Loop 10 Pipeline – Acid Sulphate Soil and Dewatering Management Plan

February 2006

DBNGP (WA) Nominees Pty Ltd

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2145167D
PR2:15575:RevC

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Distribution: electronic copies (ECOS, Alinta Gas).....

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1. Introduction

Acid sulphate soil is the common name for soil that contains iron sulphides or sulphide oxidation products. When acid sulphate soils are exposed to air and water, the iron sulphides can oxidise to produce sulphuric acid, iron precipitates and groundwater with elevated concentrations of dissolved metals such as aluminium, iron and arsenic. Although these materials are typically benign if left in the natural environment, the dewatering, excavation and/or stockpiling of acid sulphate soils may result in the aforementioned impacts. As a result, acid sulphate soils are recognised as a potentially contaminating material by the Department of Environment and therefore require specific consideration and management if present on a development site.

DBNGP (WA) Nominees Pty Limited is proposing to construct a 23 km looped pipeline (Loop 10) adjacent (and connected) to the existing underground gas transmission pipeline within the Dampier to Bunbury Natural Gas Pipeline (DPNGP) corridor (Figure 1). According to the WA Planning Commission (WAPC) Bulletin No 64, the pipeline route passes through areas classified as having a LOW to HIGH risk of containing acid sulphate soils. A desktop assessment along the length of the pipeline was undertaken in June 2005 (PB, 2005) using both regional and site-specific information to refine the WAPC mapping. The results of the desktop assessment indicated the following risk of acid sulphate soils was likely to be encountered along the Loop 10 pipeline:

- 10 km, located at the north end of the pipeline, were ranked as LOW risk, consistent with the WAPC mapping;
- 9.4 km, located between KP3 and KP4 and south of KP11, were ranked as MEDIUM risk;
- 1.9 km, located intermittently south of KP11, were ranked as HIGH risk.

Parsons Brinckerhoff was commissioned by Ecos Consulting in June 2005 to undertake a Preliminary Acid Sulphate Soil Investigation over those areas ranked as MEDIUM and HIGH risk. The objective of the investigation was to determine if acid generating soils are present along the pipeline route and to delineate their extent to assist in the development of the Environmental Management Plan (EMP) for the project. Consistant with the WAPC requirements, further investigation was not required in association with those areas ranked as having a LOW risk. In addition, PB were commissioned to prepare an acid sulphate soil and dewatering management plan to mitigate potential impacts associated with the disturbance of soils along the pipeline route.

1.1 Background

Installation of the Loop 10 pipeline will involve the excavation of a trench 23 km long, 1.5 to 2 m deep and approximately 2 m wide, resulting in the disturbance of approximately 92,000 m^3 of soil. Where possible the excavated soils will be reused to backfill the trenches once the pipeline has been laid.

In addition, dewatering may be locally required to drop the water table sufficiently to open the trench. Based on regional information on the topography and the depth to water in the area, it is anticipated that dewatering may be locally required in some low-lying areas during the excavation of the of the pipeline trench, dependant upon the time of year that earthworks are undertaken.

1.2 Scope of Works

Based on PB's understanding of the issue, the recommendations put forth in the Department of Environment's *Acid Sulfate Soil Guideline Series* (2003/2004) and PB's understanding of the current regulatory requirements of the Department of Environment (DoE), the following scope of works comprised the preliminary investigation of the Loop 10 Pipeline:

1. Preparation of a Health, Environment and Safety Plan (HESP) including a risk assessment for the on-site investigation;
2. Installation of 69 soil bores to depths up to 3 m and collection of up to 897 soil samples;
3. Field pH (pH_F) and pH after oxidation (pH_{FOX}) testing of the samples;
4. Submission of 126 samples to Australian Laboratory Services (ALS) for laboratory analysis of using the Chromium Reducible Sulphur Suite;
5. Interpretation of results;
6. Provision of this report, which includes the findings of the preliminary investigation and management strategies for soil handling and dewatering.

2. Acid Sulphate Soil Investigation Methodology

A site investigation for acid sulphate soils was undertaken between KP3 and KP4 and between KP11 and KP22.7 in October/November 2005 following a one-week dry period that occurred in late October after a prolonged period of unseasonably wet weather.

Although classified as LOW risk by the WAPC mapping, the soils between KP3 and KP4 were investigated because regional mapping indicated that wetlands existed within 1 km of the pipeline easement. Due to the scale of mapping it was considered possible that the wetlands may extend further than suggested.

The soils between KP11 and KP22.7 were investigated because WAPC mapping and the desktop assessment identified the soils as having a MEDIUM and HIGH risk of being acid generating. In particular, the following areas were identified as having a HIGH risk of being acid generating:

- 100 m between KP12.4 and KP12.5;
- 100 m between KP14.5 and KP14.6;
- 1400 km between KP 17.2 and KP18.6;
- 100 m between KP 19.9 and KP 20; and
- 200 m between KP22.5 and KP22.7.

The soil investigation for both areas included:

- Installation of 69 auger holes to a maximum depth of 3 m. Those bores installed to a depth less than 3 m either encountered refusal or collapsed during installation due to a shallow water table;
- Sampling of soils at 0.25 m intervals (where recovery of sample was possible);
- Analysis of 545 soil samples for field pH (pH_F) and field peroxide pH (pH_{FOX}) using recognised methods; and
- Submission of 126 samples to Australian Laboratory Services (ALS) for laboratory analysis of using the Chromium Reducible Sulphur Suite;
- Submission of 24 samples for analysis of Al, As, Cd, Total Cr, CrVI, Fe, Pb, Mo, Ni, Se and leachability of Pb and Ni.

Soil bore locations are provided in Figure 2 and soil bore logs are provided in Appendix A. Table 2.1 summarises the methodology adopted during the fieldwork for the assessment of soils.

Table 2.1: Soil assessment methodology

Activity	Details
Services Location	Site plans, including services locations were inspected prior to drilling. An NPS Supervisor provided clearances for bore installation locations.
Soil Bore Installation	69 hand augered soil bores were installed at intervals of approximately 200 m through the MEDIUM risk areas, and at 100 m intervals through those areas identified as HIGH risk. Soil bores were installed to 3 mBGL except where bore collapse occurred due to high water table levels. Installation of bores using a drill rig was deemed unsuitable due to the risk of drilling in such close proximity to the high pressure gas pipeline and the risk of disturbing EPP vegetation.
Soil Logging	Soil and rock type classification based on AS1726 – 1993.
Soil Sampling	Soil samples were obtained from the auger head and preserved in airtight plastic bags.
Soil Field pH Testing	pH_F and pH_{FOX} was measured using the soil paste method. (Watling et al, 2004)
Laboratory Sample Selection	126 samples were selected for analysis using the Chromium Reducible Sulphur Suite based on field results. The 126 samples comprised: the highest potential acid generating soil from each bore, soils samples at 0.5 m intervals for 1:10 soil bores installed in the MEDIUM risk areas, and soils samples at 0.5 m intervals for 1:5 soil bores installed in the HIGH risk areas
Soil Bore Abandonment	Auger holes were backfilled post sample collection and logging.
Sample Preservation	Samples were stored in airtight plastic bags on ice while on-site and whilst in transit.

3. Assessment Criteria

3.1 pH_F and pH_{FOX} Testing

In the Draft Acid Sulphate Soil Guidelines Series (2003), the Department of Environment (DoE) has provided guidelines defining indicator field pH values for pH_F and peroxide pH (pH_{FOX}) to assist with identifying likely acid generating soils.

As a general rule of thumb, soils are considered to contain some actual acidity (oxidised sulphide material and / or organic acids dependent on the sample depth) if their pH is less than 4 and may contain actual acidity if their pH is between 4 and 5. Potential acidity (unoxidised sulphide material), or the ability of a material to generate acid is determined through the pH_{FOX} test. As a general rule of thumb, soils are considered to contain potential acidity if their pH_{FOX} is less than 3 or if the difference between pH_F and pH_{FOX} is greater than 1.

3.2 Laboratory Analysis

3.2.1 Acid Generating Capacity

Western Australia's *Draft Acid Sulphate Soil Guidelines* (2003) have established action criteria for the assessment of the environmental risk of acid sulphate soils. The action criteria are based on the sum of existing plus potential acidity, calculated as equivalent sulphur (e.g. s-TAA +S_{CR} in %S units) or equivalent acidity (e.g. TAA +TPA in mol H^+/tonne).

As clay content tends to influence a soil's natural pH buffering capacity, the action criteria are grouped by three broad texture categories – coarse, medium and fine. The criteria are used to define when acid sulphate soils disturbed at a site will need to be treated and managed. Table 3.1 summarises the action criteria.

Table 3.1: Texture based acid sulphate soils action criteria

Type of Material		Action Criteria if <1,000 tonnes of material is disturbed		Action Criteria if >1,000 tonnes of material is disturbed	
Texture Range	**Approx. Clay Content**	**Equivalent Sulphur (%)**	**Equivalent Acidity (mol H^+/tonne)**	**Equivalent Sulphur (%)**	**Equivalent Acidity (mol H^+/tonne)**
Coarse – sands to loamy sands	≤5%	0.03	18	0.03	18
Medium – sandy loams to light clays	5 – 40%	0.06	36	0.03	18
Fine – medium to heavy clays and silty clays	≥40%	0.1	62	0.03	18

3.2.2 Heavy Metals

Potential disposal of soils to an off-site facility will require verification of heavy metals concentrations for landfill classification. As the minimum landfill class for acid sulphate soils is Class II, heavy metals concentrations in soil are compared against the *Guidelines for Acceptance of Solid Waste to Landfill* (DoE, 2005). The relevant criteria are summarised in Table 3.2.

Table 3.2: Class II Landfill Acceptance Criteria

Parameter	CT2 (mg/kg)	ASLP2 (mg/L)	CL2 (mg/kg)
Al	-	-	-
As	14	0.5	500
Cd	0.4	0.1	100
Total Cr	-	-	-
CrVI	10	0.5	500
Fe	-	-	-
Pb	2	0.5	1,500
Mo	10	0.5	1,000
Ni	4	0.2	3,000
Se	2	0.5	50

4. Geology, Hydrogeology and Surrounding Environment

The following discussion on the geology and hydrogeology of the site is derived from the site specific information collected between KP3 and KP 4 and KP11 and KP22.7 during the investigations undertaken at the site. A geologic cross-section of these segments of Loop 10 is provided as Figure 3.

4.1 Geology

The Loop 10 alignment between KP3 and KP4 is characterised topsoil containing some organics underlain by yellow brown to orange coarse grained sands. With the possible exception of the organic topsoils, the soils encountered over this area showed no visually characteristic signs of being acid sulphate soils. Further, the soil types suggest that the wetlands surrounding the easement in this area, have not recently encompassed this interval of the pipeline.

The Loop 10 alignment between KP11 and KP 22 is characterised by undulating hills generally underlain by sands and silts. The following lithologic units were identified:

- TOPSOIL: grey to dark brown soils with some organic matter;
- YELLOW SAND: medium to coarse grained, yellow to white, quartz-rich sands;
- GREY SAND: medium grained, pale grey sand with no apparent organics;
- BROWN SAND: medium grained, pale brown sand;
- SILTY SAND: medium to fine grained, brown/black sands in a silt matrix;
- SILTY CLAY: firm to very firm, brown to brown black silty clays
- CLAY: firm, pale blue grey clay;
- LIMESTONE: coarse-grained and cemented with friable clay, pale white/yellow; and
- PEAT: organic rich, black sandy silts;

Lithologies such as the clay, peats and limestone were locally encountered over distances typically not exceeding 500 m. Other lithologies (sands and clays) were more laterally extensive with silty clay units prevailing between KP10 and KP14 and grading into more sand-dominated stratigraphic sequences form KP14 to KP22.7 along the alignment.

4.2 Hydrogeology

Groundwater was not encountered between KP3 and KP4 suggesting that the depth of groundwater in this area is greater than 3 mBGL and that dewatering of this section of the loop will not be required during construction.

Between KP11 and KP22.7 the following hydrogeologic conditions prevailed:

- Between KP11 and KP14.6 groundwater was generally not encountered at depths less than 1.5 m and in most cases groundwater was not encountered within 2 mBGL;
- Between KP14.6 and KP16.8 groundwater was encountered between 0.7 m and 1.2 mBGL. Due to the presence of a shallow silty horizon through this area, it is likely that the depth to groundwater reflects a perched aquifer system;
- Between KP16.8 and KP18 groundwater was generally encountered at a depth of approximately 1.5 mBGL;
- Between KP18 and KP19.6 groundwater was encountered at depths less than 1 mBGL;
- Between KP19.6 and KP20.8 groundwater was not encountered in the top 3 m of the soil profile; and
- Between KP20.8 and KP22.7, groundwater was generally encountered at depths less than 1 mBGL.

It is noted that in areas where the depth to groundwater is less than 1 mBGL, dewatering may be required for the installation of the pipeline. However, the necessity for dewatering will be dependent upon the presence or absence of silty horizons (where silty horizons are present dewatering may not be required) and the time of year at which the work is undertaken. It is noted that at the time of the investigation, groundwater table levels would be near their seasonal maximum and will generally decrease through to April.

Due to the sand nature of most of the soils, which promoted bore collapse, it was not possible to sample water quality from the soil bores.

4.2.1 Background Water Quality

Background water quality was obtained on 10 January 2006 from six piezometers installed along Loop 10 in the three areas where dewatering may be required. The locations of the six piezometers are shown in Figure 2.

Table 4.1 summarises the background water quality along the pipeline route. Laboratory certificates are provided in Appendix C. It is noted that a high level of sediment was present in association with all water samples that inhibited the ability for field filtration. Samples were kept on ice after sampling and were delivered to the analytical laboratory within 3 hours of sampling.

Table 4.1: Background Water Quality – Loop 10

Parameters	Performance Criteria[1]	PZ1	PZ2	PZ3	PZ4	PZ5	PZ6
Depth to Water (mBGL)	-	0.84	2.0	2.0	0.85	1.43	0.95
pH (pH units)	6	3.63	4.4	4.25	3.97	6.65	6.19
EC (µs/cm)	2000	1180	500	487	153	455	322
TDS	-	1620	518	550	250	635	615
Alkalinity	-	<1	<1	<1	<1	159	50
Acidity	-	505	196	92	56	76	24
Acidity - Alkalinity	35	505	196	92	56	-83	-26
H_2S	0.5	<0.1	0.2	<0.1	<0.1	1.2	0.2
SO_4	-	36	27	24	3	40	<10
Cl	-	320	96.4	101	38.3	43.2	68.8
SO_4/Cl	0.5	0.11	0.28	0.24	0.08	0.93	0.14
NH_3-N	-	<0.010	0.328	0.107	0.14	0.158	0.107
Total Al	-	4.12	8.22	59.2	1.56	633	99
Total Fe	-	8.17	5.48	41.5	5.26	326	77.4
Al	0.2	2.8	1	1.54	0.82	0.02	0.35
As	0.007	0.001	<0.001	<0.001	<0.001	0.007	0.001
Cd	0.002	0.0001	0.0009	0.0014	0.0001	<0.0001	<0.0001
Cr	0.1	0.003	0.001	0.001	0.001	<0.001	0.002
Fe	0.3	4.42	0.16	0.14	3.99	<0.05	5.13
Mn	0.5	0.027	0.639	0.577	0.02	0.586	0.164
Ni	0.02	0.008	0.02	0.012	0.006	0.005	0.008
Se	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zn	3	0.053	0.087	0.096	0.052	0.008	0.009

1. Drinking Water Quality Guidelines (DoE, 2003)

Note: all values reported in units of mg/L unless otherwise specified

Results of the background water quality testing indicate the following:

- Groundwater is acidic between KP18 – KP19.6 and KP20 .8 – KP22.7 as evidence by low pH and a net acidity that exceeds 35 mg/L;
- Acidity is likely to be due to metals acidity as the sulphate:chloride ratios indicate a lack of sulphate acidity;
- Total Fe and Al concentrations are significantly elevated in all bores;
- Dissolved Al, Fe and Mn concentrations are significantly elevated in several of the bores above the performance criteria;
- No other heavy metals were present in concentrations that exceed the performance criteria.

Based on the results, management of acidity and heavy metals will be necessary in all potential areas of dewatering.

4.3 Sensitive Receptors

The sensitivity of environmental receptors located along and around the Loop 10 pipeline is discussed in detail in the Assessment on Referral Information (ARI) document (Ecos, 2005). In particular the following receptors are located within 1 km of the Loop 10 pipeline easement:

- Residential and rural residential properties to the east and west of the pipeline;
- Folly's Pool located around KP13;
- Hymus Swamp located immediately to the west of KP19;
- The Leda area, which is recognised as an ESA (environmentally significant area); and
- Several other unnamed, seasonal damplands located throughout the southern portion of the area that have not been classified as having environmental significance.

5. Results of Investigation

5.1 Field Results

Results of the field pH (pH_F) and field pH after oxidation (pH_{FOX}) tests are summarised by lithology in Table 5.1.

Table 5.1: Summary of pH_F and pH_{FOX} results

Lithology	No. of Samples	pH_F Range	pH_{FOX} Range	% Samples $\Delta pH_{F-FOX}>1$
TOPSOIL	64	3.1 – 8.7	1.6 – 6.5	40
ORGANIC SANDS	13	4.2 – 8.1	3.7 – 5.9	23
YELLOW SAND	149	3.8 – 8.3	2.8 – 6.0	16
ORANGE SAND	21	6.0 – 8.2	5.2 – 6.7	43
GREY SAND	91	3.8 – 8.4	3.4 – 8.4	8
BROWN SAND	21	3.8 – 5.2	3.6 – 5.9	4
SILTY SAND	76	4.4 – 8.8	3.5 – 8.6	26
SILTY CLAY	47	2.8 – 8.0	1.4 – 6.9	66
CLAY	11	6.8 – 8.3	6.1 – 7.9	0
LIMESTONE	19	6.9 – 9.1	5.8 – 7.6	74

The following conclusions can be drawn from the field test data:

- Although a large pH range is noted in several of the lithological units, the maximum pH_F and pH_{FOX} values tend to correlate with areas underlain by limestone materials and likely reflect a mixing of the units that has provided some neutralising capacity to the overlying units. Excluding these samples the range of pH_F and pH_{FOX} values tends to be on the order of 2 pH units;
- With the exception of the orange sand, grey-blue clay and limestone units, field pH tests suggest that some actual acidity may be present in the soils;
- With the exception of the silty clay lithology, and 2 samples located within the yellow sand unit and below the water table around KP17, pH_{FOX} values exceed a value of 3, suggesting an absence in potential acidity in most soil units; and
- ΔpH values were statistically high in the topsoil, silty clay, orange sand and limestone units. The elevated ΔpH values in the topsoil unit are likely to be reflective of the presence of organic acid whereas the elevated ΔpH values in the silty clay are consistent with the pH_F and pH_{FOX} results indicating that sulphidic acidity is likely to be present in these soils.

5.2 Laboratory Results

5.2.1 Acid Generating Capacity

Laboratory analysis using the Chromium Reducible Sulphur Suite (S_{CR}) was undertaken on 126 samples. Based on the results of the field testing, the highest risk sample from each bore was analysed as were complete soil profiles for at least every 1:10 bores. Table 5.2 summarises the laboratory results by lithology

Table 5.1: Summary of S_{CR} results

Lithology	No. of Samples	Acid Generating Capacity	
		%S	mol H^+/tonne
TOPSOIL	18	<0.02 – 0.1	<10 - 62
ORGANIC SANDS	6	<0.02	<10
YELLOW SAND	39	<0.02 – 0.04	<10 - 28
ORANGE SAND	3	<0.02	<10
GREY SAND	17	<0.02	<10
BROWN SAND	3	<0.02	<10 - 11
SILTY SAND	22	<0.02 – 0.06	<10 - 41
SILTY CLAY	12	<0.02 – 0.49	<10 - 304
CLAY	4	<0.02	<10 - 13
LIMESTONE	6	<0.02	<10

Based on the laboratory analysis, the following conclusions were drawn:

- The organic sands, orange sands, grey sand, brown sand, blue-grey clay and limestone lithologies are not acid generating with none of the samples exhibiting detectable levels of sulphides;
- With the following exceptions, the majority of the topsoil is not acid generating:
- 200 m of topsoil located between KP18.7 and KP18.9 (bore 10-43) that has a low acid generating capacity of 0.4%S (23 mol H^+/tonne);
- Topsoil in the lowlying area between Baldivis Rd and the Kwinana Freeway (KP11 to KP12). This soil also has a low acid generating capacity with sulphide concentrations of 0.05%S (33 mol H^+/tonne); and
- Topsoil located above the brown/black silty clay unit between KP12 and KP13.4 may be locally acid generating with sulphide present at concentrations up to 0.1%S (60 mol H+/tonne).
- Where topsoil is noted as acid generating, all acidity is present as actual acidity indicating that the sulphides have fully oxidised;
- One sample within the yellow sand unit (10-35 2.25m) was identified as being acid generating. This sample exhibited a low acid generating capacity (0.04%S and 28 mol H+/tonne) and is located both below the depth of excavation and the water table;

- Silty sands in the area between Baldivis Rd and the Kwinana Freeway (KP11 to KP12) exhibits a low acid generating capacity with maximum sulphide concentrations of 0.04%S (26 mol H^+/tonne). The acidity in this unit is present entirely as actual acidity indicating that the sulphides have fully oxidised, likely due to the seasonally fluctuating water table;
- The silty clay unit between KP12 and KP13.4 is found to have a moderate to high acid generating capacity with a maximum observed sulphide concentration of 0.49%S (304 mol H^+/tonne). Both actual and potential acidity are present in the unit with actual acidity dominating in the shallow soils and potential acidity dominating at depth.

5.2.2 Heavy Metals

Table 5.2 summarises the results of the heavy metals analysis undertaken on the acid generating lithologies located between KP12.1 and KP13.4 (topsoil and silty clay). Laboratory certificates are provided in Appendix C.

Table 5.2: Heavy Metal Concentrations in Soil

Parameter	CT2 (mg/kg)	ASLP2 (mg/L)	CL2 (mg/kg)	Concentration Range (mg/kg)	ASLP Leachability Range (mg/L)
Al	-	-	-	9,350 – 39,800	NA
As	14	0.5	500	<5	NA
Cd	0.4	0.1	100	<1 - 1	NA
Total Cr	-	-	-	33 - 145	NA
CrVI	10	0.5	500	NA	<0.01
Fe	-	-	-	8,020 – 28,700	NA
Pb	2	0.5	1,500	8 – 37	<0.1
Mo	10	0.5	1,000	<2 - 2	NA
Ni	4	0.2	3,000	5 – 18	<0.1 – 0.3
Se	2	0.5	50	<5	NA

Results of the heavy metals analysis indicate that the soils are suitable for disposal to Class II landfill.

5.3 Implications for Acid Generation During Earthworks

Management of acid sulphate soils is required where the soils are to be disturbed. For the installation of the Loop 10 pipeline, disturbance of soil will occur due to its excavation from the trench and potentially through dewatering. It is understood that the pipeline will be bored underneath the Kwinana Freeway between KP11.7 and KP12.1 and therefore soils in this interval will not be disturbed. Excavation works proposed during the construction process will not occur below depths of 2 mBGL. Dewatering drawdown, where necessary, is not expected to impact soils below 2.5 mBGL. Based on the results of the field and laboratory analysis, Table 5.3 summarises the units that will require acid sulphate soil management along Loop 10.

Table 5.3: Summary of lithological units that require management

Unit Description	Location	Depth of Unit	Type of Impact	Volume of Soil to be Excavated
Topsoil and silty sands	KP11 – KP11.7	0 – >2 m	Excavation & Dewatering	2,800 m^3
Topsoil and silty clay	KP12.1 – KP13.4	0 - >3m	Excavation	5,170 m^3
Yellow Sand	KP17.1 – KP17.4	>2m	Dewatering	NA
Topsoil	KP18.7 – KP18.9	0 – 0.25 m	Excavation	100 m^3

It is unlikely based on the current depth of the water table that dewatering will be required for the installation of the pipeline between KP17.1 and KP17.4. As a result disturbance of the acid generating soils in this area is unlikely.

6. Acid Sulphate Soil Management

Appropriate management of the acid generating soils will be essential to ensure that there are no adverse impacts to the sensitive receptors in the area. The following management practices will be implemented to minimise the risks associated with the disturbance of acid sulphate soils.

6.1 Timing and Duration

The timing for the earthworks for the excavation of the Loop 10 Pipeline is planned to occur during Q1 2006. This timing has been chosen to take advantage of low water table levels.

The total project duration is expected to be approximately 45 days, with earthworks undertaken in the acid sulphate soil areas expected to take up to 10 days.

6.2 Soil Handling Strategies

6.2.1 Trench Management

It is understood that the trench will be opened in 7 km segments and that each segment may be left open for up to 14 days.

In order to minimise the risk of oxidation of acid sulphate soils that may remain on the walls and floor of the excavation, the segments of the trench requiring excavation between KP11 and KP13.4 will be excavated in lengths that permit opening and closing of the trench within a period of 48 hours.

6.2.2 Soil Handling

The following soil handling strategies will be adopted during the excavation programme:

- The topsoil and silty sands excavated from the trench between KP11 and KP11.7 will be layered with sufficient neutralising material within the trench. The amount of neutralising material will be calculated assuming a sulphur concentration of 0.05%S. Assuming an ENV for the neutralising material of 95% this equates to a lime dosing rate of 2.5 kg lime/tonne of soil (a total of 14,000 kg aglime). The soils will be layered with the neutralising material by placing one quarter of the total required lime at the based of the trench, backfilling with 0.5 m of the soil, and repeating the process of emplacing a layer of lime beneath the sands to the surface;
- The topsoil and silty clay excavated from the trench between KP12.1 and KP13.4 will be excavated and disposed to a landfill with a minimum Class II rating. The trench will then be backfilled with clean sand or lime sands;
- The topsoil excavated from the trench between KP18.7 and KP18.9 will immediately underlain with aglime or lime sands when used as backfill in the trench. The amount of neutralising material will be calculated assuming a sulphur concentration of 0.4%S.

Assuming an ENV for the neutralising material of 95% this equates to a lime dosing rate of 2 kg lime/tonne of soil (a total of 550 kg aglime);

- All other units excavated from the trench will be used as backfill material in the trench and do not require treatment before reuse;
- The amount of lime to be used for neutralisation will be calculated using the following equation:

  Lime required (kg/$CaCO_3$/tonne untreated topsoil) = (%S x 30.59) x (1.5/ENV)

  where:

  %S is the maximum actual acidity detected in the samples, and

  ENV is the effective neutralising value of the lime (expressed as a decimal percent) as quoted by the supplier.

- If acid sulphate soils are to remain untreated for a period longer than 48 hours they will be stockpiled on a compacted lime pad, 300 mm thick. Lime bunding (to 500 mm) will be erected around the edges of the stockpile.

6.3 Contingency Plans

- **CONTINGENCY PLAN 1:** If any soils are encountered during excavation works that are not representative of the material sampled during the acid sulphate soil investigation, these soils will be treated as acid generating and lime dosed assuming a sulphide concentration of 0.1%S.
- **CONTINGENCY PLAN 2:** If an ENV provided with the neutralising material is not provided, 1 sample for every 500 m^3 of lime will be sampled and analysed for Calcium Carbonate Equivalence by a NATA accredited laboratory to determine the ENV of the material.

6.4 Reporting

The Department of Environment will be sent a letter report confirming the neutralisation of treated soils at the conclusion of the excavation programme. This report shall include:

- Volumes of neutralising agent brought to site;
- Volumes of soils treated, timeframe of treatment; and
- Photographs demonstrating the soil management process to confirm adherence to the management plan.

7. Dewatering Management

As groundwater in some areas is already acidic, appropriate management of the groundwater during dewatering will be essential to ensure that there are no adverse impacts to the sensitive receptors in the area. The following management practices will be implemented to minimise the risks of acid generation associated with dewatering.

7.1 Dewatering Programme

The essential components of the proposed dewatering programme are:

- Dry excavation of soils to the water table;
- Potential localised drawdown of the water table to a maximum depth of 0.5 m below the base of the trench along segments of the pipeline in low-lying areas. The possible areas of dewatering include:
- Dewatering between KP14.6 and KP16.8 where groundwater was encountered between 0.7 m and 1.2 mBGL. It is noted that groundwater in this area reflects a perched aquifer system and that may be seasonally absent. Water levels collected in January 2006 suggest that dewatering in this area is possible but unlikely;
- Between KP18 and KP19.6 where groundwater was encountered at depths less than 1 mBGL. Dewatering in this area will only need to occur if the trench cannot hold itself open;
- Between KP20.8 and KP22.7 where groundwater was generally encountered at depths less than 1 mBGL. Dewatering in this area will only need to occur if the trench cannot hold itself open;
- Where necessary, treatment of the water through a lime treatment unit and disposal to the environment as appropriate.

7.2 Groundwater Treatment & Disposal

The following groundwater neutralisation and disposal practices will be undertaken:

- Where groundwater exceeds the pH or total titratable acidity performance criteria defined in Section 7.3.1, groundwater will be neutralised through an in-line mobile lime dosing plant with automated pH adjustment (to pH 6.5 – 8.0) prior to disposal. The neutralisation of the effluent prior to disposal will reduce the mobility of heavy metals during reinfiltration;
- Due to elevated concentrations of Al and Fe in all areas of potential dewatering, dewatering effluent will be passed through a mobile wastewater filtration unit with adequate retention time to precipitate heavy metals;
- Following treatment, disposal of groundwater will be undertaken using a combination of the following methods:

- In the first instance for the purpose of dust suppression;
- In the second instance dewatering effluent will be reinfiltrated to ground within the pipeline easement.

7.3 Water Monitoring

The following routine groundwater monitoring will be undertaken in areas where dewatering occurs:

- Cumulative flow will be estimated and recorded daily;
- The discharge area will be visually inspected daily to ensure that flooding of the ground beyond the easement does not occur and to monitor for the presence or absence of iron precipitates;
- Two temporary piezometers installed (one up-gradient, one down-gradient) within the expected area of groundwater drawdown in areas where drawdown occurs (PZ1/PZ2, PZ3/PZ4, and PZ5/6). Measurements of standing water level, total titratable acidity, pH, EC and DO will be performed daily during the works on relevant piezometers and at the discharge outlet to the pump;
- Laboratory analysis of total acidity, total alkalinity, pH, sulphate, chloride, dissolved aluminium (filtered), total aluminium, dissolved arsenic (filtered), dissolved chromium (filtered), dissolved cadmium (filtered), total iron, dissolved iron (filtered), dissolved manganese (filtered), dissolved nickel (filtered), dissolved zinc (filtered), dissolved selenium (filtered), ammoniacal nitrogen, hydrogen sulphide, EC and TDS will be carried out at the conclusion of dewatering in each area.
- After completion of the works, groundwater monitoring of relevant piezometers from areas of dewatering, including laboratory analysis, will continue on a monthly basis for 3 months to determine whether there are any long-term impacts to groundwater from dewatering.

7.3.1 Performance Criteria

Table 7.1 summarises the performance criteria that will be adopted for the site during the monitoring programme.

Table 7.1: Performance criteria for groundwater monitoring

Acceptable Threshold	Exceedance Triggering Contingency Plan
SWL	>0.2 m drawdown on easement boundary
pH > 6.0 (effluent)	pH < 6.0 (effluent)
ΔpH<0.5 in one week (groundwater bores)	ΔpH>0.5 in one week (groundwater bores)
EC< 2000 μS/cm	EC>2000 μS/cm AND pH or TA exceed acceptable threshold
TSS < 100 mg/L	TSS >100 mg/L
TA (Total Acidity-Total Alkalinity) < 35 mg/L	Total Acidity-Total Alkalinity > 35 mg/L
SO_4/Cl<0.5	SO_4/Cl>0.5
H_2S< 0.5 mg/L	H_2S> 0.5 mg/L
Fe < 0.3 mg/L Cd < 0.002 mg/L Cr < 0.1 mg/L Mn < 0.5 mg/L Al < 0.2 mg/L As < 0.007 mg/L Ni < 0.02 mg/L Se < 0.01 mg/L Zn < 3.0 mg/L	One or more metals exceed acceptable threshold by 10x or exceeds background concentrations by 10% where background concentration already exceeds adopted threshold.

