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AUSTRALIA PACIFIC LNG

Australia Pacific LNG - Dredge Area Option 1B

Sediment Characterisation Study

30-Oct-09

301001-00752-00-EV-REP-0001 - APLN-000-PC-R01-D-0001

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AUSTRALIA PACIFIC LNG - DREDGE AREA OPTION 1B

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
0	Issued for information	V Seto	A Cohen	S Wakefield	30-Oct-09	N/A	

Executive Summary

Australia Pacific LNG Pty Limited (APLNG) is proposing to develop a liquefied natural gas (LNG) plant on the western side of Curtis Island, as part of its development of coal seam gas (CSG) reserves in Queensland. The establishment of the LNG plant will require the construction of wharf and jetty structures, to enable the loading of the LNG vessels. Construction may also involve the establishment of a materials offloading facility (MOF), for the transfer of building materials, heavy equipment and people to the project site.

As part of construction of the marine infrastructure, dredging will be conducted at the proposed wharf, berth pockets, MOF and dredged material. Dredging will be conducted in two phases; firstly by dredging within the initial berth location (Phase 1), followed by dredging within the second berth location (Phase 2). Phase 1 and 2 dredging activities will occur within an approximate 127ha footprint, referred to as Option 1B and will be to a depth of RL-13.0m LAT in the two swing basins and RL-8.5m LAT in all other areas. An additional 1m has been allocated for over-dredging, resulting in a final depth of RL-14.0m within the swing basins and RL-9.5m in all other areas.

A total of approximately 11.32 Million m^3 of material will be dredged, as part of capital dredging activities. Approximately 60% of the dredge area Option 1B is congruent with the Gladstone Port Corporation (GPC) Port of Gladstone Western Basin Dredging and Disposal Project. As GPC will be conducting similar studies within their project area, this study will therefore sample within the remaining area (i.e. approximately 51ha), which lies outside of the GPC Western Basin Dredging and Disposal Project.

The procedures adopted for sampling and analysis within the APLNG dredging project were based on the methods and sampling approach detailed in the draft sediment sampling and analysis plan (SAP) for the Western Basin Dredging and Disposal Project, proposed by GPC in July, 2009 and commented on by the Department of the Environment, Water, Heritage and the Arts (DEWHA) and the Department of Environment and Resource Management (DERM) in September, 2009. As adopted for the present study, the SAP for the Western Basin Dredging and Disposal Project was based on a pilot-scale study design, whereby a reduced number of sample locations (20%) were surveyed, compared to that prescribed for a full sample program.

Sampling design was based on a dredge volume of 539,000m^3. Field sampling was undertaken at a total of six randomly selected locations and samples tested for the contaminant substances and physical characteristics listed in Table 1-1. In addition, acid sulphate soil (ASS) testing was undertaken at a total of 21 sampling locations using a combination of field ASS testing and laboratory testing. Following sampling, slight modification was made to the dredge footprint which resulted in a few locations being marginally outside the new bounds.

Table 1-1 Contaminants and physical characteristics tested

Particle size distribution (PSD)	Total Petroleum Hydrocarbons (TPH)
Moisture content	Organophosphorus Pesticides (OPP)
Total Organic Carbon (TOC)	Organochlorine Pesticides (OCP)
Metals (Al, Sb, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, V, Zn)	Polychlorinated Biphenyls (PCB)
Organotins (TBT)	Polycyclic Aromatic Hydrocarbons (PAH)
Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	

Golder Associates Pty Ltd (Golder) were sub-contracted to undertake the in-field sampling and analysis and reporting for acid sulphate soils. Golder engaged GeoCoastal, to undertake the overwater vibrocoring and Shine Drilling, Australian Barge Hire and Drillsure to undertake the drilling. Sampling was undertaken between 21 September and 22 September, 2009, using vacuum-vibrocoring techniques and 25 August and 26 August, 2009 using split spoon sampling techniques.

A continuous sediment core was recovered using vacuum-vibrocoring techniques, which enabled the recovery of all sedimentary material, including unconsolidated sediments such as flowing sands. This method prevented cross contamination or vertical mixing of samples and enabled the collection of a high volume of sample for multi-parameter analyses and sub-sampling. When refusal occurred using the vibrocore, split spoon sampling drilling techniques were used to recover sample to the required dredge depth. Each borehole location was located using a differential GPS (accurate to ± 3-5m).

For contaminant testing within each borehole, two sub-samples were collected from the top 1m of the core at 0.5m intervals. Below 1m sediment depth, sub-samples were collected and composited at approximately 1m intervals from 1.0 – 5.0m and from below 5.0m (where sample was recovered). Samples collected below vibrocore refusal (drilling techniques) were taken at 1m intervals, from approximately 450mm cores.

ASS samples were initially screened at approximately 0.5m vertical intervals (in accordance with QASSIT methodology) in at least 25% of the locations sampled (ie five locations). Less intensive analysis was conducted on the remaining cores, at a rate of 1 test per 1-2m of core (depending on results of in-situ sampling). Screening was undertaken by Golder using the pH_F (field pH) and pH_{FOX} (ph following peroxide oxidation) method of analysis. A representative number of samples selected from the screened samples were sent to the primary laboratory and subjected to the full SPOCAS or S_{CR} test suites.

Primary sediment analysis was completed by a NATA accredited laboratory, Australian Laboratory Services (ALS). A secondary laboratory (Advanced Analytical Australia, AAA) was used as part of quality assurance procedures. Sediment contaminant concentrations were assessed against: the *National Assessment Guidelines for Dredging* (NAGD; Commonwealth of Australia, 2009); and Environmental Investigation Levels (EIL) and Health Investigations Levels for residential land use (HIL-A) in the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (DEH, 1998).

Chemical analyses conducted on sediments sampled within capital dredging area Option 1B revealed concentrations generally below NAGD Screening Levels, with the exception of arsenic (two samples), mercury (two samples), copper (one sample), lead (one sample), and nickel (one sample) in sediments below 1m depth. Arsenic, nickel and copper were reported in previous studies at naturally high concentrations in the region (URS, 2009). Given that all contaminants exceeding NAGD Screening Levels occurred in sediments below 1m depth, it is likely that these results are indicative of natural levels.

In comparison with DEH (1998) guidelines, two arsenic, one copper and seven manganese concentrations were reported above the EILs and further, three samples reported manganese concentrations above the HIL-A. Two of the manganese EIL exceedances occurred in the surface sediments, with the remaining five occurring in sediments below 1m. All exceedances of HIL-A were in sediments between 2m and 4.75m. The reason for the elevated arsenic and copper concentrations

is discussed above. Manganese has also been previously recorded above the EIL in the Port of Gladstone and was considered to be at naturally occurring concentrations (URS, 2009).

Survey results for organic contaminant substances in the APLNG dredge area Option 1B are summarised below:

- TPH fraction C6-C9 was below the detection limit in all samples;
- TPH fraction C10-C14 was above the detection limit in one sample only, in sediments below 1m;
- TPH fractions C15-C28 and C29-C36 were above detection limits in the majority of samples throughout the sediment horizons;
- All PAHs, except one, were below detection limits across all sample locations and sediment horizons. Phenanthrene was detected in one sample from surface sediments; and
- BTEX, TBT, OCP, OPP and PCBs were below respective detection limits in all samples.

The 95% UCL of the mean for all contaminants tested in dredge area Option 1B were below the respective NAGD Screening Levels. The 95% UCL of the mean for manganese exceeded the DEH (1998) EIL for sediments below 1m. All other contaminants were below the EIL and HIL-A guidelines at the 95% UCL of the mean. Power analysis conducted on sample results within dredge area Option 1B, confirmed that statistically valid comparisons could be made against the NAGD Screening Levels, even at the pilot level of sampling undertaken.

Results of the ASS testing indicated that all Holocene sediment samples had an absence of actual acidity (i.e not Actual ASS [AASS]). It was also indicated that the Holocene sediments within the northern and southern most extents of the study area have moderate to high levels of oxidisable sulphur, meaning that these Holocene sediments are Potential ASS (PASS). In these areas Acid Neutralising Capacity (ANC) was not sufficient to neutralise this acidity. As such, these areas would require treatment with good quality agricultural lime at a rate of up to 140kg of lime/m^3. Based on the quantity of sediments to be dredged and the level of acidity, the treatment category, according to QASSIT guidelines and State Planning Policy 2/02 is considered ‘extra high’.

Based on the analyses undertaken for the APLNG dredge area Option 1B, it is considered that the capital material to be dredged is suitable for unconfined placement at sea, according to the NAGD contaminant assessment framework. It is also suitable for placement on land, subject to acid sulphate soils management requirements.

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1. Introduction

1.1 Background

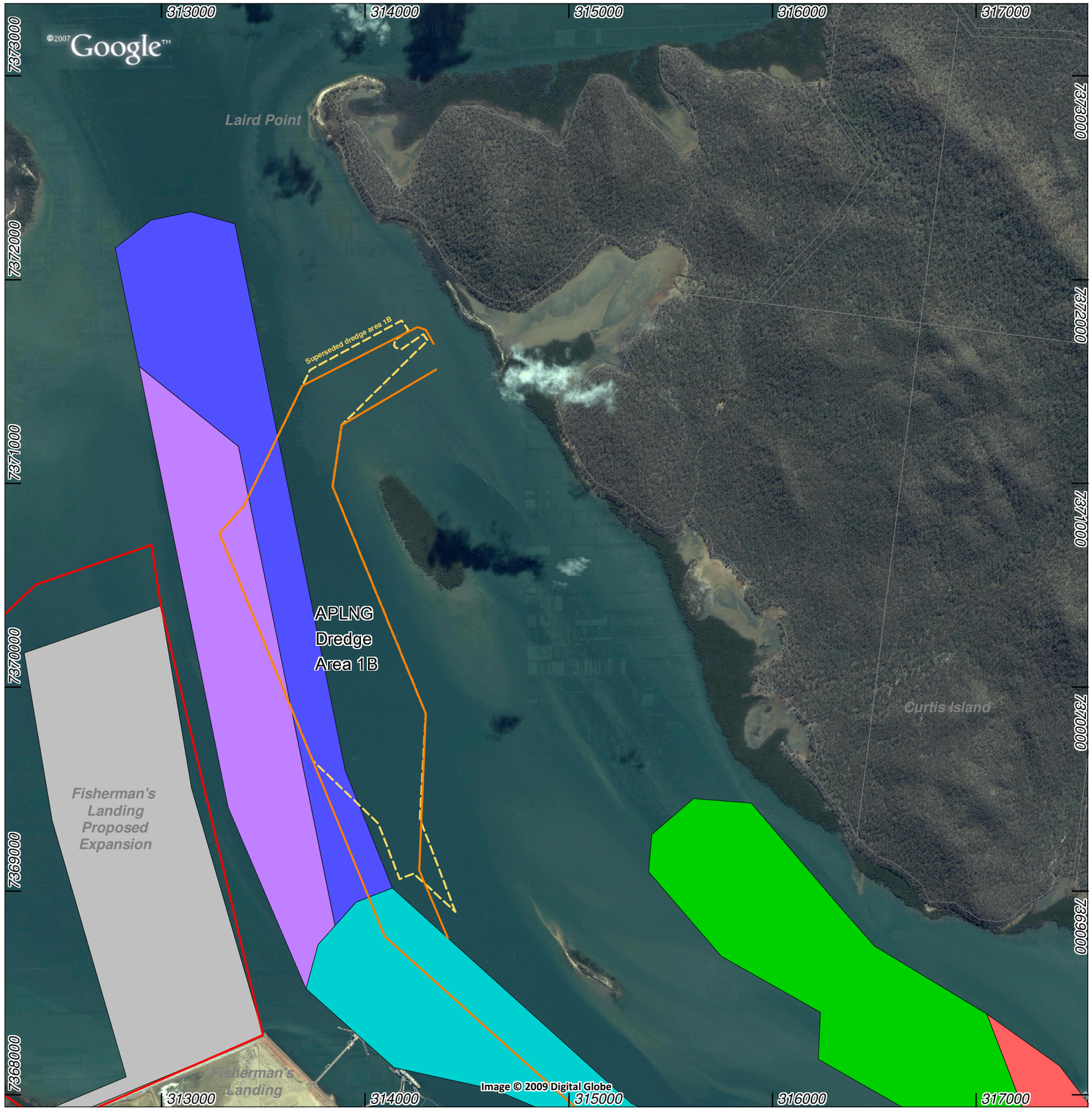
Australia Pacific LNG Limited (APLNG) is seeking to accelerate the development and production of its coal seam gas (CSG) reserves in Queensland through the development of a CSG to liquefied natural gas (LNG) project. The proposed CSG to LNG Project, which is the largest under consideration in Australia, will encompass the further development of APLNG's CSG fields, the construction of a gas transmission pipeline(s), together with the construction of a LNG plant and associated port infrastructure to export LNG to international markets.

APLNG is proposing to develop the LNG plant on the western side of Curtis Island. The establishment of the LNG plant will require the construction of wharf and jetty structures to enable the loading of the LNG vessels. Construction may also involve the establishment of a materials offloading facility (MOF) for the transfer of building materials and heavy equipment and people to the project site.

As part of construction of the marine infrastructure, dredging will be conducted at the proposed wharf, berth pockets, MOF. Dredging will be conducted in two phases; firstly by dredging within the initial berth location (Phase 1), followed by dredging within the second berth location (Phase 2). Phase 1 and 2 dredging activities will occur within an approximate 127ha footprint, referred to as Option 1B and will be to a depth of RL-13.0m LAT in two swing basins and RL-8.5m LAT in all other areas. An additional 1m has been allocated for over-dredging, resulting in a final depth of RL-14.0m within the swing basins and RL-9.5m in all other areas. A total of approximately 11.32 Million m^3 of capital dredging is required.

Approximately 60% of the dredge area Option 1B is congruent with the Gladstone Port Corporation (GPC) Port of Gladstone Western Basin Dredging and Disposal Project. As GPC will be conducting similar studies within their project area, this study will therefore sample within the remaining area, which lies outside of the GPC Western Basin Dredging and Disposal Project. These works extend a maximum of approximately 300m to the east of the proposed GPC stage 2 dredging area, and cover an area of approximately 51 hectares.

Dredged material is proposed for placement in the Western Basin Reclamation area at Fisherman's Landing, along with the other material dredged from GPC's Western Basin Dredging and Disposal Project.



LEGEND

- Cadastral boundaries
- APLNG Dredge Area 1B
- Superseded Dredge Area 1B

Dredge Areas - Gladstone Ports Corporation

- Stage 1A - North China Bay LNG Precinct
- Stage 1B - Fisherman's Landing LNG
- Stage 2 - Laird Point LNG
- Stage 3 - Fisherman's Landing
- Stage 4 - Hamilton Point

Proposed dredge area digitised from Bechtel CAD drawing 25509-100-K0-K01-00002.dgn supplied on 11/09/2009.
Dredge areas translated from GPC CAD drawing xFootprint_030909.dxf supplied 10/09/2009
Superseded dredge area digitised from Halcrow CAD drawing EAUSP100-026-00.dwg dated 15/07/2009
Aerial photography sourced from Google Earth 28/09/2009

0 500m

SCALE - 1:20,000 (at A3)

N W E S

Map Grid of Australia Zone 56
Geocentric Datum of Australia 1994

Google Earth image captured 28/09/2009

Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
A	22/09/2009	Issued for squad check	MM	KM		

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Figure 1-1 - Location of APLNG's Dredge Area 1B in Relation to the Gladstone Port Corporation's Western Basin Dredge Project

Project No: 301001-00752	Figure: 00752-00-EN-DAL-0062	Rev: A

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1.1.1 Sampling and Analysis Plan

The procedures adopted for sampling and analysis within the APLNG dredging project were based on the methods and sampling approach detailed in the draft sediment sampling and analysis plan (SAP) for the Western Basin Dredging and Disposal Project, proposed by GPC in July, 2009 and commented on by the Department of the Environment, Water, Heritage and the Arts (DEWHA) and the Department of Environment and Resource management (DERM) in September, 2009. As adopted for the present study, the draft SAP for the Western Basin Dredging and Disposal Project was based on a pilot-scale study design, whereby a reduced number of sample locations (20%) were surveyed, compared to that prescribed for a full sample program. Additional sampling to that proposed by GPC was undertaken here, including drilling for sample material beyond the depth of vibrocore refusal and undertaking additional acid sulphate soil assessment.

1.2 Project Objectives

WorleyParsons was commissioned by APLNG to characterise sediments within the Option 1B dredge area at Laird Point, Curtis Island. The objectives of the study were to:

- Undertake a pilot program of sediment sampling and analysis, consistent with the Western Basin Dredging and Disposal Project draft SAP study methods (GHD, 2009);
- Test and analyse sediments for a range of physical and chemical properties;
- Provide a comparison of contaminant concentrations against the *National Assessment Guidelines for Dredging* (NAGD; Commonwealth of Australia, 2009) Screening Levels and the DEH (1998) environment and health investigation levels;
- Undertake a pilot program of acid sulphate soils assessment, to provide an indication of the extent of acid sulphate soils present within the dredge footprint; and
- Determine the suitability of sediments for placement on land, or for unconfined sea disposal.

2. Methods

2.1 Sampling Locations and Horizons

For characterising sediments, a pilot study was undertaken in accordance with the NAGD, whereby a reduced number of locations were selected within the dredging area. Pilot programs sample approximately 20% of the total number of locations prescribed for characterising contaminated sediments as part of a detailed sampling and analysis program. For capital dredging programs assessed under the NAGD, the volume of potentially contaminated sediment is nominally identified as that which occurs within the top 1m.

The sampling intensity selected was based on a total dredge volume of 539,000m^2. Such a volume exceeds that identified within Table 6 in Appendix D of the NAGD, so the equation to linearly extend Table 6 was applied. Based on that equation, 30 sample locations are required for a full survey. For the proposed pilot study however, six sample locations were chosen.

Sample locations were selected by first overlaying a sampling grid over the intended dredge area, with the grid containing at least five times the full number of sampling location numbers (i.e. greater than 5 x 30 = 150). Final selection of six grid cell locations for sampling was undertaken using random number generation.

Acid sulphate soils testing (ASS) was undertaken at a total of 21 locations. This number was also based on pilot level approach of 20% of samples that would normally be required under the terms of the QASSIT Sampling Guideline for Acid Sulphate Soils (1997), which is based on disturbance area. Two of the 21 sample locations were congruent with that sampled in the Option 2A dredge study area (WorleyParsons 2009). The results of these sample locations have been previously reported and as such this report focuses on the remaining 19 sample locations within dredge area Option 1B. The 19 sample locations included the six randomly located locations sampled for contaminant status assessment, and another 13 sampling locations evenly distributed across the dredge footprint.

A map showing all sampling locations is provided in Figure 2.1 and Table 2.1 provides a list of the GPS coordinates and sampling depth for each core. Note that following completion of sampling, minor modification was made to the dredge footprint, resulting in a few sampling locations being marginally outside the new bounds of dredging.

Samples were labelled according to the following nomenclature:

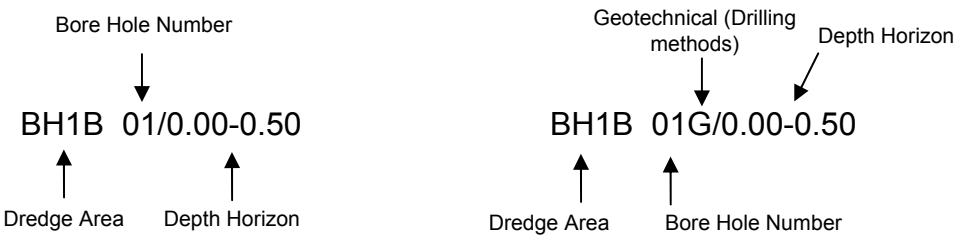


Table 2-1: Sample locations, depth of cores and number of horizons sampled for each borehole

Sample Site	Latitude (S)	Longitude (E)	Vibrocore Sediment Depth (*Drilled Core Sediment Depth*) m	Analysis Completed	No. of Horizons Analysed for Contaminants	No. of Horizons Laboratory Analysed ASS
BH 01	23°45.305'	151°10.563'	1.6 *(7.95)*	Contaminant + ASS	8	4
BH 02	23°45.469'	151°10.431'	5.8 *(10.45)*	Contaminant + ASS	12	5
BH 03	23°45.916'	151°10.430'	3.6 *(5.45)*	Contaminant + ASS	6	4
BH 04	23°46.241'	151°10.607'	2.0	Contaminant + ASS	3	3
BH 05	23°46.527'	151°10.559'	3.4	Contaminant + ASS	5	4
BH 06	23°46.691'	151°10.647'	0.6	Contaminant + ASS	2	2
BH 07	23°45.332'	151°10.497	1.6	ASS	-	3
BH 08	23°45.373'	151°10.376'	5.3	ASS	-	11
BH 09	23°45.469'	151°10.354'	5.7	ASS	-	5
BH 10	23°45.604'	151°10.383'	7.2	ASS	-	15
BH 11	23°45.725'	151°10.393'	5.7	ASS	-	6
BH 12	23°46.023'	151°10.462'	2.0	ASS	-	5
BH 13	23°46.140'	151°10.482'	0.8	ASS	-	3
BH 14	23°46.278'	151°10.489'	1.9	ASS	-	3
BH 15	23°46.328'	151°10.620'	1.2	ASS	-	3
BH 16	23°46.448'	151°10.626'	0.8	ASS	-	2
BH 17	23°46.609'	151°10.603'	1.1	ASS	-	3
BH 18	23°46.787'	151°10.709'	4.8	ASS	-	5

Sample Site	Latitude (S)	Longitude (E)	Vibrocore Sediment Depth (*Drilled Core Sediment Depth*) m	Analysis Completed	No. of Horizons Analysed for Contaminants	No. of Horizons Laboratory Analysed ASS
BH 19	23°46.403'	151°10.526'	2.2	ASS	-	3

2.2 Sample Collection

Golder Associates Pty Ltd (Golder) was sub-contracted to undertake the sampling and analysis for a wide range of substances from within the Option 1B dredge area. Golder engaged GeoCoastal to undertake the overwater vibrocoring, Shine Drilling Pty Ltd (Shine Drilling) for 'shallow water' drilling, and Australian Barge Hire Pty Ltd (ABH) and Drillsure Pty Ltd (Drillsure) for 'deeper water' drilling. Vibrocore samples were taken between 21 September and 22 September, 2009 and drilling samples were taken between 25 August and 26 August 2009.

