406047-162	EB0406047-163	EB0406047-164	EB0406047-165

Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	6.8	7.1	7.2	7.3	8.3
pH (Fox)		0.1	pH Unit	6.1	4.5	3.8	3.9	8.2
Reaction Rate		1	--	3	3	3	3	3

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 35 of 53
Issue Date : 29 Oct 2004

Analytical Results			Client Sample ID :	BH21 0.75-1.0	BH22 0.0-0.3	BH22 0.4-0.6	BH22 0.6-0.75	BH22 0.75-1.0
			Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
			Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
			Laboratory Sample ID :	EB0406047-166	EB0406047-167	EB0406047-168	EB0406047-169	EB0406047-170
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)	0.1	pH Unit		8.3	5.7	7.3	8.0	7.9
pH (Fox)	0.1	pH Unit		8.3	3.4	4.0	8.0	8.2
Reaction Rate	1	—		3	3	2	4	4



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 36 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BH23 0.0-0.3	BH23 0.3-0.5	BH23 0.55-0.75	BH23 0.75-1.0	BHA 0.0-0.1
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-171	EB0406047-172	EB0406047-173	EB0406047-174	EB0406047-175
Analyte	CAS number	LOR	Units					
EA003 :pH (field/fox)								
pH (F)		0.1	pH Unit	7.0	7.1	7.9	7.8	---
pH (Fox)		0.1	pH Unit	5.0	4.3	8.4	8.2	---
Reaction Rate		1	--	4	4	4	4	---
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	---	---	---	---	9.8
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	---	---	---	---	4
Lead	7439-92-1	1	mg/kg	---	---	---	---	4
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	---	---	---	---	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	---	---	---	---	<0.05
beta-BHC	319-85-7	0.05	mg/kg	---	---	---	---	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	---	---	---	---	<0.05
delta-BHC	319-86-8	0.05	mg/kg	---	---	---	---	<0.05
Heptachlor	76-44-8	0.05	mg/kg	---	---	---	---	<0.05
Aldrin	309-00-2	0.05	mg/kg	---	---	---	---	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	---	---	---	---	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	---	---	---	---	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	---	---	---	---	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	---	---	---	---	<0.05
Dieldrin	60-57-1	0.05	mg/kg	---	---	---	---	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	---	---	---	---	<0.05
Endrin	72-20-8	0.05	mg/kg	---	---	---	---	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	---	---	---	---	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	---	---	---	---	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	---	---	---	---	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	---	---	---	---	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	---	---	---	---	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	---	---	---	---	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	---	---	---	---	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	---	---	---	---	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	---	---	---	---	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	---	---	---	---	<0.2
Dimethoate	60-51-5	0.05	mg/kg	---	---	---	---	<0.05
Diazinon	333-41-5	0.05	mg/kg	---	---	---	---	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 37 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BH23 0.0-0.3	BH23 0.3-0.5	BH23 0.55-0.75	BH23 0.75-1.0	BHA 0.0-0.1
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-171	EB0406047-172	EB0406047-173	EB0406047-174	EB0406047-175
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	<0.05
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	----	----	----	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	----	<0.05
Ethion	563-12-2	0.05	mg/kg	----	----	----	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	----	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	----	----	----	----	99.6
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	----	----	----	----	91.3



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 38 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BHA 0.3-0.5	BHB 0.0-0.1	BHB 0.3-0.5	BHC 0.0-0.1	BHC 0.3-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-176	EB0406047-177	EB0406047-178	EB0406047-179	EB0406047-180
Analyte	CAS number	LOR	Units					
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	1.3	11.0	9.6	0.8	1.0
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	5	4	6	4	6
Lead	7439-92-1	1	mg/kg	8	3	5	3	8
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 39 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BHA 0.3-0.5	BHB 0.0-0.1	BHB 0.3-0.5	BHC 0.0-0.1	BHC 0.3-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-176	EB0406047-177	EB0406047-178	EB0406047-179	EB0406047-180
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	96.4	95.8	87.3	89.8	93.2
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	91.9	96.8	87.8	92.9	85.9



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 40 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BHC 3.0-3.2	BHD 0.0-0.1	BHE 0.0-0.1	BHF 0.0-0.1	BHF 2.8-3.0
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-181	EB0406047-182	EB0406047-183	EB0406047-184	EB0406047-185
Analyte	CAS number	LOR	Units					
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	24.9	2.8	21.1	2.4	4.1
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	6	3	5	3	8
Lead	7439-92-1	1	mg/kg	2	3	3	3	1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 41 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BHC 3.0-3.2	BHD 0.0-0.1	BHE 0.0-0.1	BHF 0.0-0.1	BHF 2.8-3.0
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-181	EB0406047-182	EB0406047-183	EB0406047-184	EB0406047-185
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	82.4	80.0	85.7	76.7	103
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	81.2	89.9	97.4	98.5	108



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 42 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :	BHG 0.0-0.1	BHH 0.0-0.1	BHH 2.0-2.2	BHI 0.0-0.1	BHJ 0.0-0.1
Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :	EB0406047-186	EB0406047-187	EB0406047-188	EB0406047-189	EB0406047-190

Analyte	CAS number	LOR	Units					
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	3.2	2.4	3.3	12.5	14.5
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	5	6	7	5	6
Lead	7439-92-1	1	mg/kg	3	3	1	4	4
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 43 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BHG 0.0-0.1	BHH 0.0-0.1	BHH 2.0-2.2	BHI 0.0-0.1	BHJ 0.0-0.1
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-186	EB0406047-187	EB0406047-188	EB0406047-189	EB0406047-190
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	80.2	74.5	97.9	88.6	82.2
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	96.5	89.3	92.5	95.4	97.9



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 44 of 53
Issue Date : 29 Oct 2004

Analytical Results

Project : GU0389-1

Client Sample ID : BHJ 3.1-3.3BHK 0.0-0.1BHL 0.0-0.1BHM 0.0-0.1BHM 2.6-2.8

Analytical Results

Sample Matrix Type / Description : SOIL / SOILSOIL / SOILSOIL / SOILSOIL / SOILSOIL / SOIL

Sample Date / Time : 30 Sep 2004 15:0030 Sep 2004 15:0030 Sep 2004 15:0030 Sep 2004 15:0030 Sep 2004 15:00

Laboratory Sample ID : EB0406047-191EB0406047-192EB0406047-193EB0406047-194EB0406047-195

Analyte	CAS number	LOR	Units					
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	17.1	0.9	9.2	3.1	19.7
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	6	5	3	6	3
Lead	7439-92-1	1	mg/kg	1	3	6	24	1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 45 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				BHJ 3.1-3.3	BHK 0.0-0.1	BHL 0.0-0.1	BHM 0.0-0.1	BHM 2.6-2.8
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-191	EB0406047-192	EB0406047-193	EB0406047-194	EB0406047-195
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	94.6	88.7	79.3	75.0	85.4
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	109	97.9	79.9	80.3	89.9



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 46 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :	BHN 0.0-0.1	BHN 2.8-3.0	BHO 0.0-0.1	BHP 0.0-0.1	BHQ 0.0-0.1
Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :	EB0406047-196	EB0406047-197	EB0406047-198	EB0406047-199	EB0406047-200

Analyte	CAS number	LOR	Units	EB0406047-196	EB0406047-197	EB0406047-198	EB0406047-199	EB0406047-200
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	0.9	21.4	4.1	3.9	1.0
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	4	4	3	6	4
Lead	7439-92-1	1	mg/kg	9	1	2	2	35
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.07	0.09	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.08	0.08	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 47 of 53
Issue Date : 29 Oct 2004

Analytical Results

Analytical Results

Client Sample ID :				BHN 0.0-0.1	BHN 2.8-3.0	BHO 0.0-0.1	BHP 0.0-0.1	BHQ 0.0-0.1
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-196	EB0406047-197	EB0406047-198	EB0406047-199	EB0406047-200
Analyte	CAS number	LOR	Units					
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	95.9	98.6	97.1	90.3	101
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	96.8	98.0	92.1	87.1	101



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 48 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :	BHR 0.0-0.1	BHS 0.0-0.1	BHT 0.0-0.1	BHU 0.0-0.1	BHV 0.0-0.1
Sample Matrix Type / Description :	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :	EB0406047-201	EB0406047-202	EB0406047-203	EB0406047-204	EB0406047-205

Analyte	CAS number	LOR	Units					
EA055: Moisture Content								
Moisture Content (dried @ 103°C)		0.1	%	5.2	1.4	1.5	1.1	1.9
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	1	mg/kg	6	3	3	5	6
Lead	7439-92-1	1	mg/kg	4	2	5	11	79
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	1.10
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	0.47
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	6.5
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Demeton-S-methyl	8022-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	0.07	<0.05	<0.05	<0.05	# <0.12
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 49 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :

BHR 0.0-0.1

BHS 0.0-0.1

BHT 0.0-0.1

BHU 0.0-0.1

BHV 0.0-0.1

Sample Matrix Type / Description :

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

SOIL / SOIL

Sample Date / Time :

30 Sep 2004

30 Sep 2004

30 Sep 2004

30 Sep 2004

30 Sep 2004

Laboratory Sample ID :

EB0406047-201

EB0406047-202

EB0406047-203

EB0406047-204

EB0406047-205

Analyte	CAS number	LOR	Units	EB0406047-201	EB0406047-202	EB0406047-203	EB0406047-204	EB0406047-205
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Bromophos-ethyl	2104-96-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	# <0.12
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	95.6	96.0	94.6	94.2	90.3
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	92.9	99.6	100	96.1	96.0



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 50 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				SW1	SW2	SW3	SW4	SP1
Sample Matrix Type / Description :				WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-206	EB0406047-207	EB0406047-208	EB0406047-209	EB0406047-210
Analyte	CAS number	LOR	Units					
EA005P: pH by PC Titrator								
pH Value	12408-02-5	0.01	pH Unit	8.03	7.84	8.95	8.06	7.05
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	2540	50500	7080	43400	11200
EA025: Suspended Solids								
Suspended Solids (SS)		1	mg/L	196	42	18	26	18900
EA045: Turbidity								
Turbidity		0.1	NTU	95.0	6.5	10.0	5.1	14400
ED037P: Alkalinity by PC Titrator								
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	73	<1	<1
Total Alkalinity as CaCO ₃		1	mg/L	214	207	338	120	226
ED040F : Dissolved Sulphate by ICPAES								
Sulphate as SO ₄ 2-	14808-79-8	1	mg/L	142	3650	911	3100	2260
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	604	24500	1810	24700	2700
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	<0.01	0.13	<0.01	# <0.05	49.4
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	4.72	0.27	0.54	0.26	380
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.05	<0.01	0.08	<0.01	0.10
Manganese	7439-96-5	0.001	mg/L	0.005	<0.001	0.005	<0.001	1.67
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	2.65	0.58	0.41	0.35	165



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 51 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				SP2	SP3 (Sample 1)	SP3 (Sample 2)	Dip Bath Liquid (A)	Dip Bath Liquid (B)
Sample Matrix Type / Description :				WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-211	EB0406047-212	EB0406047-213	EB0406047-214	EB0406047-215
Analyte	CAS number	LOR	Units					
EA005P: pH by PC Titrator								
pH Value	12408-02-5	0.01	pH Unit	8.05	8.14	7.99	7.82	7.69
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	24400	630	---	---	---
EA025: Suspended Solids								
Suspended Solids (SS)		1	mg/L	53500	5000	---	---	---
EA045: Turbidity								
Turbidity		0.1	NTU	36000	3700	---	---	---
ED037P: Alkalinity by PC Titrator								
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	---	---	---
Total Alkalinity as CaCO ₃		1	mg/L	586	174	---	---	---
ED040F : Dissolved Sulphate by ICPAES								
Sulphate as SO ₄ 2-	14808-79-8	1	mg/L	2320	64	---	---	---
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	9350	64	---	---	---
EG005F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	0.03	0.06	---	---	---
EG005T: Total Metals by ICP-AES								
Iron	7439-89-6	0.01	mg/L	536	65.3	---	---	---
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.13	0.09	---	---	---
Arsenic	7440-38-2	0.001	mg/L	---	---	0.046	0.001	0.004
Lead	7439-92-1	0.001	mg/L	---	---	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	2.71	0.034	---	---	---
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	29.3	---	---	---
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	---	---	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L	---	---	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L	---	---	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L	---	---	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L	---	---	<0.5	<0.5	<0.5
alpha-Endosulfan 21-415	959-98-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 52 of 53
Issue Date : 29 Oct 2004

Analytical Results

Client Sample ID :				SP2	SP3 (Sample 1)	SP3 (Sample 2)	Dip Bath Liquid (A)	Dip Bath Liquid (B)
Sample Matrix Type / Description :				WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER	WATER / WATER
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406047-211	EB0406047-212	EB0406047-213	EB0406047-214	EB0406047-215
Analyte	CAS number	LOR	Units					
EP068A: Organochlorine Pesticides (OC)								
cis-Chlordane	5103-71-9	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L	---	---	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L	---	---	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L	---	---	<0.5	<0.5	<0.5
4,4'-DDT	50-29-3	2	µg/L	---	---	<2	<2	<2
Endrin ketone	53494-70-5	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2	µg/L	---	---	<2	<2	<2
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Demeton-S-methyl	8022-00-2	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2	µg/L	---	---	<2	<2	<2
Dimethoate	60-51-5	0.5	µg/L	---	---	<0.5	<0.5	0.7
Diazinon	333-41-5	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2	µg/L	---	---	<2	<2	<2
Malathion	121-75-5	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Parathion	56-38-2	2	µg/L	---	---	<2	<2	<2
Pirimphos-ethyl	23505-41-1	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Bromophos-ethyl	2104-96-3	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	---	---	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	---	---	<0.5	<0.5	<0.5
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE		0.1	%	---	---	96.6	94.2	98.5
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	---	---	96.3	92.6	97.6



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 53 of 53
Issue Date : 29 Oct 2004

Surrogate Control Limits

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

		Surrogate Control Limits	
Method name	Analyte name	Lower Limit	Upper Limit
Matrix Type: WATER			
EP068: Pesticides			
EP068S: Organochlorine Pesticide Surrogate	Dibromo-DDE	10	136
EP068T: Organophosphorus Pesticide Surrogate	DEF	10	110
Matrix Type: SOIL			
EP068: Pesticides by GCMS			
EP068S: Organochlorine Pesticide Surrogate	Dibromo-DDE	10	136
EP068T: Organophosphorus Pesticide Surrogate	DEF	10	110