7.4 Contingency Planning

- **CONTINGENCY PLAN 1:** If reinfiltration of dewatering effluent results in visible accumulations of iron precipitates or results in flooding of the ground surface beyond the pipeline easement, dewatering effluent will be reinfiltrated through an above ground infiltration basin contained within the easement. The base of this infiltration basin will be validated at the completion of its use, and if necessary soil impacted by heavy metal precipitates will be disposed to landfill.
- **CONTINGENCY PLAN 2:** If neutralised effluent does not meet the performance criteria outlined in Section 7.3.1, dewatering effluent will be disposed off-site, except in the case of elevated TSS whereby a sand filter will be fitted to the discharge pipe.
- **CONTINGENCY PLAN 3:** If groundwater results indicate a deterioration of groundwater quality over the long-term for reasons directly attributable to dewatering, an appropriate soil investigation will be undertaken to determine the source of acidification and a groundwater and soil management strategy will be prepared.

7.5 Reporting

The Department of Environment Regional Operations (Mandurah Office) will be sent water quality results on a weekly basis with a brief interpretation of results and will be provided with a summary report at the conclusion of the 3 month groundwater monitoring programme.

8. References

DoE, 2004, *Identification and Investigation of Acid Sulfate Soils*, Acid Sulfate Soil Management Series.

DoE, 2004, *Guidance for Groundwater Management in Urban Areas on Acid Sulfate Soils*, Acid Sulfate Soil Management Series.

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DoE, 2004, *Preparation of Acid Sulphate Soil Management Plans*, Acid Sulfate Soil Management Series.

Ecos, 2005, *DBNGP Looping 10 Project – Assessment of the Referral Information (ARI) Summary.* Prepared for DBNGP (WA Nominee Pty Ltd), November 2005.

Parsons Brinckerhoff, 2005, *DBNGP Looping 10 Acid Sulphate Soil Risk Classification and Preliminary Site investigation Sample and Analysis Plan*. 2145167A/PR2:14476:RevB.

Watling,K.M, Ahern, C.R., and Hey, K.M., 2004, *Section H: acid sulfate soil field pH tests.* In *Acid Sulfate Soil Laboratory Methods Guidelines* (Eds CR Ahern, AE McElnea, LA Sullivan), Department of Natural Resourses, Mines and Energy, Indooroopilly, Queensland, Australia.

9. Statement of Limitations

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Parsons Brinckerhoff (PB) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, PB has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, PB has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. PB will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to PB.

Environmental Conclusions

In accordance with the scope of services, PB has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. PB assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of PB or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

PB will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

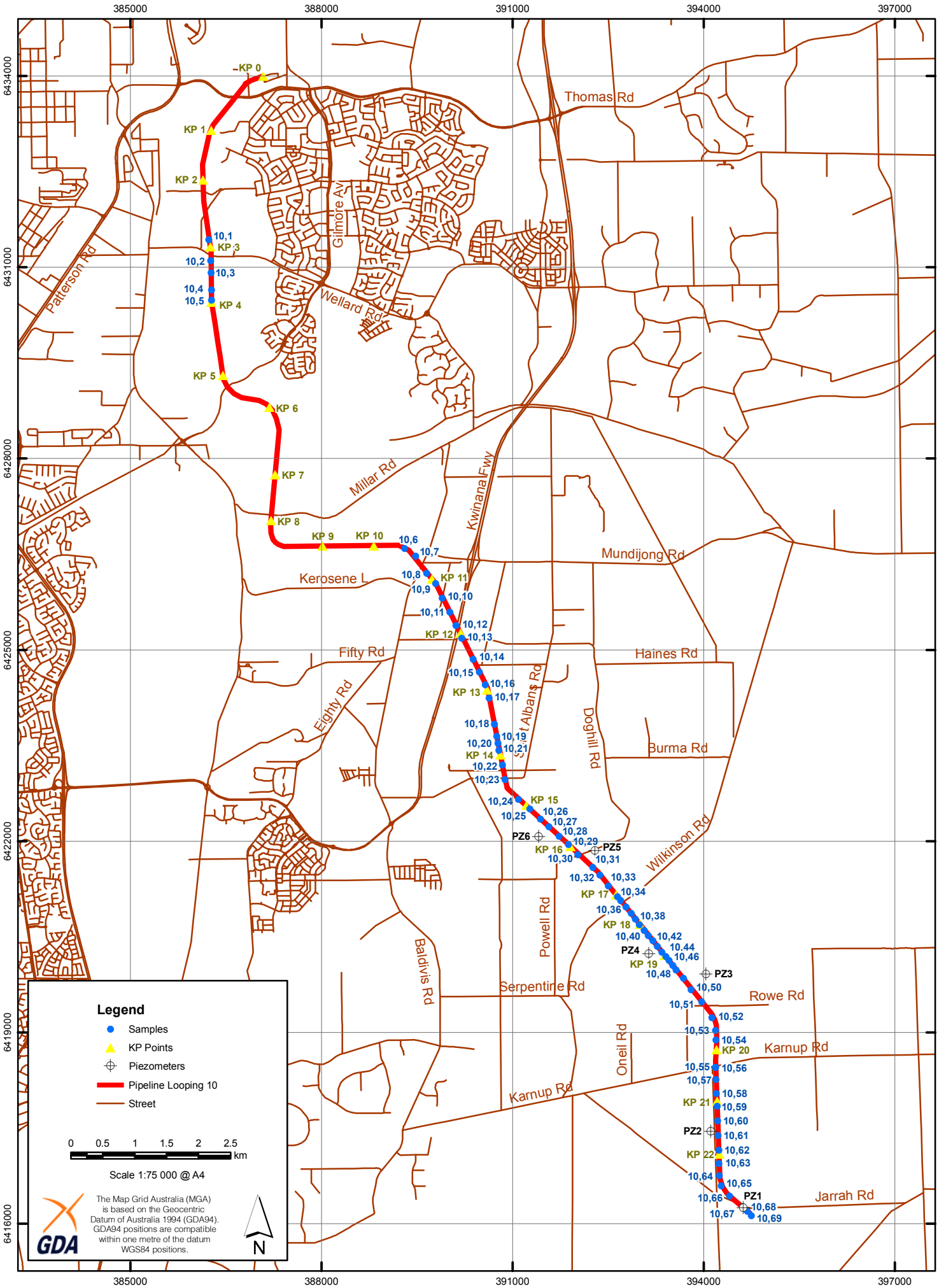
DAMPIER - BUNBURY NATURAL GAS PIPELINE ACID SULPHATE SOIL INVESTIGATION

FIGURE 1

LOOPING 10 LOCATION MAP

PARSONS BRINCKERHOFF • Email: perth@pb.com.au

DRN: JH CHKD: JP • Date: 07/12/2005 • PLAN No: 167D-001



DAMPIER - BUNBURY NATURAL GAS PIPELINE ACID SULPHATE SOIL INVESTIGATION

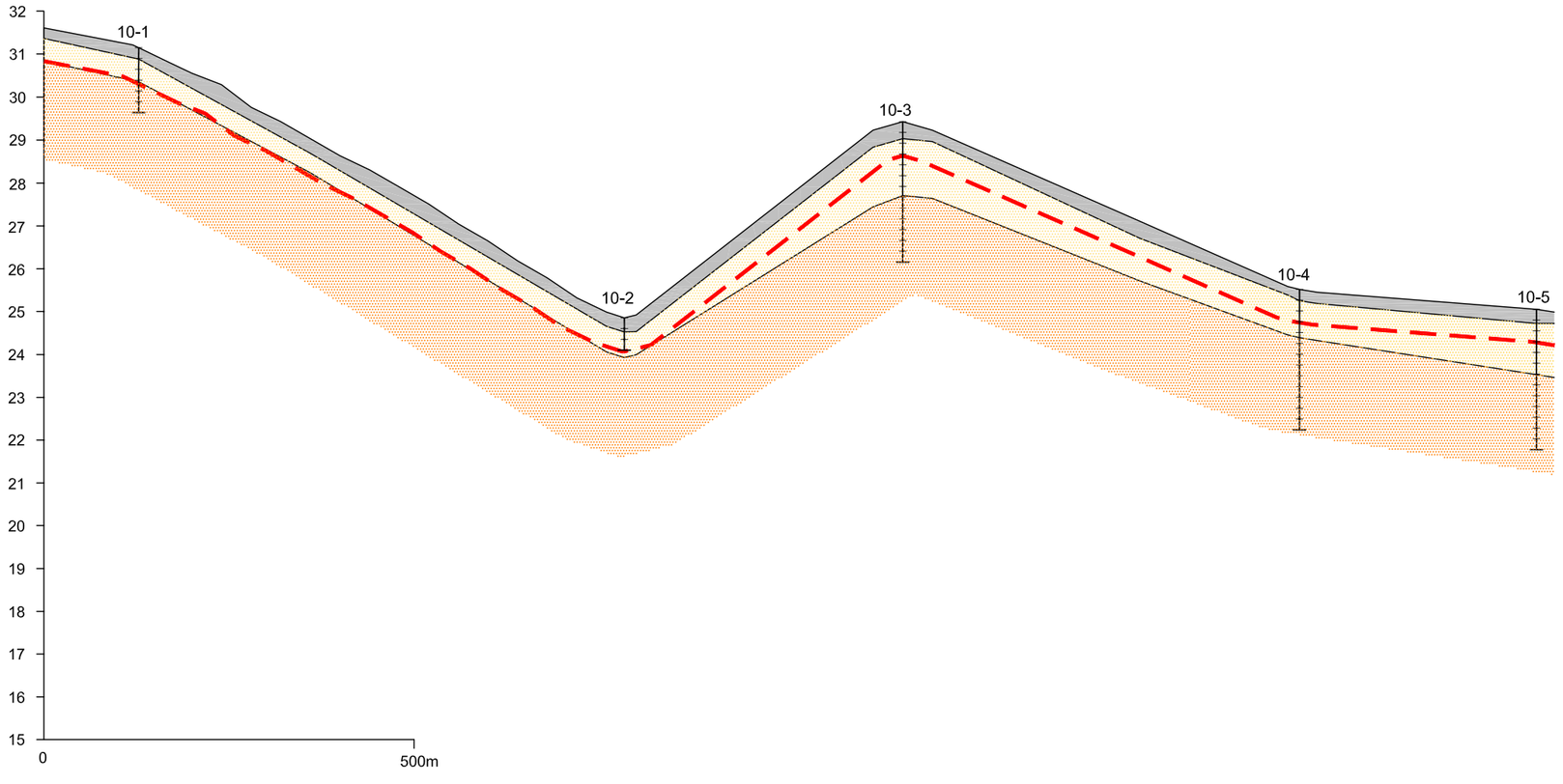
FIGURE 2

LOOPING 10 SAMPLE LOCATIONS

LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- ORANGE SAND
- DEPTH OF EXCAVATION
- SOIL BORE

FAR NORTH



DRN: A.Thompson Dec '05 CHKD: J. Palich Dec '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Interpreted Lithological Cross-Section CLIENT: Ecos Consulting Pty Ltd	PB 100 YEARS Figure 3A 2145167D

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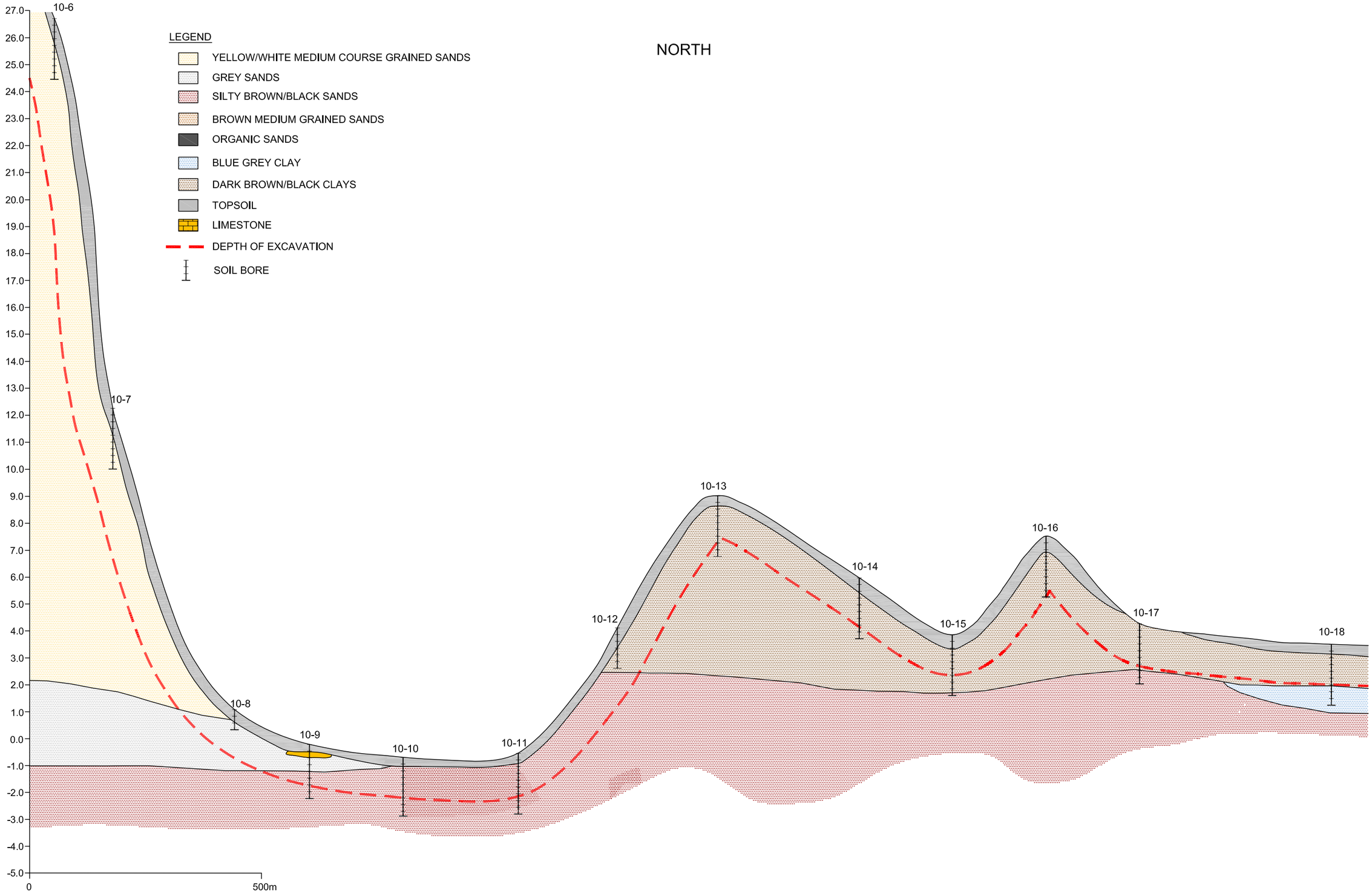

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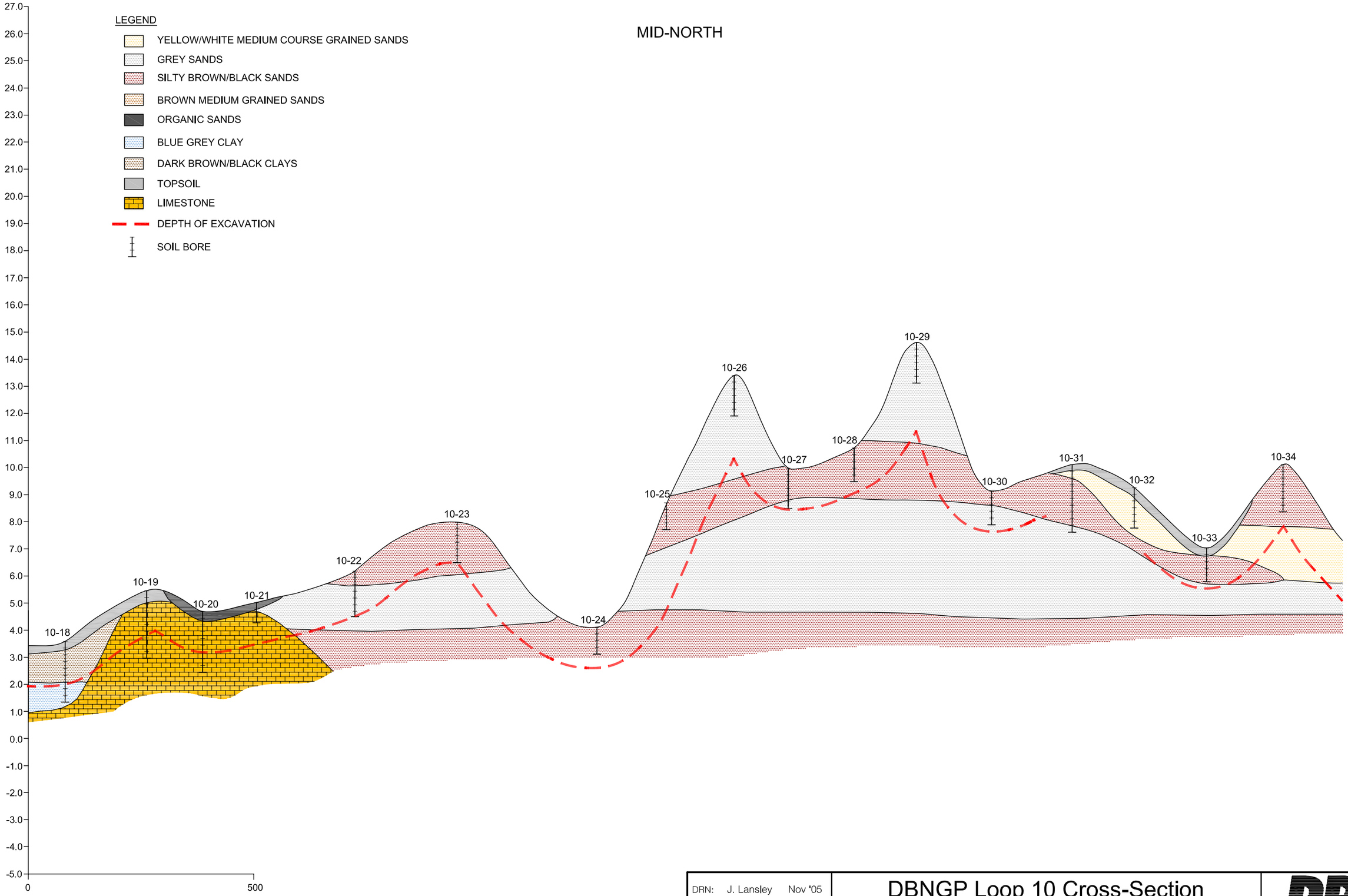
LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION
- SOIL BORE

MID-NORTH



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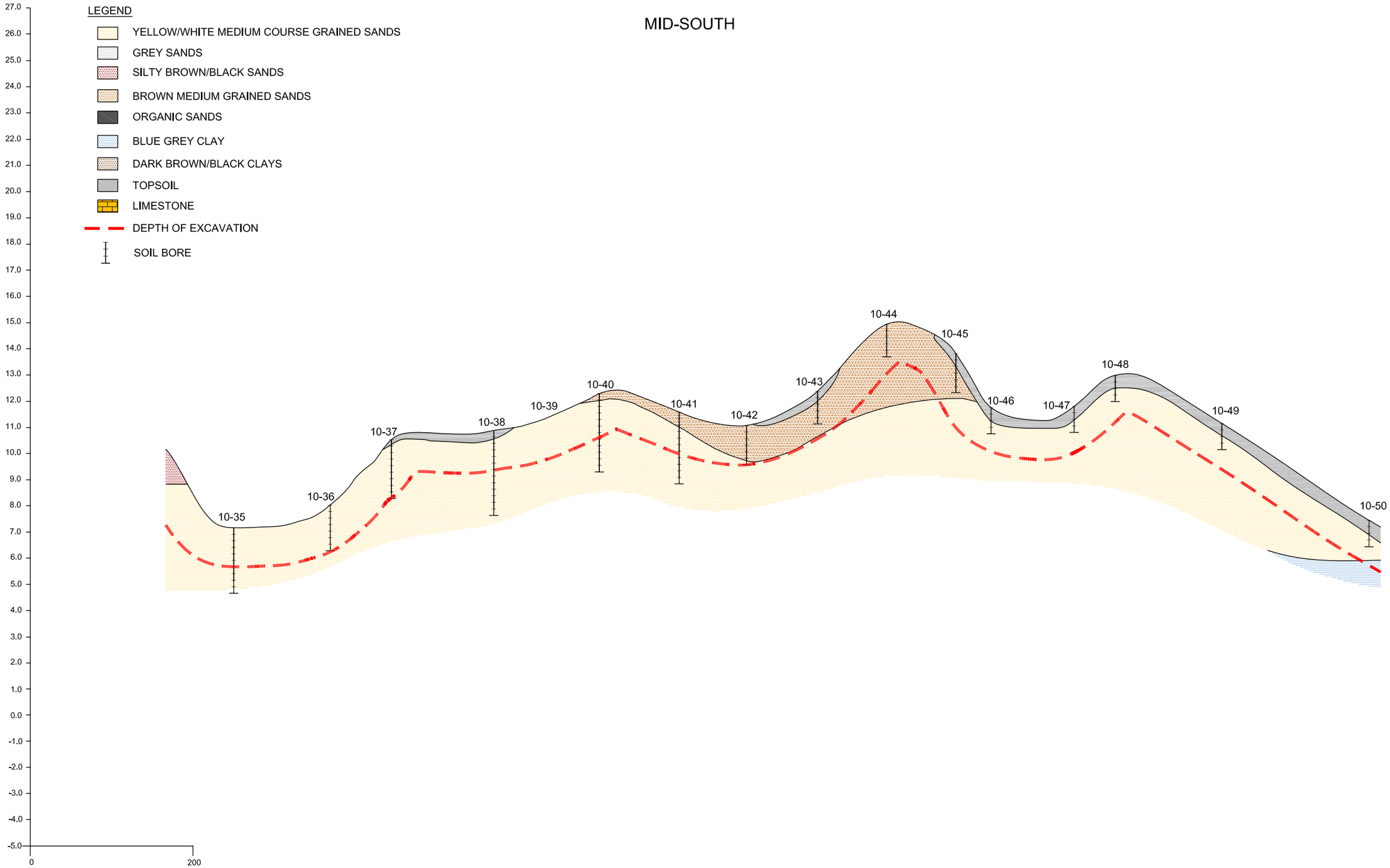

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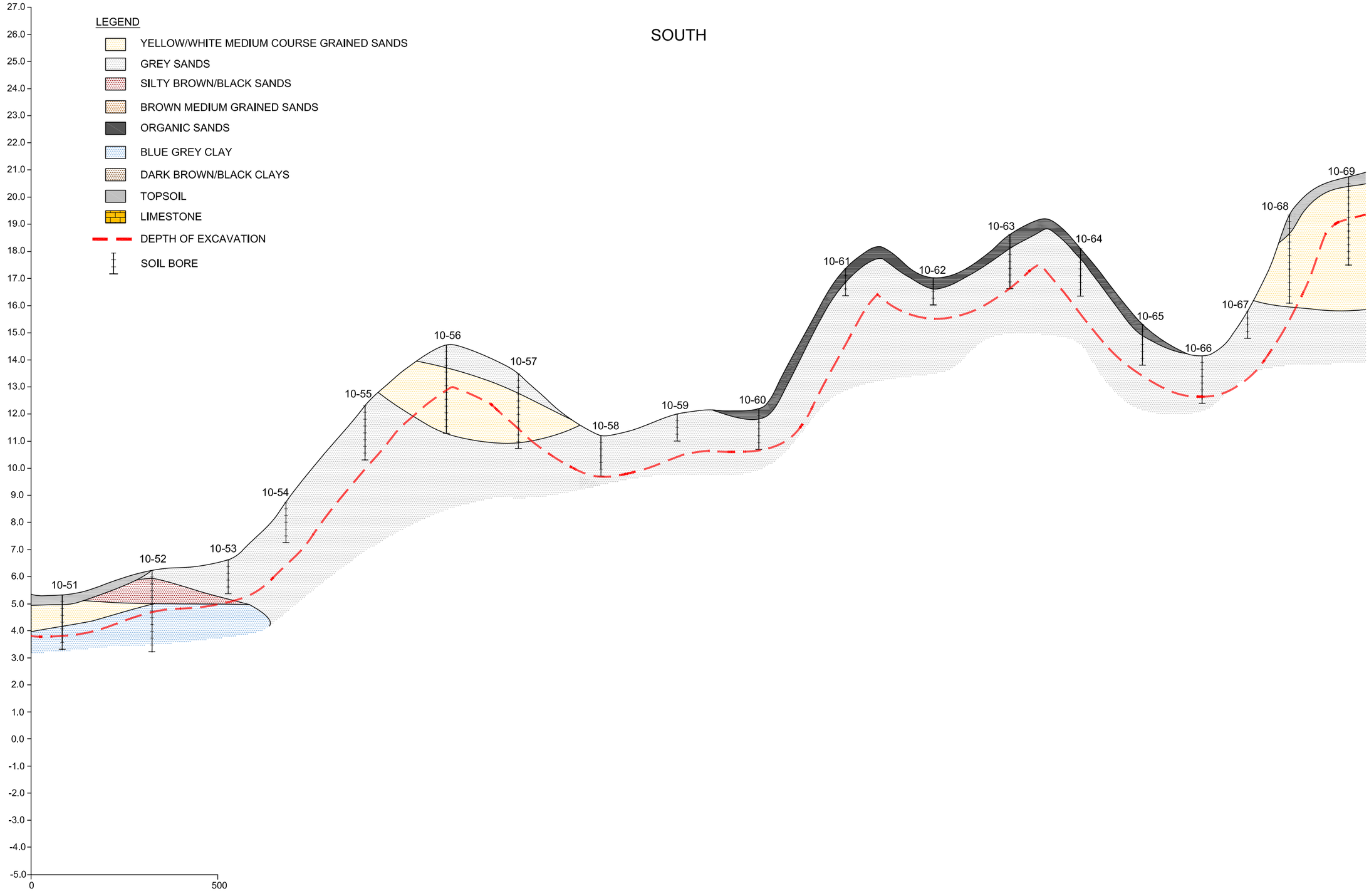
SOUTH

LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION
- SOIL BORE



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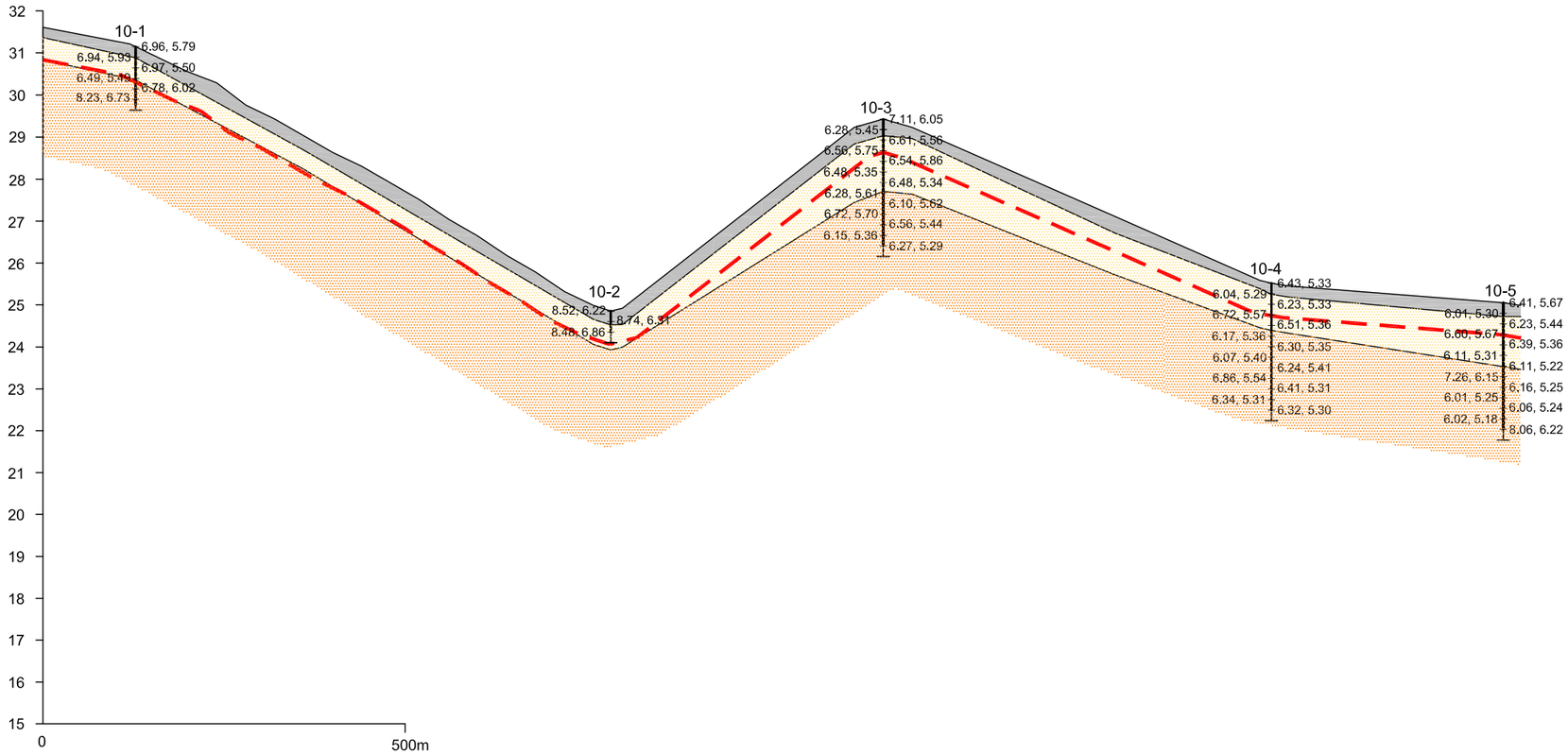
LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- ORANGE SAND
- DEPTH OF EXCAVATION
- 5.94, 4.39 / 6.5, 5.6 — pH_F, pH_{FOX}

FAR NORTH



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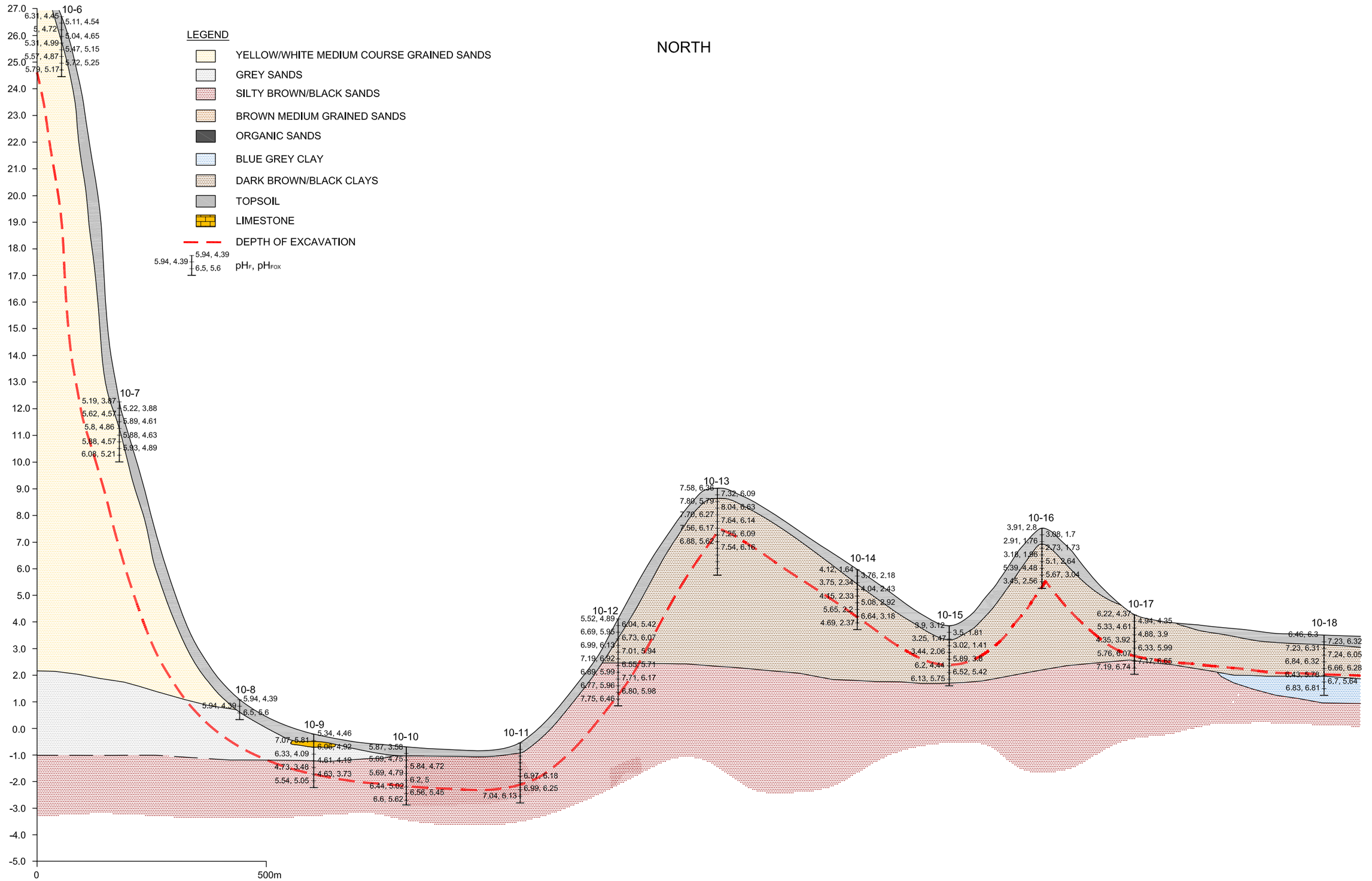