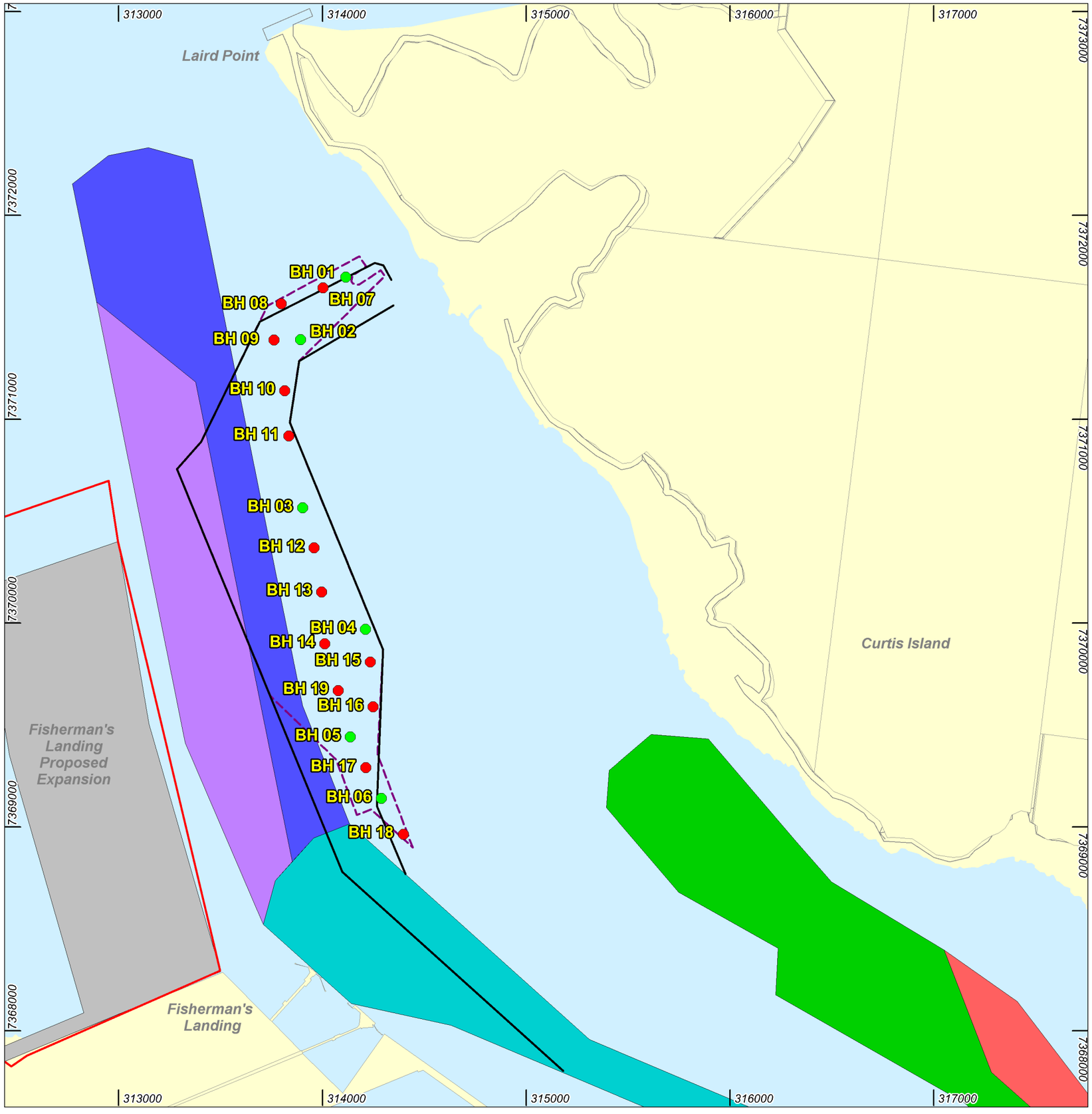
2.2.1 Vibrocoring

GeoCoastal utilised a vacuum-vibrocoring system that enabled the recovery of a continuous core of all sedimentary media, including unconsolidated sediments such as flowing sands. The method prevented cross-contamination, or vertical mixing of samples and enabled the collection of a high volume of sample for multiple analyses and sub-sampling.

The vacuum-vibrocoring system was mounted on a dumb barge/support vessel combination. The vibrocoring system used a thin-wall (2mm) stainless steel barrel to collect continuous, undisturbed sediment cores of 70mm diameter, which is extruded into plastic sheathing, for transport back to shore for processing in a controlled environment. The core barrel was thoroughly washed by a combination of high pressure water and air combined with vibration between coring runs. On average, a recovery rate of better than 95% (sample contained within the core) was achieved throughout the sampling program. A differential GPS (accurate to ± 3-5m) was used to locate each borehole location and relocate the vessel and marine coring equipment around the dredging site.

2.2.2 Drilling

Shine Drilling used a Rason 300 drilling rig, mounted on a jack-up barge and Drillsure used a Hydrapower Scout track rig mounted on a larger jack-up barge. Boreholes were drilled by open-hole rotary wash boring, in conjunction with casing advancement and using polymer 'mud' as required for cutting removal and borehole stability. A single U50/U75 undisturbed tube sample was recovered from each borehole. Actual (as built) locations of the boreholes were surveyed by North Surveys Pty Ltd following barge positioning and commencement of drilling. Sample locations are shown in Figure 2-1.



LEGEND

- APLNG Dredge Area 1B
- Superseded Dredge Area 1B

Dredge Areas - Gladstone Ports Corporation

- Stage 1A - North China Bay LNG Precinct
- Stage 1B - Fisherman's Landing LNG
- Stage 2 - Laird Point LNG
- Stage 3 - Fisherman's Landing
- Stage 4 - Hamilton Point

Analysis Points

- Acid Sulfate Soil Only
- Contaminant and Acid Sulfate Soil

Proposed dredge area digitised from Bechtel CAD drawing 25509-100-K0-K01-00001.dgn supplied on 15/09/2009.
Dredge areas translated from GPC CAD drawing xFootprint_030909.dxf supplied 10/09/2009
Superseded dredge area digitised from Halcrow CAD drawing EAUSP100-026-00.dwg dated 15/07/2009
Sampling site coordinates received from Golder Associates 30/09/2009 via Wayne Asnicar of Worley Parsons
Superseded sampling site coordinates received from Vivian Seto 15/09/2009

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Map Grid of Australia Zone 56
Geocentric Datum of Australia 1994

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Figure 2-1 - Sample Locations Dredge Area 1B

Project No: 301001-00752	Figure: 00752-00-EN-DAL-0061	Rev: A

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2.3 Sample Handling and Processing

2.3.1 Vibrocoring

The sealed cores were kept refrigerated on the barge and brought back to shore daily where they were retained in a refrigerated unit until logged and sub-sampled on the following day. Each sheathed vibro-vacuum core was placed onto cleaned PVC half-pipe supports. The top of the sheath was then carefully sliced lengthways to expose sufficient core for photographing, logging and sub-sampling.

Generally, the cores were split in half vertically and ASS screening sub-samples (about 10g) collected at 0.25m intervals. Then a representative longitudinal sample was recovered for ASS quantitative testing, by running a cleaned spatula along the length of the core. For contaminant testing in relevant boreholes, two sub-samples were collected from the top 1m of the core, at 0.5m intervals. Below 1m, sub-samples were collected and composited at approximately 1m intervals from 1.0-5.0m and from below 5.0m (where sample was available). Samples from 1m to 5m depth were submitted for analysis and the remaining samples (where the Holocene alluvium extends beyond 5m depth) were submitted to the laboratory for storage until results of analysis were known. If no contaminants above NAGD Screening Levels were detected in the immediately overlying samples (i.e. the 4-5m sample), then these deeper samples were not analysed.

Sub-samples were recovered from soil cores using a stainless steel spatula that was thoroughly cleaned between samples, using a three rinse process of post-wash rinsing, washing in detergent (Decon 90) and rinsing with de-ionised water. Sub-samples were promptly transferred into the laboratory supplied sample jars (to be used for the contaminant analysis) and plastic bags (for PSD and acid sulphate soil testing).

The material for each contaminant sample was homogenised and sub-sampled into a jar (or jars), if no volatile analysis was required. For volatiles, a number of evenly distributed representative sub-samples were recovered and placed in the jar to fill it, leaving no ‘head space’, in order to prevent any loss of volatiles during mixing.

Samples were again homogenised at the laboratory, except when volatiles analyses were required. In this instance, the jar was opened and a small longitudinal ‘core’ was recovered from the full depth of the jar and used for volatiles analysis.

Logging was conducted in the field by a scientist experienced in logging marine sediment cores. Characteristics of the sediment including texture, consistency, colour, proportional grain size estimations, presence of accessory material (biological matter, organic debris, shells etc.), were recorded against depth. Stratigraphical soil logs were produced for each core.

Chain of custody (COC) forms were completed for all samples collected, to track movement from sample collection, analysis at the laboratory, through to reporting.

2.3.2 Drilling

Drilling techniques were used to obtain samples from below the vibrocore refusal depth, to the required dredge depth, which considers overdredging.

Standard Penetration Tests (SPT) were carried out at 1m depth intervals within the boreholes (beyond the vibrocore refusal depth), to provide an indication of in situ strength of the soil strata; and for the recovery of disturbed samples. Undisturbed tube samples (U50/U75) were also recovered at selected depths in suitable cohesive strata. A single U50/U75 undisturbed tube sample was recovered from each borehole.

The 38mm diameter samples recovered from the SPT split-spoon were approximately 450mm in length. These and the single 50mm U50 sample from each borehole were used to provide samples for calculation of bulk density, and to undertake moisture, particle size distribution and settling rate tests. A small sub-sample was also recovered from each sample and submitted for heavy metals analysis.

Logging was conducted in the field by an experienced geotechnical engineer from Golders. Characteristics of the soils including texture, consistency, colour, proportional grain size estimations and presence of accessory material (biological matter, organic debris, shells etc.) were recorded against depth. Stratigraphical soil logs were produced for each core.

Sample processing was similar to that completed for vibrocoring. As for vibrocore sampling, chain of custody (COC) forms were also completed for all samples collected via split spoon sampling, to track movement from coring, analysis at the laboratory through to reporting.

2.3.3 Physical and Chemical Testing

Primary sediment analyses were completed by Australian Laboratory Services (ALS). Inter-laboratory quality control testing was undertaken by Advanced Analytical Australia (AAA). Both laboratories are NATA accredited for the analyses performed and experienced in the analysis of contaminant substances in marine sediments.

Table 2-2 provides a list of the physical and chemical tests performed and Table 2-3 provides a summary of the actual analyses performed at each sample location and depth horizon.

Table 2-2 Physical and chemical tests performed

Particle size distribution (PSD)	Total Petroleum Hydrocarbons (TPH)
Moisture content	Organophosphorus Pesticides (OPP)
Total Organic Carbon (TOC)	Organochlorine Pesticides (OCP)
Metals (Al, Sb, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, V, Zn)	Polychlorinated Biphenyls (PCB)
Organotins (TBT)	Polycyclic Aromatic Hydrocarbons (PAH)
Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	

For samples collected using vibrocoring, moisture content, metals, TBT, PAHs and TOC testing was undertaken on each sample within the upper 1m of sediment. TBT analysis was not undertaken on sediments below 1m sediment depth, as TBT was considered likely to be present only in the upper unconsolidated sediment layer. Other contaminants were tested at only half of the sampling locations, since they were likely to be below detection limits based on the results of previous nearby sampling survey (GHD, 2009). Samples collected using split spoon sampling at drilling depths were tested for metals, particle size and moisture content only, as anthropogenic compounds were unlikely to occur in these deeper, undisturbed sediments.

Table 2-3: Sample contaminant analyses undertaken at sampling locations in dredge area Option 1B

Borehole	Horizon	Coring Method*	Moisture Content	PSD	TOC	Metals	TBT	BTEX	TPH	OPP	OCP	PCB	PAH
BH 1	0.00 – 0.20	V	X	X	X	X	X						X
	0.20 – 0.70	V	X	X	X	X	X						X
	0.70 – 1.60	V	X	X	X	X							X
	2.50 – 2.66	D	X			X							
	4.50 – 4.95	D	X			X							
	5.50 – 5.95	D	X			X							
	6.50 – 6.95	D	X			X							
	7.50 – 7.95	D	X			X							
BH 2	0.00 – 0.50	V	X	X	X	X	X	X	X	X	X	X	X
	0.50 – 1.00	V	X	X	X	X	X	X	X	X	X	X	X
	1.00 – 2.00	V	X	X	X	X		X	X	X	X	X	X
	2.00 – 3.00	V	X	X	X	X		X	X	X	X	X	X
	3.00 – 4.00	V	X	X	X	X		X	X	X	X	X	X
	4.00 – 4.75	V	X	X	X	X		X	X	X	X	X	X
	4.75 – 5.80	V	X	X	X	X		X	X	X	X	X	X
	5.00 – 5.45	D	X			X							
	6.00 – 6.45	D	X			X							
	8.00 – 8.45	D	X			X							
	9.00 – 9.45	D	X			X							
	10.00 – 10.45	D	X			X							
BH 3	0.00 – 0.50	V	X	X	X	X	X	X	X	X	X	X	X
	0.50 – 1.00	V	X	X	X	X	X	X	X	X	X	X	X
	1.00 – 2.25	V	X	X	X	X		X	X	X	X	X	X
	2.50 – 3.60	V	X	X	X	X		X	X	X	X	X	X
	4.00 – 4.45	D	X			X							
	5.00 – 5.45	D	X			X							
BH 4	0.00 – 0.20	V	X	X	X	X	X						X
	0.20 – 0.50	V	X	X	X	X	X						X
	0.50 – 1.00	V	X	X	X	X	X						X
	1.00 – 2.00	V	X	X	X	X							X
BH 5	0.00 – 0.50	V	X	X	X	X	X	X	X	X	X	X	X
	0.50 – 1.00	V	X	X	X	X	X	X	X	X	X	X	X
	1.00 – 1.50	V	X	X	X	X	X	X	X	X	X	X	X
	1.50 – 2.30	V	X			X							
	2.30 – 3.30	V	X			X							
BH6	0.00 – 0.40	V	X	X	X	X	X						X
	0.40 – 0.60	V	X	X	X	X	X						X

Note: * V = Vacuum vibrocoring; D = Drilling

Additional samples were submitted for analytical testing for quality control purposes, in accordance with NAGD requirements (refer Section 2.4.1 for further details). These QC samples assessed:

- Sediment homogeneity – a 'replicate triplicate' sample (ie. three separate samples taken within $1m^3$);
- Laboratory variation – a 'split triplicate' sample – two samples sent to the 'primary laboratory' and a third sent to a secondary ('check') laboratory;
- Analytical variation – a sample 'split duplicate' analysed in one batch was submitted in a later batch; and
- Volatile transfer between samples – a 'trip blank' consisting of inert chromatographic sand was shipped in the sealed eskies with samples.

Laboratory limits of reporting (LORs) are identified as the lowest chemical analysis level that can be reliably achieved within specified limits of precision and accuracy, during routine laboratory operating conditions. Only sediments within the top 1m were analysed for compliance with Practical Quantitation Limits (PQLs) required under Appendix A, Table 1 of the NAGD. This is because capital dredging sediment sampling and analysis programs typically only require testing for contaminants in the upper 1m of sediment. Physical testing only is required for material below 1m under the NAGD, however select chemical analysis have also been undertaken here in accordance with laboratory LORs. The LORs reported in Table 2-4 were applicable to the analyses undertaken for both the top 1m and sediment below 1m as identified.

Table 2-4: Laboratory LOR for analyses undertaken

Analyte	NAGD PQL		LOR for Analysis of Top 1m of Sediment	LOR for Analysis of Sediments Below 1m
Moisture Content	-		1%	1%
Total Organic Carbon	-		0.02%	0.02%
Metals	Al	200mg/kg	50mg/kg	50mg/kg
	Fe	100mg/kg	50mg/kg	50mg/kg
	Mn	10mg/kg	10mg/kg	5mg/kg
	V	2mg/kg	2mg/kg	5mg/kg
	As	1mg/kg	1mg/kg	5mg/kg
	Cr	1mg/kg	1mg/kg	2mg/kg
	Cu	1mg/kg	1mg/kg	5mg/kg
	Pb	1mg/kg	1mg/kg	5mg/kg
	Ni	1mg/kg	1mg/kg	2mg/kg
	Zn	1mg/kg	1mg/kg	5mg/kg
	Sb	0.5mg/kg	0.5mg/kg	5mg/kg
	Co	0.5mg/kg	0.5mg/kg	2mg/kg

Analyte	NAGD PQL	LOR for Analysis of Top 1m of Sediment	LOR for Analysis of Sediments Below 1m
	Cd 0.1mg/kg	0.1mg/kg	1mg/kg
	Se 0.1mg/kg	0.1mg/kg	5mg/kg
	Ag 0.1mg/kg	0.1mg/kg	2mg/kg
	Hg 0.01mg/kg	0.01mg/kg	0.01mg/kg
TBT	1 μgSn/kg	0.5 μgSn/kg	0.5 μgSn/kg
BTEX	0.2mg/kg	0.2mg/kg	0.2mg/kg
TPH	100mg/kg	3mg/kg	3mg/kg
OPP	10-100μg/kg (varies according to toxicity	10μg/kg	10μg/kg
OCP	1μg/kg	0.5μg/kg (HCB and chlordanes 0.25μg/kg)	0.5μg/kg (HCB and chlordanes 0.25μg/kg)
PCB	5μg/kg	5μg/kg	5μg/kg
PAH	5μg/kg	4μg/kg (Naphthalene, 2-Methylnaphthalene, Coronene 5μg/kg)	4μg/kg (Naphthalene, 2-Methylnaphthalene, Coronene 5μg/kg)

2.3.4 Acid Sulphate Soils Testing

Sediments were initially screened for acid sulphate soils presence at approximately 0.5m vertical intervals (in accordance with QASSIT methodology) in at least 25% of the locations sampled (ie five locations). Less intensive screening was undertaken on the remaining cores, at a rate of one test per 1–2m or core (depending on results of sampling).

Screening was done by Golder using the pH_F (field pH) and pH_{FOX} (pH following peroxide oxidation) method of analysis. The pH_F/pH_{FOX} screening method consisted of two steps; initially determining the field pH of a 1:5 soil/water suspension, followed by the addition of 30% Hydrogen Peroxide, allowing the sample time to oxidise, before determining the pH_{FOX} (pH after oxidation) of the reacted sample. A significant drop in pH was indicative of potential acidity, while a low initial pH was indicative of actual acidity (not anticipated in a fully marine environment).

A representative number of samples selected from the screened samples were sent to the primary laboratory (ALS) and subjected to the full SPOCAS or S_{CR} test suites. The latter test method was used on some samples that contained significant amounts of organic matter, which could contain sulphur of organic origin, which could artificially 'inflate' the Percent Oxidisable Sulphur (S_{POS}) determined by the SPOCAS method.

Representative samples were determined according to the following method. In cores where screening indicated a complete absence of ASS, limited laboratory sampling was undertaken. However, a minimum of one sample of Holocene material was analysed from each borehole location.

Some samples from slightly deeper into the Pleistocene layer were included for analysis where the Holocene layer was less than 0.5m thick, to make up the sampling numbers in the profile at those locations. In total, 92 samples were selected for quantitative analysis by the primary laboratory. Of these 64 were Holocene in origin and 28 were Pleistocene.

2.4 Procedures for Sample Handling, Preservation, Storage and QA/QC

Prior to use, the vessel used for coring operations and all equipment was inspected and washed down. Any evident sources of contamination such as exposed metal, galvanized, or oily surfaces were cleaned, covered in plastic and taped down to avoid accidental contamination of samples.

Core samples collected from the vibro-corer were recovered in a clear plastic sleeve. The vibro-corer method for collecting soil cores prevented cross contamination and vertical mixing of samples. On the vessel, samples were placed in sealed eskies with crushed ice to keep the samples below 4°C. Onshore, the cores were then sub-sampled into appropriate sample containers. Samples were couriered to the laboratory in eskies with crushed ice, so that they remained frozen and were delivered to the laboratory within 72 hours of collection.

Soil samples are retained at the laboratory for three months after reporting.

Field sample collection and analyses followed Golder's QA/QC standard work procedures for managing soil samples and laboratory procedures. This included the following documentation:

- Sample inventory logs. Samples were allocated a Job number, borehole number and labelled with a depth of sample and date of collection;
- Sample collections were logged on the vessel. This provided a record of the drilled soil core and where samples were collected;
- Chain of Custody (COC) forms that list all the sample numbers and locations and the analyses required accompanied each batch of samples to the laboratory. At each stage of handling, samples were checked against the COCs;
- A Sample Receipt Notification (SRN) was issued by ALS upon receipt of the samples, detailing the condition of the samples, anticipated turnaround time, internal tracking and work order number; and
- Reporting of results (Certificate of Analysis) were sent via email from ALS to Golder. Final Result Certificates including QC results were issued as a PDF file. Contaminant substance results were then forwarded to WorleyParsons for compilation and data analysis.