Published on DES Disclosure Log
RTI Act 2009



ALS Environmental

QUALITY CONTROL REPORT

Client	: GILBERT & SUTHERLAND PTY LTD	Laboratory	: ALS Environmental Brisbane	Page	: 1 of 18
Contact	: sch4p4(6) Personal information	Contact	: sch4p4(6) Personal information	Work order	: EB0406047
Address	: P O BOX 4115 ROBINA QLD AUSTRALIA 4230	Address	: 32 Shand Street Stafford QLD Australia 4053		
Project	: GJ0389-1	Quote number	: EB20040159	Date received	: 5 Oct 2004
Order number	: - Not provided -			Date issued	: 29 Oct 2004
C-O-C number	: - Not provided -				
Site	: - Not provided -				
E-mail	: gsrobina@bigpond.com	E-mail	: sch4p4(6) Personal info@alsenviro.com	No. of samples	
Telephone	: (07)5578-9944	Telephone	: 61-7-32437222	Received	: 257
Facsimile	: (07)5578-9945	Facsimile	: 61-7-32437259	Analysed	: 215

This final report was issued on Friday, October 29, 2004 for the ALSE work order reference EB0406047 and supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

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

ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY



NATA Accredited Laboratory - 825

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

21-415

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

Signatory

sch4p4(6) Personal information

Department

Inorganics - NATA 818 (Brisbane)
Organics - NATA 818 (Brisbane)
Inorganics - NATA 818 (Brisbane)

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 2 of 18
Issue Date : 29 Oct 2004



Quality Control Report - Laboratory Duplicates (DUP)

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

Laboratory Duplicates (DUP) Report

Matrix Type: SOIL

Matrix Type: SOIL						
Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EA003: pH field/fox						
EA003 :pH (field/fox) - (QC Lot: 18975)				pH Unit	pH Unit	%
EB0406047-001	BH1 0.0-0.25	pH (F)	0.1 pH Unit	5.8	5.9	1.7
		pH (Fox)	0.1 pH Unit	2.7	2.8	3.6
		Reaction Rate		2	2	0.0
EB0406047-010	BH1 2.25-2.5	pH (F)	0.1 pH Unit	8.7	8.8	1.1
		pH (Fox)	0.1 pH Unit	6.8	7.0	2.9
		Reaction Rate		2	2	0.0
EA003 :pH (field/fox) - (QC Lot: 18976)				pH Unit	pH Unit	%
EB0406047-021	BH2 2.0-2.25	pH (F)	0.1 pH Unit	8.8	8.8	0.0
		pH (Fox)	0.1 pH Unit	6.4	6.6	3.1
		Reaction Rate		2	2	0.0
EB0406047-030	BH3 0.75-1.0	pH (F)	0.1 pH Unit	6.0	6.0	0.0
		pH (Fox)	0.1 pH Unit	4.3	4.4	2.3
		Reaction Rate		1	1	0.0
EA003 :pH (field/fox) - (QC Lot: 18977)				pH Unit	pH Unit	%
EB0406047-041	BH4 0.2-0.5	pH (F)	0.1 pH Unit	5.8	5.7	1.7
		pH (Fox)	0.1 pH Unit	2.2	2.2	0.0
		Reaction Rate		2	2	0.0
EB0406047-050	BH5 0.2-0.5	pH (F)	0.1 pH Unit	6.1	6.0	1.6
		pH (Fox)	0.1 pH Unit	2.8	2.9	3.5
		Reaction Rate		2	2	0.0
EA003 :pH (field/fox) - (QC Lot: 18978)				pH Unit	pH Unit	%
EB0406047-061	BH6 1.0-1.25	pH (F)	0.1 pH Unit	5.4	5.4	0.0
		pH (Fox)	0.1 pH Unit	4.5	4.5	0.0
		Reaction Rate		2	2	0.0
EB0406047-070	BH6 3.25-3.5	pH (F)	0.1 pH Unit	6.1	6.1	0.0
		pH (Fox)	0.1 pH Unit	1.7	1.8	5.7
		Reaction Rate		4	4	0.0
EA003 :pH (field/fox) - (QC Lot: 18979)				pH Unit	pH Unit	%
EB0406047-081	BH7 2.25-2.5	pH (F)	0.1 pH Unit	4.9	4.9	0.0
		pH (Fox)	0.1 pH Unit	3.8	3.8	0.0
		Reaction Rate		4	4	0.0
EB0406047-090	BH8 1.0-1.25	pH (F)	0.1 pH Unit	6.3	6.4	1.6
		pH (Fox)	0.1 pH Unit	4.2	4.2	0.0
		Reaction Rate		1	1	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 3 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Matrix Type: SOIL						
Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EA003 :pH (field/fox) - (QC Lot: 18980)				pH Unit	pH Unit	%
EB0406047-101	BH9 1.15-1.5	pH (F)	0.1 pH Unit	6.9	6.8	1.4
		pH (Fox)	0.1 pH Unit	3.8	4.0	5.1
		Reaction Rate		2	2	0.0
EB0406047-110	BH10 0.75-1.0	pH (F)	0.1 pH Unit	5.7	5.8	1.7
		pH (Fox)	0.1 pH Unit	3.5	3.3	5.9
		Reaction Rate		1	1	0.0
EA003 :pH (field/fox) - (QC Lot: 18981)				pH Unit	pH Unit	%
EB0406047-121	BH12 0.2-0.5	pH (F)	0.1 pH Unit	7.1	7.2	1.4
		pH (Fox)	0.1 pH Unit	4.2	4.0	4.9
		Reaction Rate		1	1	0.0
EB0406047-130	BH14 0.2-0.5	pH (F)	0.1 pH Unit	4.1	4.2	2.4
		pH (Fox)	0.1 pH Unit	2.0	2.1	4.9
		Reaction Rate		3	3	0.0
EA003 :pH (field/fox) - (QC Lot: 18982)				pH Unit	pH Unit	%
EB0406047-141	BH16 0.5-0.8	pH (F)	0.1 pH Unit	5.8	5.6	3.5
		pH (Fox)	0.1 pH Unit	1.7	1.7	0.0
		Reaction Rate		4	4	0.0
EB0406047-150	BH18 1.0-1.3	pH (F)	0.1 pH Unit	5.5	5.3	3.7
		pH (Fox)	0.1 pH Unit	1.5	1.4	6.9
		Reaction Rate		4	4	0.0
EA003 :pH (field/fox) - (QC Lot: 18983)				pH Unit	pH Unit	%
EB0406047-161	BH20 0.5-0.8	pH (F)	0.1 pH Unit	6.8	6.8	0.0
		pH (Fox)	0.1 pH Unit	6.1	5.9	3.3
		Reaction Rate		3	3	0.0
EB0406047-170	BH22 0.75-1.0	pH (F)	0.1 pH Unit	7.9	7.9	0.0
		pH (Fox)	0.1 pH Unit	8.2	8.1	1.2
		Reaction Rate		4	4	0.0
EA055-103: Moisture Content						
EA055: Moisture Content - (QC Lot: 18714)				%	%	%
EB0406039-004	- Anonymous -	Moisture Content (dried @ 103°C)	0.1 %	13.3	12.7	4.1
EB0406039-011	- Anonymous -	Moisture Content (dried @ 103°C)	0.1 %	12.6	12.7	1.1
EA055: Moisture Content - (QC Lot: 18715)				%	%	%
EB0406047-187	BHH 0.0-0.1	Moisture Content (dried @ 103°C)	0.1 %	2.4	2.5	0.0
EB0406047-194	BHM 0.0-0.1	Moisture Content (dried @ 103°C)	0.1 %	3.1	3.0	3.4
EA055: Moisture Content - (QC Lot: 18716)				%	%	%
EB0406056-004	- Anonymous -	Moisture Content (dried @ 103°C)	0.1 %	44.2	44.1	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 4 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 18626)				mg/kg	mg/kg	%
EB0406023-028	- Anonymous -	Arsenic	1 mg/kg	4	2	51.4
		Lead	1 mg/kg	22	20	7.8
EB0406047-176	BHA 0.3-0.5	Arsenic	1 mg/kg	5	6	0.0
		Lead	1 mg/kg	8	8	0.0
EG005T: Total Metals by ICP-AES - (QC Lot: 18627)				mg/kg	mg/kg	%
EB0406047-186	BHG 0.0-0.1	Arsenic	1 mg/kg	5	5	0.0
		Lead	1 mg/kg	3	4	0.0
EB0406047-196	BHN 0.0-0.1	Arsenic	1 mg/kg	4	4	0.0
		Lead	1 mg/kg	9	9	0.0

Published on DES Disclosure Log
RTI Act 2009

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 5 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EP068: Pesticides by GCMS						
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19225)						
EB0406047-175	BHA 0.0-0.1	alpha-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Hexachlorobenzene (HCB)	0.05 mg/kg	<0.05	<0.05	0.0
		beta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		gamma-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		delta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor	0.05 mg/kg	<0.05	<0.05	0.0
		Aldrin	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor epoxide	0.05 mg/kg	<0.05	<0.05	0.0
		trans-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		alpha-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		cis-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		Dieldrin	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDE	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin	0.05 mg/kg	<0.05	<0.05	0.0
		beta-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDD	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin aldehyde	0.05 mg/kg	<0.05	<0.05	0.0
		Endosulfan sulfate	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDT	0.2 mg/kg	<0.2	<0.2	0.0
		Endrin ketone	0.05 mg/kg	<0.05	<0.05	0.0
EB0406047-175	BHA 0.0-0.1	Methoxychlor	0.2 mg/kg	<0.2	<0.2	0.0
		Dichlorvos	0.05 mg/kg	<0.05	<0.05	0.0
		Demeton-S-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Monocrotophos	0.2 mg/kg	<0.2	<0.2	0.0
		Dimethoate	0.05 mg/kg	<0.05	<0.05	0.0
		Diazinon	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion-methyl	0.2 mg/kg	<0.2	<0.2	0.0
		Malathion	0.05 mg/kg	<0.05	<0.05	0.0
		Fenthion	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion	0.2 mg/kg	<0.2	<0.2	0.0
		Pirimphos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorfenvinphos	0.05 mg/kg	<0.05	<0.05	0.0
		Bromophos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Fenamiphos	0.05 mg/kg	<0.05	<0.05	0.0
		Prothiofos	0.05 mg/kg	<0.05	<0.05	0.0
		Ethion	0.05 mg/kg	<0.05	<0.05	0.0
		Carbophenothion	0.05 mg/kg	<0.05	<0.05	0.0
		Azinphos Methyl	0.05 mg/kg	<0.05	<0.05	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 6 of 18
Issue Date : 29 Oct 2004



ALS Environmental

Matrix Type: SOIL Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EB0406047-185	BHF 2.8-3.0	alpha-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Hexachlorobenzene (HCB)	0.05 mg/kg	<0.05	<0.05	0.0
		beta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		gamma-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		delta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor	0.05 mg/kg	<0.05	<0.05	0.0
		Aldrin	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor epoxide	0.05 mg/kg	<0.05	<0.05	0.0
		trans-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		alpha-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		cis-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		Dieldrin	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDE	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin	0.05 mg/kg	<0.05	<0.05	0.0
		beta-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDD	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin aldehyde	0.05 mg/kg	<0.05	<0.05	0.0
		Endosulfan sulfate	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDT	0.2 mg/kg	<0.2	<0.2	0.0
		Endrin ketone	0.05 mg/kg	<0.05	<0.05	0.0
		Methoxychlor	0.2 mg/kg	<0.2	<0.2	0.0
EB0406047-185	BHF 2.8-3.0	Dichlorvos	0.05 mg/kg	<0.05	<0.05	0.0
		Demeton-S-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Monocrotophos	0.2 mg/kg	<0.2	<0.2	0.0
		Dimethoate	0.05 mg/kg	<0.05	<0.05	0.0
		Diazinon	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion-methyl	0.2 mg/kg	<0.2	<0.2	0.0
		Malathion	0.05 mg/kg	<0.05	<0.05	0.0
		Fenthion	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion	0.2 mg/kg	<0.2	<0.2	0.0
		Pirimphos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorfenvinphos	0.05 mg/kg	<0.05	<0.05	0.0
		Bromophos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Fenamiphos	0.05 mg/kg	<0.05	<0.05	0.0
		Prothiofos	0.05 mg/kg	<0.05	<0.05	0.0
		Ethion	0.05 mg/kg	<0.05	<0.05	0.0
		Carbophenothion	0.05 mg/kg	<0.05	<0.05	0.0
		Azinphos Methyl	0.05 mg/kg	<0.05	<0.05	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 7 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19226)				mg/kg	mg/kg	%
EB0406047-195	BHM 2.6-2.8	alpha-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Hexachlorobenzene (HCB)	0.05 mg/kg	<0.05	<0.05	0.0
		beta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		gamma-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		delta-BHC	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor	0.05 mg/kg	<0.05	<0.05	0.0
		Aldrin	0.05 mg/kg	<0.05	<0.05	0.0
		Heptachlor epoxide	0.05 mg/kg	<0.05	<0.05	0.0
		trans-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		alpha-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		cis-Chlordane	0.05 mg/kg	<0.05	<0.05	0.0
		Dieldrin	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDE	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin	0.05 mg/kg	<0.05	<0.05	0.0
		beta-Endosulfan	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDD	0.05 mg/kg	<0.05	<0.05	0.0
		Endrin aldehyde	0.05 mg/kg	<0.05	<0.05	0.0
		Endosulfan sulfate	0.05 mg/kg	<0.05	<0.05	0.0
		4,4'-DDT	0.2 mg/kg	<0.2	<0.2	0.0
		Endrin ketone	0.05 mg/kg	<0.05	<0.05	0.0
		Methoxychlor	0.2 mg/kg	<0.2	<0.2	0.0
EB0406047-195	BHM 2.6-2.8	Dichlorvos	0.05 mg/kg	<0.05	<0.05	0.0
		Demeton-S-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Monocrotophos	0.2 mg/kg	<0.2	<0.2	0.0
		Dimethoate	0.05 mg/kg	<0.05	<0.05	0.0
		Diazinon	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos-methyl	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion-methyl	0.2 mg/kg	<0.2	<0.2	0.0
		Malathion	0.05 mg/kg	<0.05	<0.05	0.0
		Fenthion	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorpyrifos	0.05 mg/kg	<0.05	<0.05	0.0
		Parathion	0.2 mg/kg	<0.2	<0.2	0.0
		Pirimphos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Chlorfenvinphos	0.05 mg/kg	<0.05	<0.05	0.0
		Bromophos-ethyl	0.05 mg/kg	<0.05	<0.05	0.0
		Fenamiphos	0.05 mg/kg	<0.05	<0.05	0.0
		Prothiofos	0.05 mg/kg	<0.05	<0.05	0.0
		Ethion	0.05 mg/kg	<0.05	<0.05	0.0
		Carbophenothion	0.05 mg/kg	<0.05	<0.05	0.0
		Azinphos Methyl	0.05 mg/kg	<0.05	<0.05	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 8 of 18
Issue Date : 29 Oct 2004