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CHKD: J. Palich Nov '05	Field pH and pH After Oxidation Results	
DATUM: N/A		
SCALE: Diagrammatic	CLIENT: Ecos Consulting Pty Ltd	Figure 4B 2145167D

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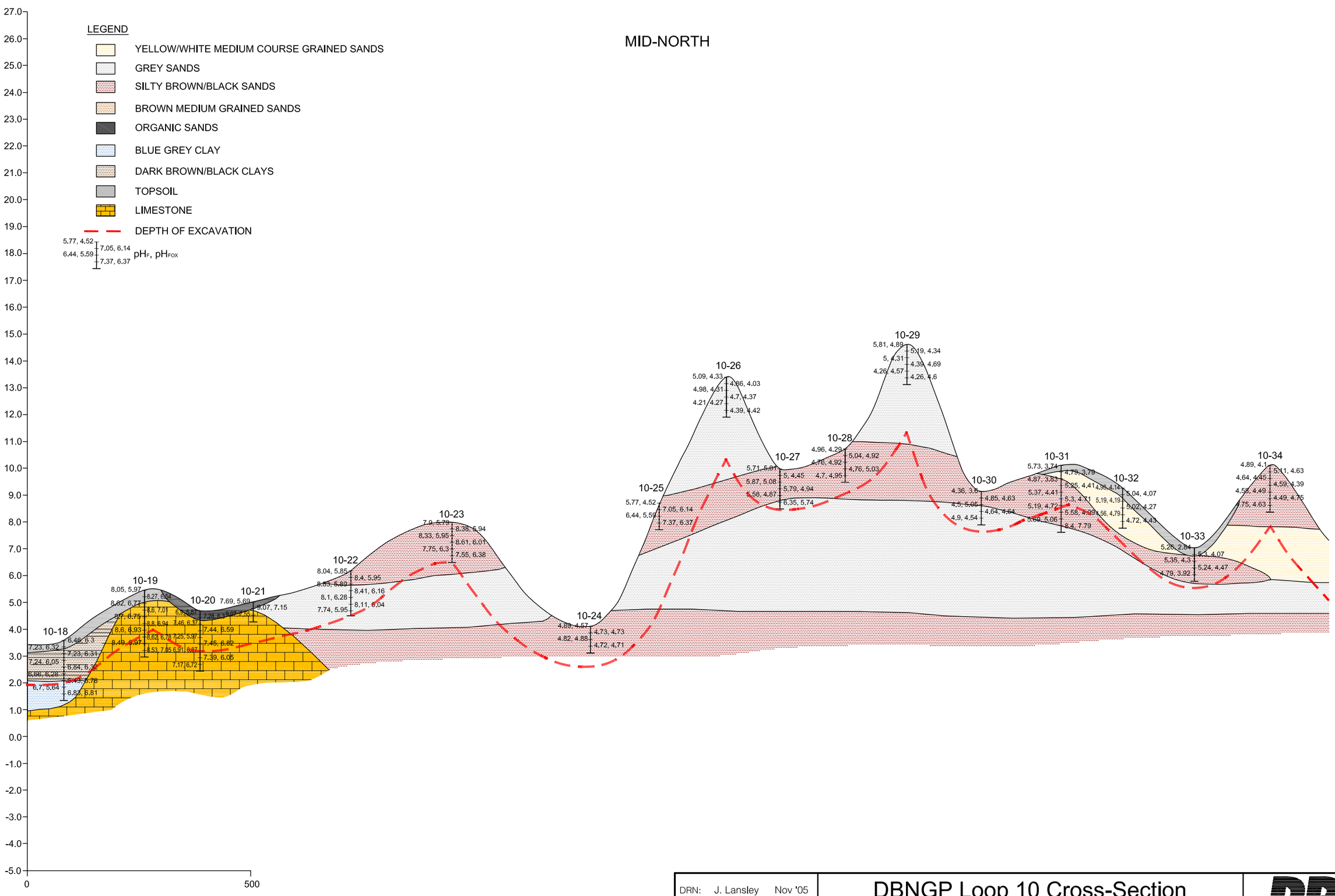
MID-NORTH

LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION

5.77, 4.52 / 6.44, 5.59 — 7.05, 6.14 / 7.37, 6.37 — pH_F, pH_{FOX}



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SCALE: Diagrammatic		

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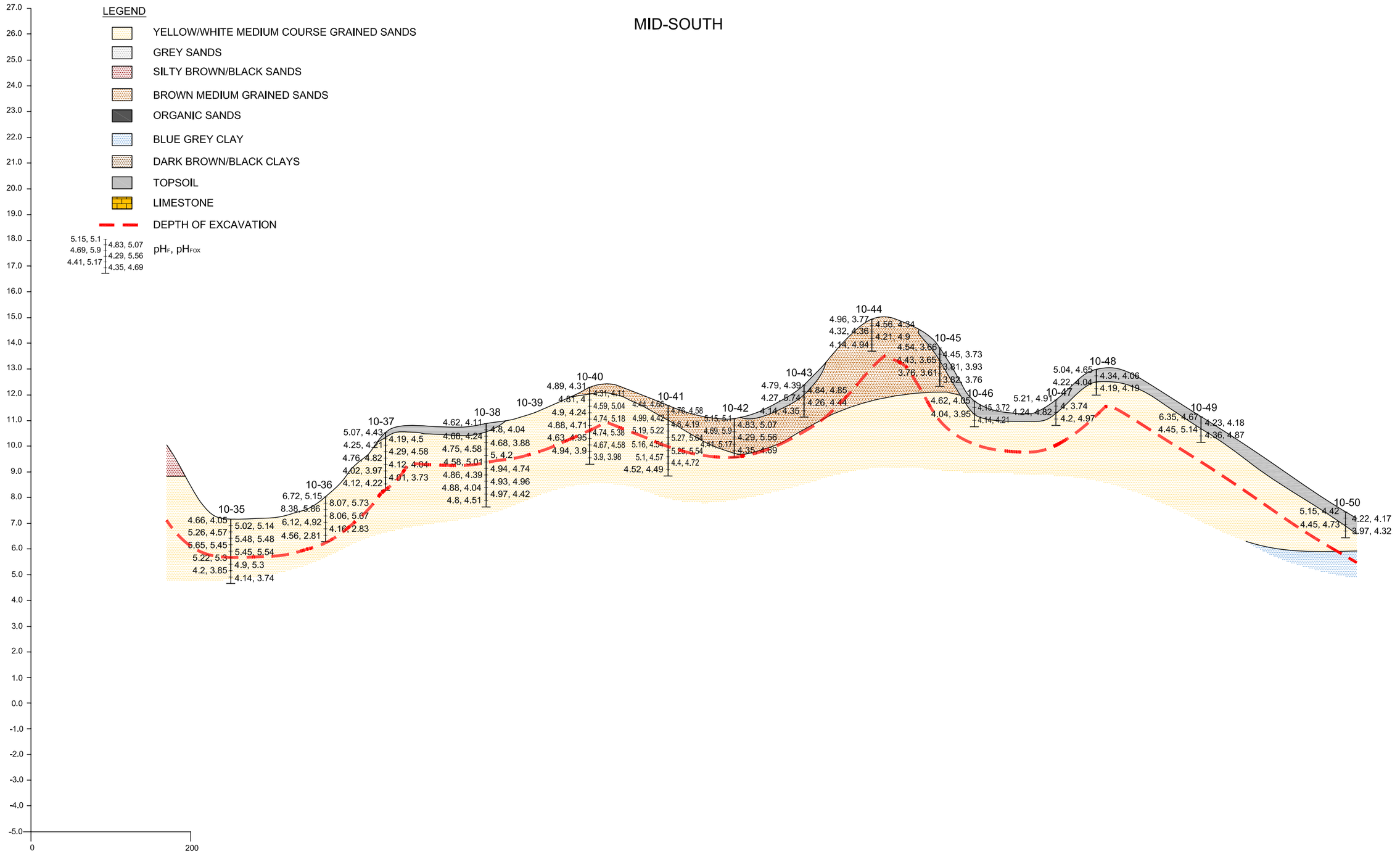
MID-SOUTH



DRN: J. Lansley Nov '05 CHKD: J. Palich Nov '05 DATUM: N/A SCALE: Diagrammatic	**DBNGP Loop 10 Cross-Section** Field pH and pH After Oxidation Results CLIENT: Ecos Consulting Pty Ltd	PB 100 YEARS Figure 4D 2145167D

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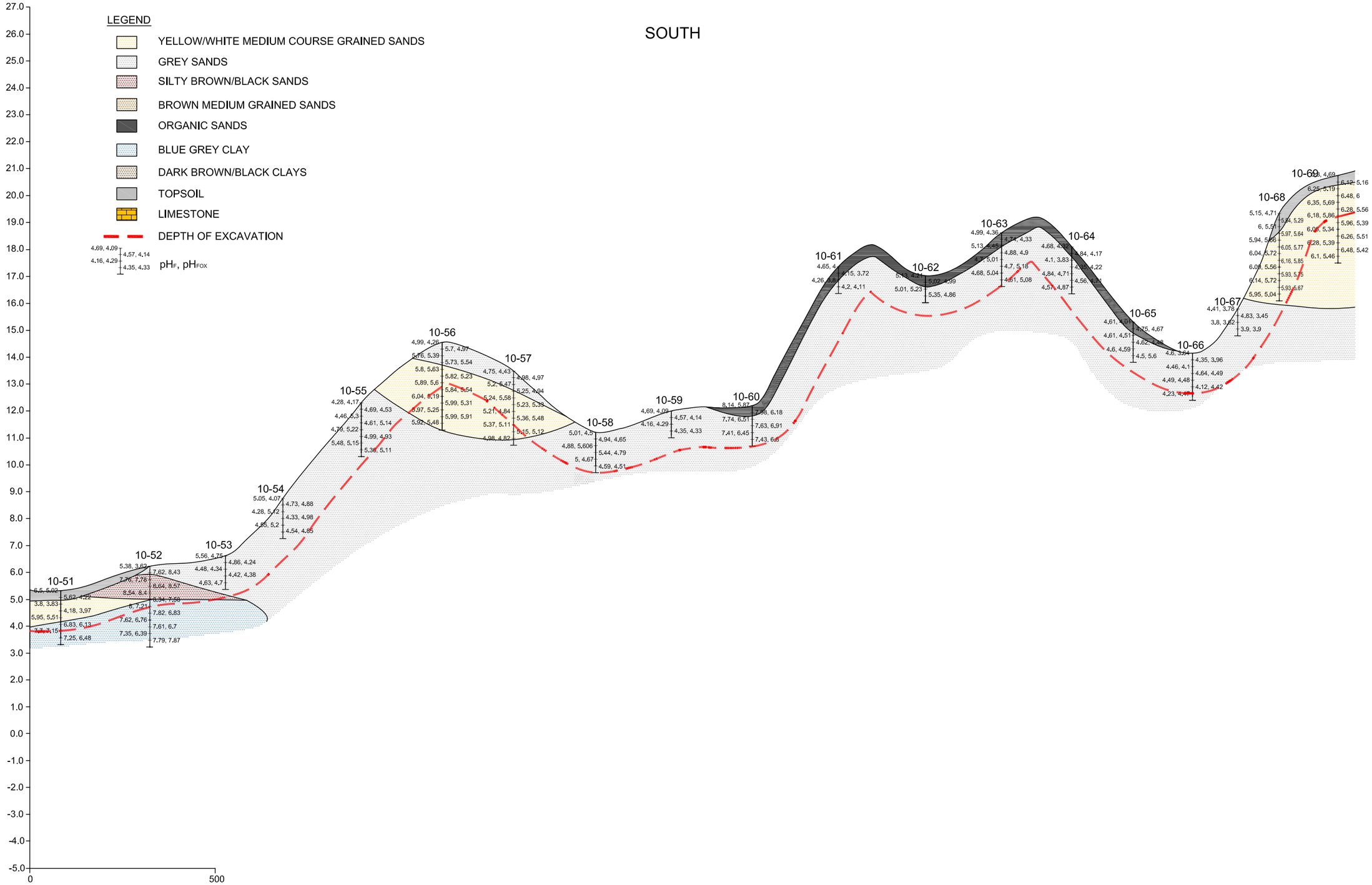
SOUTH

LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION

4.69, 4.09 / 4.16, 4.29 / 4.57, 4.14 / 4.35, 4.33 — pH_F, pH_{FOX}



DRN: J. Lansley Nov '05 CHKD: J. Palich Nov '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Field pH and pH After Oxidation Results CLIENT: Ecos Consulting Pty Ltd	PB 100 YEARS Figure 4E 2145167D

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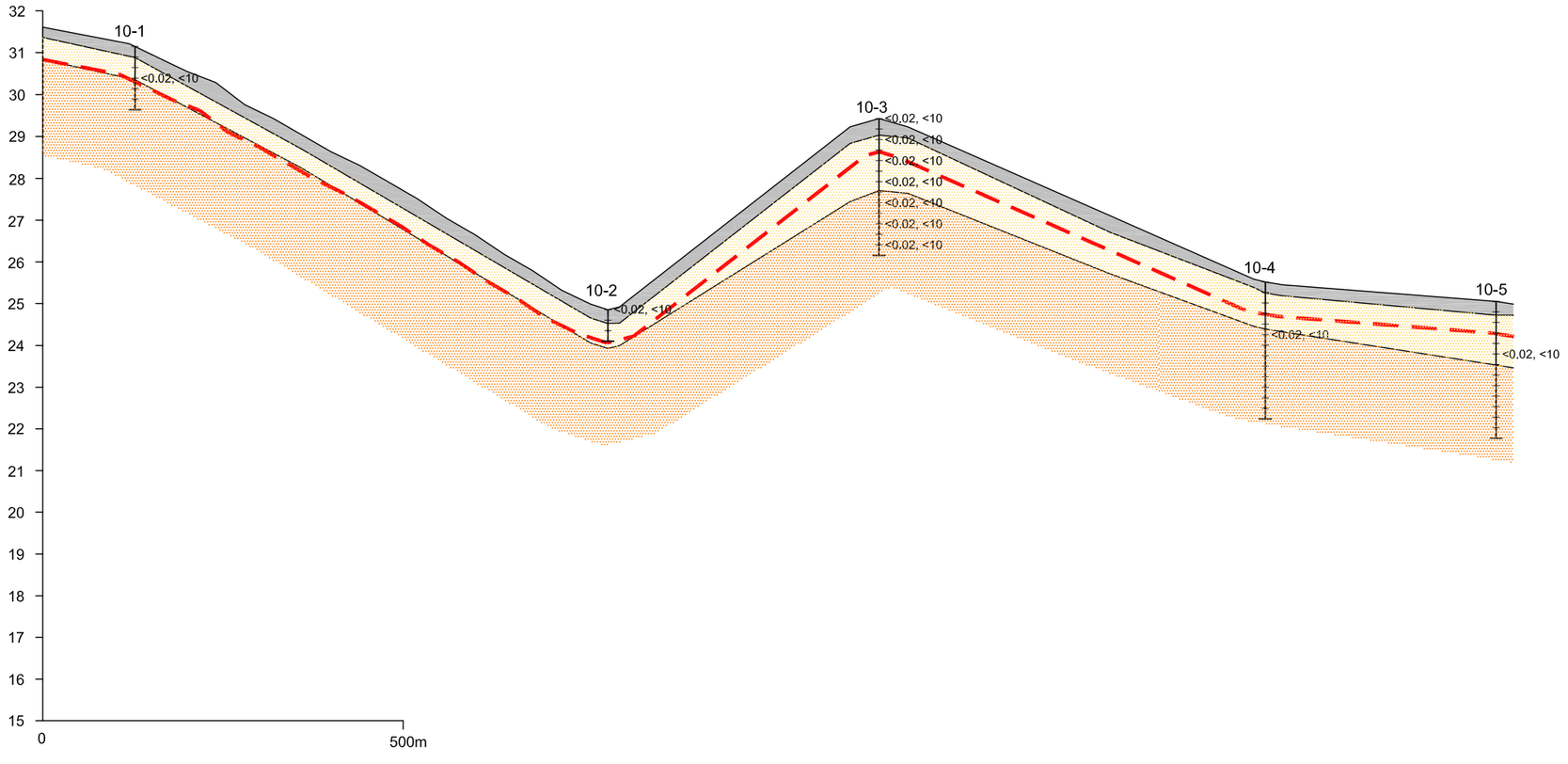
LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- ORANGE SAND
- DEPTH OF EXCAVATION
- 5.94, 4.39 / 6.5, 5.6 SULPHIDE CONCENTRATION (% S, mol H /tonne)

NORTH



DRN: A.Thompson Dec '05 CHKD: J. Palich Dec '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Interpreted Lithological Cross-Section CLIENT: Ecos Consulting Pty Ltd	PB 100 YEARS Figure 5A 2145167D

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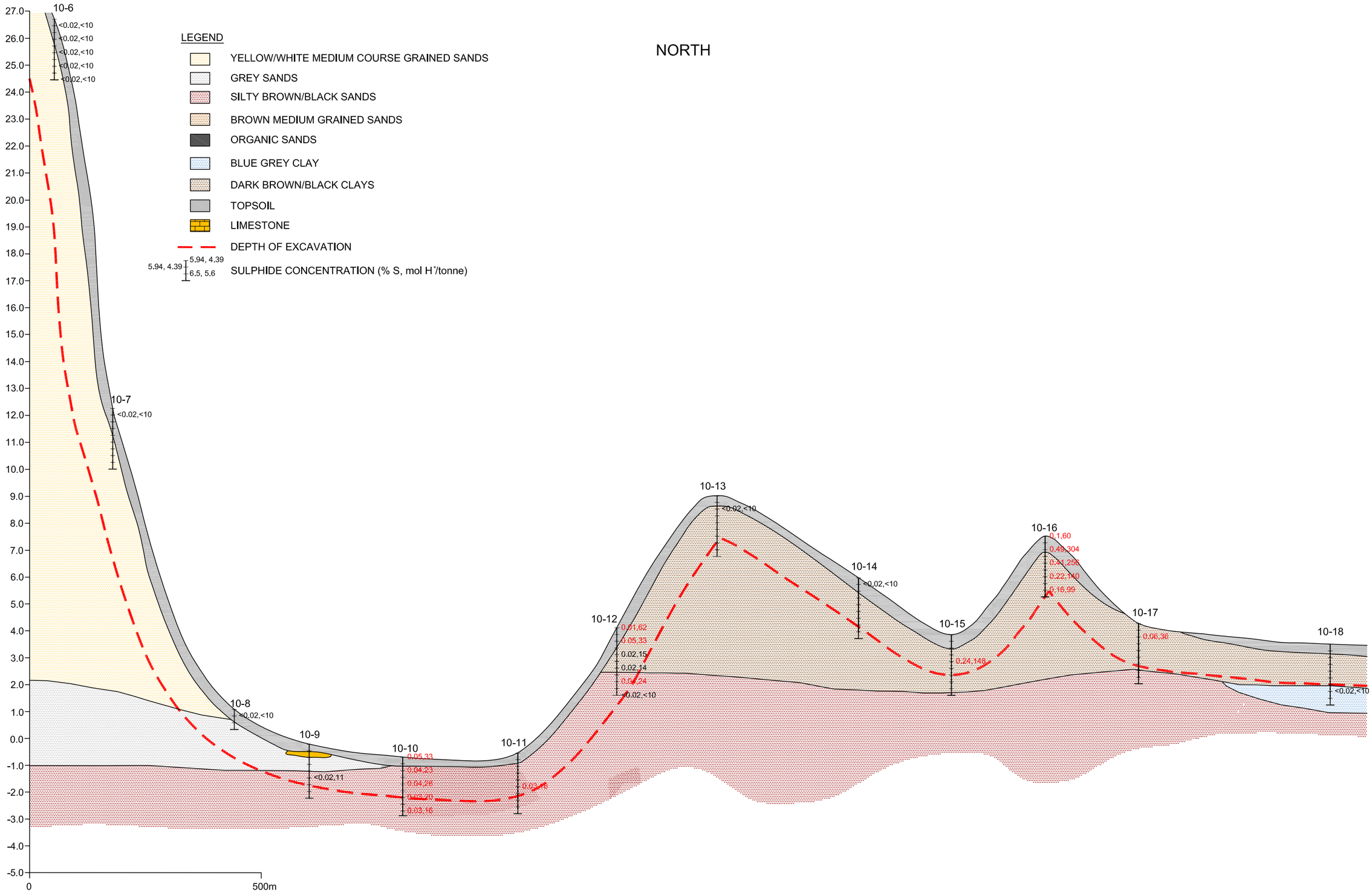

DRN: J. Lansley Nov '05 CHKD: J. Palich Nov '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Laboratory Results CLIENT: Ecos Consulting Pty Ltd	PB 100 YEARS Figure 5B 2145167D

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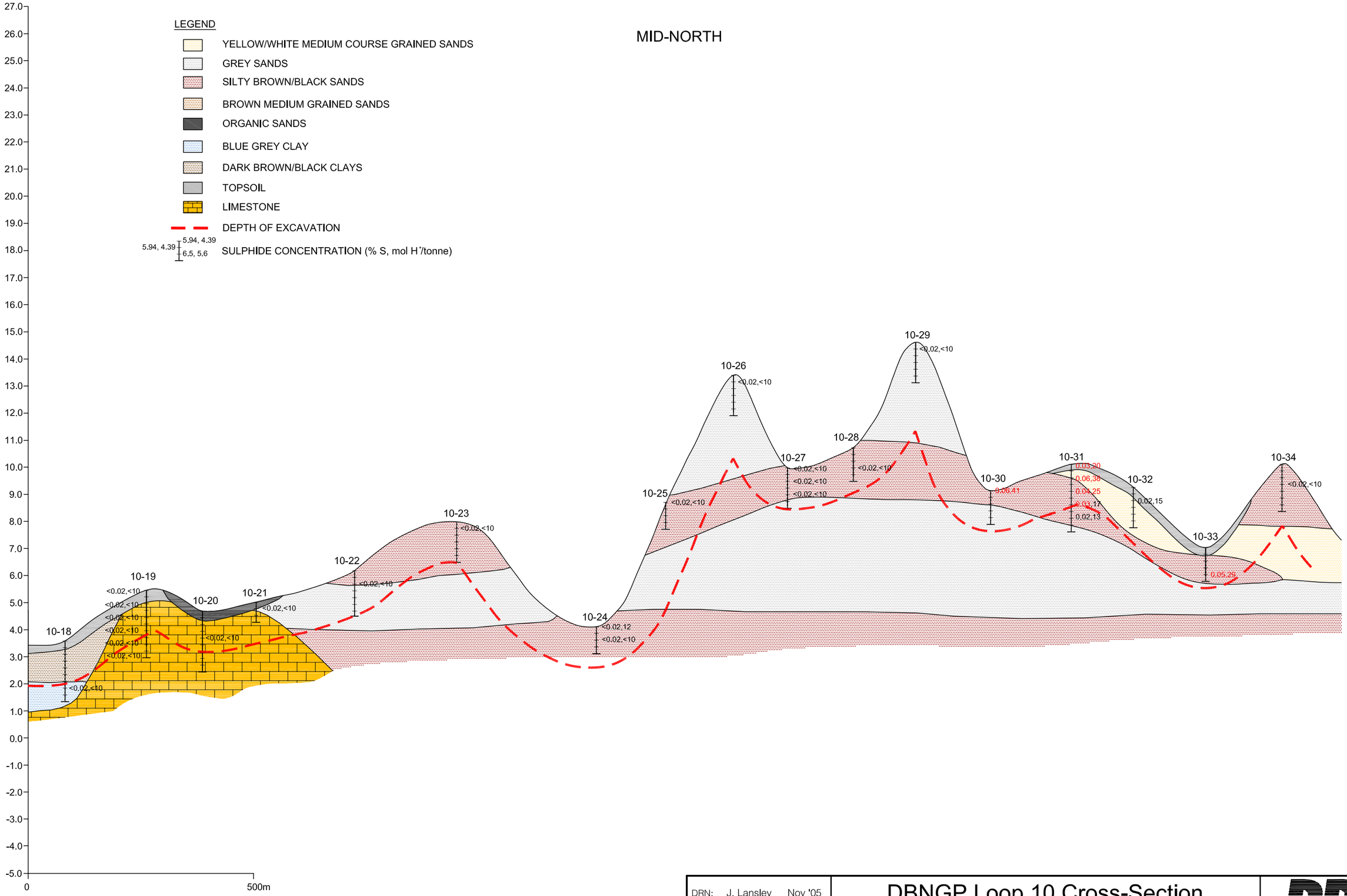
LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION
- 5.94, 4.39 / 6.5, 5.6 — SULPHIDE CONCENTRATION (% S, mol H^+/tonne)

MID-NORTH



DRN: J. Lansley Nov '05	DBNGP Loop 10 Cross-Section	PB 100 YEARS
CHKD: J. Palich Nov '05	Laboratory Results	
DATUM: N/A		
SCALE: Diagrammatic	CLIENT: Ecos Consulting Pty Ltd	Figure 5C
		2145167D

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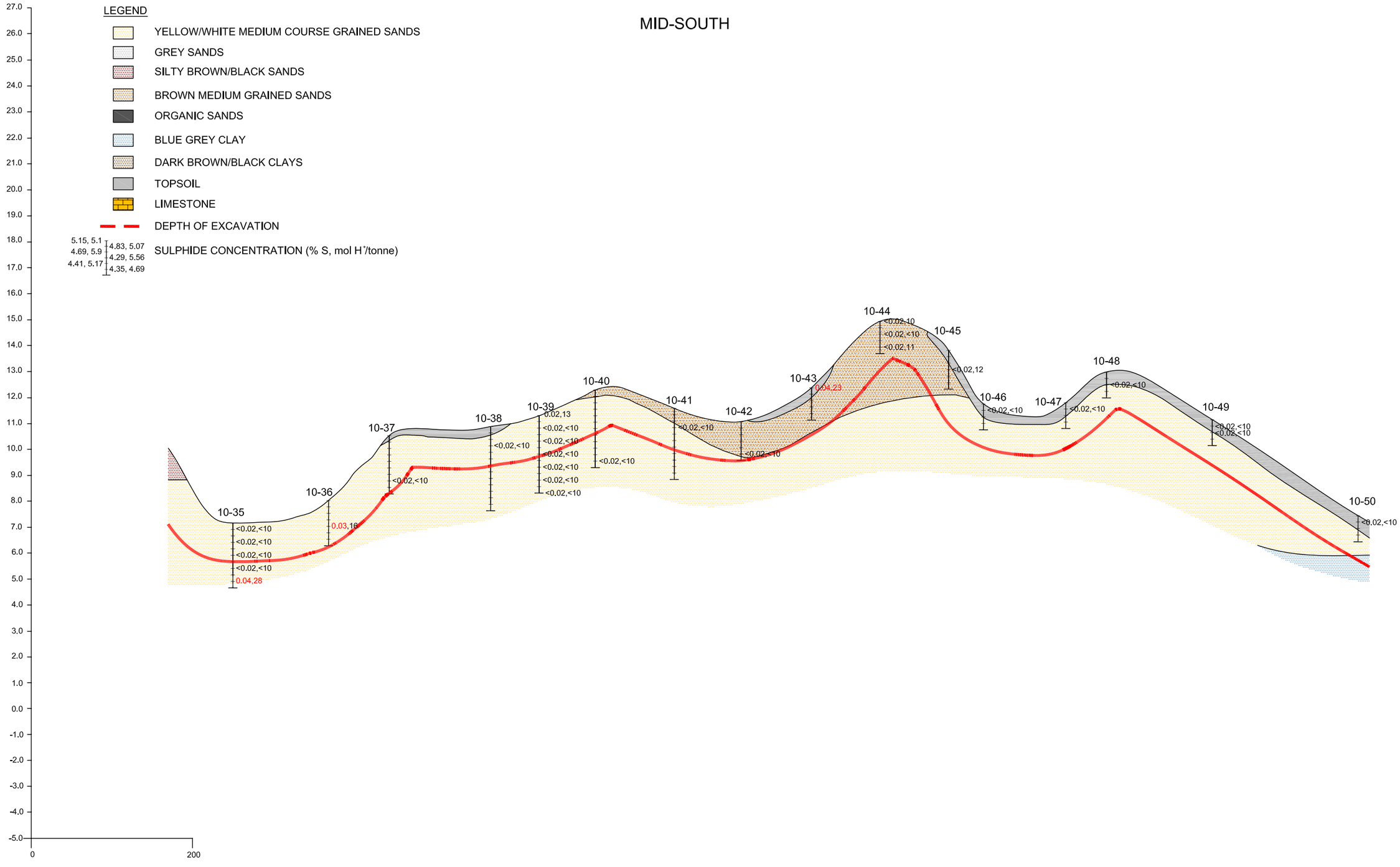

DRN: J. Lansley Nov '05 CHKD: J. Palich Nov '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Laboratory Results CLIENT: Ecos Consulting Pty Ltd	Figure 5D 2145167D

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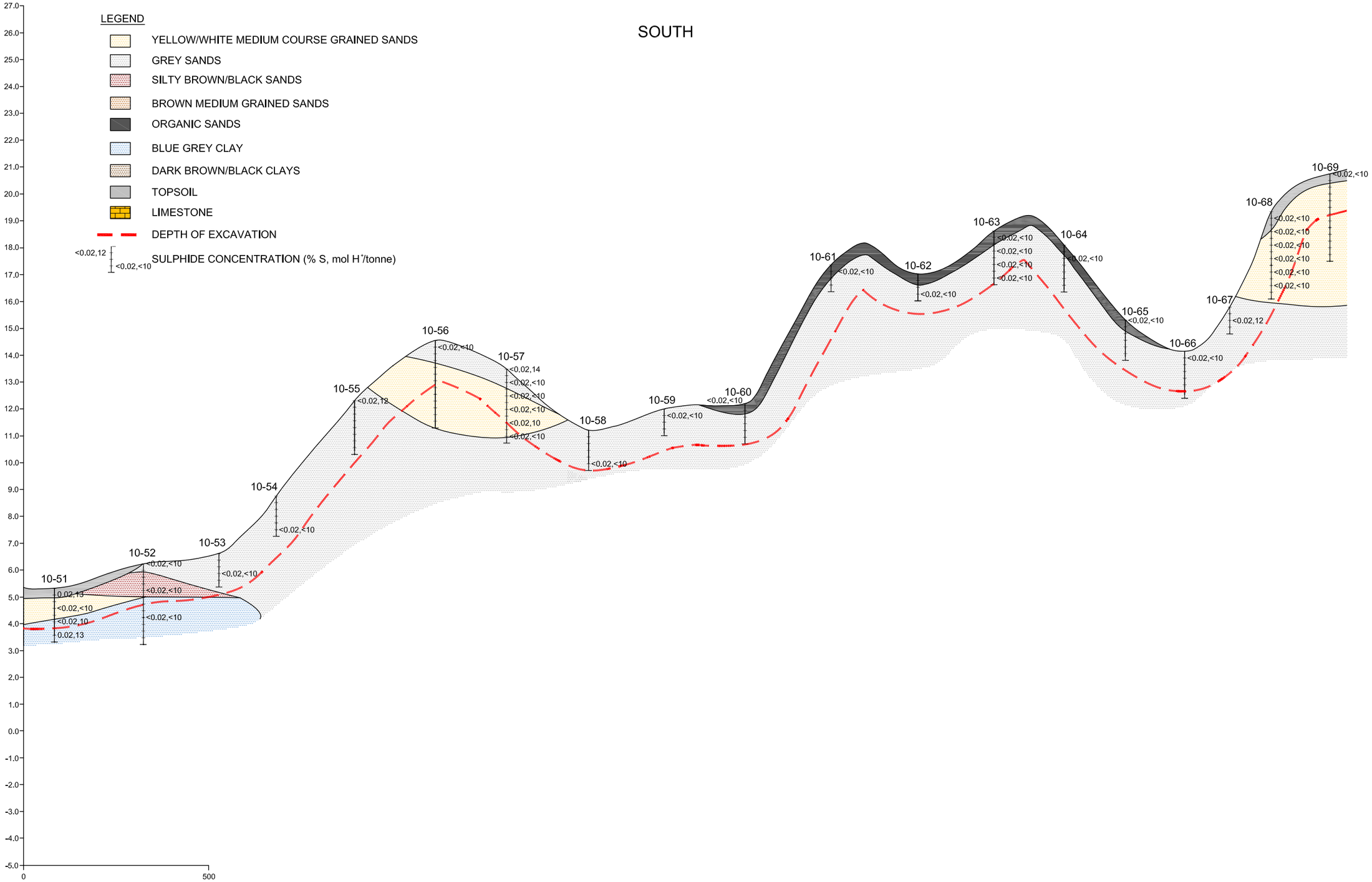
SOUTH