Similar COC, SRN and analytical results reporting procedures were undertaken by the secondary laboratory, AAA.

2.4.1 Quality Control – Laboratory Analysis

The laboratories used for sediment sample analysis, ALS (primary) and AAA (secondary) are NATA accredited for the methods used and are experienced in the analysis of marine sediments.

Quality control procedures for contaminant assessment were used from sampling through to completion of laboratory analysis, including:

- COC documentation;
- Field and intra-laboratory QC protocols; and
- Inter-laboratory analyses.

Field quality control samples included one inter-batch duplicate, one field replicate triplicate, and one field split triplicate, which were taken from the following locations:

- Inter-batch duplicate (ie one sample split into two and submitted to the laboratory in two different batches):
    - BH1B 02/0.5-1.0
- Field replicate triplicate (ie three separate samples/cores collected at the one site):
    - BH1B 04/0.0-0.2
- Field split triplicate (ie one sample split into three and tested at two laboratories):
    - BH1B 02/0.0-0.5
- Field trip-blank sample.

Laboratory QC procedures were carried out in accordance with the requirements of Appendix F of the NAGD. These requirements included analysis of laboratory blank, certified reference materials, replicate and spiked samples.

Validation of the laboratory analyses was undertaken in accordance with Appendix A of the NAGD to confirm that the data quality was suitable for undertaking an assessment to characterise material proposed for dredging and disposal. Laboratory data validation included assessment of results for laboratory blanks, standards, surrogate and matrix spikes and duplicate samples. Field data validation included calculation of relative standard deviation (RSD) for field split triplicates and replicate triplicate samples, and comparison against laboratory and NAGD criteria.

2.5 Data Analysis

2.5.1 Chemical Analysis

Contaminant levels for sediments are compared against the following guidelines:

- Screening Level concentrations listed in Appendix A Table 2 of the *National Assessment Guidelines for Dredging* (Commonwealth of Australia, 2009): to assess whether the material is suitable for unconfined placement at sea, or if further testing is required (e.g. elutriate, bioavailability and/or direct toxicity assessment).
- Environmental Investigation Level (EIL) and Health Investigation Level for residential land use (HIL-A) in *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (DEH, 1998): to assess the contaminant-related suitability for placement of dredged material on land, using the most stringent of the health investigation categories (residential use).

The comparison against guideline levels involves the comparison of mean contaminant concentrations at the upper 95% confidence level (95%UCL) of the mean. For the purposes of calculation of normalised values and of 95% UCLs, values below detection limits were set to one-half of the

laboratory detection limit (LOR) in accordance with NAGD recommendations. Results for organic parameters are normalised to 1% TOC where the recorded value is within the range of 0.2 – 10%. If TOC values are outside this range, then the highest or lowest of the 0.2 – 10% range is adopted as appropriate. Organic contaminants below the LOR were not normalised to 1%TOC in 95%UCL calculations, but were left at half the LOR.

The methods used to calculate the 95% UCLs were based on those required in Appendix A of the NAGD (P58, Comparison of Data to Screening Levels). Normality of datasets was determined using Shapiro-Wilks test and quantile-quantile plots in ProUCL Version 4 (4.00.02) developed by the US EPA. Datasets were determined as being normal, log-normal or neither in their distributions. Normal datasets were analysed using the 1-tailed student's t UCL. Log-normal datasets were analysed using non-parametric jacknife analysis as recommended in the NAGD. Similarly, datasets that were neither normal nor log-normally distributed were analysed using non-parametric jacknife analysis.

Outcomes regarding the tests are presented in Section 3. Under the NAGD, if the 95%UCL values for all substances are below relevant Screening Levels, it is considered unlikely that sediment contaminants will have adverse effects on organisms living in or on that sediment. The sediment is therefore considered non-toxic and there are no chemical obstacles to unconfined sea disposal. 95% UCLs of the mean are also compared against (DEH, 1998) EIL and HIL-A guidelines as a conservative measure when assessing the suitability of the material for disposal on land.

Statistical power analysis was undertaken to determine whether acceptable statistical power was achieved to make a valid comparison against the NAGD Screening Levels given that a pilot program level of sampling was undertaken for contaminant assessment. The NAGD refers to ANZECC/ARAMCANZ (2000: Section A5.1.10) in relation to power analysis, which suggests that a Type I error rate of 5% (i.e. $\alpha = 0.05$) is conventional and Type II error rate of 20% (i.e. $\beta = 0.2$, whereby power = $1-\beta = 0.8$) is acceptable.

Power analysis was undertaken on the metals dataset only, as TBT was not detected and other contaminant groups were either not detected or were well below Screening Levels. Power analysis also identified the required number of samples to achieve a statistically rigorous comparison against NAGD Screening Levels and these are rported against the actual number of samples taken.

Analysis of power and required sample number was undertaken using the one-sample t test method, which determines whether the population mean μ (at the 95% UCL in this case) equals some specified value $\mu 0$ (Screening Level). The t-test analysis assumes a normal distribution of data. Where datasets were log-normally distributed, the Screening Level and data were log-transformed to enable use of the t-test. Where data did not have a discernable distribution, it was assumed that they approximated a normal distribution for the purposes of the analysis.

A one-sided ('one tailed') test was used in the calculation as the study is only concerned with detecting whether a contaminant concentration is above the Screening Level. The null and alternate hypothesis of the t-test state:

$H_0 : \mu - \mu_0 = 0$

$H_1 : \mu - \mu_0 > 0$

The effect size index 'd' used in the calculations is defined as:

$d = (\mu - \mu_0)/\sigma$

where σ denotes the (unknown) standard deviation in the population. Thus, if μ and μ_0 deviate by one standard deviation then d = 1.

2.5.2 Acid Sulphate Soils Analysis

The S_{CR} and SPOCAS analysis suites have been adopted by QASSIT for the analysis of ASS in Queensland. These methods include analysis and quantification of naturally occurring alkaline materials (i.e. calcite, coral debris, fine shell fragments) and any 'retained acidity', which includes sulphur held in stable oxidation minerals such as 'jarosite' which was previously not included in estimates of total acidity.

Sulphidic derived acidity had been historically determined using the following equation:

- Total Potential Acidity (TPA) = Total Actual Acidity (TAA) + Total Sulphidic Acidity (TSA)

However, experience has proved that TPA can include acidity of organic and/or mineralogical origin, as well as sulphidic origin. Thus, an overall acid-base accounting method has been derived to calculate a 'net acidity' value which is used to qualify analytical test results and calculation of liming rates. This equation is:

- 'net acidity' = actual acidity (as TAA) + retained acidity (as SNAS) + Potential Acidity (as SCR or SPOS) – insitu acid neutralising capacity (ANC)

Results are compared to the 'action criteria' for disturbances of more that 1,000 tonnes of material (ie. 18 moles of acid/tonne) as set out in the QASSIT (1998) guidelines.

3. Results

3.1 Physical Characteristics

Samples were collected from each sampling horizon and analysed for particle size distribution (PSD). Laboratory reports for PSD analysis are included in Appendix 3. Core logs from each bore hole are presented in Appendix 1.

Figure 3-1 and Figure 3-2 provide a graphical summary of PSD within the surface 1m of sediments and those below 1m respectively. Sediments are relatively consistent throughout the sediment profile, but vary in composition throughout the dredge area. Specifically, BH1B 02 is dominated by sand in both the surface sediments and those below 1m and BH1B 04 and BH1B 05 have higher content of silt and clay compared with the other locations (refer to Figure 3-1 and Figure 3-2).

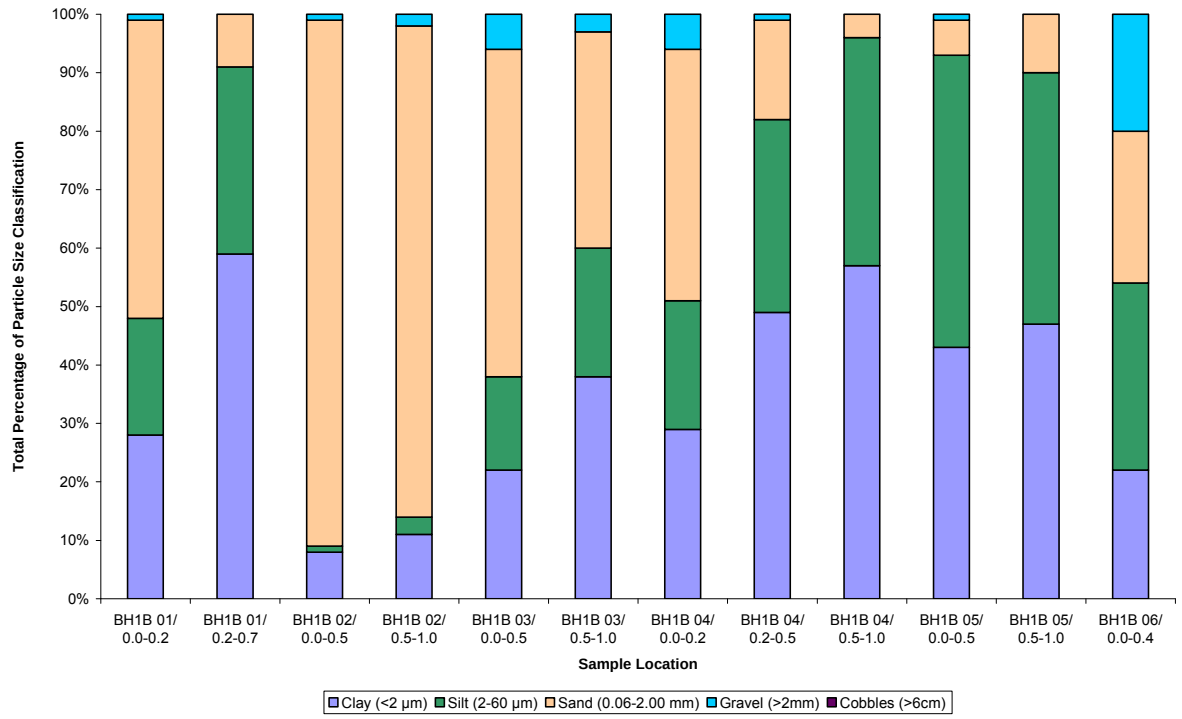


Figure 3-1: Graphical summary of particle size distribution within the top 1m of sediments

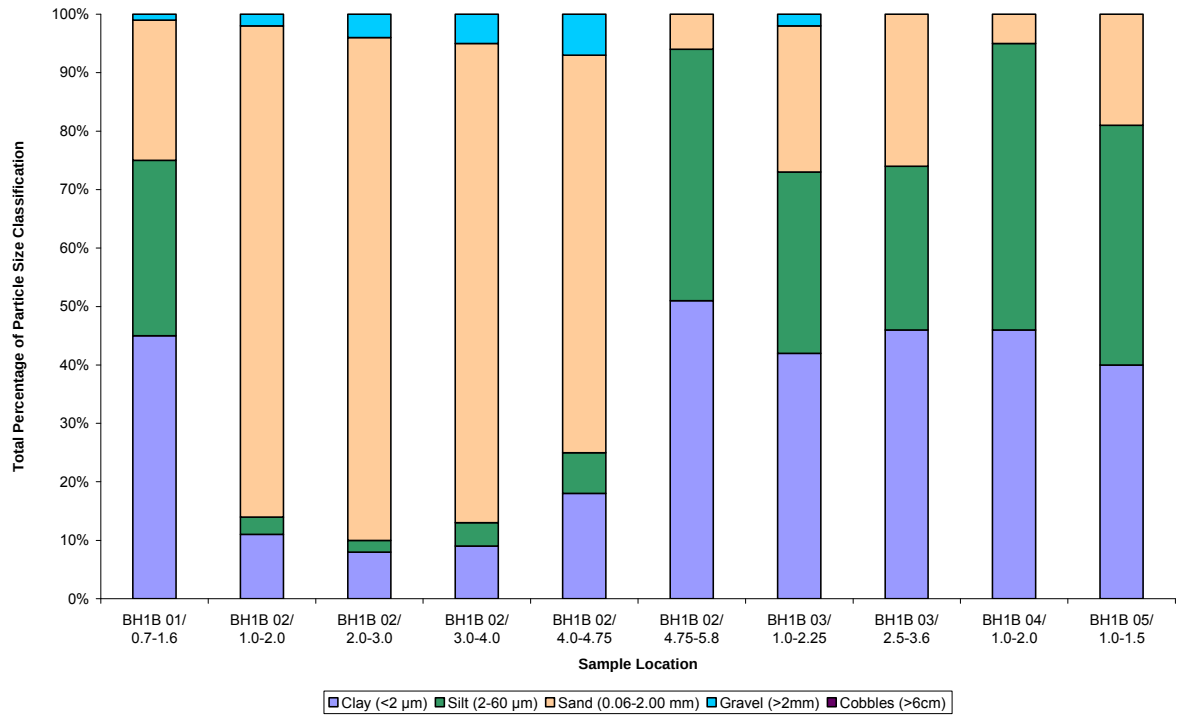


Figure 3-2: Graphical summary of particle size distribution for sediments below 1m

Table 3-1 provides a comparison of summary statistics between the top 1m of sediments and those below 1m. The top 1m of sediments is dominated by sand (36%), clay (34%) and silt (26%). Sediments below 1m are similarly dominated by sand (43%), clay (34%) and silt (24%), with a shift towards a slightly higher sand content compared to the surface sediments. Sediments within both the top 1m and below 1m had minimal gravel (3% and 2% respectively).

Table 3-1: Comparison of summary statistics for sediments within the top 1m and below 1m for particle size distribution

	Cobble (+ 6cm)		Gravel (+ 2 mm)		Sand (2 mm - 0.060 mm)		Silt (0.060 mm - 0.002 mm)		Clay (-0.002 mm)	
	Top 1m	Below 1m	Top 1m	Below 1m	Top 1m	Below 1m	Top 1m	Below 1m	Top 1m	Below 1m
Number of Samples	12	10	12	10	12	10	12	10	12	10
Mean	0	0	3	2	36	43	26	24	34	32
Standard Deviation	0.0	0.0	5.6	2.5	29.7	33.4	15.0	18.2	17.0	17.7
Minimum	0	0	0	0	4	5	1	2	8	8
Maximum	0	0	20	7	90	86	50	49	59	51

3.2 Chemical Characteristics

Laboratory results obtained during the study are summarised in Table 3-2 and Table 3-4. Primary laboratory analytical reports are provided in Appendix 4. Results are compared against the Screening Levels listed in Appendix A, Table 2 of the NAGD (Commonwealth of Australia, 2009) and against DEH (1998) EIL and HIL-A concentrations. Exceedances of these Screening Levels by individual sample locations are identified within Figure 3-3. Summary statistics (mean, standard deviation, 95% UCL of the mean, power and minimum sample size) are provided in Table 3-3 and Table 3-5.

3.2.1 Upper 1m of Sediments

Results for the upper 1m of sediments are summarised below. The NAGD recognises this layer as that which may potentially be contaminated by anthopogenically sourced contaminants. Sediments below 1m generally represent undisturbed material. The NAGD requires contaminant analyses be undertaken only on the upper 1m of sediment for capital dredging projects such as this. Salient results for relevant contaminant groups are present within the sections below.

Metals

- Aluminium, iron, cobalt, manganese, selenium, and vanadium were above laboratory detection limits in all samples across all locations. There are no NAGD Screening Levels for comparison for these metals;
- Antimony and cadmium were below detection limits at all locations;
- Arsenic, chromium, copper, lead, nickel and zinc were detected in all samples. All detections were below respective NAGD Screening Levels;
- Silver was above the detection limit in only one sample, BH1B 02/0.50-1.00, but was below the NAGD Screening Level; and
- Mercury was detected in eight of the 13 samples, but at concentrations below the NAGD Screening Level. The remaining five samples were below detection limits.

BTEX

- All BTEX species were below detection levels across all samples.

Total Petroleum Hydrocarbons

- C6-C9 and C10-C14 fractions were below detection limits in all samples;
- C15-C28 and C29-C36 fractions were present half of the samples; and
- The NAGD Screening Level for the sum of TPHs was not exceeded in any sample.

Organotins

- Tributyltin was below detection limits in all samples; and
- Monobutyltin and Dibutyltin were not analysed.

Organophosphorus Pesticides

- All organophosphorus pesticides were below detection limits in all samples.

Organochlorine Pesticides

- All organochlroine pesticides were below detection limits in all samples.

Polychlorinated Biphenyls

- All polychlorinated biphenyls were below detection limits in all samples.

Polycyclic Aromatic Hydrocarbons

- All but one PAH were below detection limits in all samples;
- Phenanthrene was above detection levels in one sample, BH1B 06/0.00-0.40;and
- The NAGD Screening Level for total PAHs was not exceeded in any sample.

3.2.1.1 Contaminant Concentrations Exceeding EIL or HIL-A

The following parameters reported concentrations exceeding EIL guidelines detailed in DEH (1998).

- Manganese exceeded EIL concentrations in two of the 13 samples. Both samples were from BH1B 02. The mean and 95% UCL of the mean were below the EIL concentrations.

There were no exceedances of HIL-A guidelines.

3.2.1.2 Power Analysis for Total Trace Metals

Results for statistical power and minimum required sample size to make a statistically valid comparison to the Screening Level are provided in Table 3-3. Only metals were tested, as TBT was below detection levels and the other analyte groups were either below detection, or were well below NAGD Screening Levels. For all metals that have NAGD Screening Levels, the power is extremely high (>0.99) and the number of samples required to make a statistically valid comparison against the Screening Levels is between two and three. This compares favourably with the 13 samples analysed. Therefore, the pilot-level of sampling undertaken is powerful enough to make a statistically valid comparison against NAGD Screening Levels to assess the suitability of material for unconfined placement at sea.

Table 3-2: Results for sediments in the upper 1m of dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.0-0.2	BH1B 01/ 0.2-0.7	BH1B 02/ 0.0-0.5	BH1B 02/ 0.5-1.0	BH1B 03/ 0.0-0.5	BH1B 03/ 0.5-1.0	BH1B 04/ 0.0-0.2	BH1B 04/ 0.2-0.5	BH1B 04/ 0.5-1.0	BH1B 05/ 0.0-0.5	BH1B 05/ 0.5-1.0	BH1B 06/ 0.0-0.4	BH1B 06/ 0.4-0.6
Sample Date							22/09/09	22/09/09	21/09/09	21/09/09	22/09/09	22/09/09	22/09/09	22/09/09	22/09/09	21/09/09	21/09/09	21/09/09	21/09/09
Moisture Content (dried @ 103°C)	%	1					43.2	30	21	26.6	36.1	40.3	43.6	28	28.2	45.5	44.2	42.8	25.2
Total Organic Carbon	%	0.02					<0.02	<0.02	0.14	0.31	<0.02	<0.02	<0.02	<0.02	<0.02	0.69	0.63	0.56	0.17
Metals																			
Aluminium	mg/kg	50	200				8600	11800	2270	3990	7230	7150	10800	15900	17900	19400	17200	12100	17300
Iron	mg/kg	50	100				17200	10200	10200	12200	17400	15800	19700	20700	34200	31400	27700	24800	38100
Antimony	mg/kg	0.5	0.5	20		2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	mg/kg	1	1	20	100	20	11.2	1.16	9.54	9.17	8.28	11.4	8.22	1.96	3.05	9.87	9.46	12.8	1.84
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	mg/kg	1	1	50	100	80	13	11.6	5	7.7	12.6	14.8	17.2	16.4	20.1	26.8	24.8	20.5	21.5
Copper	mg/kg	1	1	60	1,000	65	10.7	33.5	2.8	5.2	8.4	14.2	13.1	53.5	32.8	27.6	21	14.7	36
Cobalt	mg/kg	0.5	0.5				7.8	1.8	7.5	8	8.8	9.8	9.9	3.7	8.1	13.1	11.1	13.1	14.7
Lead	mg/kg	1	1	300	300	50	5.1	5	1.6	2.7	3.4	6.6	5.4	9.4	7.2	8.9	8.4	6.5	5.6
Manganese	mg/kg	10	10	500	1,500		208	13	**758**	**662**	403	239	456	40	96	436	465	391	413
Nickel	mg/kg	1	1	60	600	21	6.8	2.9	3.6	4.8	7.1	9.9	9.6	5.9	9.6	13.2	11.4	9.4	16.3
Selenium	mg/kg	0.1	0.1				0.4	0.6	0.2	0.4	0.4	0.6	0.6	1	0.7	0.9	0.7	0.7	1
Silver	mg/kg	0.1	0.1			1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	mg/kg	2	2				38.1	40.7	21.7	25.6	37.3	35.5	41.4	76.5	84.8	55.6	47.5	49.4	96.8
Zinc	mg/kg	1	1	200	7,000	200	24.5	13.2	10.7	13.9	19.6	27	30.5	23.9	38.7	45	38.1	33.1	53.2
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.02	<0.01	<0.01	0.01	<0.01	0.01	0.02	0.01	<0.01	0.02	0.02	0.01	<0.01
BTEX																			
Benzene	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2				<0.2	<0.2		
Toluene	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2				<0.2	<0.2		
Ethylbenzene	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2				<0.2	<0.2		
meta- & para-Xylene	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2				<0.2	<0.2		
ortho-Xylene	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2				<0.2	<0.2		
Total Petroleum Hydrocarbons																			
C6 - C9 Fraction	mg/kg	3	100						<3	<3	<3	<3				<3	<3		
C10 - C14 Fraction	mg/kg	3	100						<3	<3	<3	<3				<3	<3		
C15 - C28 Fraction	mg/kg	3	100						10	<3	7	8				<3	<3		
Normalised to 1% TOC									*50*		*35*	*16*							
C29 - C36 Fraction	mg/kg	5	100						<5	<5	9	10				<5	5		
Normalised to 1% TOC											*45*	*50*					*7.94*		
Sum of TPH Fractions (calculated)	mg/kg	5							10	<5	16	18				<5	5		
Normalised to 1% TOC						*550*			*50*		*80*	*90*					*7.94*		
Organotin																			
Tributyltin	µgSn/kg	0.5				9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organophosphorus Pesticides																			
Bromophos-ethyl	µg/kg	10							<10	<10	<10	<10				<10	<10		
Carbophenothion	µg/kg	10							<10	<10	<10	<10				<10	<10		
Chlorfenvinphos (E)	µg/kg	10							<10.0	<10.0	<10.0	<10.0				<10.0	<10.0		
Chlorfenvinphos (Z)	µg/kg	10							<10	<10	<10	<10				<10	<10		
Chlorpyrifos	µg/kg	10							<10	<10	<10	<10				<10	<10		
Chlorpyrifos-methyl	µg/kg	10							<10	<10	<10	<10				<10	<10		