ALS Environmental

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EB0406047-205	BHV 0.0-0.1	alpha-BHC	0.05 mg/kg	<0.12	<0.12	0.0
		Hexachlorobenzene (HCB)	0.05 mg/kg	<0.12	<0.12	0.0
		beta-BHC	0.05 mg/kg	<0.12	<0.12	0.0
		gamma-BHC	0.05 mg/kg	<0.12	<0.12	0.0
		delta-BHC	0.05 mg/kg	<0.12	<0.12	0.0
		Heptachlor	0.05 mg/kg	<0.12	<0.12	0.0
		Aldrin	0.05 mg/kg	<0.12	<0.12	0.0
		Heptachlor epoxide	0.05 mg/kg	<0.12	<0.12	0.0
		trans-Chlordane	0.05 mg/kg	<0.12	<0.12	0.0
		alpha-Endosulfan	0.05 mg/kg	<0.12	<0.12	0.0
		cis-Chlordane	0.05 mg/kg	<0.12	<0.12	0.0
		Dieldrin	0.05 mg/kg	<0.12	<0.12	0.0
		4,4'-DDE	0.05 mg/kg	1.10	1.24	12.2
		Endrin	0.05 mg/kg	<0.12	<0.12	0.0
		beta-Endosulfan	0.05 mg/kg	<0.12	<0.12	0.0
		4,4'-DDD	0.05 mg/kg	0.47	0.46	0.0
		Endrin aldehyde	0.05 mg/kg	<0.12	<0.12	0.0
		Endosulfan sulfate	0.05 mg/kg	<0.12	<0.12	0.0
		4,4'-DDT	0.2 mg/kg	6.5	6.2	4.1
		Endrin ketone	0.05 mg/kg	<0.12	<0.12	0.0
		Methoxychlor	0.2 mg/kg	<0.2	<0.2	0.0
EB0406047-205	BHV 0.0-0.1	Dichlorvos	0.05 mg/kg	<0.12	<0.12	0.0
		Demeton-S-methyl	0.05 mg/kg	<0.12	<0.12	0.0
		Monocrotophos	0.2 mg/kg	<0.2	<0.2	0.0
		Dimethoate	0.05 mg/kg	<0.12	<0.12	0.0
		Diazinon	0.05 mg/kg	<0.12	<0.12	0.0
		Chlorpyrifos-methyl	0.05 mg/kg	<0.12	<0.12	0.0
		Parathion-methyl	0.2 mg/kg	<0.2	<0.2	0.0
		Malathion	0.05 mg/kg	<0.12	<0.12	0.0
		Fenthion	0.05 mg/kg	<0.12	<0.12	0.0
		Chlorpyrifos	0.05 mg/kg	<0.12	<0.12	0.0
		Parathion	0.2 mg/kg	<0.2	<0.2	0.0
		Pirimphos-ethyl	0.05 mg/kg	<0.12	<0.12	0.0
		Chlorfenvinphos	0.05 mg/kg	<0.12	<0.12	0.0
		Bromophos-ethyl	0.05 mg/kg	<0.12	<0.12	0.0
		Fenamiphos	0.05 mg/kg	<0.12	<0.12	0.0
		Prothiofos	0.05 mg/kg	<0.12	<0.12	0.0
		Ethion	0.05 mg/kg	<0.12	<0.12	0.0
		Carbophenothion	0.05 mg/kg	<0.12	<0.12	0.0
		Azinphos Methyl	0.05 mg/kg	<0.12	<0.12	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 9 of 18
Issue Date : 29 Oct 2004



Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EA005P: pH by PC Titrator						
EA005P: pH by PC Titrator - (QC Lot: 18660)						
EB0406021-001	- Anonymous -	pH Value	0.01 pH Unit	pH Unit 7.37	pH Unit 7.35	% 0.3
EB0406031-011	- Anonymous -	pH Value	0.01 pH Unit	7.67	7.66	0.1
EA005P: pH by PC Titrator - (QC Lot: 18663)						
EB0406047-215	Dip Bath Liquid (B)	pH Value	0.01 pH Unit	pH Unit 7.69	pH Unit 7.66	% 0.4
EA010P: Conductivity by PC Titrator						
EA010P: Conductivity by PC Titrator - (QC Lot: 18661)						
EB0406021-001	- Anonymous -	Electrical Conductivity @ 25°C	1 µS/cm	µS/cm 224	µS/cm 223	% 0.4
EB0406031-012	- Anonymous -	Electrical Conductivity @ 25°C	1 µS/cm	1310	1330	1.3
EA025: Suspended Solids						
EA025: Suspended Solids - (QC Lot: 18690)						
EB0406010-001	- Anonymous -	Suspended Solids (SS)	1 mg/L	mg/L 45	mg/L 43	% 4.5
EB0406046-001	- Anonymous -	Suspended Solids (SS)	1 mg/L	39	34	15.2
EA025: Suspended Solids - (QC Lot: 18691)						
EB0406047-212	SP3 (Sample 1)	Suspended Solids (SS)	1 mg/L	mg/L 5000	mg/L 5020	% 0.3
EA045: Turbidity						
EA045: Turbidity - (QC Lot: 18640)						
EB0405974-006	- Anonymous -	Turbidity	0.1 NTU	NTU 6.7	NTU 6.8	% 1.5
EB0406047-207	SW2	Turbidity	0.1 NTU	6.5	6.7	3.0
ED037P: Alkalinity by PC Titrator						
ED037P: Alkalinity by PC Titrator - (QC Lot: 18662)						
EB0406025-001	- Anonymous -	Carbonate Alkalinity as CaCO3	1 mg/L	mg/L <1	mg/L <1	% 0.0
		Total Alkalinity as CaCO3	1 mg/L	13	11	16.7
ED040F: Dissolved Sulphate by ICPAES						
ED040F : Dissolved Sulphate by ICPAES - (QC Lot: 18767)						
EB0406025-001	- Anonymous -	Sulphate as SO4 2-	1 mg/L	mg/L 4	mg/L 4	% 0.0
EB0406031-009	- Anonymous -	Sulphate as SO4 2-	1 mg/L	123	124	1.1
ED045P: Chloride by PC Titrator						
ED045P: Chloride by PC Titrator - (QC Lot: 18889)						
EB0405908-018	- Anonymous -	Chloride	1 mg/L	mg/L 3	mg/L 3	% 0.0
EB0405908-027	- Anonymous -	Chloride	1 mg/L	10	11	9.5
ED045P: Chloride by PC Titrator - (QC Lot: 18890)						
EB0406047-211	SP2	Chloride	1 mg/L	mg/L 9350	mg/L 9800	% 4.7
EG005F: Dissolved Metals by ICP-AES						
EG005F: Dissolved Metals by ICP-AES - (QC Lot: 18741)						
EB0406021-001	- Anonymous -	Iron	0.01 mg/L	mg/L ---	mg/L <0.01	% 200
EB0406047-209	SW4	Iron	0.01 mg/L	<0.05	<0.05	0.0

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 10 of 18
Issue Date : 29 Oct 2004



Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EG005T: Total Recoverable Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 18711)				mg/L	mg/L	%
EB0405922-003	- Anonymous -	Iron	0.01 mg/L	36.1	36.6	1.4
EG020A-F: Dissolved Metals by ICP-MS - Suite A						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 18763)				mg/L	mg/L	%
EB0406009-001	- Anonymous -	Arsenic	0.001 mg/L	0.001	0.002	73.8
		Lead	0.001 mg/L	0.005	0.008	50.9
		Manganese	0.001 mg/L	0.099	0.100	1.4
EB0406047-212	SP3 (Sample 1)	Aluminium	0.01 mg/L	0.09	0.09	0.0
		Arsenic	0.001 mg/L	0.053	0.052	2.0
		Lead	0.001 mg/L	<0.001	<0.001	0.0
		Manganese	0.001 mg/L	0.034	0.033	3.8
EG020A-T: Total Metals by ICP-MS - Suite A						
EG020T: Total Metals by ICP-MS - (QC Lot: 18712)				mg/L	mg/L	%
EB0405922-003	- Anonymous -	Aluminium	0.01 mg/L	1.06	0.97	8.8
EB0406047-212	SP3 (Sample 1)	Aluminium	0.01 mg/L	29.3	26.1	11.6

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 11 of 18
Issue Date : 29 Oct 2004



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

The quality control term **Method / Laboratory Blank** refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC type is to monitor potential laboratory contamination. The quality control term **Laboratory Control Sample (LCS)** refers to a known, interference free matrix spiked with target analytes or certified reference material. The purpose of this QC type is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of actual laboratory data. Abbreviations: LOR = Limit of reporting.

* Indicates failed QC.

Matrix Type: SOIL

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

		Method blank result	Actual Results		Recovery Limits	
			Spike concentration	Spike Recovery	Dynamic Recovery Limits	
				LCS	Low	High
Analyte name	LOR					
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 18626)		mg/kg	mg/kg	%	%	%
Arsenic	1 mg/kg	<1	13.8	95.3	70	130
Lead	1 mg/kg	<1	55.5	103	70	130
EG005T: Total Metals by ICP-AES - (QC Lot: 18627)		mg/kg	mg/kg	%	%	%
Arsenic	1 mg/kg	<1	13.8	99.1	70	130
Lead	1 mg/kg	<1	55.5	104	70	130

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 12 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

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

		Method blank result	Actual Results		Recovery Limits	
Analyte name	LOR		Spike concentration	Spike Recovery LCS	Dynamic Recovery Limits	
					Low	High
EP068: Pesticides by GCMS						
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19225)		mg/kg	mg/kg	%	%	%
alpha-BHC	0.05 mg/kg	<0.05	0.25	80.0	73	107
Hexachlorobenzene (HCB)	0.05 mg/kg	<0.05	0.25	85.2	71	109
beta-BHC	0.05 mg/kg	<0.05	0.25	93.7	72	112
gamma-BHC	0.05 mg/kg	<0.05	0.25	82.1	72	112
delta-BHC	0.05 mg/kg	<0.05	0.25	83.9	70	112
Heptachlor	0.05 mg/kg	<0.05	0.25	98.6	73	108
Aldrin	0.05 mg/kg	<0.05	0.25	86.8	73	111
Heptachlor epoxide	0.05 mg/kg	<0.05	0.25	79.9	73	107
trans-Chlordane	0.05 mg/kg	<0.05	0.25	80.6	73	108
alpha-Endosulfan	0.05 mg/kg	<0.05	0.25	94.6	81	107
cis-Chlordane	0.05 mg/kg	<0.05	0.25	83.0	73	108
Dieldrin	0.05 mg/kg	<0.05	0.25	80.7	69	108
4,4'-DDE	0.05 mg/kg	<0.05	0.25	80.9	69	110
Endrin	0.05 mg/kg	<0.05	0.25	93.7	71	110
beta-Endosulfan	0.05 mg/kg	<0.05	0.25	100	74	109
4,4'-DDD	0.05 mg/kg	<0.05	0.25	80.7	76	107
Endrin aldehyde	0.05 mg/kg	<0.05	0.25	98.0	76	105
Endosulfan sulfate	0.05 mg/kg	<0.05	0.25	87.2	73	110
4,4'-DDT	0.2 mg/kg	<0.2	0.25	97.2	71	109
Endrin ketone	0.05 mg/kg	<0.05	0.25	91.5	71	113
Methoxychlor	0.2 mg/kg	<0.2	0.25	80.4	73	114
EP068B: Organophosphorus Pesticides (OP) - (QC Lot: 19225)		mg/kg	mg/kg	%	%	%
Dichlorvos	0.05 mg/kg	<0.05	0.25	80.1	72	112
Demeton-S-methyl	0.05 mg/kg	<0.05	0.25	81.2	73	109
Monocrotophos	0.2 mg/kg	<0.2	0.25	98.6	67	111
Dimethoate	0.05 mg/kg	<0.05	0.25	90.8	74	110
Diazinon	0.05 mg/kg	<0.05	0.25	99.0	78	109
Chlorpyrifos-methyl	0.05 mg/kg	<0.05	0.25	95.4	70	109
Parathion-methyl	0.2 mg/kg	<0.2	0.25	95.4	69	110
Malathion	0.05 mg/kg	<0.05	0.25	87.4	70	111
Fenthion	0.05 mg/kg	<0.05	0.25	95.7	74	106
Chlorpyrifos	0.05 mg/kg	<0.05	0.25	96.5	74	108
Parathion	0.2 mg/kg	<0.2	0.25	91.0	68	110
Pirimphos-ethyl	0.05 mg/kg	<0.05	0.25	99.3	73	110
Chlorfenvinphos	0.05 mg/kg	<0.05	0.25	97.3	72	111
Bromophos-ethyl	0.05 mg/kg	<0.05	0.25	98.4	73	105
Fenamiphos	0.05 mg/kg	<0.05	0.25	98.6	60	113
Prothiofos	0.05 mg/kg	<0.05	0.25	94.6	74	105
Ethion	0.05 mg/kg	<0.05	0.25	87.7	74	107
Carbophenothion	0.05 mg/kg	<0.05	0.25	98.0	68	111
Azinphos Methyl	0.05 mg/kg	<0.05	0.25	80.4	72	113

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 13 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