LEGEND

- YELLOW/WHITE MEDIUM COURSE GRAINED SANDS
- GREY SANDS
- SILTY BROWN/BLACK SANDS
- BROWN MEDIUM GRAINED SANDS
- ORGANIC SANDS
- BLUE GREY CLAY
- DARK BROWN/BLACK CLAYS
- TOPSOIL
- LIMESTONE
- DEPTH OF EXCAVATION
- <0.02,12 / <0.02,<10 SULPHIDE CONCENTRATION (% S, mol H+/tonne)



DRN: J. Lansley Nov '05 CHKD: J. Palich Nov '05 DATUM: N/A SCALE: Diagrammatic	DBNGP Loop 10 Cross-Section Laboratory Results CLIENT: Ecos Consulting Pty Ltd	Figure 5E 2145167D

J:\A657-HAZ\PROJ\2145167D_DBNGP_Loop_10_A\9_Drafting\ACAD\Figure_5E.dwg

Appendix A

Soil Bore Logs

BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-01

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**31.61 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 386230 N 6431434**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST FB VL L MD D VD H)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.30		D		SP	TOPSOIL SAND, fine to medium grained, pale brown, with humic and root organics.	D			
			31		D		SP	SAND, medium grained, yellow brown white.	M			
			0.80		D		SP	SAND, medium grained, orange, with fine to medium grained grey yellow cemented sand throughout.				
			1		D							
					D							
		NOT ENCOUNTERED						END OF BOREHOLE AT 1.40 m				EOH - Refusal on gravel
			30									
			2									
			29									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-02

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**25.05 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 386264 N 6431106**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			25		D		SP	TOPSOIL SAND, fine to medium grained, pale brown, with humic and root organics.	D			
			0.30		D		SP	SAND, medium grained, yellow brown white, with medium to coarse limestone gravel throughout.				
		NGWE			D			END OF BOREHOLE AT 0.50 m				EOH - Refusal
			24 (1)									
			23 (2)									
			22 (3)									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-03

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**29.66 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 386271 N 6430915**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
					D		SP	SAND, medium grained, grey black brown, with root organics.	D			
			0.30		D		SP	SAND, medium grained, yellow brown, trace black organics.	M			
			0.60		D			SAND, as above but orange				
			29		D							
					D							
			1		D							
					D							
			1.50		D			SAND, as above but no organics				
			28		D							
					D							
			2		D							
					D							
			2.25		D			SAND, as above grading to brown yellow orange				
					D							
			27		D							
					D							
		NGWE	3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-04

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**25.68 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 386276 N 6430645**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
					D		SP	SAND, medium grained, grey black brown, with root organics.	D			
			0.15		D		SP	SAND, medium grained, orange, trace black organics.	M			
			25		D							
					D							
			1		D							
			1.25		D			SAND, as above but no organics				
			24		D							
					D							
			2		D							
					D							
					D							
			23		D							
		NGWE	3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-05

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**25.33 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 386278 N 6430483**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			25		D		SP	SAND, medium grained, grey black brown, with root organics.	D			
					D							
			0.50		D		SP	SAND, medium grained, brown orange, with organics.	M			
					D							
			1.00 1		D			SAND, as above grading to orange, with trace organics				
			24		D							
					D							
			1.75		D			SAND, as above but no organics				
			2.00 2		D			SAND, as above grading to brown yellow orange				
			23		D							
					D							
					D							
		NGWE	3		D			END OF BOREHOLE AT 3.00 m				EOH
			22									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-06

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**26.8 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389169 N 6426451**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SM	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted, with humic and root organics.	D			
					D		SW	SAND, medium to coarse grained, pale yellow orange, well sorted.	M			
			26		D							
			1		D							
					D							
					D							
			25		D							
		NIL GW WE	2		D			END OF BOREHOLE AT 2.00 m				EOH
			24									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-07

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**12 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389344 N 6426323**

Borehole Information						Field Material Description						
1	2	3	4		5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.10		D		SM	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted, with humic and root organics.	D			
						D		SW	SAND, medium to coarse grained, pale yellow orange, well sorted.	M			
						D							
						D							
			11	1		D							
						D							
						D							
						D							
						D							
		NTCWE	10	2		D			END OF BOREHOLE AT 2.00 m				EOH
			9	3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-08

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**1.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389514 N 6426059**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	1 0.10		D		SP	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted,	D			
							SM	with humic and root organics.	M			
					D			Silty SAND, medium grained, pale grey.				
					D			END OF BOREHOLE AT 0.50 m	W			EOH
			0									
			1									
			-1									
			2									
			-2									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-09

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**-0.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389653 N 6425896**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted, with humic and root organics.	D			
			0.20					Crushed LIMESTONE				
					D		CH	CLAY, high plasticity, black, firm.	M			
					D							
					D							
			-1		D							
			1.00 1		D		CH	Sandy CLAY, high plasticity, pale white grey brown.				
					D							
					D							
		▼			D			END OF BOREHOLE AT 1.75 m	W			EOH
			-2									
			2									
			-3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-10

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**3.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389760 N 6425667**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted, with humic and root organics.				
					D		CH	Silty CLAY, high plasticity, black, very stiff.				
			3		D							
					D							
					D							
			1		D							
					D							
			2		D							
			1.50		D		CH	CLAY, high plasticity, pale black grey, firm.				
					D							
		NCWE	2		D			END OF BOREHOLE AT 2.00 m				EOH
			1									
			3									
			0									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-11

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**08/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**08/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**BW**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**-0.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 389879 N 6425444**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL Silty SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted, with humic and root organics.	D			
					D		CH	Silty CLAY, high plasticity, black, very stiff.	M			
			-1		D							
					D							
			1		D							
		▼			D							
			1.50		D		CH	CLAY, high plasticity, pale black grey, firm.	W			
			-2		D							
			2		D			END OF BOREHOLE AT 2.00 m				EOH
			-3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-12

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**4.49 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390126 N 6425391**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			4		D		OL	TOPSOIL HUMUS, brown, with roots.	D			
			0.15				CH	CLAY, high plasticity, dark brown black, with some fine to medium grained grey sand.	M			
			0.30		D		CH	CLAY, high plasticity, yellow banded dark grey.				
					D							
			0.70		D		CH	Sandy CLAY, high plasticity, grey, medium grained sand, light grey.				
			1.00 1		D		CH	CLAY, high plasticity, grey, with fine to medium grained sand.				
			1.40		D		CH	CLAY, high plasticity, grey with some grey brown yellow mottling, trace of fine grained sand.				
		▼	3		D				W			
			1.75		D		CH	CLAY, high plasticity, grey brown yellow streaked dark grey, with trace fine limestone gravel throughout.				
			2		D		CH	CLAY, high plasticity, dark black grey.				
			2.10		D							
			2		D		CH	Marine CLAY, high plasticity, dark green blue grey, with trace fine limestone gravel throughout.				
			2.50		D							
			3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-13

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**28/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**28/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**DMc**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**8.94 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390216 N 6425208**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			8		D		CL-CH	TOPSOIL CLAY, with humic and root organics.	D			
			0.15		D		SP	SAND, medium to coarse grained, orange.	M			
			0.40		D		CH	CLAY, high plasticity, dark black brown, trace organics.				
			1		D							
			1.10		D		CH	CLAY, high plasticity, green grey brown, trace organics.				
			1.60		D		CH	CLAY, high plasticity, blue grey mottled grey brown trace organics.				
			1.80		D			CLAY, as above with trace fine limestone gravel.				
			7 2									
			2.10		D		CH	CLAY, high plasticity, grey orange speckled grey clay, with medium limestone sand throughout.				
		NMGWE	6 3		D			END OF BOREHOLE AT 2.25 m				EOH - Refusal

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-14

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**6.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390241 N 6424708**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			6		D		SP	TOPSOIL SAND, dark brown, with peat and humic organics.	D			
			0.15						M			
					D		CH	CLAY, high plasticity, dark brown, firm, with minor traces of organic matter.				
					D							
					D							
					D							
			1		D							
			5		D							
					D							
					D							
					D							
		NCWE	2		D			END OF BOREHOLE AT 2.00 m				EOH
			4									
			3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-15

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**3.9 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390337 N 6424507**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL SAND, medium grained, dark grey, with organics.	D			
					D		CH	Silty CLAY, high plasticity, black, firm to stiff.	M			
					D							
					D							
			3		D							
			1.00 1		D			Silty CLAY, as above with minor root organics.				
					D							
					D							
					D							
			2		D							
		NCWE	2		D			END OF BOREHOLE AT 2.00 m				EOH
			1									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-16

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390410 N 6424307**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		OL	TOPSOIL SAND, medium grained, dark grey, with organics.	D			
					D		CI	Silty CLAY, high plasticity, black, firm to stiff.	M			
		▼	7		D				W			
					D							
			1.00 1		D			Silty CLAY, as above with minor root organics.				
					D							
			6		D							
					D							
			2		D			END OF BOREHOLE AT 2.00 m				EOH
			5									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-17

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**4.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390490 N 6424104**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			4		D		CH	CLAY, high plasticity, dark black, firm.				
					D							
					D							
					D							
			1		D							
			3		D							
			1.50		D		CH	CLAY, high plasticity, dark brown black, firm to stiff, with minor sand.				
					D							
		NTCWE	2		D			END OF BOREHOLE AT 2.00 m				EOH - Refusal
			2									
			3									
			1									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-18

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**3.5 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390578 N 6423690**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	SAND, medium grained, dark grey, with organics.	D			
			0.30		D		CH	CLAY, high plasticity, pale grey and yellow mottled, firm.	M			
			3		D			as above but black				
					D							
					D							
			1.00 1		D		CH	CLAY, high plasticity, pale brown, firm to stiff.				Earthy odour
					D							
			2		D							
					D							
		▼	1.75		D		CH	Marine CLAY, high plasticity, pale blue grey.	W			
			2		D			END OF BOREHOLE AT 2.00 m				
			1									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-19

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**5.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390617 N 6423492**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			5		D		SM	Silty SAND, dark brown, with organic matter.	D			
			0.25		D		CH	CLAY, pale brown grey, with friable limestone.	M			
			1		D							
					D							
					D							
			1.20		D		CH	CLAY, high plasticity, pale brown grey, with friable limestone.				
			2		D							
					D							
					D							
		NMGWE			D			END OF BOREHOLE AT 2.25 m				EOH
			3									
			2									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-20

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**4.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390634 N 6423385**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		OL	TOPSOIL, dark grey black, with organics.	D			
			0.20		D		SP	SAND, medium grained, pale yellow.				
			0.25				OL	PEAT				
			4		D		CH	CLAY, high plasticity, dark grey, with organics and sand.	M			
					D							
			0.75		D		CH	Sandy CLAY, high plasticity, blue green, firm.	W			Earthy odour
			1		D							
			1.25		D		CH	Sandy CLAY, high plasticity, pale grey.				
			3		D							
					D							
			2		D			END OF BOREHOLE AT 2.00 m				
			2									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-21

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**04/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**04/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**3.5 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390645 N 6423280**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			3		D		CL-CH	CLAY, organic, firm.	D			
			0.25		D		CL-CH	LIMESTONE, decomposed, friable, white.				
		NGWE	0.49		D			LIMESTONE, white END OF BOREHOLE AT 0.50 m				EOH
			1									
			2									
			1									
			2									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-22

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**6.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390707 N 6423045**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			6		D		SP	SAND, medium grained, pale brown, with some humic organics, with silt, loose, friable.	D			
					D				M			
			0.50				SP	SAND, fine to medium grained, pale grey.				
					D							
			1		D							
			5		D				W			
		NOWE			D			END OF BOREHOLE AT 1.50 m				EOH
			2									
			4									
			3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-23

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Folky Rd.**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7.9 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390745 N 6422820**

Borehole Information						Field Material Description						
1	2	3	4		5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	7	0		D		SM	Silty SAND, brown, with organics, loose, friable.	D			
						D				M			
						D				W			
						D							
				1		D							
			6			D			END OF BOREHOLE AT 1.25 m				EOH
				2									
			5										
				3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-24

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**4.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 390956 N 6422509**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	4		D		SM	Silty SAND, brown, with organics, loose, friable.	D			
					D				M			
					D				W			
					D							
			1		D			END OF BOREHOLE AT 1.00 m				EOH
			3									
			2									
			2									
			3									
			1									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-25

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**8.7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391132 N 6422355**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	8		D D D		SM	Silty SAND, brown, with organics, loose, friable.	D M W			
			7		D			END OF BOREHOLE AT 0.75 m				EOH
			6									

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This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-26

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**13.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391297 N 6422203**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	13		D		SW	SAND, medium grained, pale grey, well sorted.	D			
					D							
					D							
					D							
			1		D				W			
					D			END OF BOREHOLE AT 1.25 m				EOH
			12									
			2									
			11									
			3									
			10									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-27

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**9.9 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391436 N 6422083**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			9 1		D		SM	Silty SAND, fine to medium grained, dark brown.	D			
					D							
					D							
					D							
		▼	1.10		D		SP	SAND, medium grained, yellow brown.	W			
			8 2		D			END OF BOREHOLE AT 1.25 m				EOH
			7 3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-28

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**10.7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391593 N 6421936**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	10		D		SM	Silty SAND, medium grained, brown, moderately well sorted.	D			
					D							
					D							
					D				W			
			1		D			END OF BOREHOLE AT 1.00 m				EOH
			9									
			2									
			8									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-29

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391740 N 6421797**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		OL	TOPSOIL SAND, medium grained, pale grey, with root organics, friable.	D			Earthy Odor
					D		SP	SAND, medium grained, pale grey.				
			14		D							
					D				M			
			1		D							
		▼			D			END OF BOREHOLE AT 1.25 m	W			EOH
			13									
			2									
			12									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-30

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**5.7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 391890 N 6421645**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.20		D		SM	Silty SAND, fine to medium grained, brown, with clay.	D			
		▼	5		D		SP	SAND, medium to coarse grained, brown.	M			
					D				W			
					D							
			1		D			END OF BOREHOLE AT 1.00 m				EOH
			4									
			2									
			3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-31

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**10.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392122 N 6421441**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		OL	TOPSOIL HUMUS, with fine to medium grained	D			
							SP	silty sand. SAND, dark brown.				
			0.15									
			10		D		CH	Sandy CLAY, high plasticity, dark brown.	M			
					D							
		▼			D							
			0.75				SC	Clayey SAND, medium to coarse grained, pale brown grey.	W			
					D							
			1		D							
			9		D							
					D							
					D							
			2		D							
					D							
			8									
					D			END OF BOREHOLE AT 2.25 m				EOH
			3									
			7									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-32

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**9.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392235 N 6421329**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		OL	TOPSOIL Silty SAND, medium to fine grained.	D			
			0.20		D		CH	Sandy CLAY, high plasticity, red brown.	M			
			9		D		SP	SAND, medium to coarse grained, yellow.				
					D							
		▼			D				W			
			1		D							
								END OF BOREHOLE AT 1.25 m				EOH
			8									
			2									
			7									
			3									
			6									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-33

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392368 N 6421154**

Borehole Information						Field Material Description						
1	2	3	4		5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.10		D		OL	TOPSOIL HUMUS, with fine to medium grained silty sand.	D			
						D		CH	CLAY, high plasticity, dark grey black, with silt, with iron cemented sand.	M			
						D							
						D							
		NTCWE	6	1		D			END OF BOREHOLE AT 1.00 m				EOH
			5	2									
			4	3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-34

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**10.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392505 N 6420983**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			10		D		SM	Silty SAND, fine to medium grained, with organics.	D			
			0.20				SM	Silty SAND, fine to medium grained, light brown.	M			
					D							
					D							
					D							
			1		D							
			9		D							
		▼			D				W			
					D			END OF BOREHOLE AT 1.50 m				EOH - Collapsed borehole
			2									
			8									
			3									
			7									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-35

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392556 N 6420921**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			7 0.25		D		OL	TOPSOIL SAND, medium grained, dark grey, with monor root organics.	D			
					D		SP	SAND, medium grained, pale grey brown white.	M			
					D							
					D							
			1		D							
			6		D							
		▼			D				W			Hydrogen sulfide odour
			1.75		D		SW	SAND, medium grained, pale brown.				
			2		D							
			5		D							
					D			END OF BOREHOLE AT 2.25 m				EOH
			3									
			4									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-36

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**03/11/05**
Project:	**Loop 10 ASS**	Date Completed:	**03/11/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392777 N 6420970**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			7		D		SM	Silty SAND, medium grained, brown.				
					D							
					D							
					D							
			1.00 1		D		SC	Clayey SAND, medium grained, dark brown.				
					D							
			1.40		D		SC	Silty SAND, medium grained, very dark brown black, with minor organics.				Sulfuric odour
		NCOWE	6		D			END OF BOREHOLE AT 1.60 m				EOH
			2									
			5									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-37

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**10.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392724 N 6420722**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			10		D		SP	SAND, medium grained, dark brown, with organics, moderately well sorted.				
					D							
					D							
			0.75		D		SP	SAND, medium grained, pale brown, with organics, well sorted.				
			1		D							
		▼	1.40		D			SAND, as above grading to no organics.				
			9		D							
					D							
			2		D			END OF BOREHOLE AT 2.00 m				EOH
			8									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-38

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**10.8 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392790 N 6420627**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS FB, S VL, F L, ST MD, VST D, H VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.20		D		SP	TOPSOIL SAND, dark brown.				
					D		SP	SAND, medium grained, brown, moderately well sorted.				
					D							
			10 0.80		D		SW	SAND, medium grained, white, well sorted.				
			1		D							
					D							
					D							
					D							
			9		D							
			2		D							
					D							
					D							
					D							
			8		D							
		N E G W	3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-39

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392854 N 6420545**

Borehole Information						Field Material Description						
1	2	3	4		5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			11	0		D		SW	SAND, medium grained, white, well sorted.				
						D							
						D							
						D							
				1		D							
			10			D							
						D							
						D							
				2		D							
			9			D							
						D							
						D							
		NGWE		3		D			END OF BOREHOLE AT 3.00 m				EOH
			8										

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-40

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**12.5 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392930 N 6420452**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			12		D		SP	SAND, medium grained, dark brown, with organics, moderately well sorted.	D			
			0.40		D		SP	SAND, medium grained, white, well sorted.	M			
			11		D							
			1		D							
					D							
					D							
			2		D							
					D							
		▼	10		D				W			
					D			END OF BOREHOLE AT 2.75 m				EOH
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-41

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 392993 N 6420375**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			11		D		SP	SAND, medium grained, pale brown, moderately well sorted.	D			
					D							
			0.50									
					D		SW	SAND, medium grained, white, well sorted,	M			
			10		D							
					D							
			1		D							
					D							
					D							
					D							
			2		D							
		▼			D				W			
					D							
					D			END OF BOREHOLE AT 2.50 m				EOH
			9									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-42

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393062 N 6420291**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			11		D		SP	SAND, medium grained, pale brown.	D			
			0.25		D		SP	SAND, medium grained, white.	M			
		▼			D							
					D				W			
			1		D							
			10		D							
					D			END OF BOREHOLE AT 1.25 m				EOH
			2									
			9									
			3									
			8									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-43

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**12.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393133 N 6420205**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	0.05		D			TOPSOIL	D			
					D		SP	SAND, medium grained, white, well sorted.				
			12		D							
					D							
					D				W			
			1		D			END OF BOREHOLE AT 1.00 m				EOH
			11									
			2									
			10									
			3									
			9									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-44

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.9 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393202 N 6420120**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	14		D		SP	SAND, medium grained, pale brown.	D			
					D							
					D				W			
					D							
			1		D			END OF BOREHOLE AT 1.00 m				EOH
			13									
			2									
			12									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-45

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393267 N 6420044**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SM	Silty SAND, medium grained, grey brown, moderately well sorted.	D			
			14		D		SW	SAND, medium grained, white, well sorted.	M			
		▼			D				W			
			1		D							
			13		D							
					D			END OF BOREHOLE AT 1.25 m				EOH
			2									
			12									
			3									
			11									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-46

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393320 N 6419985**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
					D		SM	Silty SAND, medium grained, grey brown, moderately well sorted.	D			
			0.20		D		SW	SAND, medium grained, pale brown, well sorted.	M			
		▼			D			END OF BOREHOLE AT 0.50 m	W			EOH
			11									
			1									
			10									
			2									
			9									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-47

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393374 N 6419909**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			11		D		SM	Silty SAND, medium grained, grey brown, moderately well sorted.				
			0.20									
			11		D		SW	SAND, medium grained, white, well sorted.				
					D							
		NOT ENCOUNTERED			D			END OF BOREHOLE AT 0.75 m				EOH
			1									
			10									
			2									
			9									
			3									
			8									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-48

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**13 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393431 N 6419839**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
					D		SM	Silty SAND, medium grained, grey brown, moderately well sorted.	D			
			0.30		D		SW	SAND, medium grained, white, well sorted.	M			
		▼			D				W			
					D			END OF BOREHOLE AT 0.75 m				EOH
			12 1									
			11 2									
			10 3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-49

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393540 N 6419710**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	11 0.20		D		SM	TOPSOIL Silty SAND, fine to medium grained.	D			
					D		SW	SAND, medium grained, yellow, well sorted.	M			
					D				W			
					D			END OF BOREHOLE AT 0.75 m				EOH
			1 10									
			2 9									
			3 8									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-50

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**7.5 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393662 N 6419528**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.20		D		SM	TOPSOIL Silty SAND, fine to medium grained.	D			
		▼	7		D		SW	SAND, medium grained, yellow, well sorted.	M			
					D				W			
					D			END OF BOREHOLE AT 0.75 m				EOH
			1									
			6									
			2									
			5									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-51

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**26/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**26/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**5.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393828 N 6419331**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.20		D		SM	TOPSOIL Silty SAND, fine to medium grained.	D			
			5		D		SW	SAND, medium grained, well sorted.	M			
					D							
					D							
		▼	1		D				W			
			1.05		D		SC	Clayey SAND, high plasticity, grey blue.				
			4		D							
					D							
					D			END OF BOREHOLE AT 1.75 m				EOH
			2									
			3									
			3									
			2									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-52

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**6.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 393988 N 6419091**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			6		D		SO	SAND, pale brown.	D			
			0.25		D		CH	Silty CLAY, high plasticity, pale grey.	M			
					D							
					D							
			1.00 1.01		D		CH	as above with minor coffee rock Sandy CLAY, high plasticity, pale brown.				
			5		D							
					D							
					D							
			2		D							
					D							
			4		D							
		NO GW			D		CH	Sandy CLAY, high plasticity, blue. END OF BOREHOLE AT 2.50 m				EOH
			3									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-53

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**6.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394047 N 6418886**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL SAND, pale grey, with root organics.				
					D		SP	SAND, pale grey brown.				
			6		D							
					D							
			1		D							
		NCWE			D			END OF BOREHOLE AT 1.25 m				EOH
			5									
			2									
			4									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-54

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**8.7 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394047 N 6418886**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL SAND, pale grey, with root organics.				
					D		SP	SAND, pale grey brown.				
			8		D							
					D							
			1		D							
		N G W E			D			END OF BOREHOLE AT 1.25 m				EOH
			7									
			2									
			6									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-55

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394048 N 6418307**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, pale grey, with some root organics.				
					D		SP	SAND, pale grey.				
			0.50									
			14		D		SP	SAND, pale brown sand.				Trace hydrogen sulfide odour
					D							
			1		D							
					D							
					D							
			13		D							
		NO SEEPAGE			D			END OF BOREHOLE AT 1.75 m				EOH
			2									
			12									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-56

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394050 N 6418308**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, pale grey, with root organics.	D			
							SW	SAND, medium grained, pale grey, well sorted.				
					D							
			0.40				SP	SAND, pale yellow.	M			
			14		D							
					D							
			1		D							
					D							
					D							
			13		D							
					D							
			2		D							
					D							
					D							
		▼	12		D				W			
					D							
			3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-57

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**13.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394053 N 6418116**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, pale grey, with root organics.				
					D		SP	SAND, pale grey brown white.				
			0.50									
			13		D		SP	SAND, yellow.				
					D							
			1		D							
					D							
					D							
			12		D							
					D							
			2		D							
					D							
					D							
		NO WATER	11		D			END OF BOREHOLE AT 2.50 m				EOH
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-58

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**11.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394063 N 6417893**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, pale grey, with root organics.	D			
			11		D		SW	SAND, medium grained, pale grey, well sorted.	M			
		▼			D							
			0.80		D		SP	SAND, pale grey brown white.	W			
			1		D							
			10		D			END OF BOREHOLE AT 1.25 m				EOH
			2									
			9									
			3									
			8									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-59

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**12.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394071 N 6417692**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			12		D		SP	TOPSOIL SAND, pale grey, with some organics.	D			
			0.25		D		SP	SAND, medium grained, pale grey.	M			
		▼			D				W			
					D			END OF BOREHOLE AT 0.75 m				EOH
			1									
			11									
			2									
			10									
			3									
			9									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-60

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**12.2 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394081 N 6417471**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST FB VL L MD VST D H VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL SAND, dark grey, some root organics.	D			
			12		D		SP	SAND, medium grained, pale grey brown white.	M			
					D							
					D							
		▼	1		D				W			
			11		D							
					D			END OF BOREHOLE AT 1.25 m				EOH
			2									
			10									
			3									
			9									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-61

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**17.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394086 N 6417240**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, dark grey, with root oganics.	M			
							SP	SAND, pale grey brown white.				
			17		D							
		▼							W			Earthy odour
					D							
								END OF BOREHOLE AT 0.75 m				EOH
					D							
			1		D							
			16									
			2									
			15									
			3									
			14									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-62

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**17 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394097 N 6417006**

Borehole Information						Field Material Description						
1	2	3	4		5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m)	DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY VS S F ST VST H FB VL L MD D VD	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
				0.05		D		SP	TOPSOIL SAND, dark grey, with root oganics.	M			
						D		SP	SAND, pale grey brown white.				
		▼				D				W			
						D			END OF BOREHOLE AT 0.75 m				EOH
			16	1									
			15	2									
			14	3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-63

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**18.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394102 N 6416802**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SP	TOPSOIL SAND, dark grey, with root organics.	D			
					D		SP	SAND, medium grained, pale grey brown white, moderately well sorted.	M			
			18		D							
					D							
			1		D							
					D							
			17		D							
		SEEPAGE			D			END OF BOREHOLE AT 1.75 m				EOH
			2									
			16									
			3									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-64

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**18.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394109 N 6416616**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			18 0.10		D		SP	TOPSOIL SAND, dark grey, with roots organics.	D			
					D		SW	SAND, medium grained, pale grey brown white, well sorted.	M			
		▼			D				W			
					D							
			1		D							
			17		D							
					D							
					D			END OF BOREHOLE AT 1.50 m				EOH
			2									
			16									
			3									
			15									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-65

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**15.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394140 N 6416450**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SP	TOPSOIL SAND, pale grey, with roots and organics, loose, friable.	D			
			15		D		SP	SAND, medium grained, pale grey, moderately well sorted, dense.	M			
					D							
			1		D							
		NCWE			D							
			14		D			END OF BOREHOLE AT 1.25 m				EOH
			2									
			13									
			3									
			12									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-66

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**14.1 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394263 N 6416290**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05 14 1 13 2 12 3 11		D D D D D D D		SP SP	SAND, medium grained, pale grey, with root organics. SAND, medium grained, pale grey, moderately well sorted. END OF BOREHOLE AT 1.50 m				EOH

NO WATER

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-67

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**17.3 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394474 N 6416113**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
		▼	0.05		D		SP	TOPSOIL SAND, medium grained, pale grey, with root organics.	M			
							SP	SAND, medium grained, pale grey, moderately sorted.				
			17		D							
					D							
					D							
			1		D			END OF BOREHOLE AT 1.00 m	W			EOH
			16									
			2									
			15									
			3									
			14									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-68

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**19.6 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394548 N 6416048**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.05		D		SW	TOPSOIL SAND, medium grained, pale grey, sub angular and sub rounded, with root organics, well sorted.	D			
					D		SW	SAND, medium grained, yellow, well sorted.				
			19		D							
					D							
			1		D							
					D							
			18		D							
					D							
			2		D				M			
					D							
			17		D							
					D							
		NGWE	3		D			END OF BOREHOLE AT 3.00 m				EOH

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENVIRONMENTAL LOG

BOREHOLE NO.