Table 3-2: Results for sediments in the upper 1m of dredge area Option 1B

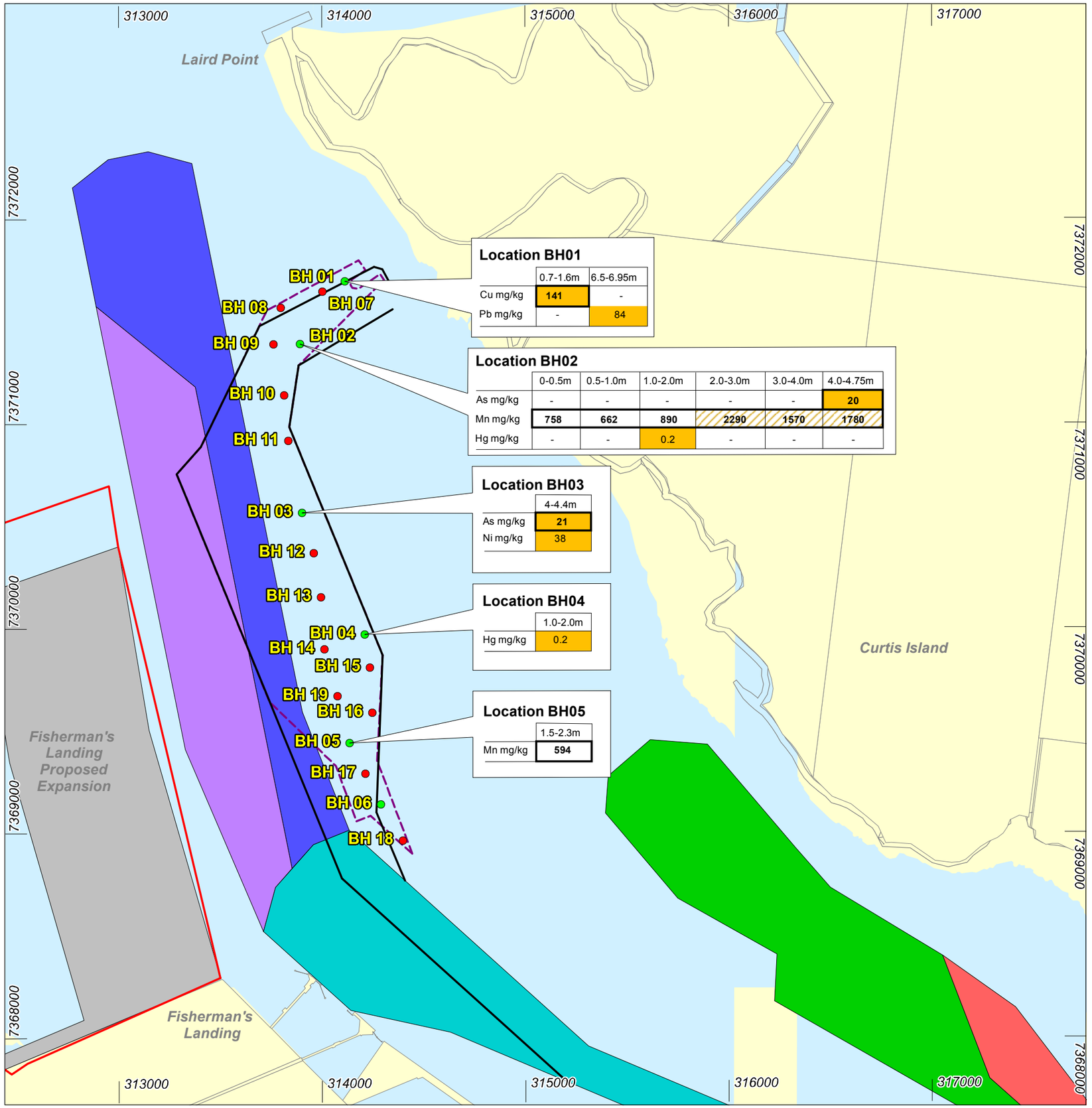
Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.0-0.2	BH1B 01/ 0.2-0.7	BH1B 02/ 0.0-0.5	BH1B 02/ 0.5-1.0	BH1B 03/ 0.0-0.5	BH1B 03/ 0.5-1.0	BH1B 04/ 0.0-0.2	BH1B 04/ 0.2-0.5	BH1B 04/ 0.5-1.0	BH1B 05/ 0.0-0.5	BH1B 05/ 0.5-1.0	BH1B 06/ 0.0-0.4	BH1B 06/ 0.4-0.6
Demeton-S-methyl	µg/kg	10							<10	<10	<10	<10				<10	<10		
Diazinon	µg/kg	10							<10	<10	<10	<10				<10	<10		
Dichlorvos	µg/kg	10							<10	<10	<10	<10				<10	<10		
Dimethoate	µg/kg	10							<10	<10	<10	<10				<10	<10		
Ethion	µg/kg	10							<10	<10	<10	<10				<10	<10		
Fenamiphos	µg/kg	10							<10	<10	<10	<10				<10	<10		
Fenthion	µg/kg	10							<10	<10	<10	<10				<10	<10		
Malathion	µg/kg	10							<10	<10	<10	<10				<10	<10		
Azinphos Methyl	µg/kg	10							<10	<10	<10	<10				<10	<10		
Monocrotophos	µg/kg	10							<10	<10	<10	<10				<10	<10		
Parathion	µg/kg	10							<10	<10	<10	<10				<10	<10		
Parathion-methyl	µg/kg	10							<10	<10	<10	<10				<10	<10		
Pirimphos-ethyl	µg/kg	10							<10	<10	<10	<10				<10	<10		
Prothiofos	µg/kg	10							<10	<10	<10	<10				<10	<10		
Organochlorine Pesticides																			
Aldrin	µg/kg	0.5	1	200	10,000				<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
alpha-BHC	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
beta-BHC	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
delta-BHC	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
4.4`-DDD	µg/kg	0.5	1			2			<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
4.4`-DDE	µg/kg	0.5	1			2.2			<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
4.4`-DDT	µg/kg	0.5	1	200	200,000				<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
DDT (total)	µg/kg	0.5	1			1.6			<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Dieldrin	µg/kg	0.5	1	200	10,000	280			<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
alpha-Endosulfan	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
beta-Endosulfan	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Endosulfan sulfate	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Endosulfan (sum)	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Endrin	µg/kg	0.5	1			10			<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Endrin aldehyde	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Endrin ketone	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Heptachlor	µg/kg	0.5	1		10,000				<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Heptachlor epoxide	µg/kg	0.5	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Hexachlorobenzene (HCB)	µg/kg	0.25	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
gamma-BHC	µg/kg	0.5	1						<0.25	<0.25	<0.25	<0.25				<0.25	<0.25		
Methoxychlor	µg/kg	0.25	1						<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
cis-Chlordane	µg/kg	0.25	1		50,000				<0.25	<0.25	<0.25	<0.25				<0.25	<0.25		
trans-Chlordane	µg/kg	0.25	1						<0.25	<0.25	<0.25	<0.25				<0.25	<0.25		
Total Chlordane (sum)	µg/kg	0.5	1			0.5			<0.25	<0.25	<0.25	<0.25				<0.25	<0.25		
Oxychlordane	µg/kg	5							<0.50	<0.50	<0.50	<0.50				<0.50	<0.50		
Polychlorinated Biphenyls																			
Total Polychlorinated biphenyls	µg/kg	5	5	1,000	10,000	23			<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1016	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1221	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		

Table 3-2: Results for sediments in the upper 1m of dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.0-0.2	BH1B 01/ 0.2-0.7	BH1B 02/ 0.0-0.5	BH1B 02/ 0.5-1.0	BH1B 03/ 0.0-0.5	BH1B 03/ 0.5-1.0	BH1B 04/ 0.0-0.2	BH1B 04/ 0.2-0.5	BH1B 04/ 0.5-1.0	BH1B 05/ 0.0-0.5	BH1B 05/ 0.5-1.0	BH1B 06/ 0.0-0.4	BH1B 06/ 0.4-0.6
Aroclor 1232	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1242	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1248	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1254	µg/kg	5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Aroclor 1260	µg/kg	0.5	5						<5.0	<5.0	<5.0	<5.0				<5.0	<5.0		
Polycyclic Hydrocarbons																			
Naphthalene	µg/kg	5	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Methylnaphthalene	µg/kg	4	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Acenaphthylene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Acenaphthene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Fluorene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Phenanthrene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	5	<4
Normalised to 1% TOC																		*8.93*	
Anthracene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Fluoranthene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Pyrene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benz(a)anthracene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Chrysene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(k)fluoranthene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(e)pyrene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(a)pyrene	µg/kg	4	5		1,000		<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Perylene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Dibenz(a.h)anthracene	µg/kg	4	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	µg/kg	5	5				<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Coronene	µg/kg	4	5				<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sum of PAHs	µg/kg	10	100		20,000	10,000	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	5	<4
Normalised to 1% TOC																		*8.93*	

Legend

Note	When calculating averages and 95% UCLs, values below detection for individual results were set to half the detection levels, consistent with the NAGD
PQL	Practical Quantitation Limit
-	No guideline levels (ie. Screening levels) or no analysis undertaken for a given sample
50	Value exceeds NAGD Screening Level
50	Value exceeds Queensland EPA soil 'environmental investigation level' (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
50	Value exceeds Queensland EPA soil 'health investigation level' - A (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%



LEGEND

- APLNG Dredge Area 1B
- Superseded Dredge Area 1B

Dredge Areas - Gladstone Ports Corporation

- Stage 1A - North China Bay LNG Precinct
- Stage 1B - Fisherman's Landing LNG
- Stage 2 - Laird Point LNG
- Stage 3 - Fisherman's Landing
- Stage 4 - Hamilton Point

Analysis Points

- Acid Sulfate Soil Only
- Contaminant and Acid Sulfate Soil

Contaminant Levels

- Value Exceeds NAGD Screening Level
- Value Exceeds DEH (1998) EIL
- Value Exceeds DEH (1998) HIL

Variables

As - Arsenic	Hg - Mercury	Ni - Nickel
Cu - Copper	Mn - Manganese	Pb - Lead

Proposed dredge area digitised from Bechtel CAD drawing 25509-100-K0-K01-00001.dgn supplied on 15/09/2009.
Superseded dredge area digitised from Halcrow CAD drawing EAUSP100-026-00.dwg dated 15/07/2009
Dredge areas translated from GPC CAD drawing xFootprint_030909.dxf supplied 10/09/2009

0 500m

SCALE - 1:20,000 (at A3)

N W E S

Map Grid of Australia Zone 56
Geocentric Datum of Australia 1994

Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
A	22/09/2009	Issued for squad check	MM	KM		

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AUSTRALIA PACIFIC LNG

AUSTRALIA PACIFIC LNG PTY LIMITED

AUSTRALIA PACIFIC LNG PROJECT

Figure 3-3 - Sample Locations and Corresponding Guideline Exceedances

Project No: 301001-00752	Figure: 00752-00-EN-DAL-0059	Rev: A

Compiled by BRISBANE INFRASTRUCTURE GIS SECTION

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Table 3-3: Summary statistics for contaminant substances in the upper 1m of sediments in dredge area Option 1B

	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log Normal (L) Neither (X)	Power (at alpha = 0.05)	No. samples required for Power of 0.8	No. samples taken
Sample Date													
Moisture Content (dried @ 103°C)	%	1					34.98	8.704	39.28	N	-	-	13
Total Organic Carbon	%	0.02					0.198	0.262	0.327	X	-	-	13
Metals													
Aluminium	mg/kg	50	200				11665	5602	14434	N	-	-	13
Iron	mg/kg	50	100				21508	9118	26015	N	-	-	13
Antimony	mg/kg	0.5	0.5	20		2	<0.50	-	<0.50	-	-	-	13
Arsenic	mg/kg	1	1	20	100	20	7.535	4.054	9.539	X	1	3	13
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	-	<0.1	-	-	-	13
Chromium	mg/kg	1	1	50	100	80	16.31	6.41	19.48	N	1	2	13
Copper	mg/kg	1	1	60	1,000	65	21.04	14.76	28.33	N	1	3	13
Cobalt	mg/kg	0.5	0.5				9.031	3.622	10.82	N	-	-	13
Lead	mg/kg	1	1	300	300	50	5.831	2.358	6.997	N	1	2	13
Manganese	mg/kg	10	10	500	1,500		352.3	255.6	463.8	N	-	-	13
Nickel	mg/kg	1	1	60	600	21	8.5	3.843	10.4	N	1	3	13
Selenium	mg/kg	0.1	0.1				0.631	0.243	0.751	N	-	-	13
Silver	mg/kg	0.1	0.1			1	0.0538	0.0139	0.0607	X	1	2	13
Vanadium	mg/kg	2	2				50.07	22.75	61.32	N	-	-	13
Zinc	mg/kg	1	1	200	7,000	200	28.57	12.87	34.93	N	1	2	13
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.0112	0.0065	0.0144	X	1	2	13
BTEX													
Benzene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	6
Toluene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	6
Ethylbenzene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	6
meta- & para-Xylene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	6
ortho-Xylene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	6
Total Petroleum Hydrocarbons													
C6 - C9 Fraction	mg/kg	3	100				<3	-	<3	-	-	-	6
C10 - C14 Fraction	mg/kg	3	100				<3	-	<3	-	-	-	6
C15 - C28 Fraction	mg/kg	3	100										
Normalised to 1% TOC							*17.58*	*20.65*	*34.57*	*N*	-	-	6
C29 - C36 Fraction	mg/kg	5	100										
Normalised to 1% TOC							*18.41*	*22.69*	*37.07*	*X*	-	-	6
Sum of TPH Fractions (calculated)	mg/kg	5											
Normalised to 1% TOC						*550*	*38.82*	*40.08*	*71.79*	*N*	*1*	*2*	*6*
Organotin													
Tributyltin	µgSn/kg	0.5				9	<0.5	-	<0.5	-	-	-	13
Organophosphorus Pesticides													
Bromophos-ethyl	µg/kg	10					<10	-	<10	-	-	-	6
Carbophenothion	µg/kg	10					<10	-	<10	-	-	-	6
Chlorfenvinphos (E)	µg/kg	10					<10	-	<10	-	-	-	6
Chlorfenvinphos (Z)	µg/kg	10					<10	-	<10	-	-	-	6
Chlorpyrifos	µg/kg	10					<10	-	<10	-	-	-	6
Chlorpyrifos-methyl	µg/kg	10					<10	-	<10	-	-	-	6
Demeton-S-methyl	µg/kg	10					<10	-	<10	-	-	-	6
Diazinon	µg/kg	10					<10	-	<10	-	-	-	6
Dichlorvos	µg/kg	10					<10	-	<10	-	-	-	6
Dimethoate	µg/kg	10					<10	-	<10	-	-	-	6
Ethion	µg/kg	10					<10	-	<10	-	-	-	6
Fenamiphos	µg/kg	10					<10	-	<10	-	-	-	6
Fenthion	µg/kg	10					<10	-	<10	-	-	-	6
Malathion	µg/kg	10					<10	-	<10	-	-	-	6
Azinphos Methyl	µg/kg	10					<10	-	<10	-	-	-	6
Monocrotophos	µg/kg	10					<10	-	<10	-	-	-	6
Parathion	µg/kg	10					<10	-	<10	-	-	-	6
Parathion-methyl	µg/kg	10					<10	-	<10	-	-	-	6
Pirimphos-ethyl	µg/kg	10					<10	-	<10	-	-	-	6
Prothiofos	µg/kg	10					<10	-	<10	-	-	-	6
Organochlorine Pesticides													
Aldrin	µg/kg	0.5	1	200	10,000		<0.50	-	<0.50	-	-	-	6
alpha-BHC	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
beta-BHC	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
delta-BHC	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
4.4`-DDD	µg/kg	0.5	1			2	<0.50	-	<0.50	-	-	-	6
4.4`-DDE	µg/kg	0.5	1			2.2	<0.50	-	<0.50	-	-	-	6
4.4`-DDT	µg/kg	0.5	1	200	200,000		<0.50	-	<0.50	-	-	-	6

Table 3-3: Summary statistics for contaminant substances in the upper 1m of sediments in dredge area Option 1B

	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log Normal (L) Neither (X)	Power (at alpha = 0.05)	No. samples required for Power of 0.8	No. samples taken
DDT (total)	µg/kg	0.5	1			1.6	<0.50	-	<0.50	-	-	-	6
Dieldrin	µg/kg	0.5	1	200	10,000	280	<0.50	-	<0.50	-	-	-	6
alpha-Endosulfan	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
beta-Endosulfan	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Endosulfan sulfate	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Endosulfan (sum)	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Endrin	µg/kg	0.5	1			10	<0.50	-	<0.50	-	-	-	6
Endrin aldehyde	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Endrin ketone	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Heptachlor	µg/kg	0.5	1		10,000		<0.50	-	<0.50	-	-	-	6
Heptachlor epoxide	µg/kg	0.5	1				<0.50	-	<0.50	-	-	-	6
Hexachlorobenzene (HCB)	µg/kg	0.25	1				<0.50	-	<0.50	-	-	-	6
gamma-BHC	µg/kg	0.5	1				<0.25	-	<0.25	-	-	-	6
Methoxychlor	µg/kg	0.25	1				<0.50	-	<0.50	-	-	-	6
cis-Chlordane	µg/kg	0.25	1		50,000		<0.25	-	<0.25	-	-	-	6
trans-Chlordane	µg/kg	0.25	1				<0.25	-	<0.25	-	-	-	6
Total Chlordane (sum)	µg/kg	0.5	1			0.5	<0.25	-	<0.25	-	-	-	6
Oxychlordane	µg/kg	5					<0.50	-	<0.50	-	-	-	6
Polychlorinated Biphenyls													
Total Polychlorinated biphenyls	µg/kg	5	5	1,000	10,000	23	<5.0	-	<5.0	-	-	-	6
Aroclor 1016	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1221	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1232	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1242	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1248	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1254	µg/kg	5	5				<5.0	-	<5.0	-	-	-	6
Aroclor 1260	µg/kg	0.5	5				<5.0	-	<5.0	-	-	-	6
Polycyclic Hydrocarbons													
Naphthalene	µg/kg	5	5				<5	-	<5	-	-	-	13
2-Methylnaphthalene	µg/kg	4	5				<5	-	<5	-	-	-	13
Acenaphthylene	µg/kg	4	5				<4	-	<4	-	-	-	13
Acenaphthene	µg/kg	4	5				<4	-	<4	-	-	-	13
Fluorene	µg/kg	4	5				<4	-	<4	-	-	-	13
Phenanthrene	µg/kg	4	5										
Normalised to 1% TOC							*2.533*	*1.922*	*3.483*	*X*	-	-	*13*
Anthracene	µg/kg	4	5				<4	-	<4	-	-	-	13
Fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	13
Pyrene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benz(a)anthracene	µg/kg	4	5				<4	-	<4	-	-	-	13
Chrysene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benzo(b)fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benzo(k)fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benzo(e)pyrene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benzo(a)pyrene	µg/kg	4	5		1,000		<4	-	<4	-	-	-	13
Perylene	µg/kg	4	5				<4	-	<4	-	-	-	13
Benzo(g.h.i)perylene	µg/kg	4	5				<4	-	<4	-	-	-	13
Dibenz(a.h)anthracene	µg/kg	4	5				<4	-	<4	-	-	-	13
Indeno(1.2.3.cd)pyrene	µg/kg	5	5				<4	-	<4	-	-	-	13
Coronene	µg/kg	4	5				<5	-	<5	-	-	-	13
Sum of PAHs	µg/kg	10	100		20,000	10,000							
Normalised to 1% TOC							*2.533*	*1.922*	*3.483*	*X*	*1*	*2*	*13*

Legend

Note	When calculating averages and 95% UCLs, values below detection for individual results were set to half the detection levels, consistent with the NAGD
PQL	Practical Quantitation Limit
-	No guideline levels (ie. Screening levels) or no analysis undertaken for a given sample
50	Value exceeds NAGD Screening Level
50	Value exceeds Queensland EPA soil 'environmental investigation level' (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
50	Value exceeds Queensland EPA soil 'health investigation level' - A (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

3.2.2 Sediments Below 1m

Results for sediments below 1m are summarised below. Under the NAGD, reporting of only physical characteristics is required, however chemical analyses have been undertaken and salient results are presented below.