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

		Method blank result	Actual Results		Recovery Limits	
Analyte name	LOR		Spike concentration	Spike Recovery	Dynamic Recovery Limits	
					Low	High
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19226)		mg/kg	mg/kg	%	%	%
alpha-BHC	0.05 mg/kg	<0.05	0.25	91.3	73	107
Hexachlorobenzene (HCB)	0.05 mg/kg	<0.05	0.25	92.6	71	109
beta-BHC	0.05 mg/kg	<0.05	0.25	82.4	72	112
gamma-BHC	0.05 mg/kg	<0.05	0.25	90.1	72	112
delta-BHC	0.05 mg/kg	<0.05	0.25	90.0	70	112
Heptachlor	0.05 mg/kg	<0.05	0.25	87.2	73	108
Aldrin	0.05 mg/kg	<0.05	0.25	97.1	73	111
Heptachlor epoxide	0.05 mg/kg	<0.05	0.25	93.5	73	107
trans-Chlordane	0.05 mg/kg	<0.05	0.25	93.2	73	108
alpha-Endosulfan	0.05 mg/kg	<0.05	0.25	85.7	81	107
cis-Chlordane	0.05 mg/kg	<0.05	0.25	90.2	73	108
Dieldrin	0.05 mg/kg	<0.05	0.25	82.6	69	108
4,4'-DDE	0.05 mg/kg	<0.05	0.25	80.5	69	110
Endrin	0.05 mg/kg	<0.05	0.25	86.8	71	110
beta-Endosulfan	0.05 mg/kg	<0.05	0.25	97.7	74	109
4,4'-DDD	0.05 mg/kg	<0.05	0.25	96.1	76	107
Endrin aldehyde	0.05 mg/kg	<0.05	0.25	83.2	76	105
Endosulfan sulfate	0.05 mg/kg	<0.05	0.25	90.8	73	110
4,4'-DDT	0.2 mg/kg	<0.2	0.25	90.7	71	109
Endrin ketone	0.05 mg/kg	<0.05	0.25	93.5	71	113
Methoxychlor	0.2 mg/kg	<0.2	0.25	81.1	73	114
EP068B: Organophosphorus Pesticides (OP) - (QC Lot: 19226)		mg/kg	mg/kg	%	%	%
Dichlorvos	0.05 mg/kg	<0.05	0.25	87.2	72	112
Demeton-S-methyl	0.05 mg/kg	<0.05	0.25	94.0	73	109
Monocrotophos	0.2 mg/kg	<0.2	0.25	86.0	67	111
Dimethoate	0.05 mg/kg	<0.05	0.25	95.4	74	110
Diazinon	0.05 mg/kg	<0.05	0.25	91.6	78	109
Chlorpyrifos-methyl	0.05 mg/kg	<0.05	0.25	90.5	70	109
Parathion-methyl	0.2 mg/kg	<0.2	0.25	94.2	69	110
Malathion	0.05 mg/kg	<0.05	0.25	81.6	70	111
Fenthion	0.05 mg/kg	<0.05	0.25	98.3	74	106
Chlorpyrifos	0.05 mg/kg	<0.05	0.25	95.8	74	108
Parathion	0.2 mg/kg	<0.2	0.25	86.1	68	110
Pirimphos-ethyl	0.05 mg/kg	<0.05	0.25	98.1	73	110
Chlorfenvinphos	0.05 mg/kg	<0.05	0.25	93.6	72	111
Bromophos-ethyl	0.05 mg/kg	<0.05	0.25	93.1	73	105
Fenamiphos	0.05 mg/kg	<0.05	0.25	96.6	60	113
Prothiofos	0.05 mg/kg	<0.05	0.25	94.3	74	105
Ethion	0.05 mg/kg	<0.05	0.25	101	74	107
Carbophenothion	0.05 mg/kg	<0.05	0.25	101	68	111
Azinphos Methyl	0.05 mg/kg	<0.05	0.25	83.5	72	113

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 14 of 18
Issue Date : 29 Oct 2004



Matrix Type: WATER

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

Analyte name		LOR	Method blank result	Actual Results		Recovery Limits	
				Spike concentration	Spike Recovery	Dynamic Recovery Limits	
					LCS	Low	High
EA010-P: Conductivity by PC Titrator							
EA010P: Conductivity by PC Titrator - (QC Lot: 18661)			µS/cm	µS/cm	%	%	%
Electrical Conductivity @ 25°C	1 µS/cm		<1	4000	97.2	70	130
EA025: Suspended Solids							
EA025: Suspended Solids - (QC Lot: 18690)			mg/L	mg/L	%	%	%
Suspended Solids (SS)	1 mg/L		<1	150	93.3	70	130
EA025: Suspended Solids - (QC Lot: 18691)			mg/L	mg/L	%	%	%
Suspended Solids (SS)	1 mg/L		<1	150	98.7	70	130
EA045: Turbidity							
EA045: Turbidity - (QC Lot: 18640)			NTU	NTU	%	%	%
Turbidity	0.1 NTU		<0.1	40.0	93.2	70	130
ED037-P: Alkalinity by PC Titrator							
ED037P: Alkalinity by PC Titrator - (QC Lot: 18662)			mg/L	mg/L	%	%	%
Total Alkalinity as CaCO3	1 mg/L		---	200	92.0	70	130
ED040F: Dissolved Sulphate by ICPAES							
ED040F : Dissolved Sulphate by ICPAES - (QC Lot: 18767)			mg/L	mg/L	%	%	%
Sulphate as SO4 2-	1 mg/L		<1	---	---	---	---
ED045-P: Chloride by PC Titrator							
ED045P: Chloride by PC Titrator - (QC Lot: 18889)			mg/L	mg/L	%	%	%
Chloride	1 mg/L		<1	1000	100	70	130
ED045P: Chloride by PC Titrator - (QC Lot: 18890)			mg/L	mg/L	%	%	%
Chloride	1 mg/L		<1	1000	100	70	130
EG005F: Dissolved Metals by ICP-AES							
EG005F: Dissolved Metals by ICP-AES - (QC Lot: 18741)			mg/L	mg/L	%	%	%
Iron	0.01 mg/L		<0.01	---	---	---	---
EG005T: Total Recoverable Metals by ICP-AES							
EG005T: Total Metals by ICP-AES - (QC Lot: 18711)			mg/L	mg/L	%	%	%
Iron	0.01 mg/L		<0.01	1.00	113	70	130
EG020A-F: Dissolved Metals by ICP-MS - Suite A							
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 18763)			mg/L	mg/L	%	%	%
Aluminium	0.01 mg/L		<0.01	0.10	108	70	130
Arsenic	0.001 mg/L		<0.001	0.100	112	70	130
Lead	0.001 mg/L		<0.001	0.100	95.9	70	130
Manganese	0.001 mg/L		<0.001	0.100	105	70	130
EG020A-T: Total Metals by ICP-MS - Suite A							
EG020T: Total Metals by ICP-MS - (QC Lot: 18712)			mg/L	mg/L	%	%	%
Aluminium	0.01 mg/L		<0.01	1.00	105	70	130

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 15 of 18
Issue Date : 29 Oct 2004



Matrix Type: WATER

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

		Method blank result	Actual Results		Recovery Limits	
Analyte name	LOR		Spike concentration	Spike Recovery	Dynamic Recovery Limits	
				LCS	Low	High
EP068: Pesticides						
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 18687)		µg/L	µg/L	%	%	%
alpha-BHC	0.5 µg/L	<0.5	5	82.6	66	111
Hexachlorobenzene (HCB)	0.5 µg/L	<0.5	5	83.0	67	102
beta-BHC	0.5 µg/L	<0.5	5	97.9	75	112
gamma-BHC	0.5 µg/L	<0.5	5	99.6	69	114
delta-BHC	0.5 µg/L	<0.5	5	81.3	65	110
Heptachlor	0.5 µg/L	<0.5	5	80.8	63	106
Aldrin	0.5 µg/L	<0.5	5	80.3	66	107
Heptachlor epoxide	0.5 µg/L	<0.5	5	80.9	61	112
trans-Chlordane	0.5 µg/L	<0.5	5	81.8	60	113
alpha-Endosulfan	0.5 µg/L	<0.5	5	89.9	69	112
cis-Chlordane	0.5 µg/L	<0.5	5	80.1	64	113
Dieldrin	0.5 µg/L	<0.5	5	80.7	67	112
4,4'-DDE	0.5 µg/L	<0.5	5	81.7	63	113
Endrin	0.5 µg/L	<0.5	5	83.0	63	109
beta-Endosulfan	0.5 µg/L	<0.5	5	86.5	70	108
4,4'-DDD	0.5 µg/L	<0.5	5	83.7	65	115
Endrin aldehyde	0.5 µg/L	<0.5	5	88.0	66	116
Endosulfan sulfate	0.5 µg/L	<0.5	5	81.9	63	114
4,4'-DDT	2 µg/L	<2	5	97.2	63	112
Endrin ketone	0.5 µg/L	<0.5	5	83.6	64	112
Methoxychlor	2 µg/L	<2	5	83.3	62	112
EP068B: Organophosphorus Pesticides (OP) - (QC Lot: 18687)		µg/L	µg/L	%	%	%
Dichlorvos	0.5 µg/L	<0.5	5	83.8	66	106
Demeton-S-methyl	0.5 µg/L	<0.5	5	86.8	65	106
Monocrotophos	2 µg/L	<2	5	83.7	10	94
Dimethoate	0.5 µg/L	<0.5	5	92.8	62	108
Diazinon	0.5 µg/L	<0.5	5	96.8	71	99
Chlorpyrifos-methyl	0.5 µg/L	<0.5	5	99.5	67	106
Parathion-methyl	2 µg/L	<2	5	98.1	65	105
Malathion	0.5 µg/L	<0.5	5	93.8	68	104
Fenthion	0.5 µg/L	<0.5	5	93.8	66	107
Chlorpyrifos	0.5 µg/L	<0.5	5	97.0	65	110
Parathion	2 µg/L	<2	5	101	68	104
Pirimphos-ethyl	0.5 µg/L	<0.5	5	85.4	59	106
Chlorfenvinphos	0.5 µg/L	<0.5	5	83.9	69	106
Bromophos-ethyl	0.5 µg/L	<0.5	5	98.9	61	112
Fenamiphos	0.5 µg/L	<0.5	5	97.9	65	108
Prothiofos	0.5 µg/L	<0.5	5	98.4	62	114
Ethion	0.5 µg/L	<0.5	5	95.0	62	115
Carbophenothion	0.5 µg/L	<0.5	5	96.2	63	108
Azinphos Methyl	0.5 µg/L	<0.5	5	84.9	59	114

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 16 of 18
Issue Date : 29 Oct 2004



Matrix Type: WATER

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

Analyte name	LOR	Method blank result	Actual Results		Recovery Limits	
			Spike concentration	Spike Recovery	Dynamic Recovery Limits	
				LCS	Low	High

Published on DES Disclosure Log
RTI Act 2009

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 17 of 18
Issue Date : 29 Oct 2004



Quality Control Report - Matrix Spikes (MS)

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

* Indicates failed QC.

Matrix Type: SOIL

Matrix Spike (MS) Report

					Actual Results		Recovery Limits	
Analyte name	Laboratory Sample ID	Client Sample ID	LOR	Spike Concentration	Sample Result	Spike Recovery	Static Limits	
						MS	Low	High
EG005T: Total Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 18626)					mg/kg	mg/kg	%	%
Arsenic	EB0406023-029	- Anonymous -	1 mg/kg	50.0	<1	102	70	130
Lead			1 mg/kg	50.0	9	103	70	130
EG005T: Total Metals by ICP-AES - (QC Lot: 18627)					mg/kg	mg/kg	%	%
Arsenic	EB0406047-187	BHH 0.0-0.1	1 mg/kg	50.0	6	99.8	70	130
Lead			1 mg/kg	50.0	3	103	70	130
EP068: Pesticides by GCMS								
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19225)					mg/kg	mg/kg	%	%
beta-BHC	EB0406047-176	BHA 0.3-0.5	.025 mg/kg	0.25	<0.05	87.7	70	130
gamma-BHC			.025 mg/kg	0.25	<0.05	95.2	70	130
Heptachlor			.025 mg/kg	0.25	<0.05	93.2	70	130
Aldrin			.025 mg/kg	0.25	<0.05	83.4	70	130
Dieldrin			.025 mg/kg	0.25	<0.05	82.4	70	130
Endrin			.025 mg/kg	0.25	<0.05	81.1	70	130
4,4'-DDT			.025 mg/kg	0.25	<0.2	81.6	70	130
EP068B: Organophosphorus Pesticides (OP) - (QC Lot: 19225)					mg/kg	mg/kg	%	%
Diazinon	EB0406047-176	BHA 0.3-0.5	.025 mg/kg	0.25	<0.05	82.2	70	130
Chlorpyrifos-methyl			.025 mg/kg	0.25	<0.05	86.5	70	130
Pirimphos-ethyl			.025 mg/kg	0.25	<0.05	81.0	70	130
Bromophos-ethyl			.025 mg/kg	0.25	<0.05	92.9	70	130
Prothiofos			.025 mg/kg	0.25	<0.05	100	70	130

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406047
ALS Quote Reference : EB20040159

Page Number : 18 of 18
Issue Date : 29 Oct 2004



Matrix Type: SOIL

Matrix Spike (MS) Report

					Actual Results		Recovery Limits	
Analyte name	Laboratory Sample ID	Client Sample ID	LOR	Spike Concentration	Sample Result	Spike Recovery	Static Limits	
						MS	Low	High
EP068A: Organochlorine Pesticides (OC) - (QC Lot: 19226)					mg/kg	%		
beta-BHC	EB0406047-196	BHN 0.0-0.1	.025 mg/kg	0.25	<0.05	89.5	70	130
gamma-BHC			.025 mg/kg	0.25	<0.05	92.8	70	130
Heptachlor			.025 mg/kg	0.25	<0.05	92.9	70	130
Aldrin			.025 mg/kg	0.25	<0.05	85.5	70	130
Dieldrin			.025 mg/kg	0.25	<0.05	83.8	70	130
Endrin			.025 mg/kg	0.25	<0.05	81.4	70	130
4,4'-DDT			.025 mg/kg	0.25	<0.2	81.8	70	130
EP068B: Organophosphorus Pesticides (OP) - (QC Lot: 19226)					mg/kg	%		
Diazinon	EB0406047-196	BHN 0.0-0.1	.025 mg/kg	0.25	<0.05	87.8	70	130
Chlorpyrifos-methyl			.025 mg/kg	0.25	<0.05	89.9	70	130
Pirimphos-ethyl			.025 mg/kg	0.25	<0.05	85.7	70	130
Bromophos-ethyl			.025 mg/kg	0.25	<0.05	92.0	70	130
Prothiofos			.025 mg/kg	0.25	<0.05	98.2	70	130