10-69

SHEET 1 OF 1

Client:	**DBNGP (WA) Nominees Pty Ltd**	Date Commenced:	**25/10/05**
Project:	**Loop 10 ASS**	Date Completed:	**25/10/05**
Borehole Location:	**Kwinana**	Recorded By:	**KS**
Project Number:	**2145167D**	Log Checked By:	**JP**

Drill Model/Mounting:	**Hand Auger**	Hole Angle:	**90°**	Surface RL:	**20.4 m**
Borehole Diameter:	**75 mm**	Bearing:	**---**	Co-ords:	**E 394614 N 6415983**

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H / FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0.10		D		SW	SAND, medium grained, pale grey, sub angular and sub rounded grains, well sorted.	D			
					D		SW	SAND, medium grained, yellow, sub angular and sub rounded grains, well sorted.				
			20		D							
					D							
					D							
			1		D							
					D							
			19		D							
					D							
					D							
			2		D							
					D							
			18		D							
					D							
			2.80		D		SP	SAND, medium to coarse grained, pale yellow brown.	M			
		NGWE	3		D			END OF BOREHOLE AT 3.00 m				EOH
			17									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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Appendix B

pH_F and pH_{FOX} Test Results

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
		10-1	
10-1 0	6.96	5.79	weak
10-1 0.25	6.94	5.93	weak
10-1 0.5	6.97	5.50	weak
10-1 0.75	6.49	5.49	weak
10-1 1.0	6.78	6.02	weak
10-1 1.25	8.23	6.73	weak
		10-2	
10-2 0	8.52	6.22	weak
10-2 0.25	8.74	6.31	weak
10-2 0.5	8.48	6.86	weak
		10-3	
10-3 0	7.11	6.05	weak
10-3 0.25	6.28	5.45	weak
10-3 0.5	6.61	5.56	weak
10-3 0.75	6.56	5.75	weak
10-3 1.0	6.54	5.86	weak
10-3 1.25	6.48	5.35	weak
10-3 1.5	6.48	5.34	weak
10-3 1.75	6.28	5.61	weak
10-3 2.0	6.10	5.62	weak
10-3 2.25	6.72	5.70	weak
10-3 2.5	6.56	5.44	weak
10-3 2.75	6.15	5.36	weak
10-3 3.0	6.27	5.29	weak
		10-4	
10-4 0	6.43	5.33	weak
10-4 0.25	6.04	5.29	weak
10-4 0.5	6.23	5.33	weak
10-4 0.75	6.72	5.57	weak
10-4 1.0	6.51	5.36	weak
10-4 1.25	6.17	5.36	weak
10-4 1.5	6.30	5.35	weak
10-4 1.75	6.07	5.40	weak
10-4 2.0	6.24	5.41	weak
10-4 2.25	6.86	5.54	weak
10-4 2.5	6.41	5.31	weak
10-4 2.75	6.34	5.31	weak
10-4 3.0	6.32	5.30	weak
		10-5	
10-5 0	6.41	5.67	weak
10-5 0.25	6.01	5.30	weak
10-5 0.5	6.23	5.44	weak
10-5 0.75	6.60	5.67	weak
10-5 1.0	6.39	5.36	weak
10-5 1.25	6.11	5.31	weak
10-5 1.5	6.11	5.22	weak
10-5 1.75	7.26	6.15	weak
10-5 2.0	6.16	5.25	weak
10-5 2.25	6.01	5.25	weak

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-5 2.5	6.06	5.24	weak
10-5 2.75	6.02	5.18	weak
10-5 3.0	8.06	6.22	weak
		10-6	
10-6 0	6.31	4.45	
10-6 0.25	5.11	4.54	
10-6 0.5	5.00	4.72	
10-6 0.75	5.04	4.65	
10-6 1.0	5.31	4.99	
10-6 1.25	5.47	5.15	
10-6 1.5	5.57	4.87	
10-6 1.75	5.72	5.25	
10-6 2.0	5.79	5.17	
		10-7	
10-7 0	5.19	3.87	
10-7 0.25	5.22	3.88	
10-7 0.5	5.62	4.57	
10-7 0.75	5.89	4.61	
10-7 1.0	5.80	4.86	
10-7 1.25	5.88	4.63	
10-7 1.5	5.88	4.57	5.63 4.68
10-7 1.75	5.93	4.89	
10-7 2.0	6.08	5.21	
		10-8	
10-8 0	5.94	4.39	
10-8 0.25	5.94	4.39	
10-8 0.5	6.50	5.60	
		10-9	
10-9 0	5.34	4.46	
10-9 0.25	7.07	5.81	
10-9 0.5	6.06	4.92	
10-9 0.75	6.33	4.09	
10-9 1.0	4.61	4.19	
10-9 1.25	4.73	3.48	
10-9 1.5	4.63	3.73	
10-9 1.75	5.54	5.05	
		10-10	
10-10 0	5.87	3.58	
10-10 0.25			
10-10 0.5	5.69	4.75	
10-10 0.75	5.84	4.72	
10-10 1.0	5.69	4.79	
10-10 1.25	6.20	5.00	
10-10 1.5	6.44	5.02	
10-10 1.75	6.56	5.45	
10-10 2.0	6.60	5.62	
		10-11	
10-11 0			
10-11 0.25			
10-11 0.5			

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-11 0.75			
10-11 1.0			
10-11 1.25	6.97	6.18	
10-11 1.5			
10-11 1.75	6.99	6.25	
10-11 2.0	7.04	6.13	
10-12			
10-12 0	5.52	4.89	weak
10-12 0.25	6.04	5.42	weak
10-12 0.5	6.69	5.95	weak
10-12 0.75	6.73	6.07	weak
10-12 1.0	6.99	6.13	weak
10-12 1.25	7.01	5.94	weak
10-12 1.5	7.19	6.92	weak
10-12 1.75	6.55	5.71	weak
10-12 2.0	6.89	5.99	weak
10-12 2.25	7.71	6.17	weak
10-12 2.5	6.77	5.96	weak
10-12 2.75	6.80	5.98	weak
10-12 3.0	7.75	6.46	weak
10-13			
10-13 0	7.58	6.36	weak
10-13 0.25	7.32	6.09	weak
10-13 0.5	7.80	5.79	weak
10-13 0.75	8.04	6.63	weak
10-13 1.0	7.70	6.27	medium
10-13 1.25	7.64	6.14	weak
10-13 1.5	7.56	6.17	weak
10-13 1.75	7.25	6.09	weak
10-13 2.0	6.88	5.62	weak
10-13 2.25	7.54	6.16	weak
10-14			
10-14 0	4.12	1.64	medium
10-14 0.25	3.76	2.18	medium dup 3.72 2.22
10-14 0.5	3.75	2.34	weak
10-14 0.75	4.04	2.43	weak - medium
10-14 1.0	4.15	2.33	weak
10-14 1.25	5.08	2.92	very strong
10-14 1.5	5.65	2.20	medium
10-14 1.75	6.64	3.18	very strong
10-14 2.0	4.69	2.37	very strong
10-15			
10-15 0	3.90	3.12	medium
10-15 0.25	3.50	1.81	strong
10-15 0.5	3.25	1.47	strong
10-15 0.75	3.02	1.41	medium
10-15 1.0	3.44	2.06	very strong
10-15 1.25	5.89	3.80	very strong
10-15 1.5	6.20	4.44	very strong
10-15 1.75	6.52	5.42	very strong

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-15 2.0	6.13	5.75	very strong
			10-16
10-16 0	3.91	2.80	medium
10-16 0.25	3.08	1.70	medium dup 3.05 1.72
10-16 0.5	2.91	1.76	weak
10-16 0.75	2.73	1.73	medium
10-16 1.0	3.18	1.96	very strong
10-16 1.25	5.10	2.64	very strong
10-16 1.5	5.39	4.48	very strong
10-16 1.75	5.67	3.04	very strong
10-16 2.0	3.45	2.56	very strong
			10-17
10-17 0	6.22	4.37	medium
10-17 0.25	4.94	4.35	medium
10-17 0.5	5.33	4.61	medium
10-17 0.75	4.88	3.90	medium
10-17 1.0	4.35	3.92	medium
10-17 1.25	6.33	5.99	medium
10-17 1.5	5.76	6.07	medium
10-17 1.75	7.17	6.65	weak - medium
10-17 2.0	7.19	6.74	weak
			10-18
10-18 0	6.46	6.30	medium
10-18 0.25	7.23	6.32	medium
10-18 0.5	7.23	6.31	weak dup 7.30 6.50
10-18 0.75	7.24	6.05	medium
10-18 1.0	6.84	6.32	medium
10-18 1.25	6.66	6.28	medium
10-18 1.5	6.43	5.78	medium
10-18 1.75	6.70	5.64	medium
10-18 2.0	6.83	6.81	medium
			10-19
10-19 0	8.05	5.97	medium
10-19 0.25	8.27	6.54	weak
10-19 0.5	8.62	6.77	weak
10-19 0.75	8.60	7.01	none
10-19 1.0	8.70	6.75	weak
10-19 1.25	8.80	6.94	weak
10-19 1.5	8.60	6.93	none
10-19 1.75	8.62	6.78	none
10-19 2.0	8.49	6.97	weak
10-19 2.25	8.53	7.05	weak
			10-20
10-20 0	6.90	5.87	medium dup 7.05 5.60
10-20 0.25	7.28	6.30	weak
10-20 0.5	7.46	6.37	weak
10-20 0.75	7.44	6.59	weak
10-20 1.0	7.25	5.97	weak
10-20 1.25	7.45	6.82	medium
10-20 1.5	6.91	6.87	medium

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-20 1.75	7.39	6.05	weak - medium
10-20 2.0	7.17	6.72	very strong
10-21			
10-21 0	7.69	5.69	medium - strong
10-21 0.25	9.07	7.15	weak
10-21 0.5	9.07	7.55	medium
10-22			
10-22 0	8.04	5.85	weak
10-22 0.25	8.40	5.95	none
10-22 0.5	8.83	5.89	none
10-22 0.75	8.41	6.16	none
10-22 1.0	8.10	6.28	weak
10-22 1.25	8.11	6.04	none
10-22 1.5	7.74	5.95	none
10-23			
10-23 0	7.90	5.79	weak -medium
10-23 0.25	8.38	5.94	weak
10-23 0.5	8.33	5.95	none
10-23 0.75	8.61	6.01	none
10-23 1.0	7.75	6.30	weak
10-23 1.25	7.55	6.38	none
10-24			
10-24 0	4.89	4.57	none
10-24 0.25	4.73	4.73	none
10-24 0.5	4.82	4.88	none
10-24 0.75	4.72	4.71	none
10-25			
10-25 0	5.77	4.52	medium
10-25 0.25	7.05	6.14	weak
10-25 0.5	6.44	5.59	weak
10-25 0.75	7.37	6.37	none
10-26			
10-26 0	5.09	4.33	weak
10-26 0.25	4.86	4.03	none
10-26 0.5	4.98	4.31	none
10-26 0.75	4.70	4.37	none
10-26 1.0	4.21	4.27	none
10-26 1.25	4.39	4.42	none
10-27			
10-27 0	5.71	5.01	weak
10-27 0.25	5.00	4.45	weak
10-27 0.5	5.87	5.08	weak
10-27 0.75	5.79	4.94	weak
10-27 1.0	5.58	4.87	none
10-27 1.25	6.35	5.74	weak
10-28			
10-28 0	4.96	4.29	weak
10-28 0.25	5.04	4.92	weak dup 5.05 4.99
10-28 0.5	4.76	4.92	weak
10-28 0.75	4.76	5.03	none

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-28 1.0	4.70	4.95	none
			10-29
10-29 0	5.81	4.89	weak
10-29 0.25	5.19	4.34	weak
10-29 0.5	5.00	4.31	none
10-29 0.75	4.39	4.69	none
10-29 1.0	4.26	4.57	none
10-29 1.25	4.26	4.60	none
			10-30
10-30 0	4.36	3.60	medium
10-30 0.25	4.85	4.63	none
10-30 0.5	4.50	5.05	none
10-30 0.75	4.64	4.64	weak
10-30 1.0	4.90	4.54	none
			10-31
10-31 0	5.73	3.74	strong
10-31 0.25	4.79	3.79	weak - dup 4.70 3.87
10-31 0.5	4.87	3.83	medium
10-31 0.75	5.25	4.41	weak
10-31 1.0	5.37	4.41	weak
10-31 1.25	5.30	4.71	medium
10-31 1.5	5.19	4.72	weak
10-31 1.75	5.58	4.99	weak
10-31 2.0	5.69	5.06	weak
10-31 2.25	8.40	7.79	strong
			10-32
10-32 0	4.98	4.14	medium
10-32 0.25	5.04	4.07	weak
10-32 0.5	5.19	4.19	weak
10-32 0.75	5.02	4.27	weak
10-32 1.0	4.56	4.79	none
10-32 1.25	4.72	4.43	none
			10-33
10-33 0	5.26	2.84	very strong
10-33 0.25	5.30	4.07	medium
10-33 0.5	5.35	4.30	medium
10-33 0.75	5.24	4.47	very strong
10-33 1.0	4.79	3.92	medium
			10-34
10-34 0	4.89	4.10	medium - dup 4.94 4.19
10-34 0.25	5.11	4.63	none
10-34 0.5	4.64	4.45	none
10-34 0.75	4.59	4.39	weak
10-34 1.0	4.58	4.49	weak
10-34 1.25	4.49	4.75	weak
10-34 1.5	4.75	4.63	none
			10-35
10-35 0	4.66	4.05	weak
10-35 0.25	5.02	5.14	none
10-35 0.5	5.26	4.57	none

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-35 0.75	5.48	5.48	none
10-35 1.0	5.65	5.45	none
10-35 1.25	5.45	5.54	weak
10-35 1.5	5.22	5.30	none
10-35 1.75	4.90	5.30	none
10-35 2.0	4.20	3.85	none
10-35 2.25	4.14	3.74	none
10-36			
10-36 0	6.72	5.15	medium
10-36 0.25	8.07	5.73	weak
10-36 0.5	8.38	5.86	weak
10-36 0.75	8.06	5.67	weak
10-36 1.0	6.12	4.92	weak
10-36 1.25	4.16	2.83	very strong
10-36 1.5	4.56	2.81	very strong
10-37			
10-37 0	5.07	4.43	
10-37 0.25	4.19	4.50	
10-37 0.5	4.25	4.21	
10-37 0.75	4.29	4.58	
10-37 1.0	4.76	4.82	
10-37 1.25	4.12	4.04	
10-37 1.5	4.02	3.97	
10-37 1.75	4.01	3.73	
10-37 2.0	4.12	4.22	
10-38			
10-38 0	4.62	4.11	
10-38 0.25	4.80	4.04	
10-38 0.5	4.68	4.24	
10-38 0.75	4.68	3.88	
10-38 1.0	4.75	4.58	
10-38 1.25	5.00	4.20	
10-38 1.5	4.58	5.01	
10-38 1.75	4.94	4.74	
10-38 2.0	4.86	4.39	
10-38 2.25	4.93	4.96	
10-38 2.5	4.88	4.04	
10-38 2.75	4.97	4.42	
10-38 3.0	4.80	4.51	
10-39			
10-39 0	4.82	4.25	
10-39 0.25	5.14	5.09	
10-39 0.5	5.03	5.11	
10-39 0.75	5.23	5.22	
10-39 1.0	4.79	4.77	
10-39 1.25	5.27	5.22	
10-39 1.5	5.20	4.90	
10-39 1.75	5.40	5.38	
10-39 2.0	5.67	4.51	
10-39 2.25	4.94	4.48	

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-39 2.5	4.96	4.10	
10-39 2.75	4.69	5.28	
10-39 3.0	4.66	5.70	
10-40			
10-40 0	4.89	4.31	
10-40 0.25	4.31	4.11	
10-40 0.5	4.81	4.00	
10-40 0.75	4.59	5.04	
10-40 1.0	4.90	4.24	
10-40 1.25	4.74	5.18	
10-40 1.5	4.88	4.71	
10-40 1.75	4.74	5.38	
10-40 2.0	4.63	4.95	
10-40 2.25	4.67	4.58	
10-40 2.5	4.94	3.90	
10-40 2.75	3.90	3.98	
10-41			
10-41 0	4.44	4.66	
10-41 0.25	4.76	4.58	
10-41 0.5	4.99	4.42	
10-41 0.75	4.60	4.19	
10-41 1.0	5.19	5.22	
10-41 1.25	5.27	5.64	
10-41 1.5	5.16	4.54	
10-41 1.75	5.25	5.54	
10-41 2.0	5.10	4.57	
10-41 2.25	4.40	4.72	
10-41 2.5	4.52	4.49	
10-42			
10-42 0	5.15	5.10	
10-42 0.25	4.83	5.07	
10-42 0.5	4.69	5.90	
10-42 0.75	4.29	5.56	
10-42 1.0	4.41	5.17	
10-42 1.25	4.35	4.69	
10-43			
10-43 0	4.79	4.39	
10-43 0.25	4.84	4.85	
10-43 0.5	4.27	5.74	
10-43 0.75	4.26	4.44	
10-43 1.0	4.14	4.35	
10-44			
10-44 0	4.96	3.77	
10-44 0.25	4.56	4.34	
10-44 0.5	4.32	4.36	
10-44 0.75	4.21	4.90	
10-44 1.0	4.14	4.94	
10-45			
10-45 0	4.54	3.66	
10-45 0.25	4.45	3.73	

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-45 0.5	4.43	3.65	
10-45 0.75	3.81	3.93	
10-45 1.0	3.76	3.61	
10-45 1.25	3.82	3.76	
		10-46	
10-46 0	4.62	4.05	
10-46 0.25	4.15	3.72	
10-46 0.5	4.04	3.95	
10-46 0.75	4.14	4.21	
		10-47	
10-47 0	5.21	4.91	
10-47 0.25	4.00	3.74	
10-47 0.5	4.24	4.82	
10-47 0.75	4.20	4.97	
		10-48	
10-48 0	5.04	4.65	
10-48 0.25	4.34	4.06	
10-48 0.5	4.22	4.04	
10-48 0.75	4.19	4.19	
		10-49	
10-49 0	6.35	4.67	
10-49 0.25	4.23	4.18	4.46, 5.02
10-49 0.5	4.45	5.14	
10-49 0.75	4.36	4.87	
		10-50	
10-50 0	5.15	4.42	
10-50 0.25	4.22	4.17	
10-50 0.5	4.45	4.73	
10-50 0.75	3.97	4.32	3.94, 4.31
		10-51	
10-51 0	6.50	5.02	medium
10-51 0.25	5.62	4.22	medium
10-51 0.5	3.80	3.83	medium
10-51 0.75	4.18	3.97	medium
10-51 1.0	5.95	5.51	medium
10-51 1.25	6.83	6.13	medium
10-51 1.5	7.70	7.15	medium
10-51 1.75	7.25	6.48	medium dup 7.42, 6.46
		10-52	
10-52 0	5.38	3.62	strong
10-52 0.25	7.62	8.43	medium
10-52 0.5	7.76	7.78	strong
10-52 0.75	8.64	8.57	very strong
10-52 1.0	8.54	8.40	very strong
10-52 1.25	8.34	7.58	very strong
10-52 1.5	8.00	7.21	very strong
10-52 1.75	7.82	6.83	very strong
10-52 2.0	7.62	6.76	very strong
10-52 2.25	7.61	6.70	very strong
10-52 2.5	7.35	6.39	very strong

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-52 2.75	7.79	7.87	medium
		10-53	
10-53 0	5.56	4.75	
10-53 0.25	4.86	4.24	
10-53 0.5	4.48	4.34	
10-53 0.75	4.42	4.38	
10-53 1.0	4.63	4.70	
		10-54	
10-54 0	5.05	4.07	
10-54 0.25	4.73	4.88	
10-54 0.5	4.28	5.12	
10-54 0.75	4.33	4.98	
10-54 1.0	4.55	5.20	4.65, 5.12
10-54 1.25	4.54	4.85	
		10-55	
10-55 0	4.28	4.17	
10-55 0.25	4.69	4.53	
10-55 0.5	4.46	5.30	
10-55 0.75	4.61	5.14	4.66, 5.17
10-55 1.0	4.79	5.22	
10-55 1.25	4.99	4.93	
10-55 1.5	5.48	5.15	
10-55 1.75	5.36	5.11	
		10-56	
10-56 0	4.99	4.26	
10-56 0.25	5.70	4.97	
10-56 0.5	5.76	5.39	
10-56 0.75	5.73	5.54	
10-56 1.0	5.80	5.63	
10-56 1.25	5.82	5.23	
10-56 1.5	5.89	5.60	
10-56 1.75	5.84	5.54	
10-56 2.0	6.04	5.19	
10-56 2.25	5.99	5.31	
10-56 2.5	5.97	5.25	
10-56 2.75	5.99	5.91	
10-56 3.0	5.92	5.48	
		10-57	
10-57 0	4.75	4.43	
10-57 0.25	4.98	4.97	
10-57 0.5	5.20	5.47	
10-57 0.75	5.25	4.94	
10-57 1.0	5.24	5.58	
10-57 1.25	5.23	5.33	
10-57 1.5	5.21	4.84	
10-57 1.75	5.36	5.48	
10-57 2.0	5.37	5.11	
10-57 2.25	5.15	5.12	
10-57 2.5	4.98	4.82	

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
		10-58	
10-58 0	5.01	4.50	
10-58 0.25	4.94	4.65	
10-58 0.5	4.88	5.61	
10-58 0.75	5.44	4.79	
10-58 1.0	5.00	4.67	
10-58 1.25	4.59	4.51	4.54, 4.51
		10-59	
10-59 0	4.69	4.09	
10-59 0.25	4.57	4.14	
10-59 0.5	4.16	4.29	
10-59 0.75	4.35	4.33	
		10-60	
10-60 0	8.14	5.87	
10-60 0.25	7.98	6.18	
10-60 0.5	7.74	6.51	
10-60 0.75	7.63	6.91	
10-60 1.0	7.41	6.45	
10-60 1.25	7.43	6.80	
		10-61	
10-61 0	4.65	4.00	
10-61 0.25	4.15	3.72	
10-61 0.5	4.26	3.80	
10-61 0.75	4.20	4.11	
		10-62	
10-62 0	5.13	4.21	
10-62 0.25	5.02	4.99	
10-62 0.5	5.01	5.23	5.02, 5.18
10-62 0.75	5.35	4.86	
		10-63	
10-63 0	4.99	4.36	
10-63 0.25	4.74	4.33	
10-63 0.5	5.13	4.45	
10-63 0.75	4.88	4.90	
10-63 1.0	4.70	5.01	
10-63 1.25	4.70	5.18	
10-63 1.5	4.68	5.04	
10-63 1.75	4.61	5.08	
		10-64	
10-64 0	4.68	4.32	4.72, ?
10-64 0.25	4.84	4.17	
10-64 0.5	4.10	3.83	
10-64 0.75	4.35	4.22	
10-64 1.0	4.84	4.71	
10-64 1.25	4.56	4.71	
10-64 1.5	4.57	4.87	
		10-65	
10-65 0	4.61	4.01	
10-65 0.25	4.75	4.67	
10-65 0.5	4.61	4.51	

Acid Sulphate Soil Test Results

Project	Loop 10 ASS	Tested By: LA & RD	Office Perth
			Job No. 2145167D
Client	ECOS	Checked By: JP	Page No.
Location	Kwinana		

Sample Name/ Depth (m)	pH_F	pH_{FOX}	comments
10-65 0.75	4.62	4.48	
10-65 1.0	4.60	4.59	
10-65 1.25	4.50	5.60	
		10-66	
10-66 0	4.60	3.64	
10-66 0.25	4.35	3.96	
10-66 0.5	4.46	4.10	
10-66 0.75	4.64	4.49	
10-66 1.0	4.49	4.48	
10-66 1.25	4.12	4.42	
10-66 1.5	4.23	4.47	4.24, 4.47
		10-67	
10-67 0	4.41	3.78	4.31, 3.69
10-67 0.25	4.83	3.45	
10-67 0.5	3.80	3.62	
10-67 0.75	3.90	3.90	
		10-68	
10-68 0	5.15	4.71	
10-68 0.25	5.84	5.29	
10-68 0.5	6.00	5.51	
10-68 0.75	5.97	5.64	
10-68 1.0	5.94	5.66	
10-68 1.25	6.05	5.77	
10-68 1.5	6.04	5.72	6.25, 5.83
10-68 1.75	6.16	5.85	
10-68 2.0	6.09	5.56	
10-68 2.25	5.93	5.75	5.86, 5.71
10-68 2.5	6.14	5.72	
10-68 2.75	5.93	5.67	
10-68 3.0	5.95	5.04	
		10-69	
10-69 0	5.80	4.69	
10-69 0.25	6.12	5.16	
10-69 0.5	6.25	5.19	
10-69 0.75	6.48	6.00	
10-69 1.0	6.35	5.69	
10-69 1.25	6.28	5.56	
10-69 1.5	6.18	5.86	
10-69 1.75	5.96	5.39	
10-69 2.0	6.06	5.34	
10-69 2.25	6.26	5.51	
10-69 2.5	6.28	5.39	
10-69 2.75	6.48	5.42	
10-69 3.0	6.10	5.46	

Appendix C

Laboratory Analysis Results

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 7
Contact	: MS JULIE PALICH	Contact	: Shaun Crabb	Work Order	: EP0501723
Address	: P O BOX 1232 SUBIACO WA AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090		
E-mail	: jpalich@pb.com.au	E-mail	: Shaun.Crabb@alsenviro.com		
Telephone	: 08 9489 9700	Telephone	: 61-8-9209-7655		
Facsimile	: 08 9380 4060	Facsimile	: 61-8-9209-7600		
Project	: 2145167D Rebatch EP0501671	Quote number	: EN/008/05	Date received	: 8 Dec 2005
Order number	: - Not provided -			Date issued	: 13 Dec 2005
C-O-C number	: - Not provided -			No. of samples	- Received : 18
Site	: Kwinana				Analysed : 18

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Signatory	Position	Department
Shaun Crabb	Laboratory Manager	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Comments

This report for the ALSE reference EP0501723 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

Specific comments for Work Order **EP0501723**

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-1 0.75	10-2 0	10-3 0	10-3 0.5	10-3 1.0
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00
Laboratory Sample ID :				EP0501723-001	EP0501723-002	EP0501723-003	EP0501723-004	EP0501723-005
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.4	9.0	6.8	6.4	6.2
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	----	4.41	0.17	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	----	882	35	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	----	1.41	0.06	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-3 1.5	10-3 2.0	10-3 2.5	10-3 3.0	10-4 1.0
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00
Laboratory Sample ID :				EP0501723-006	EP0501723-007	EP0501723-008	EP0501723-009	EP0501723-010
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.4	6.2	6.3	6.2	6.2
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

				Client Sample ID :	10-5 1.25	10-12 0	10-12 0.5	10-12 1.0	10-12 1.5
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501723-011	EP0501723-012	EP0501723-013	EP0501723-014	EP0501723-015
EA033-A: Actual Acidity									
pH KCl (23A)		0.1	pH Unit		6.2	5.0	5.4	5.8	6.0
Titratable Actual Acidity (23F)		2	mole H+ / t		<2	46	20	8	6
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S		<0.02	0.07	0.03	<0.02	<0.02
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)		0.02	% S		<0.02	0.02	0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t		<10	16	13	<10	<10
EA033-E: Acid Base Accounting									
ANC Fineness Factor		0.5			1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S		<0.02	0.10	0.05	0.02	0.02
Net Acidity (acidity units)		10	mole H+ / t		<10	62	33	15	14
Liming Rate		1	kg CaCO3/t		<1	5	2	1	1

ALS Environmental

Analytical Results

Client Sample ID				10-12 2.0	10-12 2.5	10-13 0.5		
Sample Matrix Type / Description				SOIL	SOIL	SOIL		
Sample Date / Time				28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00		
Laboratory Sample ID				EP0501723-016	EP0501723-017	EP0501723-018		
Analyte	*CAS number*	*LOR*	*Units*					
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.9	6.3	6.5		
Titratable Actual Acidity (23F)		2	mole H+ / t	14	3	<2		
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.02	<0.02	<0.02		
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02		
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10		
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5		
Net Acidity (sulfur units)		0.02	% S	0.04	<0.02	<0.02		
Net Acidity (acidity units)		10	mole H+ / t	24	<10	<10		
Liming Rate		1	kg CaCO3/t	2	<1	<1		

ALS Environmental

Surrogate Control Limits

- **No surrogates present on this report.**

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ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	: ALS Environmental Perth	**Page**	:	**1 of 4**
Contact	:	MS JULIE PALICH	**Contact**	: Shaun Crabb			
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	: 10 Hod Way Malaga WA Australia 6090	**Work order**	:	**EP0501723**
					Amendment No.	:	
Project	:	2145167D Rebatch EP0501671	**Quote number**	: EN/008/05	**Date received**	:	8 Dec 2005
Order number	:	- Not provided -			**Date issued**	:	13 Dec 2005
C-O-C number	:	- Not provided -					
Site	:	Kwinana					
E-mail	:	jpalich@pb.com.au	**E-mail**	: Shaun.Crabb@alsenviro.com	**No. of samples**		
Telephone	:	08 9489 9700	**Telephone**	: 61-8-9209-7655	**Received**	:	18
Facsimile	:	08 9380 4060	**Facsimile**	: 61-8-9209-7600	**Analysed**	:	18

This final report for the ALSE work order reference EP0501723 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

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

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Signatory	Department
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 148600)				**pH Unit**	**pH Unit**	**%**
EP0501723-001	10-1 - 0.75	pH KCl (23A)	0.1 pH Unit	6.4	6.4	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501723-011	10-5 - 1.25	pH KCl (23A)	0.1 pH Unit	6.2	6.2	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 148600)				**% S**	**% S**	**%**
EP0501723-001	10-1 - 0.75	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501723-011	10-5 - 1.25	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 148600)						**%**
EP0501723-001	10-1 - 0.75	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0
EP0501723-011	10-5 - 1.25	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0

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

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

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 148600)		pH Unit	pH Unit	%	%	%
pH KCl (23A)	0.1 pH Unit	<0.1	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 148600)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 148600)		% pyrite S	% pyrite S	%	%	%
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 148600)				%	%	%
ANC Fineness Factor		<0.5	----	----	----	----
Liming Rate	1 kg CaCO3/t	<1	----	----	----	----
Net Acidity (acidity units)	10 mole H+ / t	<10	----	----	----	----
Net Acidity (sulfur units)	0.02 % S	<0.02	----	----	----	----

ALS Environmental

Quality Control Report - Matrix Spikes (MS)

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

* Indicates failed QC

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
- (QC Lot:)						%	%	%
					----			

l **No Matrix Spike (MS) carried out on this Work Order.**

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 6
Contact	: MS JULIE PALICH	Contact	: Shaun Crabb	Work Order	: EP0501474
Address	: P O BOX 1232 SUBIACO WA AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090		
E-mail	: jpalich@pb.com.au	E-mail	: Shaun.Crabb@alsenviro.com		
Telephone	: 08 9489 9700	Telephone	: 61-8-9209-7655		
Facsimile	: 08 9380 4060	Facsimile	: 61-8-9209-7600		
Project	: 2145167D	Quote number	: EN/008/05	Date received	: 17 Nov 2005
Order number	: - Not provided -			Date issued	: 1 Dec 2005
C-O-C number	: 21843			No. of samples	- Received : 47
Site	: Kwinana				Analysed : 14

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Signatory	Position	Department
Shaun Crabb	Laboratory Manager	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Comments

This report for the ALSE reference EP0501474 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

Specific comments for Work Order **EP0501474**

ANC not required because pH KCl less than 6.5

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

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Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10_11 1.25	10_10 Surface	10_10 0.5	10_10 1	10_10 1.5
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00
Laboratory Sample ID:				EP0501474-006	EP0501474-010	EP0501474-012	EP0501474-014	EP0501474-016
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.8	5.2	5.2	5.2	5.3
Titratable Actual Acidity (23F)		2	mole H+ / t	16	29	20	26	21
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.02	0.05	0.03	0.04	0.03
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	0.03	0.05	0.04	0.04	0.03
Net Acidity (acidity units)		10	mole H+ / t	18	33	23	26	20
Liming Rate		1	kg CaCO3/t	1	2	2	2	2

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10_10 2	10_9 1.25	10_8 0.25	10_7 0.25	10_6 Surface
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00
Laboratory Sample ID:				EP0501474-018	EP0501474-024	EP0501474-028	EP0501474-031	EP0501474-039
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.3	5.4	5.7	5.6	5.8
Titratable Actual Acidity (23F)		2	mole H+ / t	17	12	5	6	4
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.03	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	0.03	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	16	11	<10	<10	<10
Liming Rate		1	kg CaCO3/t	1	<1	<1	<1	<1

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Analytical Results

				Client Sample ID :	10_6 0.5	10_6 1	10_6 1.5	10_6 2	
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	
				Sample Date / Time :	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	8 Nov 2005 15:00	
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501474-041	EP0501474-043	EP0501474-045	EP0501474-047	
EA033-A: Actual Acidity									
pH KCl (23A)		0.1	pH Unit		5.5	5.6	5.7	5.9	
Titratable Actual Acidity (23F)		2	mole H+ / t		2	4	<2	<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)		0.02	% S		<0.02	<0.02	<0.02	<0.02	
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t		<10	<10	<10	<10	
EA033-E: Acid Base Accounting									
ANC Fineness Factor		0.5			1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)		0.02	% S		<0.02	<0.02	<0.02	<0.02	
Net Acidity (acidity units)		10	mole H+ / t		<10	<10	<10	<10	
Liming Rate		1	kg CaCO3/t		<1	<1	<1	<1	

ALS Environmental

Surrogate Control Limits

- **No surrogates present on this report.**

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	:	ALS Environmental Perth	**Page**	: **1 of 4**
Contact	:	MS JULIE PALICH	**Contact**	:	Shaun Crabb		
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	:	10 Hod Way Malaga WA Australia 6090	**Work order**	: **EP0501474**
						Amendment No.	:
Project	:	2145167D	**Quote number**	:	EN/008/05	**Date received**	: 17 Nov 2005
Order number	:	- Not provided -				**Date issued**	: 1 Dec 2005
C-O-C number	:	21843					
Site	:	Kwinana					
E-mail	:	jpalich@pb.com.au	**E-mail**	:	Shaun.Crabb@alsenviro.com	**No. of samples**	
Telephone	:	08 9489 9700	**Telephone**	:	61-8-9209-7655	**Received**	: 47
Facsimile	:	08 9380 4060	**Facsimile**	:	61-8-9209-7600	**Analysed**	: 14

This final report for the ALSE work order reference EP0501474 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

ANC not required because pH KCl less than 6.5

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

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WORLD RECOGNISED ACCREDITATION

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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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 139404)				**pH Unit**	**pH Unit**	**%**
EP0501474-006	10_11 - 1.25	pH KCl (23A)	0.1 pH Unit	5.8	5.9	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	16	16	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	0.02	0.02	0.0
EP0501474-041	10_6 - 0.5	pH KCl (23A)	0.1 pH Unit	5.5	5.7	3.2
		Titratable Actual Acidity (23F)	2 mole H+ / t	2	2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 139404)				**% S**	**% S**	**%**
EP0501474-006	10_11 - 1.25	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501474-041	10_6 - 0.5	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 139404)						**%**
EP0501474-006	10_11 - 1.25	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	0.03	0.03	0.0
		Net Acidity (acidity units)	10 mole H+ / t	18	18	0.0
		Liming Rate	1 kg CaCO3/t	1	1	0.0
EP0501474-041	10_6 - 0.5	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0

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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.