Metals

- Aluminium, iron, manganese, and vanadium were above detection limits at all locations. Cobalt was above detection limits in all samples except one (BH1B 01/0.7-1.6). There are no NAGD Screening Levels for these metals for comparison;
- Antimony, cadmium, selenium and silver were below detection limits at all locations;
- Chromium and zinc were detected at all locations below respective NAGD Screening Levels. Copper was detected at the majority of locations below the NAGD Screening Level;
- Copper, lead and nickel concentrations were detected at the majority of locations generally below NAGD Screening Levels, with the exception of copper in BH1B 01/0.7-1.6, lead in BH1B 1G/6.5-6.95 and nickel in BH1B 03G/4.0-4.45, which exceeded the respective NAGD Screening Levels. The 95% UCL of the mean for each contaminant was below respective NAGD Screening Levels;
- Arsenic was above detection limits at the majority of locations. Two samples (BH1B 02/4.0-4.75 and BH1B 03G/4.0-4.45) reported arsenic concentrations above the NAGD Screening Level of 20mg/kg (20 and 21mg/kg respectively). The 95% UCL of the mean for arsenic was below the NAGD Screening Level; and
- Mercury was generally below detection limits. Two samples (BH1B 02/1.0-2.0 and BH1B 04/1.0-2.0) were above the NAGD Screening Level. The 95% UCL of the mean was below the NAGD Screening Level.

BTEX

- All BTEX species were below detection levels across all locations.

Total Petroleum Hydrocarbons

- C6-C9 was below detection limits at all locations;
- C10-C14 was detected in one sample (BH1B 05/1.0-1.5). All other samples were below detection limits;
- C15-C28 was present in five of the eight samples;
- C29-C36 was present in three of the eight samples; and
- The NAGD Screening Level for the sum of TPHs was not exceeded in any sample.

Organophosphorus Pesticides

- All organophosphorus pesticides were below detection limits in all samples.

Organochlorine Pesticides

- All organochlroine pesticides were below detection limits in all samples.

Polychlorinated Biphenyls

- All polychlorinated biphenyls were below detection limits in all samples.

Polycyclic Aromatic Hydrocarbons

- All polycyclic aromatic hydrocarbons were below detection limits in all samples.

3.2.2.1 CONTAMINANT CONCENTRATIONS EXCEEDING EIL OR HIL-A

The following parameters reported concentrations exceeding EIL and HIL (A) guidelines detailed in DEH (1998).

- Arsenic exceeded the EIL at BH1B 02/4.0-4.75 and BH1B 03G/4.0-4.45; and
- Manganese exceeded the EIL in five of the 12 samples analysed (BH1B 02/1.0-2.0, BH1B 02/2.0-3.0, BH1B 02/3.0-4.0, BH1B 02/4.0-4.75 and BH1B 05/1.5-2.3). The 95% UCL of the mean also exceeded the EIL; and
- Manganese exceeded the HIL-A in three of the 12 samples analysed (BH1B 02/2.0-3.0, BH1B 02/3.0-4.0 and BH1B 02/4.0-4.75). The mean and 95% UCL of the mean were below HIL-A.

3.2.2.2 POWER ANALYSIS FOR TOTAL TRACE METALS

Results for statistical power and corresponding sample size required to make a statistically valid comparison to the Screening Level are provided in Table 3-5. For all metals that have NAGD Screening Levels, the power is extremely high (>0.99) and the number of samples required to make a statistically valid comparison against Screening Levels is generally between two and five, which compares well with the 24 samples analysed. The exception to this is copper and nickel. Both have high power (0.99) with copper requiring six samples and nickel requiring 10 samples to make statistically valid comparison against Screening Levels. These both compare well with the 24 samples taken. Therefore, the pilot-level of sampling undertaken is powerful enough to make a statistically valid comparison against the Screening Level criteria to assess the suitability of material for unconfined placement at sea.

Table 3-4: Results for sediments below 1m depth in dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.7-1.6	BH1B 01G/ 2.5-2.66	BH1B 01G/ 4.5-4.95	BH1B 01G/ 5.5-5.95	BH1B 01G/ 6.5-6.95	BH1B 01G/ 7.5-7.95	BH1B 02/ 1.0-2.0	BH1B 02/ 2.0-3.0	BH1B 02/ 3.0-4.0	BH1B 02/ 4.0-4.75	BH1B 02/ 4.75-5.8	BH1B 02G/ 5-5.45	BH1B 02G/ 6-6.45	BH1B 02G/ 8-8.45	BH1B 02G/ 9-9.45	BH1B 02G/ 10-10.45	BH1B 03/ 1.0-2.25	BH1B 03/ 2.5-3.6	BH1B 03G/ 4-4.45	BH1B 03G/ 5-5.45	BH1B 04/ 1.0-2.0	BH1B 05/ 1.0-1.5	BH1B 05/ 1.5-2.3	BH1B 05/ 2.3-3.3
Sample Date							22/09/09	26/8/09	26/8/09	26/8/09	26/8/09	26/8/09	21/09/09	21/09/09	21/09/09	21/09/09	21/09/09	25/8/09	25/8/09	25/8/09	25/8/09	25/8/09	22/09/09	22/09/09	26/8/09	26/8/09	22/09/09	21/09/09	21/09/09	21/09/09
Moisture Content (dried @ 103°C)	%	1					23.3	18.8	17.5	18.2	23	21.4	26	21.4	19.3	20.4	20.4	23.3	21.6	20.8	21.1	15.2	47	18.3	22.4	16.7	26.9	44.7	41.8	19.6
Total Organic Carbon	%	0.02					<0.02						0.29	0.17	0.06	0.24	0.11						<0.02	<0.02			<0.02	0.68		
Metals																														
Aluminium	mg/kg	50	200				9450						2700	2020	1690	2480	8930						18100	10100			17500	16300	16700	7040
Antimony	mg/kg	5	0.5	20		2	<5						<5	<5	<5	<5	<5						<5	<5			<5	<5	<5	<5
Arsenic	mg/kg	5	1	20	100	20	<5	<5	<5	<5	13	<5	9	16	13	**20**	<5	7	<5	<5	10	6	15	12	**21**	<5	<5	11	13	7
Cadmium	mg/kg	1	0.1	3	20	1.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	2	1	50	100	80	11	2	4	12	18	11	6	5	4	8	12	33	8	6	26	7	28	17	21	7	19	26	25	15
Cobalt	mg/kg	2	0.5				<2						7	8	7	8	5						13	14			10	12	13	6
Copper	mg/kg	5	1	60	1,000	65	**141**	8	24	9	9	7	<5	<5	<5	<5	18	44	7	16	15	7	27	15	27	11	39	26	24	10
Iron	mg/kg	50	100				15800						10700	12300	11400	13800	18600						31200	24000			33500	29100	27800	25500
Lead	mg/kg	5	1	300	300	50	6	<5	6	<5	84	<5	<5	<5	<5	<5	8	7	<5	6	8	<5	8	9	<5	<5	8	9	9	6
Manganese	mg/kg	5	10	500	1,500		19						**890**	**2290**	**1570**	**1780**	55						484	153			132	408	**594**	57
Nickel	mg/kg	2	1	60	600	21	3	<2	<2	<2	3	4	4	4	3	5	6	12	4	2	9	7	15	10	38	6	12	12	12	4
Selenium	mg/kg	5	0.1				<5						<5	<5	<5	<5	<5						<5	<5			<5	<5	<5	<5
Silver	mg/kg	2	0.1			1	<2						<2	<2	<2	<2	<2						<2	<2			<2	<2	<2	<2
Vanadium	mg/kg	5	2				45						25	30	27	34	41						61	41			85	56	53	27
Zinc	mg/kg	5	1	200	7,000	200	13	23	14	7	12	24	10	8	8	9	20	33	16	10	27	20	45	26	89	15	50	40	38	18
Mercury	mg/kg	0.1	0.01	1	15	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
BTEX																														
Benzene	mg/kg	0.2											<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	<0.2				<0.2		
Toluene	mg/kg	0.2											<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	<0.2				<0.2		
Ethylbenzene	mg/kg	0.2											<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	<0.2				<0.2		
meta- & para-Xylene	mg/kg	0.2											<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	<0.2				<0.2		
ortho-Xylene	mg/kg	0.2											<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	<0.2				<0.2		
Total Petroleum Hydrocarbons																														
C6 - C9 Fraction	mg/kg	3	100										<3	<3	<3	<3	<3						<3	<3				<3		
C10 - C14 Fraction	mg/kg	3	100										<3	<3	<3	<3	<3						<3	<3				3		
Normalised to 1% TOC																												*4.41*		
C15 - C28 Fraction	mg/kg	5	100										<3	4	4	<3	<3						16	5				16		
Normalised to 1% TOC														*20*	*20*								*80*	*25*				*23.53*		
C29 - C36 Fraction	µgSn/kg	0.5	100										<5	<5	<5	<5	<5						15	6				14		
Normalised to 1% TOC																							*75*	*30*				*20.59*		
Sum of TPH Fractions (calculated)						550							<5	4	4	<5	<5						31	11				33		
Normalised to 1% TOC														*20*	*20*								*155*	*55*				*48.53*		
Organophosphorus Pesticides																														
Bromophos-ethyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Carbophenothion	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Chlorfenvinphos (E)	µg/kg	10											<10.0	<10.0	<10.0	<10.0	<10.0						<10.0	<10.0				<10.0		
Chlorfenvinphos (Z)	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Chlorpyrifos	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Chlorpyrifos-methyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Demeton-S-methyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Diazinon	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Dichlorvos	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Dimethoate	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Ethion	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Fenamiphos	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Fenthion	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Malathion	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Azinphos Methyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		

Table 3-4: Results for sediments below 1m depth in dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.7-1.6	BH1B 01G/ 2.5-2.66	BH1B 01G/ 4.5-4.95	BH1B 01G/ 5.5-5.95	BH1B 01G/ 6.5-6.95	BH1B 01G/ 7.5-7.95	BH1B 02/ 1.0-2.0	BH1B 02/ 2.0-3.0	BH1B 02/ 3.0-4.0	BH1B 02/ 4.0-4.75	BH1B 02/ 4.75-5.8	BH1B 02G/ 5-5.45	BH1B 02G/ 6-6.45	BH1B 02G/ 8-8.45	BH1B 02G/ 9-9.45	BH1B 02G/ 10-10.45	BH1B 03/ 1.0-2.25	BH1B 03/ 2.5-3.6	BH1B 03G/ 4-4.45	BH1B 03G/ 5-5.45	BH1B 04/ 1.0-2.0	BH1B 05/ 1.0-1.5	BH1B 05/ 1.5-2.3	BH1B 05/ 2.3-3.3
Monocrotophos	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Parathion	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Parathion-methyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Pirimphos-ethyl	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Prothiofos	µg/kg	10											<10	<10	<10	<10	<10						<10	<10				<10		
Organochlorine Pesticides																														
Aldrin	µg/kg	0.5	1	200	10,000								<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
alpha-BHC	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
beta-BHC	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
delta-BHC	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
4.4`-DDD	µg/kg	0.5	1			2							<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
4.4`-DDE	µg/kg	0.5	1			2.2							<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
4.4`-DDT	µg/kg	0.5	1	200	200,000								<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
DDT (total)	µg/kg	0.5	1			1.6							<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Dieldrin	µg/kg	0.5	1	200	10,000	280							<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
alpha-Endosulfan	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
beta-Endosulfan	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Endosulfan sulfate	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Endosulfan (sum)	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Endrin	µg/kg	0.5	1			10							<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Endrin aldehyde	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Endrin ketone	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Heptachlor	µg/kg	0.5	1		10,000								<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Heptachlor epoxide	µg/kg	0.5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Hexachlorobenzene (HCB)	µg/kg	0.25											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
gamma-BHC	µg/kg	0.5											<0.25	<0.25	<0.25	<0.25	<0.25						<0.25	<0.25				<0.25		
Methoxychlor	µg/kg	0.25											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
cis-Chlordane	µg/kg	0.25	1		50,000								<0.25	<0.25	<0.25	<0.25	<0.25						<0.25	<0.25				<0.25		
trans-Chlordane	µg/kg	0.25	1										<0.25	<0.25	<0.25	<0.25	<0.25						<0.25	<0.25				<0.25		
Total Chlordane (sum)	µg/kg	0.5	1			0.5							<0.25	<0.25	<0.25	<0.25	<0.25						<0.25	<0.25				<0.25		
Oxychlordane	µg/kg	5											<0.50	<0.50	<0.50	<0.50	<0.50						<0.50	<0.50				<0.50		
Polychlorinated Biphenyls																														
Total Polychlorinated biphenyls	µg/kg	5	5	1,000	10,000	23							<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1016	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1221	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1232	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1242	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1248	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1254	µg/kg	5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Aroclor 1260	µg/kg	0.5	5										<5.0	<5.0	<5.0	<5.0	<5.0						<5.0	<5.0				<5.0		
Polycyclic Hydrocarbons																														
Naphthalene	µg/kg	5	5				<5						<5	<5	<5	<5	<5						<5	<5			<5	<5		
2-Methylnaphthalene	µg/kg	4	5				<5						<5	<5	<5	<5	<5						<5	<5			<5	<5		
Acenaphthylene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Acenaphthene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Fluorene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Phenanthrene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Anthracene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Fluoranthene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Pyrene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Benz(a)anthracene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Chrysene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		

Table 3-4: Results for sediments below 1m depth in dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BH1B 01/ 0.7-1.6	BH1B 01G/ 2.5-2.66	BH1B 01G/ 4.5-4.95	BH1B 01G/ 5.5-5.95	BH1B 01G/ 6.5-6.95	BH1B 01G/ 7.5-7.95	BH1B 02/ 1.0-2.0	BH1B 02/ 2.0-3.0	BH1B 02/ 3.0-4.0	BH1B 02/ 4.0-4.75	BH1B 02/ 4.75-5.8	BH1B 02G/ 5-5.45	BH1B 02G/ 6-6.45	BH1B 02G/ 8-8.45	BH1B 02G/ 9-9.45	BH1B 02G/ 10-10.45	BH1B 03/ 1.0-2.25	BH1B 03/ 2.5-3.6	BH1B 03G/ 4-4.45	BH1B 03G/ 5-5.45	BH1B 04/ 1.0-2.0	BH1B 05/ 1.0-1.5	BH1B 05/ 1.5-2.3	BH1B 05/ 2.3-3.3
Benzo(b)fluoranthene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Benzo(k)fluoranthene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Benzo(e)pyrene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Benzo(a)pyrene	µg/kg	4	5		1,000		<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Perylene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Benzo(g.h.i)perylene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Dibenz(a.h)anthracene	µg/kg	4	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Indeno(1.2.3.cd)pyrene	µg/kg	5	5				<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		
Coronene	µg/kg	4	5				<5						<5	<5	<5	<5	<5						<5	<5			<5	<5		
Sum of PAHs	µg/kg	10	100		20,000	10,000	<4						<4	<4	<4	<4	<4						<4	<4			<4	<4		

Legend

Note	When calculating averages and 95% UCLs, values below detection for individual results were set to half the detection levels, consistent with the NAGD
PQL	Practical Quantitation Limit
-	No guideline levels (ie. Screening levels) or no analysis undertaken for a given sample
50	Value exceeds NAGD Screening Level
50	Value exceeds Queensland EPA soil 'environmental investigation level' (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
50	Value exceeds Queensland EPA soil 'health investigation level' - A (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

Table 3-5: Summary statistics for contaminant substances below 1m sediment depth in dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log Normal (L) Neither (X)	Power (at alpha = 0.05)	No. samples required for Power of 0.8	No. samples taken
Sample Date													
Moisture Content (dried @ 103°C)	%	1					23.08	7.892	25.97	X	-	-	24
Total Organic Carbon	%	0.02					0.059	0.21	0.281	L	-	-	24
Metals													
Aluminium	mg/kg	50	200				9418	6433	12752	N	-	-	12
Antimony	mg/kg	5	0.5	20		2	<5	-	<5	-	1	2	12
Arsenic	mg/kg	5	1	20	100	20	8.25	6.036	10.36	X	1	5	24
Cadmium	mg/kg	1	0.1	3	20	1.5	<1	-	<1	-	1	2	24
Chromium	mg/kg	2	1	50	100	80	13.79	8.881	16.9	N	1	2	24
Cobalt	mg/kg	2	0.5				8.667	3.869	10.67	N	-	-	12
Copper	mg/kg	5	1	60	1,000	65	12.367	28.06	30.4	L	0.99	6	24
Iron	mg/kg	50	100				21142	8311	25450	N	-	-	12
Lead	mg/kg	5	1	300	300	50	8.396	16.32	14.1	X	1	4	24
Manganese	mg/kg	5	10	500	1,500		310.443	771.4	**1103**	L	-	-	12
Nickel	mg/kg	2	1	60	600	21	5.048	7.706	14.18	L	0.99	10	24
Selenium	mg/kg	5	0.1				<5	-	<5	-	-	-	12
Silver	mg/kg	2	0.1			1	<2	-	<2	-	1	2	12
Vanadium	mg/kg	5	2				43.75	17.71	52.93	N	-	-	12
Zinc	mg/kg	5	1	200	7,000	200	19.144	18.52	30.44	L	1	2	24
Mercury	mg/kg	0.1	0.01	1	15	0.15	0.0625	0.0423	0.0773	X	1	4	24
BTEX													
Benzene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	8
Toluene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	8
Ethylbenzene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	8
meta- & para-Xylene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	8
ortho-Xylene	mg/kg	0.2					<0.2	-	<0.2	-	-	-	8
Total Petroleum Hydrocarbons													
C6 - C9 Fraction	mg/kg	3	100				<3	-	<3	-	-	-	8
C10 - C14 Fraction	mg/kg	3	100										
Normalised to 1% TOC							*1.864*	*1.029*	*2.554*	*X*	-	-	*8*
C15 - C28 Fraction	mg/kg	5	100										
Normalised to 1% TOC							*21.63*	*25.75*	*38.88*	*X*	-	-	*8*
C29 - C36 Fraction	µgSn/kg	0.5	100										
Normalised to 1% TOC							*17.26*	*25.63*	*34.43*	*X*	-	-	*8*
Sum of TPH Fractions (calculated)						550							
Normalised to 1% TOC							*15.014*	*51.43*	*72.7*	*L*	*1*	*2*	*8*
Organophosphorus Pesticides													
Bromophos-ethyl	µg/kg	10					<10	-	<10	-	-	-	8
Carbophenothion	µg/kg	10					<10	-	<10	-	-	-	8
Chlorfenvinphos (E)	µg/kg	10					<10	-	<10	-	-	-	8
Chlorfenvinphos (Z)	µg/kg	10					<10	-	<10	-	-	-	8
Chlorpyrifos	µg/kg	10					<10	-	<10	-	-	-	8
Chlorpyrifos-methyl	µg/kg	10					<10	-	<10	-	-	-	8
Demeton-S-methyl	µg/kg	10					<10	-	<10	-	-	-	8
Diazinon	µg/kg	10					<10	-	<10	-	-	-	8
Dichlorvos	µg/kg	10					<10	-	<10	-	-	-	8
Dimethoate	µg/kg	10					<10	-	<10	-	-	-	8
Ethion	µg/kg	10					<10	-	<10	-	-	-	8
Fenamiphos	µg/kg	10					<10	-	<10	-	-	-	8
Fenthion	µg/kg	10					<10	-	<10	-	-	-	8
Malathion	µg/kg	10					<10	-	<10	-	-	-	8
Azinphos Methyl	µg/kg	10					<10	-	<10	-	-	-	8
Monocrotophos	µg/kg	10					<10	-	<10	-	-	-	8
Parathion	µg/kg	10					<10	-	<10	-	-	-	8
Parathion-methyl	µg/kg	10					<10	-	<10	-	-	-	8
Pirimphos-ethyl	µg/kg	10					<10	-	<10	-	-	-	8
Prothiofos	µg/kg	10					<10	-	<10	-	-	-	8
Organochlorine Pesticides													
Aldrin	µg/kg	0.5	1	200	10,000		<0.5	-	<0.5	-	-	-	8
alpha-BHC	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
beta-BHC	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
delta-BHC	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
4.4`-DDD	µg/kg	0.5	1			2	<0.5	-	<0.5	-	-	-	8
4.4`-DDE	µg/kg	0.5	1			2.2	<0.5	-	<0.5	-	-	-	8
4.4`-DDT	µg/kg	0.5	1	200	200,000		<0.5	-	<0.5	-	-	-	8

Table 3-5: Summary statistics for contaminant substances below 1m sediment depth in dredge area Option 1B

Sample No	Units	LOR	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviaiton	95% UCL	Normal (N) Log Normal (L) Neither (X)	Power (at alpha = 0.05)	No. samples required for Power of 0.8	No. samples taken
DDT (total)	µg/kg	0.5	1			1.6	<0.5	-	<0.5	-	-	-	8
Dieldrin	µg/kg	0.5	1	200	10,000	280	<0.5	-	<0.5	-	-	-	8
alpha-Endosulfan	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
beta-Endosulfan	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Endosulfan sulfate	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Endosulfan (sum)	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Endrin	µg/kg	0.5	1			10	<0.5	-	<0.5	-	-	-	8
Endrin aldehyde	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Endrin ketone	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Heptachlor	µg/kg	0.5	1		10,000		<0.5	-	<0.5	-	-	-	8
Heptachlor epoxide	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Hexachlorobenzene (HCB)	µg/kg	0.25					<0.25	-	<0.25	-	-	-	8
gamma-BHC	µg/kg	0.5					<0.5	-	<0.5	-	-	-	8
Methoxychlor	µg/kg	0.25					<0.25	-	<0.25	-	-	-	8
cis-Chlordane	µg/kg	0.25	1		50,000		<0.25	-	<0.25	-	-	-	8
trans-Chlordane	µg/kg	0.25	1				<0.25	-	<0.25	-	-	-	8
Total Chlordane (sum)	µg/kg	0.5	1			0.5	<0.5	-	<0.5	-	-	-	8
Oxychlordane	µg/kg	5					<5	-	<5	-	-	-	8
Polychlorinated Biphenyls													
Total Polychlorinated biphenyls	µg/kg	5	5	1,000	10,000	23	<5	-	<5	-	-	-	8
Aroclor 1016	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1221	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1232	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1242	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1248	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1254	µg/kg	5	5				<5	-	<5	-	-	-	8
Aroclor 1260	µg/kg	0.5	5				<5	-	<5	-	-	-	8
Polycyclic Hydrocarbons													
Naphthalene	µg/kg	5	5				<5	-	<5	-	-	-	10
2-Methylnaphthalene	µg/kg	4	5				<5	-	<5	-	-	-	10
Acenaphthylene	µg/kg	4	5				<4	-	<4	-	-	-	10
Acenaphthene	µg/kg	4	5				<4	-	<4	-	-	-	10
Fluorene	µg/kg	4	5				<4	-	<4	-	-	-	10
Phenanthrene	µg/kg	4	5				<4	-	<4	-	-	-	10
Anthracene	µg/kg	4	5				<4	-	<4	-	-	-	10
Fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	10
Pyrene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benz(a)anthracene	µg/kg	4	5				<4	-	<4	-	-	-	10
Chrysene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benzo(b)fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benzo(k)fluoranthene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benzo(e)pyrene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benzo(a)pyrene	µg/kg	4	5		1,000		<4	-	<4	-	-	-	10
Perylene	µg/kg	4	5				<4	-	<4	-	-	-	10
Benzo(g.h.i)perylene	µg/kg	4	5				<4	-	<4	-	-	-	10
Dibenz(a.h)anthracene	µg/kg	4	5				<4	-	<4	-	-	-	10
Indeno(1.2.3.cd)pyrene	µg/kg	5	5				<4	-	<4	-	-	-	10
Coronene	µg/kg	4	5				<5	-	<5	-	-	-	10
Sum of PAHs	µg/kg	10	100		20,000	10,000	<4	-	<4	-	-	-	10

Legend

Note	When calculating averages and 95% UCLs, values below detection for individual results were set to half the detection levels, consistent with the NAGD
PQL	Practical Quantitation Limit
-	No guideline levels (ie. Screening levels) or no analysis undertaken for a given sample
50	Value exceeds NAGD Screening Level
50	Value exceeds Queensland EPA soil 'environmental investigation level' (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
50	Value exceeds Queensland EPA soil 'health investigation level' - A (as given in DEH (1998)). The DEH (1998) guideline for dieldrin and aldrin is based on the sum of the concentrations reported for the two analytes
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

3.3 Acid Sulphate Soils

The results of acid sulphate soils (ASS) testing are provided in detail in a separate report prepared by Golder Associates (2009a), which is provided in Appendix 2. Following is a summary of the key findings of the Golder Associates (2009a) report.