Matrix Type: WATER

Matrix Spike (MS) Report

					Actual Results		Recovery Limits	
					Sample Result	Spike Recovery	Static Limits	
						MS	Low	High
Analyte name	Laboratory Sample ID	Client Sample ID	LOR	Spike Concentration				
ED045-P: Chloride by PC Titrator								
ED045P: Chloride by PC Titrator - (QC Lot: 18889)					mg/L	mg/L	%	%
Chloride	EB0405908-019	- Anonymous -	1 mg/L	80	146	100	70	130
ED045P: Chloride by PC Titrator - (QC Lot: 18890)					mg/L	mg/L	%	%
Chloride	EB0406047-212	SP3 (Sample 1)	1 mg/L	40	64	97.5	70	130
EG005F: Dissolved Metals by ICP-AES								
EG005F: Dissolved Metals by ICP-AES - (QC Lot: 18741)					mg/L	mg/L	%	%
Iron	EB0406026-001	- Anonymous -	0.01 mg/L	1.00	1.91	112	70	130
EG005T: Total Recoverable Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 18711)					mg/L	mg/L	%	%
Iron	EB0405922-009	- Anonymous -	0.01 mg/L	10	0.46	111	70	130
EG020A-F: Dissolved Metals by ICP-MS - Suite A								
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 18763)					mg/L	mg/L	%	%
Aluminium	EB0406025-001	- Anonymous -	0.01 mg/L	0.10	0.03	103	70	130
Arsenic			0.001 mg/L	0.100	0.002	104	70	130
Lead			0.001 mg/L	0.100	0.001	91.1	70	130
Manganese			0.001 mg/L	0.100	0.025	105	70	130
EG020A-T: Total Metals by ICP-MS - Suite A								
EG020T: Total Metals by ICP-MS - (QC Lot: 18712)					mg/L	mg/L	%	%
Aluminium	EB0405922-009	- Anonymous -	0.01 mg/L	10	0.25	108	70	130

CHAIN OF CUSTODY DOCUMENTATION

Client	Gilbert and Sutherland	For:	Australian Laboratory Services
Postal Address:	PO Box 4115 Robina Queensland 4230	Address:	32 Shand Street, Stafford, Q4053
Send Report to:	sch4p4(6) Personal information	Send Invoice to:	sch4p4(6) Personal information (Robina)
Data Needed By:	URGENT	Report Needed By:	URGENT
G&S Project ID:	GJ0389-1	Quote Number:	

Comments:					pH (F)	pH (FOX)	CRS/TAA	Notes:
RETAIN ALL SAMPLES FOR FURTHER ANALYSIS!								
Sample ID	Matrix	Date	Time	Type and Pres				
BH1 (screen all samples to 3.00m)	Soil	28.09.04			/	/		
BH2 (screen all samples to 3.5m)	Soil	28.09.04			/	/		
BH3 (screen all samples to 3.25m)	Soil	28.09.04			/	/		
BH4 (screen all samples to 2.5m)	Soil	28.09.04			/	/		
BH5 (screen all samples to 2.0m)	Soil	29.09.04			/	/		
BH6 (screen all samples to 3.75m)	Soil	28.09.04			/	/		
BH7 (screen all samples to 3.5m)	Soil	28.09.04			/	/		
BH8 (screen all samples to 2.5m)	Soil	28.09.04			/	/		
BH9 (screen all samples to 2.5m)	Soil	28.09.04			/	/		
BH10 (screen all samples to 2.25m)	Soil	28.09.04			/	/		
BH11 (screen all samples to 1.0m)	Soil	29.09.04			/	/		
BH12 (screen all samples to 1.0m)	Soil	29.09.04			/	/		
BH13 (screen all samples to 1.25m)	Soil	29.09.04			/	/		
BH14 (screen all samples to 1.0m)	Soil	29.09.04			/	/		
BH15 (screen all samples to 1.5m)	Soil	29.09.04			/	/		
BH16 (screen all samples to 1.0m)	Soil	29.09.04			/	/		
BH17 (screen all samples to 0.5m)	Soil	29.09.04			/	/		
BH18 (screen all samples to 1.25m)	Soil	29.09.04			/	/		
BH19 (screen all samples to 2.25m)	Soil	30.09.04			/	/		
BH20 (screen all samples to 1.0m)	Soil	30.09.04			/	/		
BH21 (screen all samples to 1.0m)	Soil	30.09.04			/	/		
BH22 (screen all samples to 1.0m)	Soil	30.09.04			/	/		
BH23 (screen all samples to 1.0m)	Soil	30.09.04			/	/		

Comments:

RETAIN ALL SAMPLES FOR FURTHER ANALYSIS!

Sample ID

Matrix

Date

Time

Type and Pres

BH1 (screen all samples to 3.00m)

Soil

28.09.04

/

/

BH2 (screen all samples to 3.5m)

Soil

28.09.04

/

/

BH3 (screen all samples to 3.25m)

Soil

28.09.04

/

/

BH4 (screen all samples to 2.5m)

Soil

28.09.04

/

/

BH5 (screen all samples to 2.0m)

Soil

29.09.04

/

/

BH6 (screen all samples to 3.75m)

Soil

28.09.04

/

/

BH7 (screen all samples to 3.5m)

Soil

28.09.04

/

/

BH8 (screen all samples to 2.5m)

Soil

28.09.04

/

/

BH9 (screen all samples to 2.5m)

Soil

28.09.04

/

/

BH10 (screen all samples to 2.25m)

Soil

28.09.04

/

/

BH11 (screen all samples to 1.0m)

Soil

29.09.04

/

/

BH12 (screen all samples to 1.0m)

Soil

29.09.04

/

/

BH13 (screen all samples to 1.25m)

Soil

29.09.04

/

/

BH14 (screen all samples to 1.0m)

Soil

29.09.04

/

/

BH15 (screen all samples to 1.5m)

Soil

29.09.04

/

/

BH16 (screen all samples to 1.0m)

Soil

29.09.04

/

/

BH17 (screen all samples to 0.5m)

Soil

29.09.04

/

/

BH18 (screen all samples to 1.25m)

Soil

29.09.04

/

/

BH19 (screen all samples to 2.25m)

Soil

30.09.04

/

/

BH20 (screen all samples to 1.0m)

Soil

30.09.04

/

/

BH21 (screen all samples to 1.0m)

Soil

30.09.04

/

/

BH22 (screen all samples to 1.0m)

Soil

30.09.04

/

/

BH23 (screen all samples to 1.0m)

Soil

30.09.04

/

/

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-32437222

Notes:

ALS Environmental
Brisbane
Work Order
EB0406047
Telephone : 61-7-324

FAXED
2/10/04

ALS Environmental
Brisbane
Work Order

EB0406047



Report Version: 1.01
Telephone: 61-7-32437222

Relinquished by:
 Name: sch4p4(6) Personal information
 of: G&S
 Date: 04.10.04
 Time: Gilbert and Sutherland - Alstonville Office - Phone: 0266 260973, Fax: 0266 260993

Received by:
 Name: sch4p4(6) Personal information
 of: ACS Environmental
 Date: 5/10/04
 Time: 1pm

CHAIN OF CUSTODY DOCUMENTATION

Client	Gilbert and Sutherland	For:	Australian Laboratory Services
Postal Address:	PO Box 4115 Robina Queensland 4230	Address:	32 Shand Street, Stafford, Q4053
Send Report to:	sch4p4(6) Personal information	Send Invoice to:	sch4p4(6) Personal information (Robina)
Data Needed By:	URGENT	Report Needed By:	URGENT
G&S Project ID:	GJ0389-1	Quote Number:	
Tel:	073 243 7222	Fax:	073 243 7218

Comments:

RETAIN ALL SAMPLES FOR FURTHER ANALYSIS!

Sample ID	Matrix	Date	Time	Type and Pres	O.C	O.P	Arsenic	Lead											Notes:
BHA 0.0-0.1m (178)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHA 0.3-0.5m (178)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHA 1.3-1.5m	Soil	30.09.04		Glass Jar Nil															
BHB 0.0-0.1m (178)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHB 0.3-0.5m (178)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHB 0.8-1.0m	Soil	30.09.04		Glass Jar Nil															
BHC 0.0-0.1m (178) (179)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHC 0.3-0.5m (178) (180)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHC 0.8-1.0m	Soil	30.09.04		Glass Jar Nil															
BHC 1.3-1.5m	Soil	30.09.04		Glass Jar Nil															
BHC 3.0-3.2m (181)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHD 0.0-0.1m (182)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHD 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHD 1.3-1.5m	Soil	30.09.04		Glass Jar Nil															
BHE 0.0-0.1m (183)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHE 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHE 1.0-1.2m	Soil	30.09.04		Glass Jar Nil															
BHF 0.0-0.1m (184)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHF 0.5-0.7m	Soil	30.09.04		Glass Jar Nil															
BHF 1.3-1.5m	Soil	30.09.04		Glass Jar Nil															
BHF 2.8-3.0m (185)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHG 0.0-0.1m (186)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHG 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															

Relinquished by:

Name: sch4p4(6) Personal information
of: G&S
Date: 04.10.04
Time:

Received by:

Name: sch4p4(6) Personal information
of: sch4p4(6) Personal information
Date: 5/10/04
Time:

Gilbert and Sutherland - Alstonville Office - Phone: 0266 280973, Fax: 0266 280993

CHAIN OF CUSTODY DOCUMENTATION

Client	Gilbert and Sutherland	For:	Australian Laboratory Services
Postal Address:	PO Box 4115 Robina Queensland 4230	Address:	32 Shand Street, Stafford, Q4053
Send Report to:	sch4p4(6) Personal information	Send Invoice to:	sch4p4(6) Personal information (Robina)
Data Needed By:	URGENT	Report Needed By:	URGENT
G&S Project ID:	GJ0389-1	Quote Number:	
Tel:	073 243 7222	Fax:	073 243 7218

Comments:

RETAIN ALL SAMPLES FOR FURTHER ANALYSIS!

Sample ID	Matrix	Date	Time	Type and Pres	O.C	O.P	Arsenic	Lead											Notes:
BHH 0.0-0.1m (88)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHH 1.0-1.2m	Soil	30.09.04		Glass Jar Nil															
BHH 2.0-2.2m (88)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHI 0.0-0.1m (88)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHI 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHI 0.8-1.0m	Soil	30.09.04		Glass Jar Nil															
BHJ 0.0-0.1m (190)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHJ 0.8-1.0m	Soil	30.09.04		Glass Jar Nil															
BHJ 3.1-3.3m (191)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHK 0.0-0.1m (192)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHK 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHK 0.8-1.0m	Soil	30.09.04		Glass Jar Nil															
BHL 0.0-0.1m (193)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHL 1.0-1.2m	Soil	30.09.04		Glass Jar Nil															
BHM 0.0-0.1m (194)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHM 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHM 2.6-2.8m (195)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHN 0.0-0.1m (196)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											
BHN 0.3-0.5m	Soil	30.09.04		Glass Jar Nil															
BHN 2.0-2.3m	Soil	30.09.04		Glass Jar Nil															
BHN 2.8-3.0m (197)	Soil	30.09.04		Glass Jar Nil	/	/	/	/											

Relinquished by:

Name: sch4p4(6) Personal information
of: G&S
Date: 04.10.04
Time:

Received by:

Name: sch4p4(6) Personal information
of: 5/10/04
Date:
Time:

Gilbert and Sutherland - Alstonville Office - Phone: 0266 280973, Fax: 0266 280993

CHAIN OF CUSTODY DOCUMENTATION

Client Gilbert and Sutherland
Postal Address: PO Box 4115 Robina Queensland 4230
Send Report to: sch4p4(6) Personal information
Data Needed By: URGENT
G&S Project ID: GJ0389-1

For: Australian Laboratory Services
Address: 32 Shand Street, Stafford, Q4053
Tel: 073 243 7222
Fax: 073 243 7218

Send Invoice to: sch4p4(6) Personal information (Robina)
Report Needed By: URGENT
Quote Number:

Comments:					pH	E.C.	Turbidity	T.S.S	Iron (tot. & dis.)	Aluminium (tot. & dis.)	alkalinity	chloride	sulfate	manganese	carbonate	Arsenic	Organophos. pest.	Organochlor. pest.	Lead	Notes:
Sample ID	Matrix	Date	Time	Type and Pres																
SW1	Water	(206)			/	/	/	/	/	/	/	/	/	/	/					
SW2	Water	(207)			/	/	/	/	/	/	/	/	/	/	/					
SW3	Water	(208)			/	/	/	/	/	/	/	/	/	/	/					
SW4	Water	(209)			/	/	/	/	/	/	/	/	/	/	/					
SP1	Water	(210)			/	/	/	/	/	/	/	/	/	/	/					
SP2	Water	(211)			/	/	/	/	/	/	/	/	/	/	/					
SP3 (Sample 1)	Water	(212)			/	/	/	/	/	/	/	/	/	/	/					
SP3 (Sample 2)	Water	(213)			/	/	/	/	/	/	/	/	/	/	/		/	/	/	/
Dip Bath Liquid (A)	Water	(214)			/	/	/	/	/	/	/	/	/	/	/		/	/	/	/
Dip Bath Liquid (B)	Water	(215)			/	/	/	/	/	/	/	/	/	/	/		/	/	/	/
Extra Samples Received.																				
BHG 3.0-3.3																				
BHL 2.5-2.8 on hold.																				

**CERTIFICATE OF ANALYSIS**

Client :	GILBERT & SUTHERLAND PTY LTD	Laboratory :	ALS Environmental Brisbane	Page :	1 of 13
Contact :	sch4p4(6) Personal information	Contact :	sch4p4(6) Personal information	Work order :	EB0406698
Address :	P O BOX 4115 ROBINA QLD AUSTRALIA 4230	Address :	32 Shand Street Stafford QLD Australia 4053		
Project :	GJ0389-1	Quote number :	EB20040159	Date received :	28 Oct 2004
Order number :	- Not provided -			Date issued :	04 Nov 2004
C-O-C number :	- Not provided -				
Site :	- Not provided -				
E-mail :	gsrobina@bigpond.com	E-mail :	sch4p4(6) Personal information@alsenviro.com	No. of samples	
Telephone :	(07)5578-9944	Telephone :	61-7-32437222	Received :	51
Facsimile :	(07)5578-9945	Facsimile :	61-7-32437259	Analysed :	51

This final report was issued on Thursday, November 4, 2004 for the ALSE work order reference EB0406698 and supersedes any previous reports with this reference.

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

This report contains the following information:

- Analytical results for samples submitted
- Surrogate control limits

Work order specific comments

Chromium Reducible Sulphur as per Method 22B ASSMAC Laboratory Methods Guidelines, August 1998.

ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY**NATA Accredited Laboratory - 825**

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

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

Signatory

sch4p4(6) Personal information

Department

Inorganics - NATA 818 (Brisbane)



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 3 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH3 2.25-2.5	BH3 2.5-2.75	BH4 0.0-0.2	BH4 0.5-0.75	BH5 0.0-0.2
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-006	EB0406698-007	EB0406698-008	EB0406698-009	EB0406698-010
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.07	0.12	0.02	<0.02	0.02
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	5.2	5.9	5.8	6.2	6.0
Titrateable Actual Acidity (23F)		2	mole H+ / t	8	2	4	<2	2

Published on DES Disclosure
RTI Act 2009

Release

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 4 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH5 0.2-0.5	BH5 1.0-1.25	BH5 1.5-2.0	BH6 2.5-2.7	BH6 3.5-3.75
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-011	EB0406698-012	EB0406698-013	EB0406698-014	EB0406698-015
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.04	0.19	0.09	0.51	0.49
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	6.0	4.9	6.3	4.8	5.0
Titrateable Actual Acidity (23F)		2	mole H+ / t	2	16	<2	21	20

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 5 of 13
Issue Date : 04 Nov 2004

Analytical Results

Client Sample ID :				BH7 2.5-2.6	BH7 3.25-3.5	BH9 0.0-0.25	BH9 0.75-1.0	BH9 1.5-1.75 Light
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-016	EB0406698-017	EB0406698-018	EB0406698-019	EB0406698-020
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.62	0.19	<0.02	<0.02	1.14
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	4.6	8.7	4.7	5.7	4.4
Titratable Actual Acidity (23F)		2	mole H+ / t	36	<2	20	4	52

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 6 of 13
Issue Date : 04 Nov 2004

Analytical Results

Client Sample ID :				BH9 1.5-1.75 Dark	BH9 2.25-2.5	BH10 0.0-0.2	BH10 0.2-0.5	BH10 1.1-1.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-021	EB0406698-022	EB0406698-023	EB0406698-024	EB0406698-025
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.84	0.02	0.05	1.14	0.32
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	4.0	5.2	5.2	3.5	4.2
Titratable Actual Acidity (23F)		2	mole H+ / t	99	10	19	108	60

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 7 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH10 1.25-1.5	BH10 1.6-1.75	BH10 2.0-2.25	BH11 0.0-0.15	BH11 0.15-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				28 Sep 2004 15:00	28 Sep 2004 15:00	28 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-026	EB0406698-027	EB0406698-028	EB0406698-029	EB0406698-030
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.71	0.44	0.37	0.03	0.03
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	4.4	4.7	4.6	5.0	5.2
Titratable Actual Acidity (23F)		2	mole H+ / t	59	31	19	21	12

Published on DES Disclosure
RTI Act 2009

**ALS Environmental**

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 8 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH13 0.5-0.75	BH13 1.0-1.25	BH14 0.0-0.2	BH14 0.5-0.85 Grey	BH14 0.5-0.85 Dark Brown
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-031	EB0406698-032	EB0406698-033	EB0406698-034	EB0406698-035
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	1.84	1.50	0.02	0.84	0.78
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	3.8	4.6	4.5	4.2	3.5
Titrateable Actual Acidity (23F)		2	mole H+ / t	151	41	36	54	196

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 9 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH15 0.25-0.5	BH16 0.0-0.25	BH16 0.5-0.8	BH16 0.8-1.0	BH17 0.0-0.25
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-036	EB0406698-037	EB0406698-038	EB0406698-039	EB0406698-040
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.09	0.12	1.08	1.36	0.02
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	5.1	6.1	4.4	4.5	6.0
Titratable Actual Acidity (23F)		2	mole H+ / t	16	4	34	41	6

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 10 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH18 0.0-0.1	BH18 0.5-0.75	BH18 1.0-1.3	BH19 0.0-0.25	BH19 0.25-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	29 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-041	EB0406698-042	EB0406698-043	EB0406698-044	EB0406698-045
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.05	1.34	1.57	0.03	0.08
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	5.7	4.2	3.7	5.3	5.1
Titratable Actual Acidity (23F)		2	mole H+ / t	11	99	126	9	16

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 11 of 13
Issue Date : 04 Nov 2004

Analytical Results

Analytical Results

Client Sample ID :				BH19 0.75-1.1	BH19 1.25-1.5	BH19 2.0-2.25	BH20 0.0-0.2	BH20 0.2-0.5
Sample Matrix Type / Description :				SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL	SOIL / SOIL
Sample Date / Time :				30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00	30 Sep 2004 15:00
Laboratory Sample ID :				EB0406698-046	EB0406698-047	EB0406698-048	EB0406698-049	EB0406698-050
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	0.03	1.21	1.20	0.03	0.02
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	5.5	3.6	4.1	6.7	6.5
Titrateable Actual Acidity (23F)		2	mole H+ / t	6	134	86	<2	<2

Published on DES Disclosure
RTI Act 2009



ALS Environmental

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 12 of 13
Issue Date : 04 Nov 2004

Analytical Results

Client Sample ID :				BH22 0.0-0.3				
Sample Matrix Type / Description :				SOIL / SOIL				
Sample Date / Time :				30 Sep 2004 15:00				
Laboratory Sample ID :				EB0406698-051				
Analyte	CAS number	LOR	Units					
EA026 : Chromium Reducible Sulphur								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02				
EA033a: CRS/TAA								
pH KCl (23A)		0.1	pH Unit	5.3				
Titrateable Actual Acidity (23F)		2	mole H+ / t	11				

Client : GILBERT & SUTHERLAND PTY LTD
Project : GJ0389-1

Work Order : EB0406698
ALS Quote Reference : EB20040159

Page Number : 13 of 13
Issue Date : 04 Nov 2004

Surrogate Control Limits

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

- No surrogates present on this report.

Published on DES Disclosure Log
RTI Act 2009



ALS Environmental

QUALITY CONTROL REPORT

Client	: GILBERT & SUTHERLAND PTY LTD	Laboratory	: ALS Environmental Brisbane	Page	: 1 of 2
Contact	: sch4p4(6) Personal information	Contact	: sch4p4(6) Personal information		
Address	: P O BOX 4115 ROBINA QLD AUSTRALIA 4230	Address	: 32 Shand Street Stafford QLD Australia 4053	Work order	: EB0406698
Project	: GJ0389-1	Quote number	: EB20040159	Date received	: 28 Oct 2004
Order number	: - Not provided -			Date issued	: 04 Nov 2004
C-O-C number	: - Not provided -				
Site	: - Not provided -				
E-mail	: gsrobina@bigpond.com	E-mail	: sch4p4(6) Personal information@alsenviro.com	No. of samples	
Telephone	: (07)5578-9944	Telephone	: 61-7-32437222	Received	: 51
Facsimile	: (07)5578-9945	Facsimile	: 61-7-32437259	Analysed	: 51

This final report was issued on Thursday, November 4, 2004 for the ALSE work order reference EB0406698 and supersedes any previous reports with this reference.

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

This report contains the following information:

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

Work order specific comments

Chromium Reducible Sulphur as per Method 22B ASSMAC Laboratory Methods Guidelines, August 1998.

ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY



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

Signatory

Department

sch4p4(6) Personal information

Inorganics - NATA 818 (Brisbane)

NATA Accredited Laboratory - 825

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

Client : GILBERT & SUTHERLAND PTY LTD
 Project : GJ0389-1

Work Order : EB0406698
 ALS Quote Reference : EB20040159

Page Number : 2 of 2
 Issue Date : 04 Nov 2004

Quality Control Report - Laboratory Duplicates (DUP)

The quality control term **Laboratory Duplicate** refers to an intralaboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity.

- Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot. *Abbreviations: LOR = Limit of Reporting, RPD = Relative Percent Difference.*

* Indicates failed QC. The permitted ranges for the RPD of Laboratory Duplicates (relative percent deviation) are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting:- Result < 10 times LOR, no limit - Result between 10 and 20 times LOR, 0% - 50% - Result > 20 times LOR, 0% - 20%

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	Client Sample ID	Analyte name	LOR	Original Result	Duplicate Result	RPD
EA033a: CRS/TAA						
EA026 : Chromium Reducible Sulphur - (QC Lot: 20905)				% S	% S	%
EB0406698-001	BH1 0.0-0.25	Chromium Reducible Sulfur (22B)	0.02 % S	0.03	0.03	0.0
EB0406698-001	BH1 0.0-0.25	pH KCl (23A)	0.1 pH Unit	4.6	4.6	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	31	36	14.8
EB0406698-011	BH5 0.2-0.5	Chromium Reducible Sulfur (22B)	0.02 % S	0.04	0.05	22.2
EB0406698-011	BH5 0.2-0.5	pH KCl (23A)	0.1 pH Unit	6.0	6.0	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	2	2	0.0
EA026 : Chromium Reducible Sulphur - (QC Lot: 20906)				% S	% S	%
EB0406698-021	BH9 1.5-1.75 Dark	Chromium Reducible Sulfur (22B)	0.02 % S	0.84	0.85	1.2
EB0406698-021	BH9 1.5-1.75 Dark	pH KCl (23A)	0.1 pH Unit	4.0	4.0	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	99	104	4.9
EB0406698-031	BH13 0.5-0.75	Chromium Reducible Sulfur (22B)	0.02 % S	1.84	1.82	1.1
EB0406698-031	BH13 0.5-0.75	pH KCl (23A)	0.1 pH Unit	3.8	3.8	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	151	151	0.0
EA026 : Chromium Reducible Sulphur - (QC Lot: 20907)				% S	% S	%
EB0406698-041	BH18 0.0-0.1	Chromium Reducible Sulfur (22B)	0.02 % S	0.05	0.05	0.0
EB0406698-041	BH18 0.0-0.1	pH KCl (23A)	0.1 pH Unit	5.7	5.7	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	11	11	0.0
EB0406698-051	BH22 0.0-0.3	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
EB0406698-051	BH22 0.0-0.3	pH KCl (23A)	0.1 pH Unit	5.3	5.3	0.0
		Titrateable Actual Acidity (23F)	2 mole H+ / t	11	11	0.0

Rebatch - Ex EB0406047

CHAIN OF CUSTODY DOCUMENTATION

Client:	Gilbert and Sutherland	For:	Australian Laboratory Services
Postal Address:	PO Box 4115 Robina Queensland 4230	Address:	32 Strand Street, Stafford, Q4053
Send Report to:	sch4p4 (6) Personal information	Send Invoice to:	sch4p4 (6) Personal information
Data Needed By:	4/11/2004	Report Needed By:	4/11/2004
G&S Project ID:	GJ0389-1	Quote Number:	01 KR
Comments:			

Borehole No.	Depth(m)	Matrix	Date	Time	Type and Pres	CRS/TAA	Notes:
BH1	1	0.0-0.25	Soil	28.09.04		YES	
BH1	5	1.0-1.25	Soil	28.09.04		YES	
BH2	17	1.0-1.25	Soil	28.09.04		YES	
BH3	28	0.0-0.25	Soil	28.09.04		YES	
	29	0.25-0.5	Soil	28.09.04		YES	
	36	2.25-2.5	Soil	28.09.04		YES	
	37	2.5-2.75	Soil	28.09.04		YES	
BH4	40	0.0-0.2	Soil	29.09.04		YES	
	43	0.5-0.75	Soil	28.09.04		YES	
BH5	49	0.0-0.2	Soil	28.09.04		YES	
	50	0.2-0.5	Soil	28.09.04		YES	
	53	1.0-1.25	Soil	28.09.04		YES	
	55	1.5-2.0	Soil	28.09.04		YES	
BH6	67	2.5-2.7	Soil	28.09.04		YES	
	71	3.5-3.75	Soil	28.09.04		YES	
BH7	82	2.5-2.8	Soil	28.09.04		YES	
	85	3.25-3.5	Soil	28.09.04		YES	

ALS Environmental
Brisbane
Work Order

EB0406698



Report Version: 1.01
Telephone : 61-7-32437222

Relinquished by:	
Name:	sch4p4 (6) Personal information
of:	G&S
Date:	27.10.04
Time:	

Received by:	
Name:	sch4p4 (6) Personal information
of:	ALS Brisbane
Date:	28/10
Time:	17.09

Gilbert and Sutherland - Alstonville Office - Phone: 0266 280973, Fax: 0266 280993

Client:	Gilbert and Sutherland	For:	Australian Laboratory Services																
Postal Address:	PO Box 4115 Robina Queensland 4230	Address:	32 Shand Street, Stafford, Q4053																
Send Report to:	sch4p4(6) Personal information	Send Invoice to:	sch4p4(6) Personal info (Robina)																
Data Needed By:	04.11.04	Report Needed By:	04.11.04																
G&S Project ID:	GJ0389-1	Quote Number:																	
Comments:																			
Borehole No.	Depth(m)	Matrix	Date	Time	Type and Pres	CRS/TAA	Notes:												
BH14	129	0.0-0.2	Soil	29.09.04		YES													
	131	0.5-0.85	Soil	29.09.04	*	YES													
BH15	134	0.25-0.5	Soil	29.09.04	(35)	YES													
BH16	139	0.0-0.25	Soil	29.09.04		YES													
	141	0.5-0.8	Soil	29.09.04		YES													
	142	0.8-1.0	Soil	29.09.04		YES													
BH17	143	0.0-0.25	Soil	29.09.04		YES													
BH18	145	0.0-0.1	Soil	29.09.04		YES													
	148	0.5-0.75	Soil	29.09.04		YES													
	150	1.0-1.3	Soil	29.09.04		YES													
BH19	151	0.0-0.25	Soil	29.09.04		YES													
	152	0.25-0.5	Soil	30.09.04		YES													
	154	0.75-1.1	Soil	30.09.04		YES													
	155	1.25-1.5	Soil	30.09.04		YES													
	158	2.0-2.25	Soil	30.09.04		YES													
BH20	159	0.0-0.2	Soil	30.09.04		YES													
	161	0.2-0.5	Soil	30.09.04		YES													
BH22	167	0.0-0.3	Soil	30.09.04		YES													
Relinquished by:																			
Name:	sch4p4(6) Personal information																		
of:	G&S																		
Date:	27.10.04																		
Time:																			
Received by:																			
Name:	sch4p4(6) Personal information																		
of:	PLS																		
Date:	28/10																		
Time:																			

CHAIN OF CUSTODY DOCUMENTATION

[illegible]



Appendix E. Acid Sulfate Management Plan

Published on DES Disclosure Log
RTI Act 2009



**Acid Sulfate Soil
Management Plan**

**Lot 4 on RP817122
Mackay, Queensland**

Prepared for
Sunland Group Limited

November, 2004

Originating office:

Suite 12, Riverwalk One
Robina Town Centre Drive, Robina Q4230
PO Box 4115, Robina Q4226
Telephone 07 5578 9944
Facsimile 07 5578 9945
gsrobina@bigpond.com

Also at Kawana and Ballina



Table of contents

1. Introduction.....	3
1.1 ASMP aims & objectives	3
1.2 Management techniques	4
2. Relevant legislation and requirements	5
2.1 Environmental Duties.....	5
2.2 Legislative Requirements	5
3. Implementation of the ASMP	6
3.1 Responsibility for implementation	6
3.2 Training	6
3.3 Monitoring, reporting and auditing requirements	6
3.4 Non conformance and corrective action	6
4. Identification of Acid Sulfate Soils.....	7
5. Management of potential impacts – Construction phase	8
5.1 ASMP Structure	8
5.2 General Commitments.....	8
5.3 Definitions	8
5.4 Acid sulfate soil identification.....	11
5.5 Acid sulfate soil treatment – stormwater and sewer trenches.....	13
5.6 Acid sulfate soil treatment – dam maintenance	15
5.7 Acid sulfate soil treatment – topsoil removal.....	17
5.8 Surface water monitoring	19
5.9 Contractor Management.....	21
6. Administration of the ASMP.....	22
6.1 Amendment of the ASMP	22
6.2 Incident management.....	22



1. Introduction

This document constitutes an Acid Sulfate Soil Management Plan (ASMP) for the construction phase of Lot 4 RP817122 Shoal Point, Mackay, Queensland which will involve topsoil removal, dam maintenance work and excavation works for the construction of trenches for stormwater and sewerage infrastructure. Based on discussions with the proponent the earthworks will primarily involve filling of the site and minimal topsoil removal. Due to the absence of unconsolidated marine clays underlying the existing fill area, it is considered unlikely that the proposed filling of the site would result in the extrusion of PASS material. This ASMP is based on the findings of the Acid sulfate soil assessment prepared by Gilbert & Sutherland Pty Ltd in November 2004.