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 139404)		pH Unit	pH Unit	%	%	%
pH KCl (23A)	0.1 pH Unit	<0.1	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 139404)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 139404)				%	%	%
ANC Fineness Factor		<0.5	----	----	----	----
Liming Rate	1 kg CaCO3/t	<1	----	----	----	----
Net Acidity (acidity units)	10 mole H+ / t	<10	----	----	----	----
Net Acidity (sulfur units)	0.02 % S	<0.02	----	----	----	----

ALS Environmental

Quality Control Report - Matrix Spikes (MS)

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

* Indicates failed QC

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
- (QC Lot:)						%	%	%
					----			

l **No Matrix Spike (MS) carried out on this Work Order.**

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CERTIFICATE OF ANALYSIS

Client	: **PARSONS BRINCKERHOFF AUST P/L**	*Laboratory*	: **ALS Environmental Perth**	*Page*	: **1 of 7**
Contact	: **MS JULIE PALICH**	*Contact*	: **Shaun Crabb**	*Work Order*	: **EP0501418**
Address	: **P O BOX 1232 SUBIACO WA AUSTRALIA 6904**	*Address*	: **10 Hod Way Malaga WA Australia 6090**		
E-mail	: **jpalich@pb.com.au**	*E-mail*	: **Shaun.Crabb@alsenviro.com**		
Telephone	: **08 9489 9700**	*Telephone*	: **61-8-9209-7655**		
Facsimile	: **08 9380 4060**	*Facsimile*	: **61-8-9209-7600**		
Project	: **2145167D**	*Quote number*	: **EN/008/05**	*Date received*	: **4 Nov 2005**
Order number	: **- Not provided -**			*Date issued*	: **2 Dec 2005**
C-O-C number	: **24455**			*No. of samples*	- *Received* : **74**
Site	: **Kwinana**				*Analysed* : **17**

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Accredited for compliance with ISO/IEC 17025.

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	*Position*	*Department*
Shaun Crabb	**Laboratory Manager**	**Perth Inorganics - NATA 15847 (Perth)**

ALS Environmental

Comments

This report for the ALSE reference EP0501418 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

Specific comments for Work Order **EP0501418**

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

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Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-14 0.5	10-15 1.0	10-16 0	10-16 0.5	10-16 1.0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
Laboratory Sample ID:				EP0501418-003	EP0501418-014	EP0501418-019	EP0501418-021	EP0501418-023
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	8.3	4.4	5.2	3.9	4.2
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	108	57	282	201
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	0.17	0.09	0.45	0.32
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	0.07	<0.02	0.02	0.10
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	46	<10	13	61
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	2.35	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	470	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.75	----	----	----	----
EA033-D: Retained Acidity								
Net Acid Soluble Sulfur (20Je)		0.02	% S	----	<0.02	----	<0.02	<0.02
acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	----	<10	----	<10	<10
sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	----	<0.02	----	<0.02	<0.02
KCl Extractable Sulfur (23Ce)		0.02	% S	----	0.18	----	0.11	0.22
HCl Extractable Sulfur (20Be)		0.02	% S	----	0.17	----	0.13	0.21
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	0.24	0.10	0.49	0.41
Net Acidity (acidity units)		10	mole H+ / t	<10	148	60	304	256
Liming Rate		1	kg CaCO3/t	<1	11	4	23	19

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-16 1.5	10-16 2.0	10-17 0.5	10-18 1.75	10-19 0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
Laboratory Sample ID:				EP0501418-025	EP0501418-027	EP0501418-030	EP0501418-044	EP0501418-046
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	4.8	5.2	5.2	7.0	8.6
Titratable Actual Acidity (23F)		2	mole H+ / t	51	26	29	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.08	0.04	0.05	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	0.14	0.12	<0.02	0.03	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	89	74	<10	21	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	----	----	----	1.23	9.85
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	----	----	----	246	1970
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	----	----	----	0.39	3.16
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	0.22	0.16	0.06	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	140	99	36	<10	<10
Liming Rate		1	kg CaCO3/t	10	7	3	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-19 0.5	10-19 1.0	10-19 1.5	10-19 2.0	10-20 1.0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
Laboratory Sample ID:				EP0501418-048	EP0501418-050	EP0501418-052	EP0501418-054	EP0501418-060
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	8.9	9.0	8.7	8.5	8.9
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	78.8	77.2	74.8	59.4	45.6
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	15700	15400	14900	11900	9110
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	25.2	24.7	24.0	19.0	14.6
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

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Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-21 0	10-22 0.5			
Sample Matrix Type / Description:				SOIL	SOIL			
Sample Date / Time:				4 Nov 2005 15:00	4 Nov 2005 15:00			
Laboratory Sample ID:				EP0501418-065	EP0501418-070			
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	8.5	9.2			
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2			
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02			
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	0.11			
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	71			
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	3.32	0.92			
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	664	185			
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	1.06	0.30			
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5			
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02			
Net Acidity (acidity units)		10	mole H+ / t	<10	<10			
Liming Rate		1	kg CaCO3/t	<1	<1			

ALS Environmental

Surrogate Control Limits

- **No surrogates present on this report.**

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	: ALS Environmental Perth	**Page**	:	**1 of 5**
Contact	:	MS JULIE PALICH	**Contact**	: Shaun Crabb			
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	: 10 Hod Way Malaga WA Australia 6090	**Work order**	:	**EP0501418**
					Amendment No.	:	
Project	:	2145167D	**Quote number**	: EN/008/05	**Date received**	:	4 Nov 2005
Order number	:	- Not provided -			**Date issued**	:	2 Dec 2005
C-O-C number	:	24455					
Site	:	Kwinana					
E-mail	:	jpalich@pb.com.au	**E-mail**	: Shaun.Crabb@alsenviro.com	**No. of samples**		
Telephone	:	08 9489 9700	**Telephone**	: 61-8-9209-7655	**Received**	:	74
Facsimile	:	08 9380 4060	**Facsimile**	: 61-8-9209-7600	**Analysed**	:	17

This final report for the ALSE work order reference EP0501418 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

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

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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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 142526)				**pH Unit**	**pH Unit**	**%**
EP0501418-003	10-14 - 0.5	pH KCl (23A)	0.1 pH Unit	8.3	8.3	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501418-048	10-19 - 0.5	pH KCl (23A)	0.1 pH Unit	8.9	9.0	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 142526)				**% S**	**% S**	**%**
EP0501418-003	10-14 - 0.5	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501418-048	10-19 - 0.5	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 142526)				**% CaCO3**	**% CaCO3**	**%**
EP0501418-003	10-14 - 0.5	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	2.35	2.38	1.3
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	470	476	1.3
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	0.75	0.76	0.0
EP0501418-048	10-19 - 0.5	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	78.8	78.8	0.0
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	15700	15700	0.01
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	25.2	25.2	0.0
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 142526)						**%**
EP0501418-003	10-14 - 0.5	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0

Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-E: Acid Base Accounting - continued						
EA033-E: Acid Base Accounting - (QC Lot: 142526) - continued				**kg CaCO3/t**	**kg CaCO3/t**	**%**
EP0501418-003	10-14 - 0.5	Liming Rate	1 kg CaCO3/t	<1	<1	0.0
EP0501418-048	10-19 - 0.5	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0

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

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

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 142526)		pH Unit	pH Unit	%	%	%
pH KCl (23A)	0.1 pH Unit	<0.1	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 142526)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 142526)		% CaCO3	% CaCO3	%	%	%
Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	----	----	----	----
Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----
EA033-D: Retained Acidity						
EA033-D: Retained Acidity - (QC Lot: 142526)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Net Acid Soluble Sulfur (a-20J)	10 mole H+ / t	<10	----	----	----	----
HCl Extractable Sulfur (20Be)	0.02 % S	<0.02	----	----	----	----
KCl Extractable Sulfur (23Ce)	0.02 % S	<0.02	----	----	----	----
Net Acid Soluble Sulfur (20Je)	0.02 % S	<0.02	----	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	0.02 % pyrite S	<0.02	----	----	----	----
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 142526)				%	%	%
ANC Fineness Factor		<0.5	----	----	----	----
Liming Rate	1 kg CaCO3/t	<1	----	----	----	----
Net Acidity (acidity units)	10 mole H+ / t	<10	----	----	----	----
Net Acidity (sulfur units)	0.02 % S	<0.02	----	----	----	----

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 Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
- (QC Lot:)						%	%	%
					----			

l **No Matrix Spike (MS) carried out on this Work Order.**

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 8
Contact	: MS JULIE PALICH	Contact	: Shaun Crabb	Work Order	: EP0501391
Address	: P O BOX 1232 SUBIACO WA AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090		
E-mail	: jpalich@pb.com.au	E-mail	: Shaun.Crabb@alsenviro.com		
Telephone	: 08 9489 9700	Telephone	: 61-8-9209-7655		
Facsimile	: 08 9380 4060	Facsimile	: 61-8-9209-7600		
Project	: 2145167D - Loop 10 ASS	Quote number	: EN/008/05	Date received	: 4 Nov 2005
Order number	: - Not provided -			Date issued	: 29 Nov 2005
C-O-C number	: - Not provided -			No. of samples	- Received : 87
Site	: Kwinana				Analysed : 25

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Signatory	Position	Department
Shaun Crabb	Laboratory Manager	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Comments

This report for the ALSE reference EP0501391 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

Specific comments for Work Order **EP0501391**

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-23 0.25	10-24 0	10-24 0.5	10-25 0	10-26 0.25
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00
Laboratory Sample ID :				EP0501391-002	EP0501391-007	EP0501391-009	EP0501391-011	EP0501391-016
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	9.2	6.0	6.1	6.1	5.9
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	7	5	5	7
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	0.44	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	87	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.14	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	12	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-27 0	10-27 0.5	10-27 1.0	10-28 1.0	10-29 0.25
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00
Laboratory Sample ID :				EP0501391-021	EP0501391-023	EP0501391-025	EP0501391-031	EP0501391-033
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	8.0	6.6	6.7	5.8	5.7
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	5	9
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	2.14	<0.01	0.19	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	426	<10	37	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.68	<0.01	0.06	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-30 0	10-31 0.25	10-31 0.75	10-31 1.25	10-31 1.75
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00
Laboratory Sample ID :				EP0501391-038	EP0501391-044	EP0501391-046	EP0501391-048	EP0501391-050
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.0	5.5	5.4	5.4	5.6
Titratable Actual Acidity (23F)		2	mole H+ / t	41	20	38	24	17
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.06	0.03	0.06	0.04	0.03
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	0.06	0.03	0.06	0.04	0.03
Net Acidity (acidity units)		10	mole H+ / t	41	20	38	25	17
Liming Rate		1	kg CaCO3/t	3	1	3	2	1

ALS Environmental

Analytical Results

				Client Sample ID :	10-31 2.25	10-32 0.5	10-33 1.0	10-34 0.75	10-35 0.25
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501391-052	EP0501391-055	EP0501391-063	EP0501391-067	EP0501391-072
EA033-A: Actual Acidity									
pH KCl (23A)		0.1	pH Unit		5.9	5.5	5.2	5.3	5.9
Titratable Actual Acidity (23F)		2	mole H+ / t		7	15	29	5	6
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S		<0.02	0.02	0.05	<0.02	<0.02
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)		0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t		<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting									
ANC Fineness Factor		0.5			1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S		0.02	0.02	0.05	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t		13	15	29	<10	<10
Liming Rate		1	kg CaCO3/t		<1	1	2	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-35 0.75	10-35 1.25	10-35 1.75	10-35 2.25	10-36 1.25
Sample Matrix Type / Description				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time				3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00	3 Nov 2005 15:00
Laboratory Sample ID				EP0501391-074	EP0501391-076	EP0501391-078	EP0501391-080	EP0501391-086
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.1	6.2	6.2	5.2	6.1
Titratable Actual Acidity (23F)		2	mole H+ / t	4	2	4	28	13
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	0.04	0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	0.04	0.03
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	28	16
Liming Rate		1	kg CaCO3/t	<1	<1	<1	2	1

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Surrogate Control Limits

- **No surrogates present on this report.**

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	:	ALS Environmental Perth	**Page**	: **1 of 6**
Contact	:	MS JULIE PALICH	**Contact**	:	Shaun Crabb		
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	:	10 Hod Way Malaga WA Australia 6090	**Work order**	: **EP0501391**
						Amendment No.	: **1**
Project	:	2145167D - Loop 10 ASS	**Quote number**	:	EN/008/05	**Date received**	: 4 Nov 2005
Order number	:	- Not provided -				**Date issued**	: 15 Dec 2005
C-O-C number	:	- Not provided -					
Site	:	Kwinana					
E-mail	:	jpalich@pb.com.au	**E-mail**	:	Shaun.Crabb@alsenviro.com	**No. of samples**	
Telephone	:	08 9489 9700	**Telephone**	:	61-8-9209-7655	**Received**	: 87
Facsimile	:	08 9380 4060	**Facsimile**	:	61-8-9209-7600	**Analysed**	: 25

This final report for the ALSE work order reference EP0501391 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

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. Conversion to liming rate in kg/m3 = kg/t x wet bulk density in t/m3.

This workorder has been amended only to inlude the QC reports.

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Accredited for compliance with ISO/IED 17025

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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 140710)				**pH Unit**	**pH Unit**	**%**
EP0501391-002	10-23 - 0.25	pH KCl (23A)	0.1 pH Unit	9.2	9.0	2.2
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501391-038	10-30 - 0	pH KCl (23A)	0.1 pH Unit	5.0	5.0	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	41	40	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	0.06	0.06	0.0
EA033-A: Actual Acidity - (QC Lot: 140711)				**pH Unit**	**pH Unit**	**%**
EP0501391-074	10-35 - 0.75	pH KCl (23A)	0.1 pH Unit	6.1	6.1	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	4	4	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 140710)				**% S**	**% S**	**%**
EP0501391-002	10-23 - 0.25	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501391-038	10-30 - 0	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-B: Potential Acidity - (QC Lot: 140711)				**% S**	**% S**	**%**
EP0501391-074	10-35 - 0.75	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 140710)				**% CaCO3**	**% CaCO3**	**%**
EP0501391-002	10-23 - 0.25	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	0.44	0.44	0.0
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	87	87	0.0
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	0.14	0.14	0.0
EA033-E: Acid Base Accounting						

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Matrix Type: SOIL

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-E: Acid Base Accounting - continued						
EA033-E: Acid Base Accounting - (QC Lot: 140710)						**%**
EP0501391-002	10-23 - 0.25	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0
EP0501391-038	10-30 - 0	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	0.06	0.06	0.0
		Net Acidity (acidity units)	10 mole H+ / t	41	41	0.0
		Liming Rate	1 kg CaCO3/t	3	3	0.0
EA033-E: Acid Base Accounting - (QC Lot: 140711)						**%**
EP0501391-074	10-35 - 0.75	ANC Fineness Factor		1.5	1.5	0.0
		Net Acidity (sulfur units)	0.02 % S	<0.02	<0.02	0.0
		Net Acidity (acidity units)	10 mole H+ / t	<10	<10	0.0
		Liming Rate	1 kg CaCO3/t	<1	<1	0.0

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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.

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 140710)		pH Unit	pH Unit	%	%	%
pH KCl (23A)	0.1 pH Unit	<0.1	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-A: Actual Acidity - (QC Lot: 140711)		pH Unit	pH Unit	%	%	%
pH KCl (23A)	0.1 pH Unit	<0.1	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 140710)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-B: Potential Acidity - (QC Lot: 140711)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 140710)		% CaCO3	% CaCO3	%	%	%
Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	----	----	----	----
Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting						
EA033-E: Acid Base Accounting - (QC Lot: 140710)				%	%	%
ANC Fineness Factor		<0.5	----	----	----	----
Liming Rate	1 kg CaCO3/t	<1	----	----	----	----
Net Acidity (acidity units)	10 mole H+ / t	<10	----	----	----	----
Net Acidity (sulfur units)	0.02 % S	<0.02	----	----	----	----

Matrix Type: SOIL

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*
EA033-E: Acid Base Accounting - continued						
EA033-E: Acid Base Accounting - (QC Lot: 140711)				%	%	%
ANC Fineness Factor		<0.5	----	----	----	----
Liming Rate	1 kg CaCO3/t	<1	----	----	----	----
Net Acidity (acidity units)	10 mole H+ / t	<10	----	----	----	----
Net Acidity (sulfur units)	0.02 % S	<0.02	----	----	----	----

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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 Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
- (QC Lot:)						%	%	%
					----			

l **No Matrix Spike (MS) carried out on this Work Order.**

Client	: **PARSONS BRINCKERHOFF AUST P/L**	*Laboratory*	: **ALS Environmental Perth**	*Page*	: **2 of 16**
Contact	: **MS JULIE PALICH**	*Contact*	: **Shaun Crabb**	*Work Order*	: **EP0501387**
Address	: **P O BOX 1232 SUBIACO WA AUSTRALIA 6904**	*Address*	: **10 Hod Way Malaga WA Australia 6090**		
E-mail	: **jpalich@pb.com.au**	*E-mail*	: **Shaun.Crabb@alsenviro.com**		
Telephone	: **08 9489 9700**	*Telephone*	: **61-8-9209-7655**		
Facsimile	: **08 9380 4060**	*Facsimile*	: **61-8-9209-7600**		
Project	: **21451670**	*Quote number*	: **EN/008/05**	*Date received*	: **4 Nov 2005**
Order number	: **- Not provided -**			*Date issued*	: **25 Nov 2005**
C-O-C number	: **- Not provided -**			*No. of samples*	- *Received* : **245**
Site	: **LOOP 10 ASS**				*Analysed* : **60**

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Signatory	*Position*	*Department*
Shaun Crabb	**Laboratory Manager**	**Perth Inorganics - NATA 15847 (Perth)**

Comments

This report for the ALSE reference EP0501387 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

Specific comments for Work Order **EP0501387**

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-37 1.75	10-38 0.75	10-39 0	10-39 0.5	10-39 1.0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-008	EP0501387-013	EP0501387-023	EP0501387-025	EP0501387-027
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	7.4	6.6	5.4	6.2	6.4
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	10	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	<0.01	0.12	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	<10	24	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	<0.01	0.04	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	13	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-39 1.5	10-39 2.0	10-39 2.5	10-39 3.0	10-40 2.75
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-029	EP0501387-031	EP0501387-033	EP0501387-035	EP0501387-047
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.9	6.5	6.4	6.4	6.2
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	1.09	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	217	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.35	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-41 0.75	10-42 1.25	10-43 0	10-44 0	10-44 0.5
Sample Matrix Type / Description				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID				EP0501387-051	EP0501387-064	EP0501387-065	EP0501387-070	EP0501387-072
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.0	6.2	5.1	5.3	5.9
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	19	7	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	0.03	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	0.04	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	23	10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	2	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-44 1.0	10-45 1.0	10-46 0.25	10-47 0.25	10-48 0.5
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID :				EP0501387-074	EP0501387-079	EP0501387-082	EP0501387-086	EP0501387-091
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.8	5.6	5.6	5.4	5.8
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	2	2	4	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	11	12	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-49 0	10-49 0.5	10-50 0.25	10-51 0.25	10-51 0.75
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-093	EP0501387-095	EP0501387-098	EP0501387-102	EP0501387-104
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	6.9	5.9	5.6	5.3	6.0
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	2	12	4
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	1.04	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	207	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	0.33	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	13	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-51 1.25	10-51 1.75	10-52 0	10-52 1.0	10-52 2.0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-106	EP0501387-108	EP0501387-109	EP0501387-113	EP0501387-117
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.8	5.9	6.1	8.7	7.2
Titratable Actual Acidity (23F)		2	mole H+ / t	7	11	2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	----	----	----	2.44	2.56
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	----	----	----	487	512
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	----	----	----	0.78	0.82
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	10	13	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-53 0.75	10-54 1.25	10-55 0	10-56 0.25	10-57 0
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID :				EP0501387-124	EP0501387-131	EP0501387-132	EP0501387-141	EP0501387-153
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	7.0	5.8	5.4	5.7	5.5
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	5	11	<2	12
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	<0.01	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	<0.01	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	12	<10	14
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-57 0.5	10-57 1.0	10-57 1.5	10-57 2.0	10-57 2.5
Sample Matrix Type / Description				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID				EP0501387-155	EP0501387-157	EP0501387-159	EP0501387-161	EP0501387-163
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.4	6.1	5.9	5.8	5.9
Titratable Actual Acidity (23F)		2	mole H+ / t	7	4	5	6	5
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-58 1.25	10-59 0.25	10-60 0	10-61 0.25	10-62 0.75
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-169	EP0501387-171	EP0501387-174	EP0501387-181	EP0501387-187
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.8	5.7	7.7	5.7	5.9
Titratable Actual Acidity (23F)		2	mole H+ / t	5	6	<2	6	4
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	----	----	<0.01	----	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	----	----	<10	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	----	----	<0.01	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-63 0.25	10-63 0.75	10-63 1.25	10-63 1.75	10-64 0.5
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID :				EP0501387-189	EP0501387-191	EP0501387-193	EP0501387-195	EP0501387-198
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.8	8.8	6.2	6.8	6.2
Titratable Actual Acidity (23F)		2	mole H+ / t	6	<2	<2	<2	2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A1)		0.01	% CaCO3	----	<0.01	----	3.33	----
acidity - Acid Neutralising Capacity (a-19A1)		10	mole H+ / t	----	<10	----	666	----
sulfidic - Acid Neutralising Capacity (s-19A1)		0.01	% pyrite S	----	<0.01	----	1.07	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID : 10-65 0	10-66 0.25	10-67 0.5	10-68 0.25	10-68 0.75
Sample Matrix Type / Description :				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time :				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID :				EP0501387-203	EP0501387-210	EP0501387-218	EP0501387-221	EP0501387-223
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.4	6.0	5.8	5.8	6.0
Titratable Actual Acidity (23F)		2	mole H+ / t	10	4	6	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	10	<10	12	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: 10-68 1.25	10-68 1.75	10-68 2.25	10-68 2.75	10-69 0
Sample Matrix Type / Description:				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Date / Time:				25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00	25 Oct 2005 15:00
Laboratory Sample ID:				EP0501387-225	EP0501387-227	EP0501387-229	EP0501387-231	EP0501387-233
EA033-A: Actual Acidity								
pH KCl (23A)		0.1	pH Unit	5.9	5.8	6.0	6.0	5.7
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate		1	kg CaCO3/t	<1	<1	<1	<1	<1

ALS Environmental

Surrogate Control Limits

- **No surrogates present on this report.**

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	: ALS Environmental Perth	**Page**	:	**1 of 6**
Contact	:	MS JULIE PALICH	**Contact**	: Shaun Crabb			
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	: 10 Hod Way Malaga WA Australia 6090	**Work order**	:	**EP0501387**
					Amendment No.	:	
Project	:	21451670	**Quote number**	: EN/008/05	**Date received**	:	4 Nov 2005
Order number	:	- Not provided -			**Date issued**	:	25 Nov 2005
C-O-C number	:	- Not provided -					
Site	:	LOOP 10 ASS					
E-mail	:	jpalich@pb.com.au	**E-mail**	: Shaun.Crabb@alsenviro.com	**No. of samples**		
Telephone	:	08 9489 9700	**Telephone**	: 61-8-9209-7655	**Received**	:	245
Facsimile	:	08 9380 4060	**Facsimile**	: 61-8-9209-7600	**Analysed**	:	60

This final report for the ALSE work order reference EP0501387 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

Retained Acidity not required because pH KCl greater than or equal to 4.5

Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

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Accredited for compliance with ISO/IED 17025

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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 134935)				**pH Unit**	**pH Unit**	**%**
EP0501387-008	10-37 - 1.75	pH KCl (23A)	0.1 pH Unit	7.4	7.3	1.4
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501387-051	10-41 - 0.75	pH KCl (23A)	0.1 pH Unit	6.0	6.0	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-A: Actual Acidity - (QC Lot: 134936)				**pH Unit**	**pH Unit**	**%**
EP0501387-093	10-49 - 0	pH KCl (23A)	0.1 pH Unit	6.9	6.9	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501387-124	10-53 - 0.75	pH KCl (23A)	0.1 pH Unit	7.0	7.0	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	<2	<2	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-A: Actual Acidity - (QC Lot: 134937)				**pH Unit**	**pH Unit**	**%**
EP0501387-169	10-58 - 1.25	pH KCl (23A)	0.1 pH Unit	5.8	5.9	1.9
		Titratable Actual Acidity (23F)	2 mole H+ / t	5	4	29.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EP0501387-203	10-65 - 0	pH KCl (23A)	0.1 pH Unit	5.4	5.4	0.0
		Titratable Actual Acidity (23F)	2 mole H+ / t	10	10	0.0
		sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	<0.02	0.0
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 134935)				**% S**	**% S**	**%**
EP0501387-008	10-37 - 1.75	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501387-051	10-41 - 0.75	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EA033-B: Potential Acidity - continued						
EA033-B: Potential Acidity - (QC Lot: 134935) - continued				**mole H+ / t**	**mole H+ / t**	**%**
EP0501387-051	10-41 - 0.75	Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-B: Potential Acidity - (QC Lot: 134936)				**% S**	**% S**	**%**
EP0501387-093	10-49 - 0	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501387-124	10-53 - 0.75	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-B: Potential Acidity - (QC Lot: 134937)				**% S**	**% S**	**%**
EP0501387-169	10-58 - 1.25	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EP0501387-203	10-65 - 0	Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	<0.02	0.0
		Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	<10	0.0
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 134935)				**% CaCO3**	**% CaCO3**	**%**
EP0501387-008	10-37 - 1.75	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	<0.01	0.0
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	<10	0.0
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	<0.01	0.0
EA033-C: Acid Neutralising Capacity - (QC Lot: 134936)				**% CaCO3**	**% CaCO3**	**%**
EP0501387-093	10-49 - 0	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	1.04	1.11	7.0
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	207	222	7.0
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	0.33	0.36	7.0
EP0501387-124	10-53 - 0.75	Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	<0.01	0.0
		Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	<10	0.0
		sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	<0.01	0.0

ALS Environmental

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.

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA033-A: Actual Acidity						
EA033-A: Actual Acidity - (QC Lot: 134935)		% pyrite S	% pyrite S	%	%	%
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-A: Actual Acidity - (QC Lot: 134936)		% pyrite S	% pyrite S	%	%	%
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-A: Actual Acidity - (QC Lot: 134937)		% pyrite S	% pyrite S	%	%	%
sulfidic - Titratable Actual Acidity (s-23F)	0.02 % pyrite S	<0.02	----	----	----	----
Titratable Actual Acidity (23F)	2 mole H+ / t	<2	----	----	----	----
EA033-B: Potential Acidity						
EA033-B: Potential Acidity - (QC Lot: 134935)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-B: Potential Acidity - (QC Lot: 134936)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-B: Potential Acidity - (QC Lot: 134937)		mole H+ / t	mole H+ / t	%	%	%
Acidity - Chromium Reducible Sulfur (a-22B)	10 mole H+ / t	<10	----	----	----	----
Chromium Reducible Sulfur (22B)	0.02 % S	<0.02	----	----	----	----
EA033-C: Acid Neutralising Capacity						
EA033-C: Acid Neutralising Capacity - (QC Lot: 134935)		% CaCO3	% CaCO3	%	%	%
Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	----	----	----	----
Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity - (QC Lot: 134936)		% CaCO3	% CaCO3	%	%	%

Matrix Type: SOIL

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*
EA033-C: Acid Neutralising Capacity - continued						
EA033-C: Acid Neutralising Capacity - (QC Lot: 134936) - continued		% CaCO3	% CaCO3	%	%	%
Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	----	----	----	----
Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity - (QC Lot: 134937)		% CaCO3	% CaCO3	%	%	%
Acid Neutralising Capacity (19A1)	0.01 % CaCO3	<0.01	----	----	----	----
Acidity - Acid Neutralising Capacity (a-19A1)	10 mole H+ / t	<10	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A1)	0.01 % pyrite S	<0.01	----	----	----	----

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 Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
- (QC Lot:)						%	%	%
					----			

l **No Matrix Spike (MS) carried out on this Work Order.**

Chain of Custody

Project	Loop 10 ASS	Project Manager	Julie Palich	Office	Perth
Client	ECOS		9489 9722	Job No.	2145167D
Location	Kwinana		jpalich@pb.com.au	Page No.	

	Sample Name/ Depth (m)	pHF	pHFOX	Scr Suite
	10-1			
	10-1 0	6.96	5.79	28/11/05
	10-1 0.25	6.94	5.93	
	10-1 0.5	6.97	5.50	
(1)	10-1 0.75	6.49	5.49	x
	10-1 1.0	6.78	6.02	
	10-1 1.25	8.23	6.73	
	10-2			
(2)	10-2 0	8.52	6.22	x
	10-2 0.25	8.74	6.31	
	10-2 0.5	8.48	6.86	
	10-3			
(3)	10-3 0	7.11	6.05	x
	10-3 0.25	6.28	5.45	
(4)	10-3 0.5	6.61	5.56	x
	10-3 0.75	6.56	5.75	
(5)	10-3 1.0	6.54	5.86	x
	10-3 1.25	6.48	5.35	
(6)	10-3 1.5	6.48	5.34	x
	10-3 1.75	6.28	5.61	
(7)	10-3 2.0	6.10	5.62	x
	10-3 2.25	6.72	5.70	
(8)	10-3 2.5	6.56	5.44	x
	10-3 2.75	6.15	5.36	
(9)	10-3 3.0	6.27	5.29	x
	10-4			
	10-4 0	6.43	5.33	
	10-4 0.25	6.04	5.29	
	10-4 0.5	6.23	5.33	
	10-4 0.75	6.72	5.57	
(10)	10-4 1.0	6.51	5.36	x
	10-4 1.25	6.17	5.36	
	10-4 1.5	6.30	5.35	
	10-4 1.75	6.07	5.40	
	10-4 2.0	6.24	5.41	
	10-4 2.25	6.86	5.54	
	10-4 2.5	6.41	5.31	
	10-4 2.75	6.34	5.31	
	10-4 3.0	6.32	5.30	
	10-5			
	10-5 0	6.41	5.67	
	10-5 0.25	6.01	5.30	
	10-5 0.5	6.23	5.44	
	10-5 0.75	6.60	5.67	
	10-5 1.0	6.39	5.36	
(11)	10-5 1.25	6.11	5.31	x
	10-5 1.5	6.11	5.22	
	10-5 1.75	7.26	6.15	
	10-5 2.0	6.16	5.25	
	10-5 2.25	6.01	5.25	

Chain of Custody

Project	Loop 10 ASS	Project Manager	Julie Palich	Office	Perth
Client	ECOS		9489 9722	Job No.	2145167D
Location	Kwinana		jpalich@pb.com.au	Page No.	

	Sample Name/ Depth (m)	pHF	pHFOX	Scr Suite
	10-5 2.5	6.06	5.24	
	10-5 2.75	6.02	5.18	
	10-5 3.0	8.06	6.22	
	10-12			
(12)	10-12 0	5.52	4.89	x
	10-12 0.25	6.04	5.42	
(13)	10-12 0.5	6.69	5.95	x
	10-12 0.75	6.73	6.07	
(14)	10-12 1.0	6.99	6.13	x
	10-12 1.25	7.01	5.94	
(15)	10-12 1.5	7.19	6.92	x
	10-12 1.75	6.55	5.71	
(16)	10-12 2.0	6.89	5.99	x
	10-12 2.25	7.71	6.17	
(17)	10-12 2.5	6.77	5.96	x
	10-12 2.75	6.80	5.98	
	10-13			
	10-13 0	7.58	6.36	
	10-13 0.25	7.32	6.09	
(18)	10-13 0.5	7.80	5.79	x
	10-13 0.75	8.04	6.63	
	10-13 1.0	7.70	6.27	
	10-13 1.25	7.64	6.14	
	10-13 1.5	7.56	6.17	
	10-13 1.75	7.25	6.09	
	10-13 2.0	6.88	5.62	
	10-13 2.25	7.54	6.16	

PB 100 YEARS ABN 84 797 323 433

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❑ **Bathurst**
59 Sydney Road, Kelso NSW 2795
Tel: (02) 6331 4188 Fax: (02) 6331 6798

❑ **Singleton**
100 George Street, Singleton NSW 2330
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❑ **Newcastle**
Suite 1, 3rd Floor, 55 Bolton Street, Newcastle NSW, 2300
Tel: (02) 4929 3900 Fax: (02) 4929 7299

❑ **Adelaide**
101 Pirie Street, Adelaide SA 5000
Tel: (08) 8405 4300 Fax: (08) 8405 4301

❑ **Brisbane**
12th Floor, 348 Edward Street, Brisbane QLD 4000
Tel: (07) 3218 2222 Fax: (07) 3831 4223

❑ **Melbourne**
Level 7, 457 St. Kilda Road, Melbourne VIC 3004
Tel: (03) 9861 1111 Fax: (03) 9861 1144

❑ **Perth**
589 Hay Street, Subiaco WA 6008
Tel: (08) 9489 9700 Fax: (08) 9380 4060

❑ **Sydney**
9 Blaxland Road, Rhodes NSW 2138
Tel: (02) 9743 0333 Fax: (02) 9736 1568

Chain of Custody

Order No: 21843

Job Title: Loop 10 ASS (DBNGP)

PB Job Number: 2145167D

Job Location: Kwinana.