The area studied is underlain by Holocene aged sediments, which in-turn are underlain by Pleistocene age sediments. Holocene sediments are characterised mainly by silt/clay and are associated with former mangrove areas and the tidal flats of Curtis Island. These sediments are ASS bearing. Pleistocene sediments are residual soils of older age, and therefore do not present inherent ASS forming conditions. There is a 'zone of infiltration' on the boundary of the Holocene and Pleistocene sediments in which ASS may also occur, having infiltrated from the Holocene sediments into the underlying Pleistocene sediments. This phenomenon was not as prevalent in dredge area Option 1B compared to dredge area Option 2A (Golder Associates, 2009b).

In general, Holocene sediments in the dredge area Option 1B comprised very dark greenish grey, moist, soft medium to heavy clays with occasional sandy layers. Holocene sediments in the northern half of the footprint are generally comprised of fine to coarse sand with some gravel and clay fines. The northern section of the study area had the thickest Holocene layer (4.7m) compared with the central and southern parts of the study area in which the Holocene layer was much shallower (<1m).

Results of the ASS testing indicated that all Holocene sediment samples had an absence of actual acidity (i.e not Actual ASS [AASS]), which is indicative of the saturated environment in which they were located. It was also indicated that the Holocene sediments within the northern and southern most extents of the study area have moderate to high levels of oxidisable sulphur meaning that these Holocene sediments are Potential ASS (PASS).

Acid Neutralising Capacity (ANC) was evident in the majority of the Holocene sediments which mean that they have the ability to buffer the impact of acid generation. Predominantly this ANC was adequate or in excess of that required to neutralise actual and potential acidity. Areas where the ANC was not sufficient to neutralise this acidity was concentrated in at the northern and southern most extents of the study area. These areas would require treatment with good quality agricultural lime at a rate of up to 140kg of lime/m^3.

Actionable levels of net acidity were present in Holocene sediments in less than 5% of the dredge footprint studied. These sediments are considered to contain moderate to high levels of PASS through the depth of proposed dredging. Proposed dredging activities are likely to generate acid in only a small part of the footprint studied and as such physical disturbance of sediments (in the affected areas) poses a moderate risk of adverse impact to the receiving environment if not properly managed.

Based on the quantity of sediments to be dredged and the level of acidity, the treatment category, according to QASSIT guidelines and State Planning Policy 2/02 is considered 'extra high'.

3.4 Bulk Density and Settling Rates

Results for bulk density and settling rate test results are provided in Appendix 6. These provide information relevant to turbidity plume modelling for the project.

4. Chemical Data Validation

This section examines the validity of the analytical data obtained in the study. It provides the scientific confidence in the actual results presented.

4.1 Laboratory Accuracy and Precision

The primary laboratory (ALS) and secondary laboratory (AAA) incorporated a range of QA/QC methods to ensure accuracy of data. These are detailed further below. Laboratory QA/QC reports are included in laboratory reports in Appendix 4 (ALS) and Appendix 5 (AAA). Discussion of these is presented below.

4.1.1 Laboratory Blanks

Laboratory blanks are samples submitted by the laboratory during sample analysis to assist in identifying any cross contamination of samples during laboratory preparation, extraction or analysis. Analysis of laboratory blank samples should result in a concentration not exceeding the detection limit for a particular contaminant. An assessment of laboratory blank samples reported by ALS demonstrates concentrations below the detection limit for all parameters, so cross-contamination of samples does not appear to have occurred.

4.1.2 Laboratory Duplicates

The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the percent difference between the two sample concentrations for a specific contaminant. While NAGD states that the RPD should be within ±35%, ALS prefer to use a sliding scale to account for greater analytical uncertainty for contaminant concentrations nearer to the detection limit. The laboratory RPDs have been assessed using the following protocol:

- Results <10 times LOR: no limits;
- Results between 10 and 20 times LOR: 0% - 50%; and
- Results >20 time LOR: 0% - 20%.

Laboratory duplicates for only one substance, lead, was outside of the above laboratory criteria, so the overall level of precision for laboratory analysis is considered acceptable and valid conclusions can be drawn from the data.

4.1.3 Surrogate Spikes

Surrogate spikes are compounds similar in composition to the target analyte but are not likely to be present within the environment. Samples are spiked with the surrogate material and a calculation of the percent recovery of the spiked amount against the returned concentration is performed. The percent recovery result provides an indication of the ability of the laboratory to extract a specified contaminant type from the sample matrix. Typically surrogate spikes are performed only on organic compounds. NAGD states that recovery limits of 75% - 125% are generally acceptable.

Assessment of surrogate spike recoveries identified that some recovery rates for tributyltin were above laboratory recovery limits and OPPs were below recovery limits. In comparison with the NAGD guidelines the majority of OPP, OCP and PCBs were below the criteria.

The NAGD criteria range is likely based on surrogate recoveries from 'clean' matrix free samples. In real samples, the range of recoveries can be much greater and often lower due to matrix interference. Matrix interference occurs when samples contain certain properties such as high moisture content, high salinity and contain substances such as plant sterols, waxes, lipids or other organic matter content that can inhibit the full extrusion of a contaminant during laboratory surrogate extraction.

4.1.4 Matrix Spikes

Matrix spikes are undertaken by the laboratory to identify the amount of interference from the sediment matrix on contaminant recovery. Samples collected from the field are split from the base sample and spiked with a known contaminant concentration. The percent recovery of the contaminant is then calculated.

The accuracy of the data is determined through analysis of spiked samples. NAGD recommends that "*Recovery Rates [for matrix spiked samples] should be within the limits specified for the analysis method (typically 75-125%)*".

Assessment of matrix spike recoveries show that the majority of recoveries conform with ALS's specified recovery limits. Outliers included one OCP (trans-Chlordane), one PCB (Aroclor 1254), one BTEX (Benzene), and one OPP (Chlorfenvinphos (Z)). In comparison with the NAGD criteria, three PAH compounds and the majority of BTEX, OPPs, OCP, and PCBs fall outside of the above criteria.

Matrix interference occurs when samples contain certain properties such as high salinity, moisture content and/or organic matter that inhibit the full extrusion of a contaminant during laboratory analysis. Consequently, reported contaminant concentrations by the laboratory are potentially lower than actual contaminant concentrations found within sediment samples.

4.1.5 Field Split Triplicate, Replicate Triplicate and Inter-Batch Duplicate Analysis

Table 4-1 provides a summary RPDs and RSDs of field split triplicate, field replicate triplicate and inter-batch duplicate analyses. Results for the various analyses are discussed below.

Field Split Triplicate Sample Analyses

Field split triplicates are samples that are split from the original sample with two of the samples submitted to the primary laboratory and the third sample submitted to the secondary laboratory for analysis. This assesses variation associated with sub-sample handling and repeatability of laboratory analysis. Contaminant concentrations are compared between the split samples through calculation of the Relative Standard Deviation (RSD). The RSD value provides an indication of the accuracy of laboratory analysis between samples. One field split triplicate was collected from site, BH1B 02/0.00-0.50.

The NAGD states that RSDs for field split samples should be within ±50%. Assessment of field split triplicate samples identified that only one contaminant, selenium (77.08%), was outside of the 50% criteria value (Table 4-1). Based on RSD data analysis for all field split triplicate samples, sub-sample

handling was undertaken effectively to a standard that ensured sample contaminant concentrations were representative of sampled sediments.

Field Replicate Triplicate Analyses

One field replicate triplicate sample (i.e. three separate samples collected in the field at a given sampling location) was collected from site BH1B 04/0.00-0.20, to test for sediment homogeneity. Contaminant results were compared through calculation of the Relative Standard Deviation (RSD). According to NAGD:

> *"Field replicates (that is, two separate samples taken at the same location) should agree within an RPD (or for three samples at the one location, the relative standard deviation, RSD) of ±50%, although they may not always do so where the sediments are very inhomogeneous or greatly differing in grain size"*.

Assessment of field replicate triplicate analyses identified that all contaminants assessed were compliant with the NAGD guidelines.

Inter-batch Duplicate Sample Analyses

Inter-batch duplicates are samples that are split from the original sample and each sample is then submitted to the laboratory in a different sample batch for analysis. This is to identify any analysis variation sample batches. Contaminant concentrations are compared between the two split samples through calculation of the Relative Percent Difference (RPD). The RPD value provides an indication of the accuracy of laboratory analysis between samples/batches. The NAGD states that RPDs for duplicate split samples should be within ±50%. One inter-batch duplicate sample was taken from site BH1B 02/0.50-1.00.

Assessment of inter-batch duplicate samples identified that all contaminants were compliant with the NAGD criteria.

Based on RPD data analysis for all inter-batch duplicate samples, laboratory analysis between batches appears to be consistent.

4.1.6 Trip Blank

Field trip blank samples provide an indication of cross-contamination from volatile substances during field sampling. One trip blank sample was collected in the field and sent to the primary laboratory for BTEX analysis. BTEX concentrations were below detection limits, so no cross-contamination was likely to have occurred during in-field sample processing.

4.2 Holding Times

Samples were kept chilled whilst in the field, during storage and during delivery, and stored under refrigeration at the laboratories. All sample analyses, except one, were undertaken within required holding times by the primary laboratory (ALS) and the secondary laboratory (AAA). One sample (BH1B 06/0.4-0.6) analysed for moisture content was reported by ALS to have been completed outside of the holding time.

Table 4-1: Field duplicate, triplicate and inter-laboratory precision testing for dredge area Option 1B

	Moisture Content	Total Organic Carbon	Aluminium	Iron	Arsenic	Chromium	Copper	Cobalt	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	C15 - C28 Fraction	C29 - C36 Fraction
	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inter-batch Duplicate																	
BH1B 02/0.5-1.0	26.6	0.31	3990	12200	9.17	7.7	5.2	8	2.7	662	4.8	0.4	25.6	13.9	0.01	<3	<5
QC6/	24.9	<0.02	3900	11700	9.14	7.3	4.6	7.8	2.2	744	4.5	0.3	25.5	14	<0.01	8	6
RPD (%)	**6.60**	**ND**	**2.28**	**4.18**	**0.33**	**5.33**	**12.24**	**2.53**	**20.41**	**11.66**	**6.45**	**28.57**	**0.39**	**0.72**	**ND**	**ND**	**ND**
Field Replicate Triplicate																	
BH1B 04/0.0-0.2	43.6	<0.02	10800	19700	8.22	17.2	13.1	9.9	5.4	456	9.6	0.6	41.4	30.5	0.02		
QC9/	47.7	<0.02	10400	17500	9.9	17.1	16.2	8.3	4.8	409	8.9	0.5	36.1	28.8	0.01		
QC10/	42	<0.02	10800	19100	9.18	17.3	13.5	10.1	5.4	462	9.7	0.7	41.5	28.2	0.02		
RSD (%)	**6.62%**	**ND**	**2.17%**	**6.06**	**9.26**	**0.58**	**11.82**	**10.46**	**6.66**	**6.56**	**4.64**	**16.67**	**7.79**	**4.09**	**34.64**		
Field Split Triplicate																	
BH1B 02/0.0-0.5	21	0.14	2270	10200	9.54	5	2.8	7.5	1.6	758	3.6	0.2	21.7	10.7	<0.01	10	<5
QC5/	22.5	0.34	2220	10400	10.7	5	2.8	7.7	1.6	816	3.6	0.3	23.4	10.1	<0.01	8	<5
BH1B 02, 0.0-0.5	22.4	0.32	1700	11000	16	4.6	2.3	8.2	1.4	1000	3.4	0.84	27	11	<0.01	<50	<50
RSD (%)	**3.82**	**41.31**	**15.30**	**3.95**	**28.51**	**4.75**	**10.96**	**4.62**	**7.53**	**14.73**	**3.27**	**77.08**	**11.26**	**4.32**	**ND**	**15.71**	**ND**

Note: Cell shaded yellow represent RPD or RSD percentages outside of the NAGD criteria (only substances with concentrations above detection limits for each sample have been reported)

5. Discussion and Conclusions

Chemical analyses conducted on sediments within the capital dredging area Option 1B reported concentrations generally below NAGD Screening Levels, with the exception of arsenic (two samples), mercury (two samples), copper (one sample), lead (one sample), and nickel (one sample) below 1m depth. Arsenic and nickel in particular are recognised as occurring naturally at high concentrations (Vicente-Beckett *et al*, 2006). Apte *et al* (2006) also identified that copper and nickel were present in higher concentrations within the vicinity of dredge area Option 1B, compared with the remainder of Port Curtis. Given that these contaminants, including mercury and lead, all occurred in sediments below 1m and have been identified in previous nearby sediment sampling programs (URS, 2009) as also occurring below 1m, it is possible that these results are indicative of natural concentrations.

In comparison with DEH (1998) guidelines, two arsenic, one copper and seven manganese samples exceeded the EILs and further, three of the manganese samples also exceeded the HIL-A. As discussed, arsenic and copper may be at naturally high levels in sediments within the Port of Gladstone. Similarly, manganese has been recorded above the EIL in the Port of Gladstone previously and was considered to be at naturally occurring levels (URS, 2009).

The results of this study are comparable with those of URS (2009), which also undertook studies at Curtis Island. URS (2009) identified that arsenic, mercury, copper and nickel were present above NAGD Screening Levels in a number of samples and that these generally occurred in sediments below 1m. Similarly manganese was identified in a number of samples above EILs. Results of this present study differed only in the presence of lead above NAGD Screening Levels in one sample. Aside from this one sample, lead concentrations are comparable between the two studies.

Survey results for organic contaminant substances in the APLNG dredge area Option 1B are summarised below:

- TPH fraction C6-C9 was below laboratory detection limits in all samples;
- C10-C14 was above the detection limit in one sample only, in sediments below 1m;
- Fractions C15-C28 and C29-C36 were detected in the majority of samples throughout the sediment horizons;
- All PAHs, except one, were below detection limits, across all locations and sediment horizons. Phenanthrene was above the detection limit in one sample, in surface sediments; and
- BTEX, TBT, OCP, OPP and PCBs were not detected in any sample.

The 95% UCL of the mean for all contaminants tested in dredge area Option 1B were below respective NAGD Screening Levels. The 95% UCL of the mean for manganese exceeded the DEH (1998) EIL for sediments below 1m. All other contaminants were below the EIL and HIL-A guidelines at the 95% UCL of the mean. Power analyses conducted on the sample results within the dredge area Option 1B indicated that statistically valid comparisons could be made against the NAGD Screening Levels, even at the pilot level of sampling undertaken.

With regard to ASS results, the level of treatment required under the terms of the current State Planning Policy 2/02 (SPP) is deemed ‘extra high’. As such, should the dredged material be placed on land, specific strategies are required to manage ASS. These are required to be documented in a ‘stand alone’ Environmental Management Plan following the requirements of Appendix 4 of the SPP

2/02. Ultimately the PASS will be required to be treated with good quality agricultural lime according to the determined liming rates of up to 140kg lime/m^3. To avoid areas of high PASS, modifications to the dredge footprint would be required. Further ASS testing will be required in areas where PASS has been identified.

Based on the analyses undertaken for the APLNG dredge area Option 1B, it is considered that the capital material to be dredged is suitable for unconfined placement at sea, according to the NAGD contaminant assessment framework. It is also suitable for placement on land, subject to ASS management requirements.

6. REFERENCES

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Appendix 1 Core Logs and Photos

BOREHOLE #BH1B-01

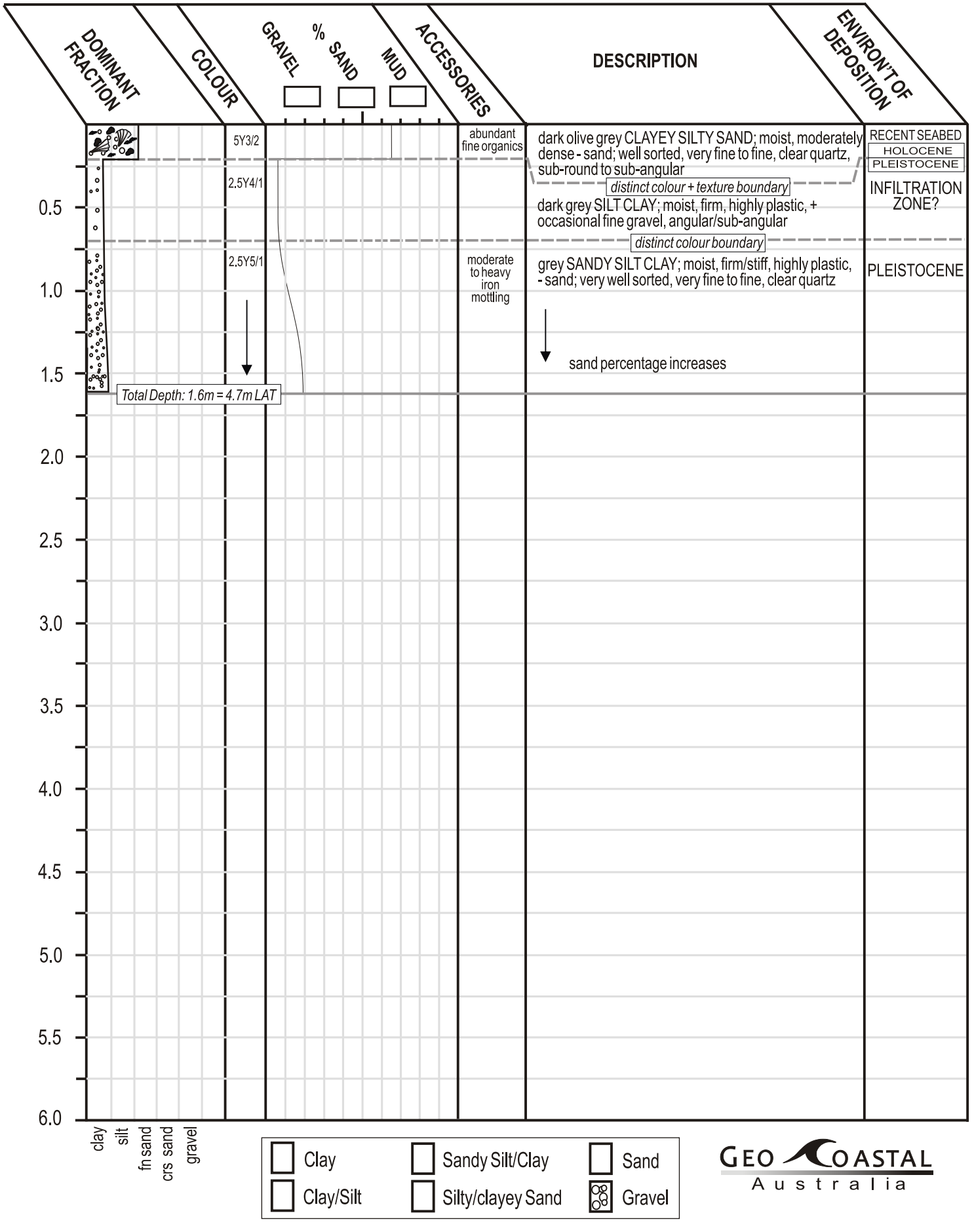
SITE: GC/BH1B-01

LOCATION: Port of Gladstone
23°45.306 **S** 151°10.562 **E**
R.L. 3.1 m L.A.T. (Port Datum)