1.1 ASMP aims & objectives

This ASMP provides a framework to ensure that the impacts of construction for the development are managed, treated, monitored, reported and, if necessary, mitigated. Compliance with this plan would effectively ensure that the Developer's obligations under the Environmental Protection Act (1994) were met.

The ASMP aims to provide the following:

- evidence of practical and achievable plans for the management of the project, with particular regard to acid sulfate soils, to ensure that environmental requirements are complied with, by producing an integrated planning framework for control of construction phase impacts;
- a framework for regulatory authorities and the proponent to confirm compliance with policies and conditions; and
- evidence to the community that the project is being managed in an environmentally responsible manner.

The objectives of this ASMP are:

1. to implement assessment procedures for acid trend materials utilising a defined sampling protocol;
2. effective treatment and management of any drained, filled, disturbed or excavated PASS soils; and
3. remediation of acid trend waters if discovered and installation of control structures to prevent leachate discharge off-site unless it meets specified target water quality criteria.



1.2 Management techniques

The suggested principal management techniques associated with the proposed topsoil removal, dam maintenance and stormwater/sewerage works with regard to in-situ acid sulfate materials can be summarised as follows;

1. **Avoidance of PASS materials (i.e. filling in dams and maintaining existing topsoil)** - Avoidance is generally the preferred option with regard to acid sulfate soils. Avoidance would involve filling in the dams to avoid removal of PASS material. Also by retaining undisturbed topsoil across the site, the disturbance of PASS material may be avoided or minimized.
2. **Lime treatment** - This is the most widely used method of treatment and would involve the excavation and placement of in-situ acid sulfate materials (i.e. materials with net potential acidity) into 300mm layers followed by liming and verification testing.

The following section details the management measures to be implemented during the proposed works with specific reference to the above management techniques.



2. Relevant legislation and requirements

2.1 Environmental Duties

The *Environmental Protection Act (EPAct) 1994* aims to protect the environment by directing all personnel to review and where possible, adopt better environmental management practices. Specifically, the EPAct specifies that one must not carry out an activity that causes, or has the potential to cause environmental harm unless all reasonable and practicable measures are taken to prevent or minimise the harm. (The "General Environmental Duty").

The EPAct also requires that, should one become aware that environmental harm is occurring or likely to occur, that appropriate action be taken to report such occurrence. Reporting the incident to one's employer and/or the administering authority may satisfy this obligation. (The "Duty to Notify").

All parties must consider these points during the course of the proposed works as they imply broader requirements than those specified within this document.

2.2 Legislative Requirements

The proposed construction works must have regard to the following legislative and policy documents:

- Environmental Protection Act 1994;
- Environmental Protection (Water) Policy 1997; and,
- State Planning Policy SPP2/02 – Planning and Managing Development Involving Acid Sulfate Soils



3. Implementation of the ASMP

3.1 Responsibility for implementation

The construction contractor is responsible for the implementation of the ASMP during the construction phase. The contractor's site manager must be knowledgeable and experienced in the requirements of acid sulfate soil identification and management.

All construction and site staff are responsible for ensuring that activities are undertaken in a manner that prevents or minimises potential impacts, in accordance with the ASMP. A copy of the ASMP must be kept on site and available at all times.

3.2 Training

As part of the site induction program, the contractor's staff will be trained by a suitably qualified and experienced person/s in the measures required to implement the requirements of this ASMP. The training will cover issues such as:

- General environmental responsibilities such as the general environmental duty and the duty to notify;
- Acceptable and unacceptable practices for the site;
- Identification of the appropriate person to report to in the instance of environmental issues; and
- The requirements of the ASMP.

A register of site induction and environmental training shall be maintained and available for inspection upon request.

3.3 Monitoring, reporting and auditing requirements

The Contractor's site manager shall ensure that all monitoring, sampling and testing required is undertaken in accordance with the ASMP. Performance under the ASMP shall be reported by the Contractor to the Supervising Engineer, Developer and Environmental Consultant on a monthly basis. The report shall include a copy of all weekly site inspection checklists and results of all monitoring undertaken. The results of monitoring and testing will be audited for compliance with the ASMP by the Environmental Consultant.

3.4 Non conformance and corrective action

Any non-conformances with the requirements of this ASMP shall be identified by the Contractor's Site Manager or Supervising Engineer. Appropriate corrective actions shall be identified and implemented to ensure the non-conformance does not recur. Consultation with State and Local authorities will be undertaken where necessary, or as directed by the ASMP.



4. Identification of Acid Sulfate Soils

The proposed works involve the possible excavation into low-lying areas which may intercept soils below 5m AHD. As such, the *State Planning Policy SPP2/02 – Planning and Managing Development Involving Acid Sulfate Soils* applies to the proposed works and Council must consider the results of an Acid Sulfate Soil Assessment (ASSA) in their assessment of the proposal.

An ASSA was therefore undertaken by Gilbert & Sutherland Pty Ltd to determine whether ASS were present, and if so, the concentration and spatial extent of acidity within the sites soils. The results of this assessment were reported as the *Acid Sulfate Soil Assessment for Lot 4 RP817122 Shoal Point, Mackay, Queensland* (November 2004, Gilbert & Sutherland for Sunland Group limited).

The report concluded that it is likely that fill and natural (alluvial) soils disturbed below 5m AHD will require lime treatment to neutralize actual and potential acidity. Based on the proposed design, it is understood that additional fill (up to 1m) would be placed over the site to raise the development level. This is likely to result in minimal disturbance to in-situ actual and potential acid sulfate soils. However, it is anticipated that topsoil stripping and excavation for services would result in the exposure of some of these soils. By utilizing recognized management practices, it is considered that actual and potential acid sulfate soils could be managed without compromising the integrity of the surrounding environment.

The subsequent management tables therefore relate specifically to: the handling and treatment of PASS which may be disturbed during the topsoil removal; the management of ASS which may be disturbed during the dam maintenance works; and the identification and management of ASS within the alignments of stormwater and sewerage infrastructure.



5. Management of potential impacts – Construction phase

5.1 ASMP Structure

This ASMP acknowledges the environmental impacts associated with the disturbance of Acid Sulfate Soils (ASS) during topsoil removal, dam maintenance and excavation works for the construction of trenches for stormwater and sewerage infrastructure, for Lot 4 RP817122 Shoal Point, Mackay, Queensland.

Each control strategy is based upon proven environmental management methods and is presented as a commitment. The commitments made within this document will form the basis for future assessments and management of works.

The ASMP is based on a series of tables setting out specific management protocols for a range of environmental components, for use during the construction phase of the development. The person responsible for the implementation of the measures detailed is written on the table itself. The tables then detail the Issue, the performance criteria, the Implementation strategy, monitoring, auditing, reporting, failure identification and the corrective action. The detachable pages within each section detail the provisions of the ASMP. The format is presented below for reference purposes:

#.# Title

Person responsible	This is the person who has accepted the responsibility of implementing the ASMP provisions detailed on this page.
Issue	The Issue that the table deals with
Operational policy	The operational policy or management objective that applies to the element.
Performance criteria	Performance criteria (outcomes) for each element of the operation.
Implementation strategy	The strategies or tasks (to nominated operational design standards) that will be implemented to achieve the performance criteria.
Monitoring	The monitoring requirements which will measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements, which will verify implementation of, agreed construction and operational phase environmental management strategies and compliance with agreed performance criteria.
Reporting	Content, timing and responsibility for reporting and auditing of monitoring results.
Identification of incident	The circumstances under which the agreed performance criteria are unlikely to be met and environmental harm may



or failure	occur.
Corrective Action	The action to be implemented in case a performance requirement is not reached and the company(s) responsible for action.

Commitment #

What the management has committed the company to.

An objective of the tabular format is to accommodate change and allow the ASMP to be a *working* document. If management strategies need to be reviewed, alterations may be made, following appropriate consultation with the regulatory authorities.

5.2 General Commitments

Commitment 1

The Developer undertakes to comply with the environmental implementation strategy as contained within the approved Acid Sulfate Management Plan (ASMP).

Commitment 2

The Developer undertakes to fulfil all commitments made in this ASMP and to conduct works on the project site in accordance with relevant current statutory requirements and approved amendments.

5.3 Definitions

In this ASMP the terms have the following meanings;

- **AASS** means Actual Acid Sulfate Soils. These soils have existing acidity and are formed when the pyrite in Potential Acid Sulfate Soils oxidise to produce sulfuric acidity.
- **ASMP** means the approved Acid Sulfate Soils Management Plan and includes any amendments that may be approved from time to time,
- **ASS** means Acid Sulfate Soils. This is a collective term for both Actual and Potential Acid Sulfate Soils.
- **ASSA** means Acid Sulfate Soil Assessment.
- **development** means the development of the site for residential and other related purposes,
- **Developer** means the person undertaking the development of the land and includes the person nominated as having the responsibility for implementing the provisions of the ASMP.
- **MCC** means Mackay City Council.



- **PASS** means Potential Acid Sulfate Soils. These soils contain pyrite and are usually undisturbed. When these soils are exposed, the pyrite oxidises to produce sulfuric acid; and
- **Qld DNRME** means the Queensland Department of Natural Resources, Mines and Energy.

Published on DES Disclosure Log
RTI Act 2009



5.4 Acid sulfate soil identification

Person responsible	Contractor's Site Manager, Environmental Consultant.														
Issue	Acid sulfate soil identification.														
Operational policy	Identify actual and potential acid sulfate soils (AASS & PASS) and determine their acid generating potential prior to treatment.														
Performance criteria	All AASS & PASS are appropriately identified prior to treatment.														
Implementation strategy	<p>All soils excavated below 5.0m AHD will be investigated according to one of the following sampling protocols, which will be undertaken prior to excavation.</p> <p>Option 1: Identification based on ASS Assessment results</p> <p>Based on results of the <i>Acid Sulfate Soil Assessment for Lot 4 RP817122 Shoal Point, Mackay, Queensland</i> (undertaken by Gilbert & Sutherland Pty Ltd in November 2004), a conservative blanket rate for excavated fill and natural soils could be adopted. The rates determined are as follows:</p> <table border="1"> <thead> <tr> <th>Soil</th><th>Liming rate kg/dry tonne</th></tr> </thead> <tbody> <tr> <td>Fill material</td><td>64</td></tr> <tr> <td>Natural material</td><td>101</td></tr> </tbody> </table> <p>All excavated fill and natural soils will be separated according to colour and texture. The fill soil consists predominantly of grey brown fine to medium grained silty sand topsoils and yellow orange brown fine to coarse grained sands. The natural soil consists predominantly of grey fine to medium grained sands, silty sands, clayey sands and sandy clays.</p> <p>Given that the majority of fill samples displayed negligible PASS characteristics, it may be more economical to conduct further testing prior to trench excavations to confirm the established liming rate for fill. This may result in reduced liming rates. This option is discussed below.</p> <p>Option 2: ASS identification process</p> <p>Frequency: The minimum number of samples required for non-linear excavations are as follows:</p> <table border="1"> <thead> <tr> <th>Volume of disturbance (m³)</th><th>Minimum number of boreholes</th></tr> </thead> <tbody> <tr> <td>≤250</td><td>2</td></tr> <tr> <td>251 - 1000</td><td>3</td></tr> <tr> <td>>1000</td><td>4 or more*</td></tr> </tbody> </table> <p><small>*See Queensland Sampling Guidelines</small></p> <p>For linear excavations, drilling will be undertaken at a rate of 1 hole per 50m interval of trench excavations, with borehole locations sited along the proposed trenches. Holes will be constructed to a depth of 1m below the maximum depth of services in the immediate vicinity of the borehole location, or to refusal on weathered rock. Samples will be collected from at least every 0.25m or from individual soil horizons if more frequent.</p> <p>Sample size: Soil samples of approximately 0.3kg each are to be collected from each soil horizon with a soil profile description.</p>	Soil	Liming rate kg/dry tonne	Fill material	64	Natural material	101	Volume of disturbance (m ³)	Minimum number of boreholes	≤250	2	251 - 1000	3	>1000	4 or more*
Soil	Liming rate kg/dry tonne														
Fill material	64														
Natural material	101														
Volume of disturbance (m ³)	Minimum number of boreholes														
≤250	2														
251 - 1000	3														
>1000	4 or more*														



Monitoring Reporting Corrective action	<p>Sampling: Soil samples are to be collected in sealed containers that exclude air.</p> <p>Analysis: All samples will be field tested for Field pH (pH_F) and Field Oxidation pH (pH_{FOx}). Samples from every 0.5m will be laboratory analysed by the Chromium Reducible Sulfur (S_{CR}) and Titratable Actual Acidity (TAA) methods.</p> <p>Handling and storage: Sent to laboratory or dried within 24 hours.</p>
	Laboratory analysis will employ the S _{CR} and TAA methods.
	Field results and the results of laboratory analysis, including appropriate liming rates where required (Option 2), will be provided to the Supervising Engineer, Construction Contractor and Mackay City Council.
	Excavation of trenches will not be undertaken until the required investigation is complete and appropriate liming rates have been provided.