Project Manager: Julie Palich.

Laboratory Name: ALS

Address: 10 Hod Way
Malaga 6090.

Fax Number: 9209 7600

Phone Number: 9209 7655

Contact Name: Jan Houlahan.

Delivery Method: courier.

Quote Number:

Terms of Business	PB	Other	Checked
	X		

Results Expected by/on: Hold for advice.

Fax Results to:

Fax Number:

Phone Number: 94899722.

Spreadsheet of Results Required: Y / N

Format:

Turnaround Time Required:

Invoice to:

Comments:

Date Sampled	Time	Sample I.D.	Container Size	Sample Location	Medium*	Preservative Type	Filtered (X)	TPH	BTEX	PAH's	OC/OP/PCB's	Metals**	Initials	Comments/Additional Information and/or Analysis Required
8/11/05		10-11 to 10-6	1x Bag/sample		S								BW.	Dry + Hold Samples as attached. Will advise samples for SCR suite early next week. Email with Sample IDs to follow.

ALS Environmental
Perth
Work Order
EP0501474

Report Version: AliquotLabel 1.02

Telephone : 61-8-9209-7655

Relinquished by:	Relinquished by:	Relinquished by:
Date & Time: 8/11/05 11am.	Date & Time:	Date & Time:
Company: PB.	Company:	Company:
Signature:	Signature:	Signature:
Received in Good Order & Condition by (Name): R. Walther.	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time: 11/11/05 1620	Date & Time:	Date & Time:
Company: ALSE	Company:	Company:
Signature: R Walther	Signature:	Signature:

Medium*: S = Soil, W = Water, V = Vapour

Legend**: (circle the following to be tested)

Metals: Al As Be Cd Co Cr Cu Fe Hg Li Mg Mn Ni Pb Se Sn V Zn

Samples on Ice: ☒ Yes ☐ No

Please fax back a signed copy when samples are received at the laboratory

Rebecca Walther

From: Palich, Julie [JPalich@pb.com.au]
Sent: Tuesday, 15 November 2005 10:34 AM
To: Rebecca Walther
Subject: FW: Soil Sample ID's - PB Job #2145167A (PB CoC Ref # 21843)

From: Weekes, Bernard
Sent: Monday, 14 November 2005 09:41
To: perth@alsenviro.com
Cc: Palich, Julie
Subject: Soil Sample ID's - PB Job #2145143A (PB CoC Ref # 21843)

Customer service officer,

Please find below soil sample id's for a batch of soil samples that were sent to ALS laboratory late lastweek. Julie Palich (PB Project manager) will notify ALS later in the week, as to which samples she intends to have analysed for reduced chromium. Date sampled (8/11/05)

Sample ID's

10_11 (Surface), 10_11 (0.25m), 10_11 (0.5m), 10_11 (0.75m), 10_11 (1m), 10_11 (1.25m), 10_11 (1.5m), 10_11 (1.75m), 10_11 (2m).

10_10 (Surface), 10_10 (0.25m), 10_10 (0.5m), 10_10 (0.75m), 10_10 (1m), 10_10 (1.25m), 10_10 (1.5m), 10_10 (1.75m), 10_10 (2m).

10_9 (Surface), 10_9 (0.25m), 10_9 (0.5m), 10_9 (0.75m), 10_9 (1m), 10_9 (1.25m), 10_9 (1.5m), 10_9 (1.75m).

10_8 (Surface), 10_8 (0.25m), 10_8 (0.5m)

10_7 (Surface), 10_7 (0.25m), 10_7 (0.5m), 10_7 (0.75m), 10_7 (1m), 10_7 (1.25m), 10_7 (1.5m), 10_7 (1.75m), 10_7 (2m).

10_6 (Surface), 10_6 (0.25m), 10_6 (0.5m), 10_6 (0.75m), 10_6 (1m), 10_6 (1.25m), 10_6 (1.5m), 10_6 (1.75m), 10_6 (2m).

Kind Regards,
Bernie

Bernard Weekes
Environmental Scientist
Contaminated Land Management
Parsons Brinckerhoff Australia Pty Limited
1 Alvan Street
PO Box 1232
Subiaco WA 6008
Perth AUSTRALIA

PB 100 YEARS ® ABN 84 797 323 433

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❑ **Sydney** 9 Blaxland Road, Rhodes NSW 2138 Tel: (02) 9743 0333 Fax: (02) 9736 1568

Chain of Custody

Order No: 24455

Job Title: Loop 10 ASS
PB Job Number: 2145167 D
Job Location: Kwinana

Laboratory Name: ALS
Address: 10 Hod Way, Malaga 6090
Fax Number: 9209 7600
Phone Number: 9209 7655
Contact Name: Jon Houlahan
Delivery Method: courier
Quote Number:

Terms of Business	PB	Other	Checked
	X		

Project Manager: Julie Palich
Results Expected by/on: Hold for advice
Fax Results to:
Fax Number:
Phone Number: 9489 9700
Spreadsheet of Results Required: Y / N
Format:
Turnaround Time Required:
Invoice to:
Comments:

Date Sampled	Time	Sample I.D.	Container Size	Sample Location	Medium*	Preservative Type	Filtered (X)	TPH	BTEX	PAH's	OC/OP/PCB's	Metals**							Initials	Comments/Additional Information and/or Analysis Required
4/11/05		10-14 to 10-22	1x bags/sample		S														JP	Dry + Hold samples as attached. Will advise samples for SCR suite early next week - e-mail w/sample IDs to follow.

ALS Environmental
Perth
Work Order
EP0501418
Report Version: AliquotLabel 1.02
Telephone : 61-8-9209-7655

Relinquished by: J Palich	Relinquished by:	Relinquished by:
Date & Time: 4/11/05 4:00pm	Date & Time:	Date & Time:
Company: PB	Company:	Company:
Signature: J Pli	Signature:	Signature:
Received in Good Order & Condition by (Name): R. Walther	Received in Good Order & Condition by (Name):	Received in Good Order & Condition by (Name):
Date & Time: 4/11/05 1715	Date & Time:	Date & Time:
Company: ALSE	Company:	Company:
Signature: R Walther	Signature:	Signature:

Medium*: S = S
Legend**: (circle
Metals: Al As Be Cd Co Cr Cu Fe Hg
Li Mg Mn Ni Pb Se Sn V Zn

Samples on Ice: ☑ Yes ☐ No

Please fax back a signed copy when samples are received at the laboratory

Chain of Custody

Project	Loop 10 ASS	Project Manager: Julie Palich	Office Perth
Client	ECOS	9489 9722	Job No. 2145167D
Location	Kwinana	jpalich@pb.com.au	Page No.

	Sample Name/ Depth (m)	Dry& Hold	S_{CR} Suite	Comments
	10-14			
1	10-14 0	x		
2	10-14 0.25	x		
3	10-14 0.5	x		
4	10-14 0.75	x		
5	10-14 1.0	x		
6	10-14 1.25	x		
7	10-14 1.5	x		
8	10-14 1.75	x		
9	10-14 2.0	x		
	10-15			
10	10-15 0	x		
11	10-15 0.25	x		
12	10-15 0.5	x		
13	10-15 0.75	x		
14	10-15 1.0	x		
15	10-15 1.25	x		
16	10-15 1.5	x		
17	10-15 1.75	x		
18	10-15 2.0	x		
	10-16			
19	10-16 0	x		
20	10-16 0.25	x		
21	10-16 0.5	x		
22	10-16 0.75	x		
23	10-16 1.0	x		
24	10-16 1.25	x		
25	10-16 1.5	x		
26	10-16 1.75	x		
27	10-16 2.0	x		
	10-17			
28	10-17 0	x		
29	10-17 0.25	x		
30	10-17 0.5	x		
31	10-17 0.75	x		
32	10-17 1.0	x		
33	10-17 1.25	x		
34	10-17 1.5	x		
35	10-17 1.75	x		
36	10-17 2.0	x		
	10-18			
37	10-18 0	x		
38	10-18 0.25	x		
39	10-18 0.5	x		
40	10-18 0.75	x		
41	10-18 1.0	x		
42	10-18 1.25	x		
43	10-18 1.5	x		
44	10-18 1.75	x		
45	10-18 2.0	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager: Julie Palich	Office Perth
Client	ECOS	9489 9722	Job No. 2145167D
Location	Kwinana	jpalich@pb.com.au	Page No.

	Sample Name/ Depth (m)	Dry& Hold	S_{CR} Suite	Comments
	10-19			
46	10-19 0	x		
47	10-19 0.25	x		
48	10-19 0.5	x		
49	10-19 0.75	x		
50	10-19 1.0	x		
51	10-19 1.25	x		
52	10-19 1.5	x		
53	10-19 1.75	x		
54	10-19 2.0	x		
55	10-19 2.25	x		
	10-20			
56	10-20 0	x		
57	10-20 0.25	x		
58	10-20 0.5	x		
59	10-20 0.75	x		
60	10-20 1.0	x		
61	10-20 1.25	x		
62	10-20 1.5	x		
63	10-20 1.75	x		
64	10-20 2.0	x		
	10-21			
65	10-21 0	x		
66	10-21 0.25	x		
67	10-21 0.5	x		
	10-22			
68	10-22 0	x		
69	10-22 0.25	x		
70	10-22 0.5	x		
71	10-22 0.75	x		
72	10-22 1.0	x		
73	10-22 1.25	x		
74	10-22 1.5	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager: Julie Palich	Office Perth
Client	ECOS	9489 9722	Job No. 2145167D
Location	Kwinana	jpalich@pb.com.au	Date: 4/11/2005

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
	10-23			
1	10-23 0	x		
2	10-23 0.25	x		
3	10-23 0.5	x		
4	10-23 0.75	x		
5	10-23 1.0	x		
6	10-23 1.25	x		
	10-24			
7	10-24 0	x		
8	10-24 0.25	x		
9	10-24 0.5	x		
10	10-24 0.75	x		
11	10-24 1.0	x		
	10-25			
12	10-25 0	x		
13	10-25 0.25	x		
14	10-25 0.5	x		
15	10-25 0.75	x		
	10-26			
16	10-26 0	x		
17	10-26 0.25	x		
18	10-26 0.5	x		
19	10-26 0.75	x		
20	10-26 1.0	x		
21	10-26 1.25	x		
	10-27			
22	10-27 0	x		
23	10-27 0.25	x		
24	10-27 0.5	x		
25	10-27 0.75	x		
26	10-27 1.0	x		
27	10-27 1.25	x		
	10-28			
28	10-28 0	x		
29	10-28 0.25	x		
30	10-28 0.5	x		
31	10-28 0.75	x		
32	10-28 1.0	x		
	10-29			
33	10-29 0	x		
34	10-29 0.25	x		
35	10-29 0.5	x		
36	10-29 0.75	x		
37	10-29 1.0	x		
38	10-29 1.25	x		
	10-30			
39	10-30 0	x		
40	10-30 0.25	x		
41	10-30 0.5	x		
42	10-30 0.75	x		

ALS Environmental
Perth
Work Order
EP0501391

Report Version: AliquotLabel 1.02

Telephone : 61-8-9209-7655

Chain of Custody

Project	Loop 10 ASS	Project Manager:	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Date: 4/11/2005
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
45	10-30 1.0	x		
	10-31			
44	10-31 0	x		
45	10-31 0.25	x		
46	10-31 0.5	x		
47	10-31 0.75	x		
48	10-31 1.0	x		
49	10-31 1.25	x		
50	10-31 1.5	x		
51	10-31 1.75	x		
52	10-31 2.0	x		
53	10-31 2.25	x		
	10-32			
54	10-32 0	x		
55	10-32 0.25	x		
56	10-32 0.5	x		
57	10-32 0.75	x		
58	10-32 1.0	x		
59	10-32 1.25	x		
	10-33			
60	10-33 0	x		
61	10-33 0.25	x		
62	10-33 0.5	x		
63	10-33 0.75	x		
64	10-33 1.0	x		
	10-34			
65	10-34 0	x		
66	10-34 0.25	x		
67	10-34 0.5	x		
68	10-34 0.75	x		
69	10-34 1.0	x		
70	10-34 1.25	x		
71	10-34 1.5	x		
	10-35			
72	10-35 0	x		
73	10-35 0.25	x		
74	10-35 0.5	x		
75	10-35 0.75	x		
76	10-35 1.0	x		
77	10-35 1.25	x		
78	10-35 1.5	x		
79	10-35 1.75	x		
80	10-35 2.0	x		
81	10-35 2.25	x		
	10-36			
82	10-36 0	x		
83	10-36 0.25	x		
84	10-36 0.5	x		
85	10-36 0.75	x		
86	10-36 1.0	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager:	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Date: 4/11/2005
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
81	10-36 1.25	x		
48	10-36 1.5	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
	10-37			
1	10-37 0	x		
2	10-37 0.25	x		
3	10-37 0.5	x		
4	10-37 0.75	x		
5	10-37 1.0	x		
6	10-37 1.25	x		
7	10-37 1.5	x		
8	10-37 1.75	x	x	
9	10-37 2.0	x		
	10-38			
10	10-38 0	x		
11	10-38 0.25	x		
12	10-38 0.5	x		
13	10-38 0.75	x	x	
14	10-38 1.0	x		
15	10-38 1.25	x		
16	10-38 1.5	x		
17	10-38 1.75	x		
18	10-38 2.0	x		
19	10-38 2.25	x		
20	10-38 2.5	x		
21	10-38 2.75	x		
22	10-38 3.0	x		
	10-39			
23	10-39 0	x	x	
24	10-39 0.25	x		
25	10-39 0.5	x	x	
26	10-39 0.75	x		
27	10-39 1.0	x	x	
28	10-39 1.25	x		
29	10-39 1.5	x	x	
30	10-39 1.75	x		
31	10-39 2.0	x	x	
32	10-39 2.25	x		
33	10-39 2.5	x	x	
34	10-39 2.75	x		
35	10-39 3.0	x	x	
	10-40			
36	10-40 0	x		
37	10-40 0.25	x		
38	10-40 0.5	x		
39	10-40 0.75	x		
40	10-40 1.0	x		
41	10-40 1.25	x		
42	10-40 1.5	x		
43	10-40 1.75	x		
44	10-40 2.0	x		
45	10-40 2.25	x		
46	10-40 2.5	x		

ALS Environmental
Perth
Work Order
EP0501387

Report Version: AliquotLabel 1.02
Telephone : 61-8-9209-7655

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
	10-40 2.75	x	x	
	10-41			
47	10-41 0	x		
48	10-41 0.25	x		
49	10-41 0.5	x		
50	10-41 0.75	x	x	
51	10-41 1.0	x		
52	10-41 1.25	x		
53	10-41 1.5	x		
54	10-41 1.75	x		
55	10-41 2.0	x		
56	10-41 2.25	x		
57	10-41 2.5	x		
	10-42			
58	10-42 0	x		
59	10-42 0.25	x		
60	10-42 0.5	x		
61	10-42 0.75	x		
62	10-42 1.0	x		
63	10-42 1.25	x	x	
	10-43			
64	10-43 0	x	x	
65	10-43 0.25	x		
66	10-43 0.5	x		
67	10-43 0.75	x		
68	10-43 1.0	x		
	10-44			
69	10-44 0	x	x	
70	10-44 0.25	x		
71	10-44 0.5	x	x	
72	10-44 0.75	x		
73	10-44 1.0	x	x	
	10-45			
74	10-45 0	x		
75	10-45 0.25	x		
76	10-45 0.5	x		
77	10-45 0.75	x		
78	10-45 1.0	x	x	
79	10-45 1.25	x		
	10-46			
80	10-46 0	x		
81	10-46 0.25	x	x	
82	10-46 0.5	x		
83	10-46 0.75	x		
	10-47			
84	10-47 0	x		
85	10-47 0.25	x	x	
86	10-47 0.5	x		
87	10-47 0.75	x		
	10-48			

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
10-48 0	x		
10-48 0.25	x		
10-48 0.5	x	x	
10-48 0.75	x		
10-49			
10-49 0	x	x	
10-49 0.25	x		
10-49 0.5	x	x	
10-49 0.75	x		
10-50			
10-50 0	x		
10-50 0.25	x	x	
10-50 0.5	x		
10-50 0.75	x		
10-51			
10-51 0	x		
10-51 0.25	x	x	
10-51 0.5	x		
10-51 0.75	x	x	
10-51 1.0	x		
10-51 1.25	x	x	
10-51 1.5	x		
10-51 1.75	x	x	
10-52			
10-52 0	x	x	
10-52 0.25	x		
10-52 0.5	x		
10-52 0.75	x		
10-52 1.0	x	x	
10-52 1.25	x		
10-52 1.5	x		
10-52 1.75	x		
10-52 2.0	x	x	
10-52 2.25	x		
10-52 2.5	x		
10-52 2.75	x		
10-53			
10-53 0	x		
10-53 0.25	x		
10-53 0.5	x		
10-53 0.75	x	x	
10-53 1.0	x		
10-54			
10-54 0	x		
10-54 0.25	x		
10-54 0.5	x		
10-54 0.75	x		
10-54 1.0	x		
10-54 1.25	x	x	
10-55			

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
31	10-55 0	x	x	
32	10-55 0.25	x		
33	10-55 0.5	x		
34	10-55 0.75	x		
35	10-55 1.0	x		
36	10-55 1.25	x		
37	10-55 1.5	x		
38	10-55 1.75	x		
	10-56			
39	10-56 0	x		
40	10-56 0.25	x	x	
41	10-56 0.5	x		
42	10-56 0.75	x		
43	10-56 1.0	x		
44	10-56 1.25	x		
45	10-56 1.5	x		
46	10-56 1.75	x		
47	10-56 2.0	x		
48	10-56 2.25	x		
49	10-56 2.5	x		
50	10-56 2.75	x		
51	10-56 3.0	x		
	10-57			
52	10-57 0	x	x	
53	10-57 0.25	x		
54	10-57 0.5	x	x	
55	10-57 0.75	x		
56	10-57 1.0	x	x	
57	10-57 1.25	x		
58	10-57 1.5	x	x	
59	10-57 1.75	x		
60	10-57 2.0	x	x	
61	10-57 2.25	x		
62	10-57 2.5	x	x	
	10-58			
63	10-58 0	x		
64	10-58 0.25	x		
65	10-58 0.5	x		
66	10-58 0.75	x		
67	10-58 1.0	x		
68	10-58 1.25	x	x	
	10-59			
69	10-59 0	x		
70	10-59 0.25	x	x	
71	10-59 0.5	x		
72	10-59 0.75	x		
	10-60			
73	10-60 0	x	x	
74	10-60 0.25	x		
75	10-60 0.5	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
10-60 0.75	x		
10-60 1.0	x		
10-60 1.25	x		
10-61			
10-61 0	x		
10-61 0.25	x	x	
10-61 0.5	x		
10-61 0.75	x		
10-62			
10-62 0	x		
10-62 0.25	x		
10-62 0.5	x		
10-62 0.75	x	x	
10-63			
10-63 0	x		
10-63 0.25	x	x	
10-63 0.5	x		
10-63 0.75	x	x	
10-63 1.0	x		
10-63 1.25	x	x	
10-63 1.5	x		
10-63 1.75	x	x	
10-64			
10-64 0	x		
10-64 0.25	x		
10-64 0.5	x	x	
10-64 0.75	x		
10-64 1.0	x		
10-64 1.25	x		
10-64 1.5	x		
10-65			
10-65 0	x	x	
10-65 0.25	x		
10-65 0.5	x		
10-65 0.75	x		
10-65 1.0	x		
10-65 1.25	x		
10-66			
10-66 0	x		
10-66 0.25	x	x	
10-66 0.5	x		
10-66 0.75	x		
10-66 1.0	x		
10-66 1.25	x		
10-66 1.5	x		
10-67			
10-67 0	x		
10-67 0.25	x		
10-67 0.5	x	x	
10-67 0.75	x		

Chain of Custody

Project	Loop 10 ASS	Project Manager	Office Perth
		Julie Palich	Job No. 2145167D
Client	ECOS	9489 9722	Page No.
Location	Kwinana	jpalich@pb.com.au	

	Sample Name/ Depth (m)	Dry & Hold	S_{CR} Suite	Comments
	10-68			
19	10-68 0	x		
20	10-68 0.25	x	x	
21	10-68 0.5	x		
22	10-68 0.75	x	x	
23	10-68 1.0	x		
24	10-68 1.25	x	x	
25	10-68 1.5	x		
26	10-68 1.75	x	x	
27	10-68 2.0	x		
28	10-68 2.25	x	x	
29	10-68 2.5	x		
30	10-68 2.75	x	x	
31	10-68 3.0	x		
	10-69			
32	10-69 0	x	x	
33	10-69 0.25	x		
34	10-69 0.5	x		
35	10-69 0.75	x		
36	10-69 1.0	x		
37	10-69 1.25	x		
38	10-69 1.5	x		
39	10-69 1.75	x		
40	10-69 2.0	x		
41	10-69 2.25	x		
42	10-69 2.5	x		
43	10-69 2.75	x		
44	10-69 3.0	x		

EXTRA - NO LABEL - JULIE SAYS IGNORE IT. 1214 on 4/11/05 RW.

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 8
Contact	: MS JULIE PALICH	Contact	: Shaun Crabb	Work Order	: EP0501756
Address	: P O BOX 1232 SUBIACO WA AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090		
E-mail	: jpalich@pb.com.au	E-mail	: Shaun.Crabb@alsenviro.com		
Telephone	: 08 9489 9700	Telephone	: 61-8-9209-7655		
Facsimile	: 08 9380 4060	Facsimile	: 61-8-9209-7600		
Project	: 2145167D Rebatch EP0501418-167	Quote number	: EN/008/05	Date received	: 9 Dec 2005
Order number	: - Not provided -			Date issued	: 19 Dec 2005
C-O-C number	: - Not provided -			No. of samples	- Received : 24
Site	: - Not provided -				Analysed : 24

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NATA Accredited Laboratory 825

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Accredited for compliance with ISO/IEC 17025.

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	Position	Department
Shaun Crabb	Laboratory Manager	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Comments

This report for the ALSE reference EP0501756 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

ALS Environmental

Analytical Results

				Client Sample ID :	10-14 0	10-14 0.5	10-14 1.0	10-14 1.5	10-14 2.0
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501756-001	EP0501756-002	EP0501756-003	EP0501756-004	EP0501756-005
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		19200	10500	21100	24700	24600
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		55	145	48	85	52
Iron	7439-89-6	50	mg/kg		13200	10100	13300	16400	17000
Lead	7439-92-1	5	mg/kg		25	10	20	19	19
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		8	11	8	14	11
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5

ALS Environmental

Analytical Results

				Client Sample ID :	10-15 0.25	10-15 0.75	10-15 1.25	10-16 0	10-16 0.5
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501756-006	EP0501756-007	EP0501756-008	EP0501756-009	EP0501756-010
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		35400	39800	27000	25500	31800
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		62	66	54	60	54
Iron	7439-89-6	50	mg/kg		25600	24000	17600	11100	28700
Lead	7439-92-1	5	mg/kg		26	26	18	28	27
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		12	13	11	9	10
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5

ALS Environmental

Analytical Results

				Client Sample ID :	10-16 1.0	10-16 1.5	10-16 2.0	10-17 0.25	10-17 0.75
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501756-011	EP0501756-012	EP0501756-013	EP0501756-014	EP0501756-015
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		23700	26600	19900	20300	25000
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		48	43	48	66	33
Iron	7439-89-6	50	mg/kg		15100	18600	15300	11700	15100
Lead	7439-92-1	5	mg/kg		16	20	19	17	24
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		10	15	11	8	8
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5

ALS Environmental

Analytical Results

				Client Sample ID :	10-17 1.25	10-17 1.75	10-18 0	10-18 0.5	10-18 1.0
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Date / Time :	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00	4 Nov 2005 15:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501756-016	EP0501756-017	EP0501756-018	EP0501756-019	EP0501756-020
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		25200	25800	26000	20000	29100
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		36	64	80	65	77
Iron	7439-89-6	50	mg/kg		16500	20300	20700	17300	27100
Lead	7439-92-1	5	mg/kg		21	37	37	22	24
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	<2	<2
Nickel	7440-02-0	2	mg/kg		12	15	10	10	14
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	<5

ALS Environmental

Analytical Results

				Client Sample ID :	10-18 1.5	10-13 0	10-13 0.5	10-13 1.0	
				Sample Matrix Type / Description :	SOIL	SOIL	SOIL	SOIL	
				Sample Date / Time :	4 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	28 Nov 2005 15:00	
				Laboratory Sample ID :	EP0501756-021	EP0501756-022	EP0501756-023	EP0501756-024	
Analyte	*CAS number*	*LOR*	*Units*						
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		21400	9350	16200	19700	
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg		57	49	59	41	
Iron	7439-89-6	50	mg/kg		24600	8020	12400	15600	
Lead	7439-92-1	5	mg/kg		17	8	14	19	
Molybdenum	7439-98-7	2	mg/kg		<2	<2	<2	2	
Nickel	7440-02-0	2	mg/kg		13	5	7	18	
Selenium	7782-49-2	5	mg/kg		<5	<5	<5	<5	

ALS Environmental

Surrogate Control Limits

- **No surrogates present on this report.**

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ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	:	ALS Environmental Perth	**Page**	: **1 of 6**
Contact	:	MS JULIE PALICH	**Contact**	:	Shaun Crabb		
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	:	10 Hod Way Malaga WA Australia 6090	**Work order**	: **EP0501756**
						Amendment No.	:
Project	:	2145167D Rebatch EP0501418-167	**Quote number**	:	EN/008/05	**Date received**	: 9 Dec 2005
Order number	:	- Not provided -				**Date issued**	: 19 Dec 2005
C-O-C number	:	- Not provided -					
Site	:	- Not provided -					
E-mail	:	jpalich@pb.com.au	**E-mail**	:	Shaun.Crabb@alsenviro.com	**No. of samples**	
Telephone	:	08 9489 9700	**Telephone**	:	61-8-9209-7655	**Received**	: 24
Facsimile	:	08 9380 4060	**Facsimile**	:	61-8-9209-7600	**Analysed**	: 24

This final report for the ALSE work order reference EP0501756 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

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NATA Accredited Laboratory - 825

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

Accredited for compliance with ISO/IED 17025

This document has been 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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 151239)				**mg/kg**	**mg/kg**	**%**
EP0501756-001	10-14 - 0	Aluminium	50 mg/kg	19200	21200	9.7
		Arsenic	5 mg/kg	<5	<5	0.0
		Cadmium	1 mg/kg	<1	<1	0.0
		Chromium	2 mg/kg	55	56	2.7
		Iron	50 mg/kg	13200	14400	8.9
		Lead	5 mg/kg	25	26	7.4
		Molybdenum	2 mg/kg	<2	<2	0.0
		Nickel	2 mg/kg	8	8	0.0
		Selenium	5 mg/kg	<5	<5	0.0
EP0501756-011	10-16 - 1.0	Aluminium	50 mg/kg	23700	28200	17.5
		Arsenic	5 mg/kg	<5	<5	0.0
		Cadmium	1 mg/kg	<1	<1	0.0
		Chromium	2 mg/kg	48	57	16.5
		Iron	50 mg/kg	15100	18200	18.6
		Lead	5 mg/kg	16	19	15.8
		Molybdenum	2 mg/kg	<2	<2	0.0
		Nickel	2 mg/kg	10	11	17.2
		Selenium	5 mg/kg	<5	<5	0.0
EG005T: Total Metals by ICP-AES - (QC Lot: 151240)				**mg/kg**	**mg/kg**	**%**
EP0501756-021	10-18 - 1.5	Aluminium	50 mg/kg	21400	21700	1.4
		Arsenic	5 mg/kg	<5	<5	0.0
		Cadmium	1 mg/kg	<1	<1	0.0
		Chromium	2 mg/kg	57	58	0.0
		Iron	50 mg/kg	24600	25200	2.0
		Lead	5 mg/kg	17	17	0.0

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 - continued						
EG005T: Total Metals by ICP-AES - (QC Lot: 151240) - continued				**mg/kg**	**mg/kg**	**%**
EP0501756-021	10-18 - 1.5	Molybdenum	2 mg/kg	<2	<2	0.0
		Nickel	2 mg/kg	13	14	0.0
		Selenium	5 mg/kg	<5	<5	0.0

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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.

Matrix Type: SOIL

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 151239)		mg/kg	mg/kg	%	%	%
Aluminium	50 mg/kg	<50	----	----	----	----
Arsenic	5 mg/kg	----	13.75	105	70	130
	5 mg/kg	<5	----	----	----	----
Cadmium	1 mg/kg	----	2.82	100	70	130
	1 mg/kg	<1	----	----	----	----
Chromium	2 mg/kg	----	61.6	105	70	130
	2 mg/kg	<2	----	----	----	----
Iron	50 mg/kg	<50	----	----	----	----
Lead	5 mg/kg	----	55.5	104	70	130
	5 mg/kg	<5	----	----	----	----
Molybdenum	2 mg/kg	<2	----	----	----	----
Nickel	2 mg/kg	----	55.1	112	70	130
	2 mg/kg	<2	----	----	----	----
Selenium	5 mg/kg	<5	----	----	----	----
EG005T: Total Metals by ICP-AES - (QC Lot: 151240)		mg/kg	mg/kg	%	%	%
Aluminium	50 mg/kg	<50	----	----	----	----
Arsenic	5 mg/kg	----	13.75	95.9	70	130
	5 mg/kg	<5	----	----	----	----
Cadmium	1 mg/kg	----	2.82	92.5	70	130
	1 mg/kg	<1	----	----	----	----
Chromium	2 mg/kg	----	61.6	94.5	70	130
	2 mg/kg	<2	----	----	----	----
Iron	50 mg/kg	<50	----	----	----	----
Lead	5 mg/kg	----	55.5	96.2	70	130
	5 mg/kg	<5	----	----	----	----
Molybdenum	2 mg/kg	<2	----	----	----	----

Matrix Type: SOIL

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*
EG005T: Total Metals by ICP-AES - continued						
EG005T: Total Metals by ICP-AES - (QC Lot: 151240) - continued		mg/kg	mg/kg	%	%	%
Nickel	2 mg/kg	----	55.1	93.6	70	130
	2 mg/kg	<2	----	----	----	----
Selenium	5 mg/kg	<5	----	----	----	----

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Quality Control Report - Matrix Spikes (MS)

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

* Indicates failed QC

Matrix Type: SOIL

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
EG005T: Total Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 151239)				mg/kg	mg/kg	%	%	%
Aluminium	EP0501756-002	10-14 - 0.5	50 mg/kg	50	10500	* Not Determined	70	130
Arsenic			5 mg/kg	50	<5	99.1	70	130
Cadmium			1 mg/kg	50	1	98.1	70	130
Chromium			2 mg/kg	50	145	114	70	130
Iron			50 mg/kg	50	10100	* Not Determined	70	130
Lead			5 mg/kg	50	10	90.6	70	130
Molybdenum			2 mg/kg	10	<2	100	70	130
Nickel			2 mg/kg	50	11	84.4	70	130
Selenium			5 mg/kg	10	<5	94.0	70	130
EG005T: Total Metals by ICP-AES - (QC Lot: 151240)				mg/kg	mg/kg	%	%	%
Aluminium	EP0501756-022	10-13 - 0	50 mg/kg	50	9350	* Not Determined	70	130
Arsenic			5 mg/kg	50	<5	112	70	130
Cadmium			1 mg/kg	50	<1	112	70	130
Chromium			2 mg/kg	50	49	102	70	130
Iron			50 mg/kg	50	8020	* Not Determined	70	130
Lead			5 mg/kg	50	8	112	70	130
Molybdenum			2 mg/kg	10	<2	85.0	70	130
Nickel			2 mg/kg	50	5	112	70	130
Selenium			5 mg/kg	10	<5	130	70	130

Rebecca Walther

From: Palich, Julie [JPalich@pb.com.au]
Sent: Friday, 9 December 2005 1:34 PM
To: Rebecca Walther
Subject: additional analysis for 2145167D

Rebecca –

Could I please get the following samples from batch 0501418 analyses for metals (Fe, Al, As, Cd, Cr, Pb, Mo, Ni, Se):

1. 10-14 0,
2. 10-14 0.5,
3. 10-14 1.0,
4. 10-14 1.5,
5. 10-14 2.0,
6. 10-15 0.25,
7. 10-15 0.75,
8. 10-15 1.25,
9. 10-16 0,
10. 10-16 0.5,
11. 10-16 1.0,
12. 10-16 1.5,
13. 10-16 2.0,
14. 10-17 0.25,
15. 10-17 0.75,
16. 10-17 1.25,
17. 10-17 1.75,
18. 10-18 0,
19. 10-18 0.5,
20. 10-18 1.0,
21. 10-18 1.5.