DATE: 22/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-02

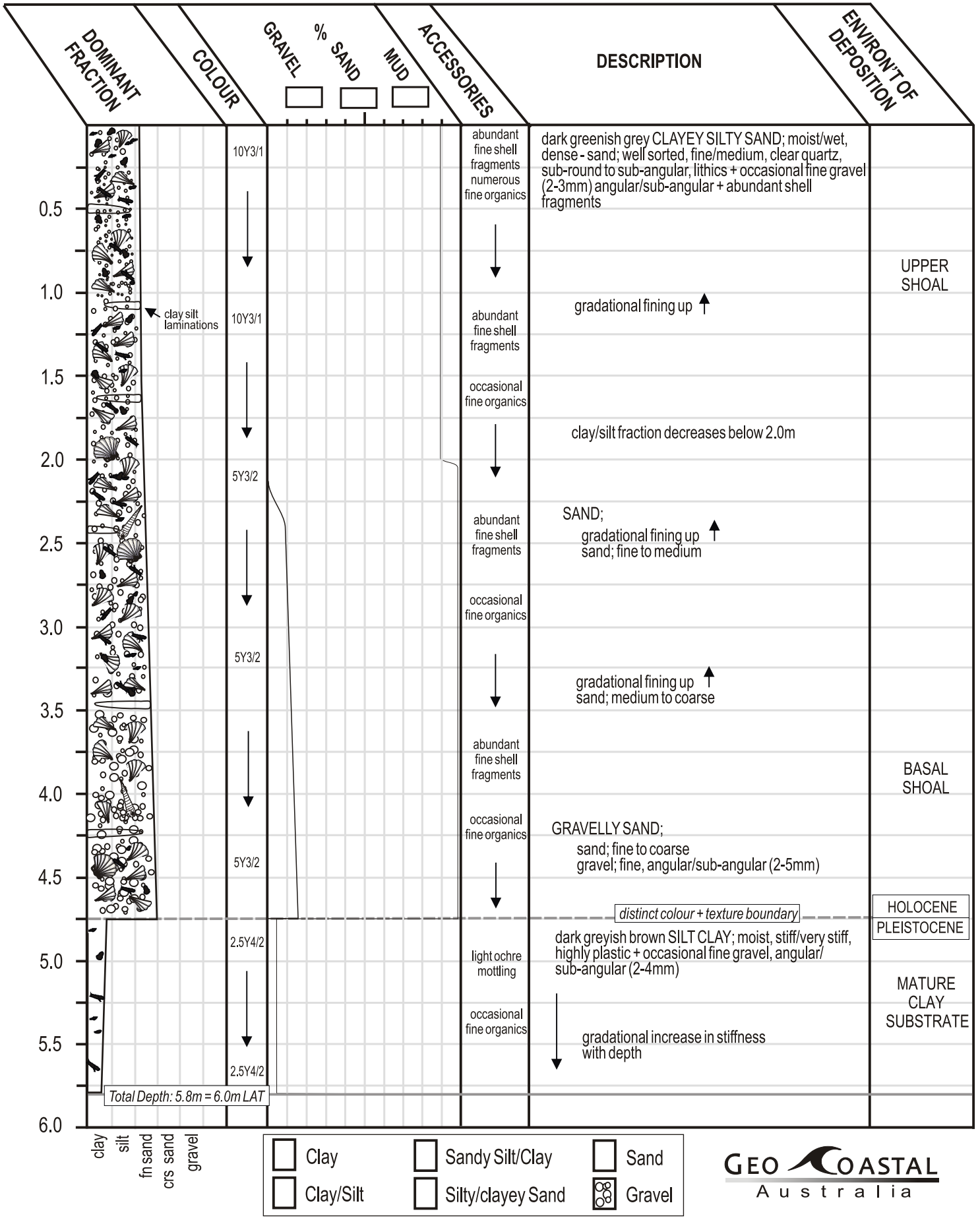
SITE: GC/BH1B-02

LOCATION: Port of Gladstone
23°45.471 **S** 151°10.432 **E**
R.L. 0.2 m L.A.T. (Port Datum)

DATE: 21/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-03

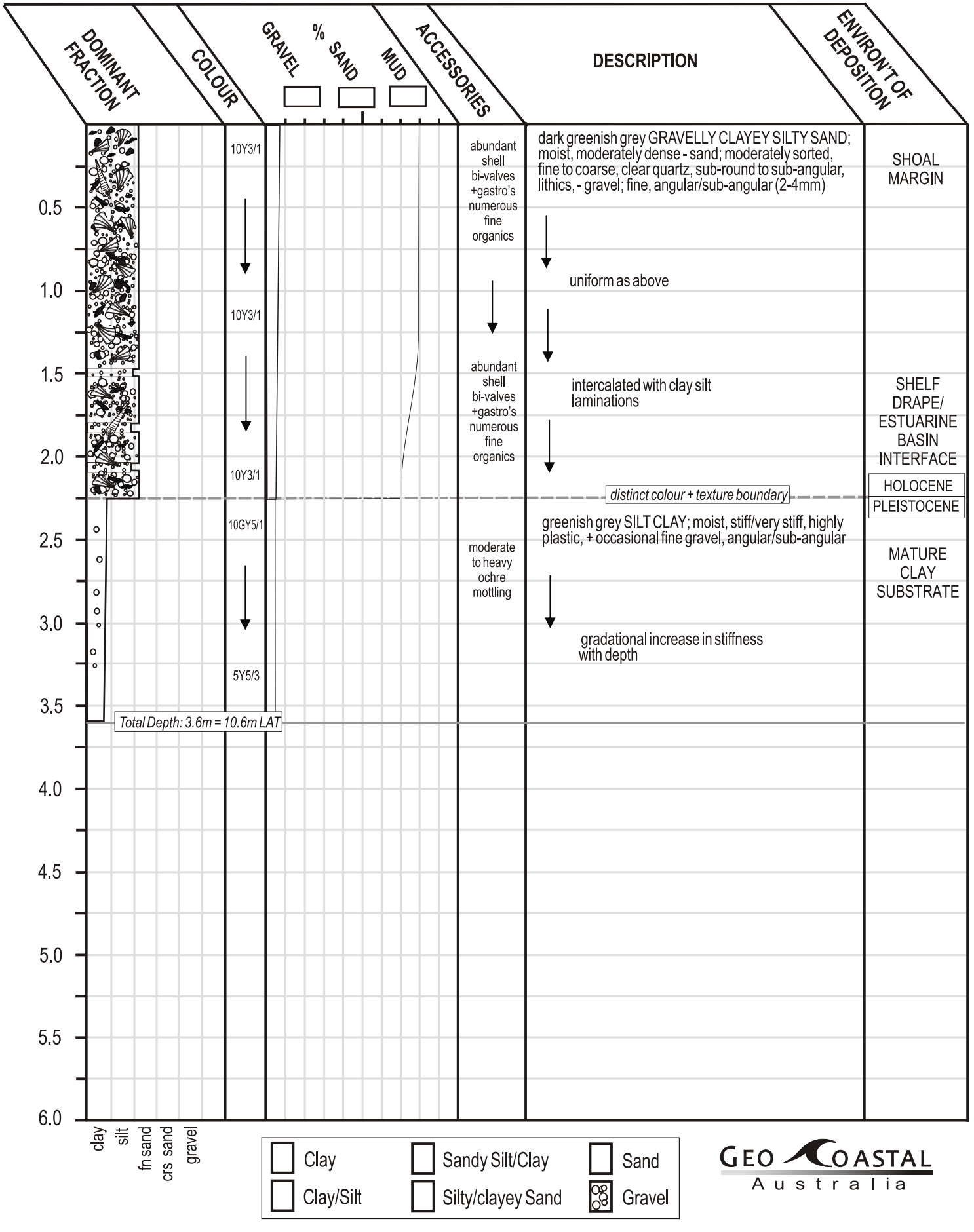
SITE: GC/BH1B-03

DATE: 22/09/09

LOCATION: Port of Gladstone
23°45.912 **S** 151°10.427 **E**
R.L. 7.0 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-04

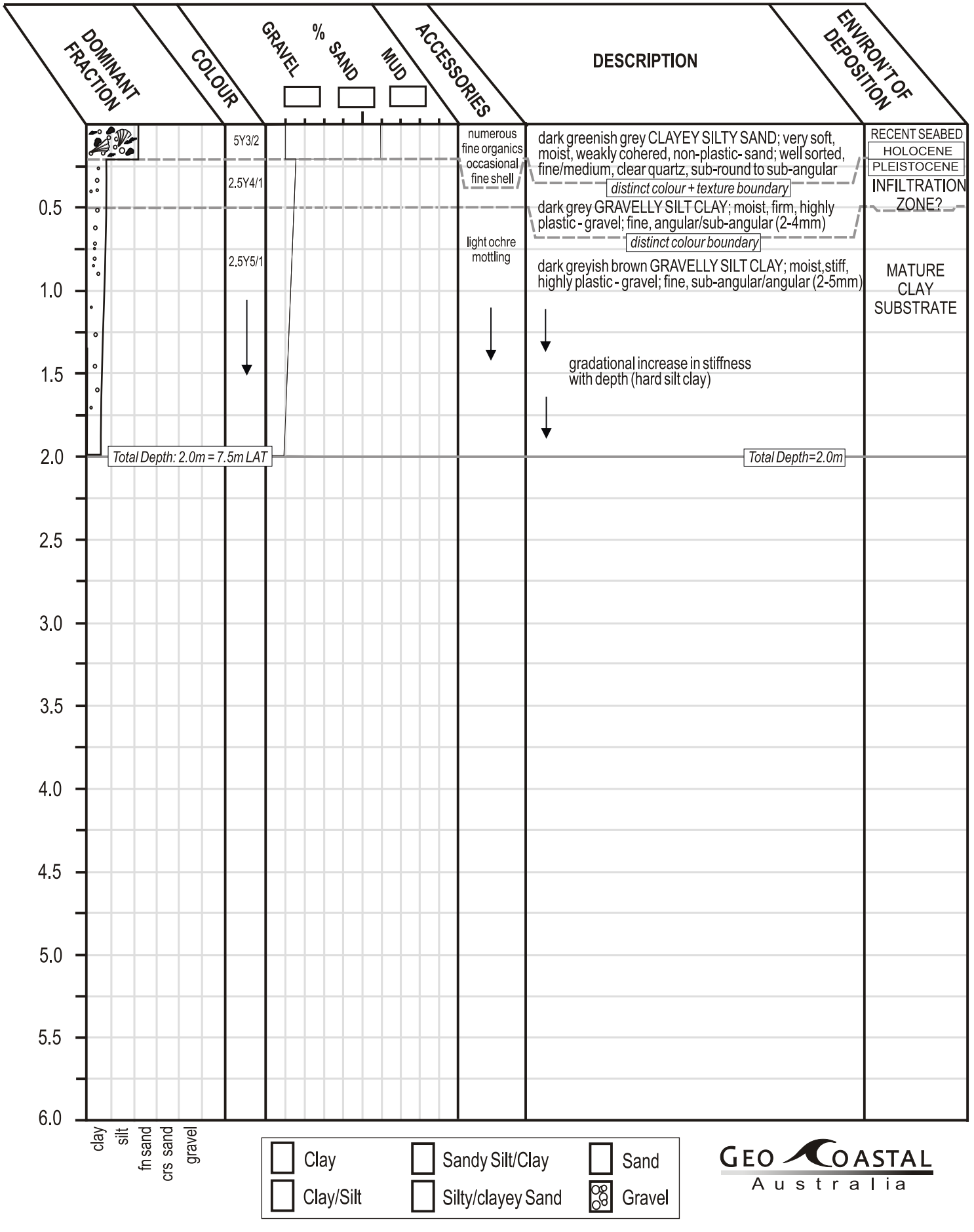
SITE: GC/BH1B-04

DATE: 22/09/09

LOCATION: Port of Gladstone
23°45.242 **S** 151°10.604 **E**
R.L. 5.5 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-05

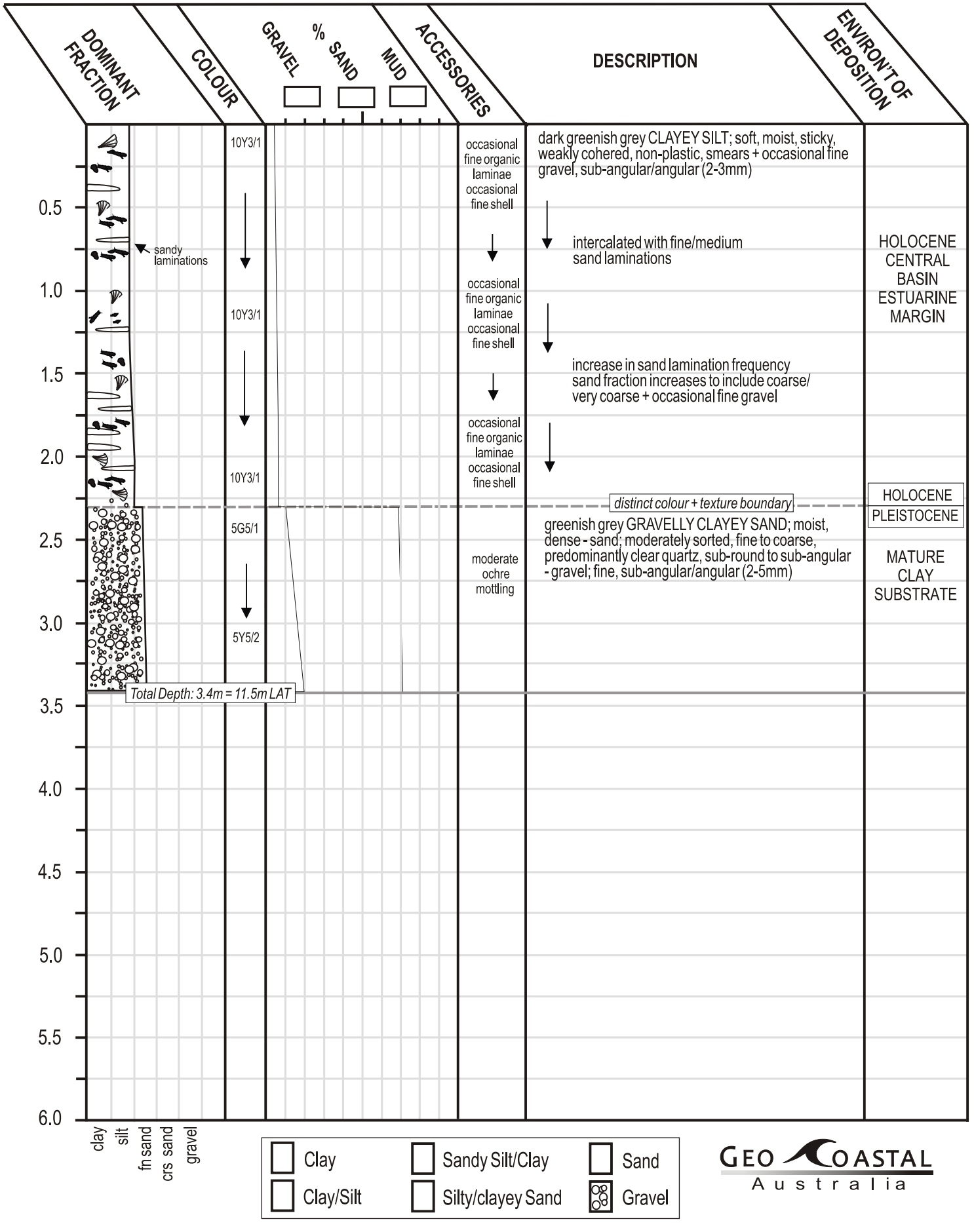
SITE: GC/BH1B-05

DATE: 21/09/09

LOCATION: Port of Gladstone
23°46.525 **S** 151°10.556 **E**
R.L. 8.1 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-06

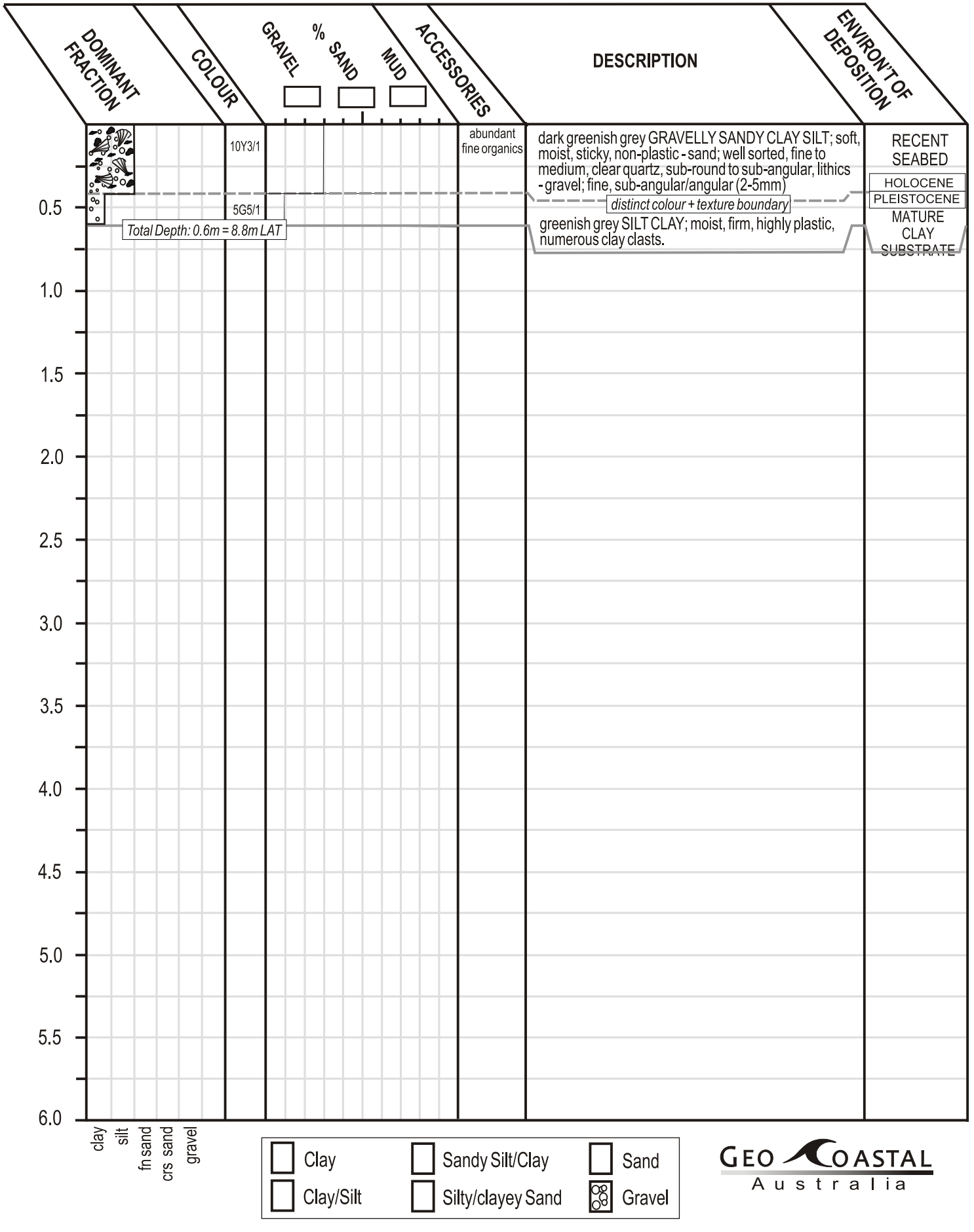
SITE: GC/BH1B-06

LOCATION: Port of Gladstone
23°46.689 **S** 151°10.646 **E**
R.L. 8.2 m L.A.T. (Port Datum)

DATE: 21/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 01

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL: 3.1m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 1.60m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP
DATE: 08/10/2009

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 02

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL:0.2m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 5.80m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP
DATE:08/10/2009

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 03

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL: 7.0m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 3.60m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP DATE: 08/10/2009

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 04

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL: 5.5m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 2.00m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP DATE:08/10/2009

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 05

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL: 8.1m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 3.40m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP DATE: 08/10/2009

REPORT OF PHOTOGRAPHS: BH1-B Re-sampled 06

CLIENT: Worley Parsons
PROJECT: Laird Point Dredging Study
LOCATION: Dredge Footprint - Option 1B [Re-sampled]
JOB NO: 097633052

SURFACE RL: 8.2m DATUM: LAT
INCLINATION: -90°
HOLE DEPTH: 0.60m

DRILL RIG: Barge 1
DRILLER: GeoCoastal
CHECKED: HP DATE:08/10/2009

Appendix 2 Acid Sulfate Soils Investigation Laird Point Dredge Study Option 1B (Prepared by Golder Associates)

October, 2009

REPORT ON

ACID SULFATE SOILS INVESTIGATION LAIRD PT DREDGE STUDY - OPTION 1B (Part) Repeat, GLADSTONE, QUEENSLAND

Submitted to:
Worley Parsons (Resources & Energy)
PO Box 15081,
City East, Brisbane,
Queensland, 4002

REPORT

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Golder Associates

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1.0 INTRODUCTION

1.1 Background

Golder Associates Pty Ltd (Golder) were commissioned by WorleyParsons (WP) to undertake sampling for Acid Sulfate Soils (ASS) and potential contaminants in bottom sediments from the eastern portion of a proposed dredging footprint 'Option 1B', referred herein as 'Option 1B (Part)', located off Laird Point in central Queensland. The Option 1B footprint lies adjacent to the coast of Gladstone, to the south of Laird Point.