Commitment 3

The Developer will undertake all necessary investigation to identify the occurrence and severity of ASS prior to construction.

Published on DES Disclosure Log
RTI Act 2009



5.5 Acid sulfate soil treatment – stormwater and sewer trenches

Person responsible	Contractor's Site Manager, Environmental Consultant.
Issue	Acid Sulfate Soil treatment - stormwater and sewer trenches.
Operational policy	No acid sulfate soils are to be disturbed or excavated without appropriate treatment.
Performance criteria	No material requiring lime treatment will be covered or used as backfill until verification tests indicate compliance with acceptance criteria based on the action levels of oxidisable sulfur or TPA as outlined in the QASSIT Guidelines.
Implementation strategy	<p>Acid sulfate soil excavation from stormwater and sewer trenches is to be conducted according to the following treatment measures:</p> <p>LIME TREATMENT.</p> <ul style="list-style-type: none"> • All fill and natural materials identified (Option 1) or materials shown by the ASS identification process (Option 2), detailed in Section 5.4, to require neutralisation treatment shall be excavated, transported to a dedicated treatment area and treated prior to strategic reburial. • The treatment area may include both sides of the trench if fill and natural soil are to be separated (Option 1) and respective liming rates applied. • The treatment area will be prepared with a guard layer of lime at a minimum rate of 10kg/m²/metre depth of material to be placed. A layer of lime may be applied to the trench prior to the commencement of excavation and the remaining lime can be applied to the excavation spoil as excavations occur. • The excavation spoil is to be treated and reburied prior to rainfall or within a maximum of 48hours. • Materials selected for treatment using this method will be treated with lime or neutralising agent to neutralise their equivalent TPA and oxidisable sulfur based on the recommended rate as indicated for fill (Option 1) or testing detailed in the ASS identification process (Option 2). • In calculating the amount of lime or neutralising agent to be added, a mixing factor of safety of 1.5 will be used. Liming rates will be based on the results of laboratory analysis and provided by the Environmental Consultant to the Supervising Engineer and Construction Contractor.
Monitoring	<p>Collect lime delivery dockets and compare with calculated amounts required.</p> <p>Given that conservative blanket rates may be applied (Option 1) and the majority of the soil is non-PASS material, verification testing is not seen to be necessary. If required, verification testing will be performed on limed materials by assessing oxidisable sulfur, TPA and excess acid neutralising capacity sampled at the rate of one sample per 1,000m³ of treated material. Verification testing will be undertaken by the Environmental Consultant or an appropriately trained and independent technician.</p>
Reporting	<p>Records shall be kept on site during construction phase and available for inspection at all times.</p> <p>Results of all verification testing to be forwarded to the Environmental Consultant for auditing purposes.</p>



	Provision of results to Council and Statutory authorities upon request.
Identification of incident or failure	Examination of works for evidence of; <ul style="list-style-type: none"> • Yellow efflorescence on soil surface, • Iron staining of soils or water, • Sulfurous odour and; • Low pH in water bodies.
	Inadequate mixing of lime into treated material. Failure of a single validation sample.
Corrective action	<ul style="list-style-type: none"> • Retesting of materials in the vicinity of the excavation using SCR and TAA methods. • Any need for additional lime or vertical mixing in specific lots would be assessed and applied with thorough mixing.

Commitment 4

The Developer will appropriately treat any ASS excavated in the course of stormwater and sewer trench excavation, in accordance with the pre-determined liming rates.

Published on DES Disclosure Log
RTI Act 2009



5.6 Acid sulfate soil treatment – dam maintenance

Person responsible	Contractor's Site Manager, Environmental Consultant.
Issue	Treatment of Acid Sulfate Soils disturbed during the dam maintenance works.
Operational policy	No acid sulfate soils are to be disturbed or excavated without appropriate treatment.
Performance criteria	No material requiring lime treatment will be covered until verification tests indicate compliance with acceptance criteria based on the action levels of oxidisable sulfur or TPA as outlined in the QASIT Guidelines.
Implementation strategy	<p>Acid sulfate soil excavation to be conducted according the following treatment measures:</p> <p>AVOIDANCE.</p> <ul style="list-style-type: none"> Avoidance of ASS during the dam maintenance works would involve the filling in of the dams. This would allow any PASS material to remain undisturbed <p>LIME TREATMENT.</p> <ul style="list-style-type: none"> All material removed from the dam should be tested at the rates prescribed for Option 2; Table 5.4. Materials removed from the dam will be treated with lime or neutralising agent to neutralise their equivalent TPA and oxidisable sulfur based on the results of the above testing regime. In calculating the amount of lime or neutralising agent to be added, a mixing factor of safety of 1.5 will be used. Liming rates will be based on the results of laboratory analysis and provided by the Environmental Consultant to the Supervising Engineer and Construction Contractor. Material excavated from the areas of the dams which require treatment shall be excavated and transported to a dedicated, bunded treatment area. A bunded treatment area shall be constructed prior to the commencement of excavation into areas requiring lime treatment. Materials used to construct the bunds will be impervious and free from acid sulfate soils. The base of the bunded area will be prepared with a guard layer of lime at a minimum rate of 10kg/m²/metre depth of material to be placed. Secondary bunds will be constructed around the broad perimeter of the treatment area to minimise the catchment size and reduce potential flooding in the vicinity of the treatment area. Material will be placed in spatially tracked treatment pads within the bunded area. Material will be placed to a depth of <300mm, limed at the determined rate and mixed with a rotary hoe or disc plough to a minimum depth of 300mm.
Monitoring	<p>Collect lime delivery dockets and compare with calculated amounts required.</p> <p>Verification testing will be performed on limed materials by assessing oxidisable sulfur, TPA and excess acid neutralising capacity sampled at the rate of one sample per 1,000m³ of treated material. Verification testing will be undertaken by the Environmental Consultant or an appropriately trained and independent technician.</p>



Reporting	Records shall be kept on site during construction phase and available for inspection at all times.
	Results of all verification testing to be forwarded to the Environmental Consultant for auditing purposes.
	Provision of results to Council and Statutory authorities upon request.
Identification of incident or failure	<p>Examination of works for evidence of;</p> <ul style="list-style-type: none"> • Yellow efflorescence on soil surface, • Iron staining of soils or water, • Sulfurous odour and; • Low pH in water bodies. <p>Inadequate mixing of lime into treated material.</p> <p>Failure of a single validation sample.</p>
Corrective action	<ul style="list-style-type: none"> • Retesting of materials in the vicinity of the excavation using S_{CR} and TAA method. • Any need for additional lime or vertical mixing in specific lots would be assessed and applied with thorough mixing.

Commitment 5

The Developer will appropriately treat any ASS excavated in the course of the dam maintenance, in accordance with the pre-determined liming rates.



5.7 Acid sulfate soil treatment – topsoil removal

Person responsible	Contractor's Site Manager, Environmental Consultant.
Issue	Treatment of Acid Sulfate Soils disturbed during topsoil removal.
Operational policy	No acid sulfate soils are to be disturbed or excavated without appropriate treatment.
Performance criteria	No material requiring lime treatment will be covered until verification tests indicate compliance with acceptance criteria based on the action levels of oxidisable sulfur or TPA as outlined in the QASSIT Guidelines.
Implementation strategy	<p>Acid sulfate soil excavation to be conducted according the following treatment measures:</p> <ul style="list-style-type: none"> The depth of topsoil removal shall be limited to 0.5m (below near surface level). Materials selected for treatment will be treated with lime or neutralising agent to neutralise their equivalent TPA and oxidisable sulfur based on a blanket liming rate of a minimum of 32kg/dry tonne. Lime may be applied to the topsoil surface prior to removal and incorporated as topsoil removal occurs.
Monitoring	<p>Collect lime delivery dockets and compare with calculated amounts required.</p> <p>Given that conservative blanket rates will be applied and the majority of the soil is non-PASS material, verification testing is not seen to be necessary. If required, verification testing will be performed on limed materials by assessing oxidisable sulfur, TPA and excess acid neutralising capacity sampled at the rate of one sample per 1,000m³ of treated material. Verification testing will be undertaken by the Environmental Consultant or an appropriately trained and independent technician.</p>
Reporting	<p>Records shall be kept on site during construction phase and available for inspection at all times.</p> <p>Results of all verification testing to be forwarded to the Environmental Consultant for auditing purposes.</p> <p>Provision of results to Council and Statutory authorities upon request.</p>
Identification of incident or failure	<p>Examination of works for evidence of;</p> <ul style="list-style-type: none"> Yellow efflorescence on soil surface, Iron staining of soils or water, Sulfurous odour and; Low pH in water bodies. <p>Inadequate mixing of lime into treated material.</p> <p>Failure of a single validation sample.</p>
Corrective action	<ul style="list-style-type: none"> Any need for additional lime to the stockpile would be assessed and applied to the surface of the stockpile.

***Commitment 6***

The Developer will appropriately treat any ASS excavated in the course of topsoil removal, in accordance with the pre-determined liming rates.

Published on DES Disclosure Log
RTI Act 2009



5.8 Surface water monitoring

Person responsible	Contractor's Site Manager, Environmental Consultant.									
Issue	Surface water controls.									
Operational policy	No water is to be discharged from the site or to groundwater without monitoring and meeting appropriate criteria.									
Performance criteria	<p>All ponded water discharged to land will comply with the criteria specified in the following table.</p> <p>Monitoring will be conducted within bunded areas used for treatment of PASS prior to the release of any ponded water. This ponded water will comply with the following criteria prior to release:</p> <table><tr><th>Water Quality Parameter</th><th>Release Criteria</th><th>Criteria Type</th></tr><tr><td>pH</td><td>6.5-8.5</td><td>Range</td></tr><tr><td>Turbidity</td><td>50</td><td>NTU</td></tr></table>	Water Quality Parameter	Release Criteria	Criteria Type	pH	6.5-8.5	Range	Turbidity	50	NTU
Water Quality Parameter	Release Criteria	Criteria Type								
pH	6.5-8.5	Range								
Turbidity	50	NTU								
Implementation strategy	<ul style="list-style-type: none">• The bunded area constructed for the treatment of PASS will be inspected following rainfall for ponded water.• Where water is present it will be monitored to ensure compliance with the pH and turbidity criteria prior to release.• Following testing and appropriate treatment of the ponded water, the water will be discharged off site or to ground for infiltration to groundwater.• Where the pH of ponded water is less than 6.5, pH will be raised by the application of hydrated lime.• If turbidity is elevated, either the water will be flocculated and given time to settle prior to retesting, or the water will be irrigated on site.• Surface water external to the bunded area will be directed around the treatment areas to minimise the potential for leaching and the possibility of the bund breaching prior to the testing and treatment of the contained water.• Contractors shall be informed of surface water monitoring and release requirements during site induction.									
Monitoring	<p>Surface water monitoring for pH and turbidity will be conducted prior to discharge of ponded water off site or to land.</p> <p>Surface water monitoring will be undertaken by the Environmental Consultant or an appropriately trained and independent technician.</p>									
Auditing	Environmental Consultant to audit water quality results to ensure all discharges comply with the performance criteria.									
Reporting	<ul style="list-style-type: none">• Result sheets to be compiled for monitoring results relating to water quality of ponded water. These results to be kept on site for inspection by local and state government officers upon request.• These results to be provided monthly to the Supervising Engineer and the Environmental Consultant until completion of works.• Water quality results will be provided to Council and Statutory authorities upon request.									



Identification of incident or failure	<ul style="list-style-type: none"> • Ponded water quality within PASS treatment areas being below pH 6.5 or greater than pH 8.5 immediately prior to discharge. • Ponded water quality within PASS treatment areas being >50NTU immediately prior to discharge. • Water discharged off site or to groundwater without appropriate monitoring and/or pH or turbidity outside of release criteria.
Corrective action	<ul style="list-style-type: none"> • If pH is detected outside the criteria range, then waters will be contained until such time as the pH is adjusted to within the range of 6.5 to 8.5. • If turbidity is detected outside the criteria range, then waters will be contained until such time as the turbidity is adjusted to ≤50NTU. • If water outside of release criteria is discharged to land or if water which meets the criteria is discharged from the site appropriate Council officers shall be informed. • If water outside of release criteria is discharged from the site appropriate Council and EPA officers shall be informed, as required under the Environmental Protection Act 1994.

Commitment 7

Water which is trapped within bunded areas established for the treatment of PASS will be monitored and treated to ensure that acidic or turbid water is not discharged to groundwater or from the site.



5.9 Contractor Management

Person Responsible	Consulting Engineer.
Issue	Contractor management.
Operational policy	To ensure the Developer's duty of care is met by ensuring the Contractor is aware of his responsibilities under the terms of the ASMP and the <i>Environmental Protection Act 1994</i> .
Performance criteria	Contractor is fully aware of his responsibilities under the terms of the ASMP.
Implementation strategy	<ul style="list-style-type: none"> • Review of the ASMP and the construction phase contracts by the Developer. • Periodic checks to be made by an independent Environmental Consultant. • Training for construction staff in implementation of ASMP provisions.
Monitoring	Weekly site inspections to be carried out.
Auditing	Inspections will be carried out monthly during the construction phase by an Environmental Consultant for every stage of development.
Reporting	Full details to be available to the contractor together with suggested corrective actions if required.
Corrective action	To be detailed at the time.

Commitment 8

A proactive program of contractor management will be implemented.



6. Administration of the ASMP

6.1 Amendment of the ASMP

The Developer may make an application to MCC to amend the provisions of this ASMP. The application shall:

- be in writing;
- specify the provisions of the ASMP to which the application relates; and
- state how the proposed amendments achieve the objectives of the provisions to which the amendments relate.

MCC shall approve the amendment where MCC is satisfied acting reasonably that the proposed amendments achieve the objective of the provisions to which the amendment relates.

6.2 Incident management

The Developer and any person appointed by the Developer as having responsibility for a control strategy set out in this ASMP have clearly defined responsibilities under the *Environmental Protection Act 1994* to report any incidents likely to cause material or serious environmental harm.

Relevant contact details are as follows:

Gilbert & Sutherland
(Acid Sulfate Soils Management)
PO Box 4115, Robina Qld 4230
Contact: (6) Personal information
Phone: 07 5578 9944
Fax: 07 55 78 9945
Email: gsrobina@bigpond.com