ALS Environmental
Perth
Work Order
EP0501756

Telephone : 61-8-9209-7655

And from batch 0501~~761~~ 1671 (same analysis as above)

22. 10-13 0,
23. 10-13 0.5,
24. 10-13 1.0.

Please register all as one batch. Thanks.

Julie

Julie Palich
Environmental Geoscientist/Project Manager
Parsons Brinckerhoff Australia Pty Limited
1 Alvan Street
PO Box 1232
Subiaco WA 6008
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tel: +61(0)8 9489 9700
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email: JPalich@pb.com.au
www.pb.com.au and www.pbworld.com

Everyone profits by delivering client outcomes on time

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CERTIFICATE OF ANALYSIS

Client	: **PARSONS BRINCKERHOFF AUST P/L**	*Laboratory*	: **ALS Environmental Perth**	*Page*	: **1 of 8**
Contact	: **MS JULIE PALICH**	*Contact*	: **Shaun Crabb**	*Work Order*	: **EP0501827**
Address	: **P O BOX 1232 SUBIACO WA AUSTRALIA 6904**	*Address*	: **10 Hod Way Malaga WA Australia 6090**		
E-mail	: **jpalich@pb.com.au**	*E-mail*	: **Shaun.Crabb@alsenviro.com**		
Telephone	: **08 9489 9700**	*Telephone*	: **61-8-9209-7655**		
Facsimile	: **08 9380 4060**	*Facsimile*	: **61-8-9209-7600**		
Project	: **2145167D**	*Quote number*	: **EN/008/05**	*Date received*	: **20 Dec 2005**
Order number	: **- Not provided -**			*Date issued*	: **9 Jan 2006**
C-O-C number	: **Rebatch EP0501756**			*No. of samples* - *Received*	: **24**
Site	: **- Not provided -**			*Analysed*	: **24**

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Accredited for compliance with ISO/IEC 17025.

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Signatory	*Position*	*Department*
Shaun Crabb	**Laboratory Manager**	**Perth Inorganics - NATA 15847 (Perth)**

ALS Environmental

Comments

This report for the ALSE reference EP0501827 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

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Analytical Results

				Client Sample ID :	10-14 0.0	10-14 0.5	10-14 1.0	10-14 1.5	10-14 2.0
				Sample Matrix Type / Description :	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE
				Sample Date / Time :	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501827-001	EP0501827-002	EP0501827-003	EP0501827-004	EP0501827-005
EG005C: Leachable Metals by ICPAES									
Lead	7439-92-1	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EG050G: Hexvalent Chromium by Discrete Analyser									
Hexavalent Chromium	18540-29-9	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN60: Bottle Leaching Procedure									
Final pH		0.1	pH Unit		7.7	7.4	7.7	7.6	7.8

ALS Environmental

Analytical Results

				Client Sample ID :	10-15 0.25	10-15 0.75	10-15 1.25	10-16 0.0	10-16 0.5
				Sample Matrix Type / Description :	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE
				Sample Date / Time :	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501827-006	EP0501827-007	EP0501827-008	EP0501827-009	EP0501827-010
EG005C: Leachable Metals by ICPAES									
Lead	7439-92-1	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EG050G: Hexvalent Chromium by Discrete Analyser									
Hexavalent Chromium	18540-29-9	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN60: Bottle Leaching Procedure									
Final pH		0.1	pH Unit		7.3	7.4	7.5	7.2	6.9

ALS Environmental

Analytical Results

				Client Sample ID :	10-16 1.0	10-16 1.5	10-16 2.0	10-17 0.25	10-17 0.75
				Sample Matrix Type / Description :	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE
				Sample Date / Time :	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	4 Jan 2006 12:00	5 Jan 2006 16:07
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501827-011	EP0501827-012	EP0501827-013	EP0501827-014	EP0501827-015
EG005C: Leachable Metals by ICPAES									
Lead	7439-92-1	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	<0.1	0.3	<0.1
EG050G: Hexvalent Chromium by Discrete Analyser									
Hexavalent Chromium	18540-29-9	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN60: Bottle Leaching Procedure									
Final pH		0.1	pH Unit		7.0	7.2	7.3	7.4	6.7

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Analytical Results

Client Sample ID :	10-17 1.25	10-17 1.75	10-18 0.0	10-18 0.5	10-18 1.0
Sample Matrix Type / Description :	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE
Sample Date / Time :	5 Jan 2006 16:07	5 Jan 2006 16:07	5 Jan 2006 16:07	5 Jan 2006 16:07	5 Jan 2006 16:07
Laboratory Sample ID :	EP0501827-016	EP0501827-017	EP0501827-018	EP0501827-019	EP0501827-020

Analyte	CAS number	LOR	Units					
EG005C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EG050G: Hexvalent Chromium by Discrete Analyser								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EN60: Bottle Leaching Procedure								
Final pH		0.1	pH Unit	6.8	7.1	7.4	7.6	7.7

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Analytical Results

				Client Sample ID :	10-18 1.5	10-13 0.0	10-13 0.5	10-13 1.0	
				Sample Matrix Type / Description :	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	WATER LEACHATE	
				Sample Date / Time :	5 Jan 2006 16:07	5 Jan 2006 16:07	5 Jan 2006 16:07	5 Jan 2006 16:07	
				Laboratory Sample ID :					
Analyte	*CAS number*	*LOR*	*Units*		EP0501827-021	EP0501827-022	EP0501827-023	EP0501827-024	
EG005C: Leachable Metals by ICPAES									
Lead	7439-92-1	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	
EG050G: Hexvalent Chromium by Discrete Analyser									
Hexavalent Chromium	18540-29-9	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	
EN60: Bottle Leaching Procedure									
Final pH		0.1	pH Unit		7.9	7.9	8.4	8.0	

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Surrogate Control Limits

- **No surrogates present on this report.**

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QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	:	ALS Environmental Perth	**Page**	: **1 of 4**
Contact	:	MS JULIE PALICH	**Contact**	:	Shaun Crabb		
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	:	10 Hod Way Malaga WA Australia 6090	**Work order**	: **EP0501827**
						Amendment No.	:
Project	:	2145167D	**Quote number**	:	EN/008/05	**Date received**	: 20 Dec 2005
Order number	:	- Not provided -				**Date issued**	: 9 Jan 2006
C-O-C number	:	Rebatch EP0501756					
Site	:	- Not provided -					
E-mail	:	jpalich@pb.com.au	**E-mail**	:	Shaun.Crabb@alsenviro.com	**No. of samples**	
Telephone	:	08 9489 9700	**Telephone**	:	61-8-9209-7655	**Received**	: 24
Facsimile	:	08 9380 4060	**Facsimile**	:	61-8-9209-7600	**Analysed**	: 24

This final report for the ALSE work order reference EP0501827 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

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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
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Quality Control Report - Laboratory Duplicates (DUP)

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

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EG005C: Leachable Metals by ICPAES						
EG005C: Leachable Metals by ICPAES - (QC Lot: 157081)				**mg/L**	**mg/L**	**%**
EP0501827-001	10-14 - 0.0	Lead	0.1 mg/L	<0.1	<0.1	0.0
		Nickel	0.1 mg/L	<0.1	<0.1	0.0
EP0501827-011	10-16 - 1.0	Lead	0.1 mg/L	<0.1	<0.1	0.0
		Nickel	0.1 mg/L	<0.1	<0.1	0.0
EG005C: Leachable Metals by ICPAES - (QC Lot: 157252)				**mg/L**	**mg/L**	**%**
EP0501827-015	10-17 - 0.75	Lead	0.1 mg/L	<0.1	<0.1	0.0
		Nickel	0.1 mg/L	<0.1	<0.1	0.0
EP0501852-001	Anonymous	Lead	0.1 mg/L	<0.1	<0.1	0.0
		Nickel	0.1 mg/L	<0.1	<0.1	0.0
EG050G: Hexvalent Chromium by Discrete Analyser						
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 156964)				**mg/L**	**mg/L**	**%**
EP0501827-001	10-14 - 0.0	Hexavalent Chromium	0.01 mg/L	<0.01	<0.01	0.0
EP0501827-010	10-16 - 0.5	Hexavalent Chromium	0.01 mg/L	<0.01	<0.01	0.0
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 157277)				**mg/L**	**mg/L**	**%**
EP0501827-015	10-17 - 0.75	Hexavalent Chromium	0.01 mg/L	<0.01	<0.01	0.0
EP0501827-024	10-13 - 1.0	Hexavalent Chromium	0.01 mg/L	<0.01	<0.01	0.0

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

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

Matrix Type: WATER

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EG005C: Leachable Metals by ICPAES						
EG005C: Leachable Metals by ICPAES - (QC Lot: 157081)		mg/L	mg/L	%	%	%
Lead	0.1 mg/L	----	1.0	95.3	70	130
	0.1 mg/L	<0.1	----	----	----	----
Nickel	0.1 mg/L	----	1.0	97.1	70	130
	0.1 mg/L	<0.1	----	----	----	----
EG005C: Leachable Metals by ICPAES - (QC Lot: 157252)		mg/L	mg/L	%	%	%
Lead	0.1 mg/L	----	1.0	103	70	130
	0.1 mg/L	<0.1	----	----	----	----
Nickel	0.1 mg/L	----	1.0	97.3	70	130
	0.1 mg/L	<0.1	----	----	----	----
EG050G: Hexvalent Chromium by Discrete Analyser						
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 156964)		mg/L	mg/L	%	%	%
Hexavalent Chromium	0.01 mg/L	----	0.50	96.1	70	130
	0.01 mg/L	<0.01	----	----	----	----
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 157277)		mg/L	mg/L	%	%	%
Hexavalent Chromium	0.01 mg/L	----	0.50	93.6	70	130
	0.01 mg/L	<0.01	----	----	----	----

ALS Environmental

Quality Control Report - Matrix Spikes (MS)

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

* Indicates failed QC

Matrix Type: WATER

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
EG005C: Leachable Metals by ICPAES								
EG005C: Leachable Metals by ICPAES - (QC Lot: 157081)				mg/L	mg/L	%	%	%
Lead	EP0501827-002	10-14 - 0.5	0.1 mg/L	1.0	<0.1	89.5	70	130
Nickel			0.1 mg/L	1.0	<0.1	91.8	70	130
EG005C: Leachable Metals by ICPAES - (QC Lot: 157252)				mg/L	mg/L	%	%	%
Lead	EP0501827-016	10-17 - 1.25	0.1 mg/L	1.0	<0.1	103	70	130
Nickel			0.1 mg/L	1.0	<0.1	98.8	70	130
EG050G: Hexvalent Chromium by Discrete Analyser								
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 156964)				mg/L	mg/L	%	%	%
Hexavalent Chromium	EP0501827-002	10-14 - 0.5	0.01 mg/L	0.50	<0.01	89.9	70	130
EG050G: Hexvalent Chromium by Discrete Analyser - (QC Lot: 157277)				mg/L	mg/L	%	%	%
Hexavalent Chromium	EP0501827-016	10-17 - 1.25	0.01 mg/L	0.50	<0.01	90.4	70	130

Shaun Crabb

From: Palich, Julie [JPalich@pb.com.au]
Sent: Tuesday, 20 December 2005 8:26 AM
To: Jon Houlahan; Shaun Crabb
Subject: RE: Deliverables for ALSE Workorder : EP0501756

Jon/Shaun

Could I please get all samples from batch EP0501756 analysed for ASLP for Cr(VI), Ni and Pb?

Thanks.

Julie

Rebatch samples 1-24 Project ID 2105167D
1-21 Sampled 4/11/05, 22-24 Sampled 28/11/05

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ALS Environmental
Perth
Work Order
EP0501827

Report Version: AliquotLabel 1.02
Telephone : 61-8-9209-7655

Lab No	Sample ID
1	1
2	2
3	3
4	4
5	5
6	6
7	7
24	24.

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: ALS Environmental Perth	Page	: 1 of 5
Contact	: MS JULIE PALICH	Contact	: Shaun Crabb	Work Order	: EP0600044
Address	: P O BOX 1232 SUBIACO WA AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090		
E-mail	: jpalich@pb.com.au	E-mail	: Shaun.Crabb@alsenviro.com		
Telephone	: 08 9489 9700	Telephone	: 61-8-9209-7655		
Facsimile	: 08 9380 4060	Facsimile	: 61-8-9209-7600		
Project	: 2145167D	Quote number	: EN/008/05	Date received	: 10 Jan 2006
Order number	: - Not provided -			Date issued	: 13 Jan 2006
C-O-C number	: 200468			No. of samples	- Received : 7
Site	: - Not provided -				Analysed : 7

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Signatory	Position	Department
Celine Conceicao	Spectroscopist	Inorganics - NATA 10911 (Sydney)
Sarah Millington	Senior Inorganic Chemist	Inorganics - NATA 10911 (Sydney)
Shaun Crabb	Laboratory Manager	Perth Inorganics - NATA 15847 (Perth)

ALS Environmental

Comments

This report for the ALSE reference EP0600044 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**

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 insuffient 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). Where LOR of reported result differ from standard LOR, this may be due to high moisture, reduced sample amount or matrix interference. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number, LOR = Limit of Reporting. * Indicates failed Surrogate Recoveries.

- **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.

ALS Environmental

Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: QC1	PZ1	PZ2	PZ3	PZ4
Sample Matrix Type / Description:				WATER	WATER	WATER	WATER	WATER
Sample Date / Time:				10 Jan 2006 12:00	10 Jan 2006 12:00	10 Jan 2006 12:00	10 Jan 2006 12:00	10 Jan 2006 12:00
Laboratory Sample ID:				EP0600044-001	EP0600044-002	EP0600044-003	EP0600044-004	EP0600044-005
EA005P: pH by PC Titrator								
pH Value	12408-02-5	0.01	pH Unit	4.01	3.63	4.40	4.25	3.97
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	158	1180	500	487	153
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	300	1620	518	550	250
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3		1	mg/L	<1	<1	<1	<1	<1
ED038A: Acidity								
Acidity as CaCO3		1	mg/L	64	505	196	92	56
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	3	36	27	24	3
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1.0	mg/L	26.1	320	96.4	101	38.3
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	0.10	mg/L	0.88	4.12	8.22	59.2	1.56
Iron	7439-89-6	0.05	mg/L	3.45	8.17	5.48	41.5	5.26
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.78	2.80	1.00	1.54	0.82
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0001	0.0009	0.0014	0.0001
Chromium	7440-47-3	0.001	mg/L	0.001	0.003	0.001	0.001	0.001
Manganese	7439-96-5	0.001	mg/L	0.016	0.027	0.639	0.577	0.020
Nickel	7440-02-0	0.001	mg/L	0.003	0.008	0.020	0.012	0.006
Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	0.038	0.053	0.087	0.096	0.052
Iron	7439-89-6	0.05	mg/L	4.14	4.42	0.16	0.14	3.99
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.010	mg/L	0.018	<0.010	0.328	0.107	0.140
EK085M: Sulphide as S2-								
Sulphide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.2	<0.1	<0.1

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Analytical Results

Analyte	CAS number	LOR	Units	Client Sample ID: PZ5 Sample Matrix Type / Description: WATER Sample Date / Time: 10 Jan 2006 12:00 Laboratory Sample ID: EP0600044-006	Client Sample ID: PZ6 Sample Matrix Type / Description: WATER Sample Date / Time: 10 Jan 2006 12:00 Laboratory Sample ID: EP0600044-007			
EA005P: pH by PC Titrator								
pH Value	12408-02-5	0.01	pH Unit	6.65	6.19			
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	455	322			
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	635	615			
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1			
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1			
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	159	50			
Total Alkalinity as CaCO3		1	mg/L	159	50			
ED038A: Acidity								
Acidity as CaCO3		1	mg/L	76	24			
ED040F: Dissolved Major Anions								
Sulphate as SO4 2-	14808-79-8	1	mg/L	40	<10			
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1.0	mg/L	43.2	68.8			
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	0.10	mg/L	633	99.0			
Iron	7439-89-6	0.05	mg/L	326	77.4			
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.02	0.35			
Arsenic	7440-38-2	0.001	mg/L	0.007	0.001			
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001			
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002			
Manganese	7439-96-5	0.001	mg/L	0.586	0.164			
Nickel	7440-02-0	0.001	mg/L	0.005	0.008			
Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010			
Zinc	7440-66-6	0.005	mg/L	0.008	0.009			
Iron	7439-89-6	0.05	mg/L	<0.05	5.13			
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.010	mg/L	0.158	0.107			
EK085M: Sulphide as S2-								
Sulphide as S2-	18496-25-8	0.1	mg/L	1.2	0.2			

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Surrogate Control Limits

- **No surrogates present on this report.**

ALS Environmental

QUALITY CONTROL REPORT

Client	:	**PARSONS BRINCKERHOFF AUST P/L**	**Laboratory**	: ALS Environmental Perth	**Page**	:	**1 of 8**
Contact	:	MS JULIE PALICH	**Contact**	: Shaun Crabb			
Address	:	P O BOX 1232 SUBIACO WA AUSTRALIA 6904	**Address**	: 10 Hod Way Malaga WA Australia 6090	**Work order**	:	**EP0600044**
					Amendment No.	:	
Project	:	2145167D	**Quote number**	: EN/008/05	**Date received**	:	10 Jan 2006
Order number	:	- Not provided -			**Date issued**	:	13 Jan 2006
C-O-C number	:	200468					
Site	:	- Not provided -					
E-mail	:	jpalich@pb.com.au	**E-mail**	: Shaun.Crabb@alsenviro.com	**No. of samples**		
Telephone	:	08 9489 9700	**Telephone**	: 61-8-9209-7655	**Received**	:	7
Facsimile	:	08 9380 4060	**Facsimile**	: 61-8-9209-7600	**Analysed**	:	7

This final report for the ALSE work order reference EP0600044 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

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Signatory	Department
Celine Conceicao	Inorganics - NATA 10911 (Sydney)
Sarah Millington	Inorganics - NATA 10911 (Sydney)
Shaun Crabb	Perth Inorganics - NATA 15847 (Perth)

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: 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: 158784)				**pH Unit**	**pH Unit**	**%**
EP0600044-001	QC1	pH Value	0.01 pH Unit	4.01	3.96	1.2
EP0600045-005	Anonymous	pH Value	0.01 pH Unit	5.17	5.13	0.7
EA010P: Conductivity by PC Titrator						
EA010P: Conductivity by PC Titrator - (QC Lot: 158785)				**µS/cm**	**µS/cm**	**%**
EP0600044-001	QC1	Electrical Conductivity @ 25°C	1 µS/cm	158	158	0.0
EP0600045-005	Anonymous	Electrical Conductivity @ 25°C	1 µS/cm	184	185	0.0
EA015: Total Dissolved Solids						
EA015: Total Dissolved Solids - (QC Lot: 158936)				**mg/L**	**mg/L**	**%**
EP0600044-001	QC1	Total Dissolved Solids @180°C	1 mg/L	300	310	3.4
EP0600045-003	Anonymous	Total Dissolved Solids @180°C	1 mg/L	1140	1080	6.3
ED037P: Alkalinity by PC Titrator						
ED037P: Alkalinity by PC Titrator - (QC Lot: 158783)				**mg/L**	**mg/L**	**%**
EP0600044-001	QC1	Hydroxide Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Carbonate Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Bicarbonate Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Total Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
EP0600045-005	Anonymous	Hydroxide Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Carbonate Alkalinity as CaCO3	1 mg/L	<1	<1	0.0
		Bicarbonate Alkalinity as CaCO3	1 mg/L	4	3	0.0
		Total Alkalinity as CaCO3	1 mg/L	3	10	108
ED038A: Acidity						
ED038A: Acidity - (QC Lot: 158791)				**mg/L**	**mg/L**	**%**
EP0600044-001	QC1	Acidity as CaCO3	1 mg/L	64	60	5.5
EP0600045-003	Anonymous	Acidity as CaCO3	1 mg/L	76	75	0.0
ED040F: Dissolved Major Anions						

Matrix Type: WATER

Laboratory Duplicates (DUP) Report

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
ED040F: Dissolved Major Anions - continued						
ED040F: Dissolved Major Anions - (QC Lot: 158938)				mg/L	mg/L	%
EP0600044-001	QC1	Sulphate as SO4 2-	1 mg/L	3	3	0.0
EP0600045-004	Anonymous	Sulphate as SO4 2-	1 mg/L	27	20	28.9
ED045G: Chloride Discrete analyser						
ED045G: Chloride Discrete analyser - (QC Lot: 159122)				mg/L	mg/L	%
EP0600038-001	Anonymous	Chloride	1.0 mg/L	<1.0	<1.0	0.0
EP0600045-003	Anonymous	Chloride	1.0 mg/L	80.9	89.9	10.5
EG005T: Total Metals by ICP-AES						
EG005T: Total Metals by ICP-AES - (QC Lot: 158789)				mg/L	mg/L	%
EP0600044-001	QC1	Aluminium	0.10 mg/L	0.88	0.96	8.7
		Iron	0.05 mg/L	3.45	3.78	9.2
EP0600045-004	Anonymous	Aluminium	0.10 mg/L	56.2	55.1	2.1
		Iron	0.05 mg/L	1.85	1.81	2.4
EG020F: Dissolved Metals by ICP-MS						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 159024)				mg/L	mg/L	%
EP0600044-001	QC1	Aluminium	0.01 mg/L	0.78	0.80	1.4
		Arsenic	0.001 mg/L	<0.001	<0.001	0.0
		Cadmium	0.0001 mg/L	0.0001	0.0001	0.0
		Chromium	0.001 mg/L	0.001	0.001	0.0
		Manganese	0.001 mg/L	0.016	0.016	0.0
		Nickel	0.001 mg/L	0.003	0.003	0.0
		Selenium	0.010 mg/L	<0.010	<0.010	0.0
		Zinc	0.005 mg/L	0.038	0.036	6.0
		Iron	0.05 mg/L	4.14	4.14	0.0
EP0600045-004	Anonymous	Aluminium	0.01 mg/L	1.58	1.61	1.7
		Arsenic	0.001 mg/L	0.001	0.001	0.0
		Cadmium	0.0001 mg/L	<0.0001	<0.0001	0.0
		Chromium	0.001 mg/L	0.001	0.002	0.0
		Manganese	0.001 mg/L	0.010	0.010	0.0
		Nickel	0.001 mg/L	<0.001	<0.001	0.0

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

Laboratory Sample ID	*Client Sample ID*	*Analyte name*	*LOR*	*Original Result*	*Duplicate Result*	*RPD*
EG020F: Dissolved Metals by ICP-MS - continued						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 159024) - continued				**mg/L**	**mg/L**	**%**
EP0600045-004	Anonymous	Selenium	0.010 mg/L	<0.010	<0.010	0.0
		Zinc	0.005 mg/L	<0.005	<0.005	0.0
		Iron	0.05 mg/L	0.51	0.54	4.7
EK055G: Ammonia as N by Discrete Analyser						
EK055G: Ammonia as N by Discrete Analyser - (QC Lot: 159016)				**mg/L**	**mg/L**	**%**
EP0600044-001	QC1	Ammonia as N	0.010 mg/L	0.018	0.022	20.0
EP0600045-004	Anonymous	Ammonia as N	0.010 mg/L	0.861	0.848	1.5
EK085M: Sulphide as S2-						
EK085M: Sulphide as S2- - (QC Lot: 159045)				**mg/L**	**mg/L**	**%**
EP0600044-001	QC1	Sulphide as S2-	0.1 mg/L	<0.1	<0.1	0.0
EP0600045-003	Anonymous	Sulphide as S2-	0.1 mg/L	0.4	0.4	0.0

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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.

Matrix Type: WATER

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

		Method blank result	*Actual Results*		*Recovery Limits*	
			Spike concentration	*Spike Recovery*	*Dynamic Recovery Limits*	
Analyte name	*LOR*			*LCS*	*Low*	*High*
EA005P: pH by PC Titrator						
EA005P: pH by PC Titrator - (QC Lot: 158784)		pH Unit	pH Unit	%	%	%
pH Value	0.01 pH Unit	----	4.00	100	70	130
	0.01 pH Unit	----	7.00	100	70	130
EA010P: Conductivity by PC Titrator						
EA010P: Conductivity by PC Titrator - (QC Lot: 158785)		µS/cm	µS/cm	%	%	%
Electrical Conductivity @ 25°C	1 µS/cm	----	4000	102	70	130
	1 µS/cm	<1	----	----	----	----
EA015: Total Dissolved Solids						
EA015: Total Dissolved Solids - (QC Lot: 158936)		mg/L	mg/L	%	%	%
Total Dissolved Solids @180°C	1 mg/L	----	2000	98.2	70	130
	1 mg/L	<1	----	----	----	----
ED037P: Alkalinity by PC Titrator						
ED037P: Alkalinity by PC Titrator - (QC Lot: 158783)		mg/L	mg/L	%	%	%
Total Alkalinity as CaCO3	1 mg/L	----	200	104	70	130
ED038A: Acidity						
ED038A: Acidity - (QC Lot: 158791)		mg/L	mg/L	%	%	%
Acidity as CaCO3	1 mg/L	----	100	102	70	130
ED040F: Dissolved Major Anions						
ED040F: Dissolved Major Anions - (QC Lot: 158938)		mg/L	mg/L	%	%	%
Sulphate as SO4 2-	1 mg/L	<1	----	----	----	----
ED045G: Chloride Discrete analyser						
ED045G: Chloride Discrete analyser - (QC Lot: 159122)		mg/L	mg/L	%	%	%
Chloride	1 mg/L	----	250	99.9	70	130
	1.0 mg/L	<1.0	----	----	----	----
EG005T: Total Metals by ICP-AES						

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*
EG005T: Total Metals by ICP-AES - continued						
EG005T: Total Metals by ICP-AES - (QC Lot: 158789)		mg/L	mg/L	%	%	%
Aluminium	0.1 mg/L	----	1.0	96.1	70	130
	0.10 mg/L	<0.10	----	----	----	----
Iron	0.05 mg/L	----	1.00	93.2	70	130
	0.05 mg/L	<0.05	----	----	----	----
EG020F: Dissolved Metals by ICP-MS						
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 159024)		mg/L	mg/L	%	%	%
Aluminium	0.01 mg/L	----	0.5	104	70	130
	0.01 mg/L	<0.01	----	----	----	----
Arsenic	0.001 mg/L	----	0.1	99.4	70	130
	0.001 mg/L	<0.001	----	----	----	----
Cadmium	0.0001 mg/L	----	0.1	95.8	70	130
	0.0001 mg/L	<0.0001	----	----	----	----
Chromium	0.001 mg/L	----	0.1	99.3	70	130
	0.001 mg/L	<0.001	----	----	----	----
Iron	0.05 mg/L	----	0.5	93.4	70	130
	0.05 mg/L	<0.05	----	----	----	----
Manganese	0.001 mg/L	----	0.1	103	70	130
	0.001 mg/L	<0.001	----	----	----	----
Nickel	0.001 mg/L	----	0.1	97.8	70	130
	0.001 mg/L	<0.001	----	----	----	----
Selenium	0.01 mg/L	----	0.1	93.4	70	130
	0.010 mg/L	<0.010	----	----	----	----
Zinc	0.005 mg/L	----	0.1	98.3	70	130
	0.005 mg/L	<0.005	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser						
EK055G: Ammonia as N by Discrete Analyser - (QC Lot: 159016)		mg/L	mg/L	%	%	%
Ammonia as N	0.01 mg/L	----	1	117	70	130
	0.010 mg/L	<0.010	----	----	----	----
EK085M: Sulphide as S2-						
EK085M: Sulphide as S2- - (QC Lot: 159045)		mg/L	mg/L	%	%	%

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*
EK085M: Sulphide as S2- - continued						
EK085M: Sulphide as S2- - (QC Lot: 159045) - continued		mg/L	mg/L	%	%	%
Sulphide as S2-	0.10 mg/L	----	0.50	112	70	130
	0.1 mg/L	<0.1	----	----	----	----

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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: WATER

Matrix Spike (MS) Report

					Actual Results		*Recovery Limits*	
					Sample Result	*Spike Recovery*	*Static Limits*	
Analyte name	*Laboratory Sample ID*	*Client Sample ID*	*LOR*	*Spike Concentration*		*MS*	*Low*	*High*
ED045G: Chloride Discrete analyser								
ED045G: Chloride Discrete analyser - (QC Lot: 159122)				mg/L	mg/L	%	%	%
Chloride	EP0600044-002	PZ1	1 mg/L	2500	320	91.8	70	130
EG005T: Total Metals by ICP-AES								
EG005T: Total Metals by ICP-AES - (QC Lot: 158789)				mg/L	mg/L	%	%	%
Aluminium	EP0600044-002	PZ1	0.1 mg/L	1.0	4.12	* Not Determined	70	130
Iron			0.05 mg/L	1.00	8.17	* Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS								
EG020F: Dissolved Metals by ICP-MS - (QC Lot: 159024)				mg/L	mg/L	%	%	%
Arsenic	EP0600044-001	QC1	0.001 mg/L	0.2	<0.001	102	70	130
Cadmium			0.0001 mg/L	0.05	0.0001	100	70	130
Chromium			0.001 mg/L	0.2	0.001	96.7	70	130
Manganese			0.001 mg/L	0.2	0.016	100	70	130
Nickel			0.001 mg/L	0.2	0.003	98.7	70	130
Zinc			0.005 mg/L	0.2	0.038	101	70	130
EK055G: Ammonia as N by Discrete Analyser								
EK055G: Ammonia as N by Discrete Analyser - (QC Lot: 159016)				mg/L	mg/L	%	%	%
Ammonia as N	EP0600044-002	PZ1	0.01 mg/L	1	<0.010	111	70	130

CHAIN OF CUSTODY DOCUMENTATION 200468

ALS Environmental

CLIENT: PB	LABORATORY BATCH NO.:
POSTAL ADDRESS: 1 Alvan St Subiaco.	SAMPLERS:
SEND REPORT TO: Julie Palych SEND INVOICE TO:	PHONE: FAX: EMAIL:
DATA NEEDED BY: Friday 13th Jan REPORT NEEDED BY:	REPORT FORMAT: HARD: ☐ FAX: ☐ E-MAIL: ☐
PROJECT ID: 21451670 QUOTE NO.: PE-049-05	QC LEVEL: QCS1: ☐ QCS2: ☐ QCS3: ☐ QCS4: ☐
P.O. NO.: COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:	ANALYSIS REQUIRED
FOR LAB USE ONLY	
COOLER SEAL	Note turn around
Yes ..... No	
Broken..... Intact	
COOLER TEMP. deg. C	

SAMPLE DATA				*CONTAINER DATA			NOTES
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH	
QC1 x3		10.1	12noon	NA			Dissolved Red 30
PZ 1 x3							Total Red 100
PZ 2 x3 (1)							Green 200
PZ 3 x3 (2)							Purple 50
PZ 4 x3							Yellow 100
PZ 5 x3							
PZ 6 x3							

Diss Al, Al, Cr, Cr, Fe 20 mL, Mn, Ni, Zn, Se, Total Al Fe 18, Acidity 50, Alkalinity 50, pH, SO4, Cl 50, NH3, H2S 100, EC, TDS 50

ALS Environmental
Perth
Work Order
EP0600044
Report Version: AliquotLabel 1.02
Telephone : 61-8-9209-7655

RELINQUISHED BY		RECEIVED BY		METHOD OF SHIPMENT
NAME: Kim Sammut	DATE: 10.1.06	NAME: SHAUN CRABB	DATE: 10/1/06	CONSIGNMENT NOTE NO.
OF: PB	TIME: 12noon	OF: ALSE	TIME: 16.40	
NAME:	DATE:	NAME:	DATE:	TRANSPORT CO. NAME
OF:	TIME:	OF:	TIME:	

*Container Type and Preservative Codes: **P** = Natural Plastic; **N** = Nitric Acid Preserved; **C** = Sodium Hydroxide Preserved; **J** = Solvent Washed Acid Rinsed Jar; **S** = Solvent Washed Acid Rinsed Glass Bottle; **V** = Vial; **VC** = Hydrochloric Acid Preserved Vial; **VS** = Sulphuric Acid Preservative Vial; **BS** = Sulphuric Acid Preserved Glass Bottle; **PS** = Sulphuric Acid Preserved Plastic Bottle; **Z** = Zinc Acetate Preserved Bottle; **E** = EDTA Preserved Bottle; **H** = Hydrochloric Acid Preserved Plastic Bottle; **F** = Formaldehyde Preserved; **ST** = Sterile Bottle; **B** = Plastic Bag; **O** = Other

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