Golder has undertaken an assessment of ASS within the eastern part of the Option 1B footprint. Assessment of contaminants has been conducted by others. The extent of the proposed dredge footprint is indicated on Figure 1. The Option 1B (Part) footprint is approximately 55ha in area and represents approximately 40% of the total area of 1B. The remainder of the 1B footprint has been assessed previously by others.

The purpose of the ASS investigation was to assess the extent of any Potential Acid Sulfate Soil (PASS) existing in Holocene sediments proposed for dredging from within the Option 1B (Part) footprint.

On completion of the initial fieldwork and sample selection program, a review of the reported coring locations revealed that the sampling locations had been translated by between 400m and 750m to the north-west of the target Option 1B (Part) footprint. After close scrutiny, the error was confirmed and relates to the formatting of the coordinates that were entered into the GPS units used on site. Thus the Option 1B sampling program was repeated immediately, and the findings of that [repeat] program are reported herein.

The data previously attained and reported in the earlier revision of this report (Rev0) does not actually reflect conditions at the locations specified in the scope of work, although the data is representative of seabed conditions in the passage adjoining the Option 1B (Part) and partly within the greater Option 1B footprint and may be of use to the overall project.

Following completion of the [second] sampling and analysis program, the proposed shape and extent of the Option IB footprint was modified and moved/extended south-westward, by approximately 350m. There was very little alteration to the shape and extent of Option 1B (Part), amounting to a translation of approximately 150m at the southern most tip of the investigation area, and 100m at the northern most end, with no alteration to majority of the footprint. The extent of the amended footprint is outlined in yellow (and Option 1B (Part) in red) on Figure 1.

A separate ASS assessment has been undertaken by Golder for an alternate dredging footprint Option 2A, located to the east of Option 1B, and is reported in Golder Report 097633052-003.

1.2 Limitations

The assessment was limited to undertaking sampling at approximately 20% of the locations that would normally be required for ASS investigations under the terms of the State Planning Policy 2/02 Guideline "Planning and Managing Development involving Acid Sulfate Soils" (SPP 2/02).

The basis of 20% of 'normal' site coverage under the terms of the National Assessment Guidelines for Dredging NAGD (2009) has been proposed by the final preparer of the Environmental Impact Statement (EIS), as sufficient site coverage for a 'pilot study' for Option 1B (Part). The same basis of approximately 20% of 'normal' site coverage under the terms of the QASSIT Sampling Guideline for ASS (1997), which is based on disturbance area, was adopted by Golder as the minimum site coverage for a preliminary ASS investigation, and is also consistent with the 'pilot study' approach adopted for the contaminant assessment for Option 1B (Part). For the proposed investigation area of 55ha, this is equivalent to approximately twenty-one (21) locations.

As a result of moving the footprint slightly south-west, 3 of the coring locations (BH1B-06, BH1B-08 and BH1B-18) now lie outside of the footprint by between 30m and 70m.

As there is an 'overlap' of the Option 1B and Option 2A footprints of approximately 5% in area, two ASS sampling locations are common to both areas and thus these two locations will be reported in the ASS assessment reports for both footprint options, identified as BH2A-01 and BH2A-02. The remaining 19 locations were sampled as part of the current investigation.

2.0 SITE DESCRIPTION

Dredging of the footprint that is eventually chosen will be required to deepen the seabed to allow access by heavy shipping. The ASS assessment is required for the preparation of an EIS for the overall project, to be prepared by others. There are two alternate locations proposed for the dredge footprint, Option 1B (considered in this report), and Option 2A. The two footprints overlap where they adjoin the Materials Handling Facility (MOF) to be constructed on Curtis Island.

Option 1B (Part) is approximately 51ha in area and is situated east of the mainland and to the west of a small island (North Passage Island) located in the channel between Curtis Island and the mainland. The 1B (Part) footprint is elongated and runs approximately north – south. The existing seabed dips from both the west (North Passage Island) and the mainland to the west. Within Option 1B (Part), the seabed level varies from approximately -0.5m Lowest Astronomical Tide (LAT) at the northern end, down to -8m LAT towards the southern end.

Two figures were provided by WP, showing the approximate original location and extent of the proposed dredge footprint option and including the locations of two deeper turning basin circles, situated within each dredge footprint. The layout of Option 1B (Part) footprint was revised on three occasions and the final extent is that which is depicted in Figures 1-3 included with this report.

3.0 EXTENT OF PROPOSED DREDGING

It is understood that the maximum dredging depth within the seabed will be to -13m LAT inside the turning basin circles, and -8.5m LAT in other areas within the Option 2A footprint. This is the basis that was adopted for preparation of the field sampling program. It has not been determined at this time which of the two options will be adopted for the final dredging operation, so both possible footprints required investigation.

If Option 1B is adopted, dredging within the total 1B footprint would produce approximately 11,320,000m^3 of spoil (calculated volume supplied by WP). Dredging depth within the turning basins would range from a maximum of 13.5m at the northern end, down to 8m to reach -13m LAT. It has been calculated (by WP) that dredging within 1B (part) would produce a volume of approximately 4,551,059 m^3.

ASS occur generally within Holocene age sediments (6,500 – 10,000 years old). It was anticipated that the Holocene layer, likely to contain ASS, would be generally shallow (i.e. average 3-4m thick) towards the northern end of the footprint and deeper (greater than 8-10m) towards the southern end of the footprint. Where Holocene sediment was present through the full depth of the sediment profile, the cores were to be extended an additional 1m in depth to conform to SPP 2/02 sampling requirements. Therefore cores were progressed to a minimum depth of approximately -14m LAT within the turning basin circles, and -9.5m LAT in other areas, unless shallower, very stiff/dense Pleistocene sediments and/or residual soils were encountered, which prevented further progression of the vibro-corer. However, investigations indicated that the actual Holocene thickness was less than anticipated at most locations, particularly towards the northern end of the footprint.

The final fate/use of the dredge spoil cannot be confirmed at this time until the results of the contaminant investigation are known. However, for purposes of developing preliminary ASS management strategies, disposal on land has been assumed.

4.0 REGIONAL GEOLOGY & GEOMORPHOLOGY

4.1 Regional Geology

The onshore geology of the region is presented on published geological maps; however, the offshore geology of the region is not available. The Queensland Department of Mines "Geology of the Rockhampton and Port Clinton 1:250 000 Sheet Areas" indicates that Curtis Island is underlain by the Lower Palaeozoic Wandilla Formation of the Curtis Island Group. Regionally, the formation consists of layered, interbedded mudstone with subordinate arenite and minor chert. The bedding is steeply dipping and is orientated north-west/south-east parallel to the prevailing regional lineament. The parent geology of the Wandilla Formations extends to the seabed underlying the north-east end of the Option 1B footprint and extending east from North Passage Island in the southern half of the footprint.

The geology sheet also indicates the presence of Quaternary aged Holocene alluvial deposits comprising gravel, sand, silt and clay in areas of the site immediately adjacent to the Curtis Island coastline and extending in places out into the channel within the Option 1B footprint at the northern end of the footprint. Holocene sediments in the central and southern parts of the footprint encountered by our investigations are more likely to be extensions from the mainland.

Graphical depictions of the stratigraphy and geology taken through the 1B footprint are included in Figures 4a and 4b and described in Table 1 below.

Table 1: Description of Typical Geological Units

Formation	Location
Holocene Alluvium - Soft Silts and Clays layered with loose Sands and Gravels	Extending from tidal mudflats at Curtis Island into the eastern edge of northern footprint, and present closer to the mainland and out into the channel to the west of the Passage Islands.
Wandilla Formation Mudstone, Greywacke, Chert	Underlies the entire footprint and emerges at some locations as areas of chert cobbles.

4.2 Geomorphology Related to Origins of ASS

Pyritic soils or ASS, were deposited in coastal zones throughout the world during the last 6,500 to 10,000 years. When drained for development or otherwise disturbed, the iron pyrite in these sediments oxidises producing sulfuric acid which subsequently lowers the pH in runoff and groundwater, leading to the release of toxic aluminium and iron from the sediments. Acidic water introduced into coastal streams can cause fish kills, alterations to ecosystems and corrosion of civil structures. The source of the acid is naturally occurring pyrite (FeS_2). Environmental degradation occurs when this pyrite oxidises and sulfuric acid is produced and discharged into receiving waters.

The geological sequences most likely to contain ASS relate primarily to deposition that has occurred in the Holocene epoch and in some circumstances deposits from the penultimate interglacial high sea level period in the late Pleistocene period (ca. 125,000 years). On Curtis Island, and extending into the top of the Option 1B footprint, Holocene age deposition is characterised mainly by silt/clay sediments associated with former mangrove areas which fill embayments within the bedrock geological template of the underlying Wandilla Formation. The depth of Holocene sediments has proved to be relatively shallow at the northern end near the MOF, but is deeper just below the northern-most part of the 1B footprint (Part) and again at the very southern tip of the footprint (refer to Figure 2). However, recoverable sediments did not extend to the planned investigation depth(s) at any of the sample locations.

Pre-Holocene sequences at most sites are residual soils of older age, and therefore do not present inherent ASS forming conditions. This is supported generally by consistent negligible potential acidity results in residual soils tested.

An important exception to this general rule is the phenomenon that has been reported at a number of locations in Queensland, where a shallow zone of discolouration occurs immediately below the surface of the pre-Holocene clays. This phenomenon is interpreted as a zone of infiltration by overlying Holocene-age interstitial water and can include limited physical intermixing where the sediments are soft enough. Within the Option 1B footprint, this phenomenon was not observed to any great extent (i.e. only identified in a sample from the top of the Pleistocene layer in BH1B-04 and BH2A-01 [from the previous investigation]).

The Pleistocene clays which underlie the Holocene layer contain only low levels of ASS derived acidity, except where the 'mixing zone' is present at the base of the softer Holocene layer. The phenomenon was more evident in sediment cores recovered from the Option 2A footprint, where the intermixing of sediments in the top 0.5m or so of the Pleistocene layer.

Determination of the local upper Pleistocene and Holocene sedimentary sequences was part of the objective of the investigation program undertaken and reported herein, as this relates directly to the vertical extent of ASS and any required management measures. Even in the north-western and southern-most tip of the 1B (Part) footprint, where the Holocene layer is thickest, the Holocene layer does not extend beyond the proposed dredging depth and so some Pleistocene clays / residual soils will be dredged at all locations sampled.

5.0 INVESTIGATION METHODOLOGY

5.1 Desk Top Study

A brief desktop study of the site has been undertaken. The work was undertaken to meet part of the requirements of assessment of ASS set down in the SPP 2/02.

The desktop study included review of soil landscapes (geomorphology), site geology and potential ASS conditions in the area. The scope of the study was limited to interpretation of available published maps, aerial photographs and existing soil data from previous studies (where available), with respect to preliminary drawings of the site.

Reference material includes:

- State Planning Policy 2/02 Guideline - "Planning and Managing Development involving Acid Sulfate Soils";
- QASSIT - "Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland - 1998";
- A Guide to the Influence of Parent Material on Soil Distribution in Eastern Australia "Parent Material and Soils (DLWC Technical Report No. 45)" - 1999;
- Geology of the Rockhampton and Port Clinton 1:250 000 Sheet; and
- A figure showing proposed outline of Dredge Footprint for Option 1B and bathymetry of the site (supplied by WP) – "Laird Point, Case A, Option 1-A , June 2009, Fig 8 rev4" and a Bit Map image of the final extent of Option 1B (Part), dated 23 July .

5.2 Mapped ASS Layers

Reference to the Department of Natural Resources Mines (DNR & M) [now Department of Environment and Resource Management] Map for the "Tannum Sands – Gladstone Area (QNRM04285)" was undertaken; however, islands (including Curtis island and surrounds) are not surveyed as part of that mapping program. As such, the site is mapped as "Not Assessed".

5.3 Previously Identified Areas of ASS

Reference to the DNR & M report "Acid Sulfate Soils, Tannum Sands – Gladstone Area, Central Queensland Coast - 2004" indicates that the majority of land containing ASS in the Gladstone area is generally tidal flats with an elevation of less than 3m AHD. No specific information was included on whether the ASS extended into the adjoining passage.

A number of previous studies undertaken in mudflats areas adjoining the mainland have also indicated the presence of very high levels of potential acidity (more than 5% oxidisable sulfur) in shallow Holocene sediments.

5.4 Receiving Environment

The aquatic receiving environment comprises the immediate channel and fringe of the Pacific Ocean. This includes aggregated Sea Grass meadows, with regional receiving waters including the Great Barrier Reef Marine Park and a Dugong Protected Area (DPA) which includes the majority of the immediate Gladstone Port area. The Great Barrier Reef Marine Park extends from mainland east and north-east and includes, General Use, Island Cay, and Marine National Park and Habitat Protection Zones near Curtis Island. Declared Fish habitats also exist within about 15km of the project area (to the south).

5.5 Potential Impacts

During dredging, excavations in the shallow Holocene sediment layer and immediately underlying Pleistocene clays could result in oxidation of PASS and the migration of acidic fines into receiving waters. Depending on specific location, this includes the top 1.5-6m of spoil.

Where any disturbance of confirmed ASS is required, specific management measures will need to be developed and carefully followed, in order to prevent generation of acid run off.

6.0 SAMPLING PROGRAM

The information collected from the desktop study was used in part as the basis of assessment of the likely extent of ASS/PASS materials within the proposed dredge footprint, and the associated risk of disturbance in these areas.

6.1 Equipment

Golder engaged GeoCoastal, an integrated company with scientific expertise and specialised marine coring equipment and vessels, to undertake the overwater coring. GeoCoastal utilised vacuum-vibrocoring techniques which enabled the recovery of a continuous core of all sedimentary media including unconsolidated sediments such as flowing sands. The method prevented cross contamination or vertical mixing of samples and enabled the collection of a high volume of sample for multiple analyses and sub-sampling.

GeoCoastal's vacuum-vibrocoring system is mounted on a dumb barge/support vessel combination. The vibrocoring system uses a thin-wall (2mm) stainless steel barrel to collect continuous, undisturbed sediment cores of 70mm diameter, which is extruded into plastic sheathing for transport back to shore for processing in a controlled environment. The core barrel is thoroughly washed by a combination of high pressure water and air combined with vibration between coring runs. On average, recovery of better than 95% was achieved throughout the sampling program.

A small barge unit ('The Crab') was utilised for coring at some sampling locations in the northern half of the footprint. However, strong currents and deeper water meant that a larger barge unit (Barge #1) had to be utilised for sampling from the majority of the locations.

The vessels and marine coring equipment were relocated around the dredging site using a differential GPS (accurate to ± 3-5m), to locate the borehole sites.

6.2 Sampling Plan

The part of the proposed dredge footprint to be assessed includes an elongated area of approximately 51ha along the eastern edge of the Option 1B footprint, and includes an area of approximately 6ha (at the northern most end of the footprint) common to the Option 2A footprint. This small area has been assessed separately by Golder as part of the Option 2A footprint. Data from these two locations has been utilised for this report. Golder has attempted to evenly distribute sampling points within the footprint, while first allowing for distribution of the 6 common contaminant sampling locations (BH1B-01 to BH1B-06). These locations were selected by WP using the 'random methods' described in the NAGD. Selected sample locations and final investigation depths are presented in Table 2 below and locations are also indicated on Figure 1.

Table 2: Investigation Locations and Depths

Sample Location No.	Latitude	Longitude	Depth of Core (m)	Depth of Holocene (m)
BH2A-01	23° 45.305	151° 10.563	3.00	1.80
BH2A-02	23° 45.469	151° 10.431	0.90	0.05
BH1B-033	23° 45.916	151° 10.430	1.60	0.70
BH1B-044	23° 46.241	151° 10.607	5.80	4.75
BH1B-05	23° 46.527	151° 10.559	3.60	2.25
BH1B-06	23° 46.691	151° 10.647	2.00	0.50
BH1B-07	23° 45.332	151° 10.497	3.40	2.40
BH1B-08	23° 45.373	151° 10.376	0.60	0.60
BH1B-09	23° 45.469	151° 10.354	1.60	0.20
BH1B-10	23° 45.604	151° 10.383	5.30	4.80
BH1B-11	23° 45.725	151° 10.393	5.60	5.25
BH1B-12	23° 46.023	151° 10.462	7.20	6.75
BH1B-13	23° 46.140	151° 10.482	5.70	4.90
BH1B-14	23° 46.278	151° 10.489	2.00	1.00
BH1B-15	23° 46.328	151° 10.620	0.78	0.10
BH1B-16	23° 46.448	151° 10.626	1.90	0.10
BH1B-17	23° 46.609	151° 10.603	1.20	0.10
BH1B-18	23° 46.787	151° 10.709	0.80	0.00
BH1B-19	23° 46.403	151° 10.526	1.10	0.20

Coring revealed that the Holocene layer was generally shallow at the northern end and for a significant part of the central and southern footprint (and absent altogether in BH1B-16, near the southern end). On average, 2.1m of Holocene sediment occurred across Option 1B (Part) footprint. In BH1B-02, BH1B-08, BH1B-09, BH1B-10, BH1B-11 to BH1B-18, deeper deposits (4.75m and deeper) were encountered, mainly in the central part of the footprint and at the very tip of the southern end. At the remaining sampling locations, Holocene sediment depths were generally of the order of 1m or less. Holocene sediments do not extend to below -13m LAT anywhere within the footprint except at BH1B-18, where the Holocene deposit was greater than 5.3m depth. The thickest deposit was 6.75m encountered at BH1B-10.

Overall Holocene recovery was 35.6m of the 57.7m recovered from the Option 1B program, plus 1.85m of 3.9m recovered for BH2A-01 and BH2A-02.

Subsequently, as a result of moving the footprint south-west, BH1B-06, BH1B-08 and BH1B-18 lie slightly outside of the final target area.

6.3 Sample Selection for Analysis.

A representative number of sub-samples were selected and subjected to quantitative analyses by the Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) or 'improved' Chromium Reducible Sulfur (S_{CR}) analytical test methods. The approach adopted was to undertake analysis of sediments at approximately 0.5m vertical intervals (in accordance with QASSIT methodology) in at least 25% of the locations sampled (i.e. in 5 locations) and to carry out less intensive analysis on the remaining cores, at a rate of 1 test per 1-2m of core (depending on results of sampling). In some cores where screening indicated a complete absence of ASS, limited sampling was undertaken. However, a minimum of one sample of Holocene material was analysed from each location. Due to the overall limited depth of Holocene at the northern end, slightly fewer samples were recovered for analysis. In all, 92 samples were selected for quantitative analysis (not including BH2A-01 and BH2A-02). Of these, 64 were Holocene and 28 were Pleistocene, in origin.

The sealed cores were kept refrigerated and returned to land daily for sub-sampling by a scientist from Golder. Sub-samples were collected from the sealed cores in labelled bags. Additional samples were recovered for contaminant analysis (to be reported by others).

6.4 Analysis Methods

Sub-samples were screened by Golder using the pH_F (Field pH) and pH_{FOX} (pH Following Peroxide Oxidation) methods of analyses.

The pH_F/pH_{FOX} screening method consists of two steps; initially determining the field pH of a 1:5 soil/water suspension, followed by the addition of 30% Hydrogen Peroxide, allowing the sample time to oxidise, before determining the pH_{FOX} (pH after oxidation) of the reacted sample. A significant drop in pH is indicative of potential acidity, while a low initial pH is indicative of actual acidity (not anticipated in a fully marine environment).

A representative number of samples selected from the screened samples were sent to ALS Brisbane and subjected to the full SPOCAS or S_{CR} test suites. The latter test method was used on some samples that contained significant amounts of organic matter, which could contain sulfur of organic origin that could artificially 'inflate' the Percent Oxidisable Sulfur (S_{POS}) determined by the SPOCAS method.

The S_{CR} and SPOCAS analysis suites have been adopted by QASSIT for the analysis of ASS in Queensland. These methods include analysis and quantification of naturally occurring alkaline materials (i.e. calcite, coral debris, fine shell fragments) and any 'retained acidity' which includes sulfur held in stable oxidation minerals such as 'jarosite' which was previously not included in estimates of total potential acidity.

Sulfidic derived acidity had been historically determined using the following equation:

- Total Potential Acidity (TPA) = Total Actual Acidity (TAA) + Total Sulfidic Acidity (TSA)

However, experience has proved that TPA can include acidity of organic and/or mineralogical origin as well as sulfidic origin. Thus an overall acid-base accounting method has been derived to calculate a 'net acidity' value which is used to qualify analytical test results and calculate of liming rates. This equation is:

- 'net acidity' = actual acidity (as TAA) + retained acidity (as S_{NAS}) + Potential Acidity (as S_{CR} or S_{POS}) - insitu acid neutralising capacity (ANC).

7.0 FIELDWORK

Overwater sampling commenced on 21st September, 2009 and was completed on 30th September. Due to strong winds developing on some days, sampling was not possible on two occasions resulting in 2 days of 'standby' time for the barges.

Locations BH2A-01 and BH2A-02 were sampled as part of the Option 2A investigation undertaken in June 2009.

GeoCoastal's vibrocoring system mounted on a mobile barge was used to drill the holes and sample soils. This method produces undisturbed sediment cores of 65mm diameter. Each sheathed vibro-vacuum core was placed onto cleaned PVC half-pipe supports. The top of the sheath was then carefully sliced lengthways to expose sufficient core for logging and sub-sampling.

Logging was conducted in the field by an experienced scientist from GeoCoastal. Characteristics of the sediment including texture, consistency, colour, proportional grain size estimations, presence of accessory material (biological matter, organic debris, shells etc.), were recorded against depth. Stratigraphical soil logs were produced for each core by GeoCoastal for reporting purposes (Appendix A).

All sub-samples collected on site were placed in labelled plastic bags which were sealed and refrigerated until screened, then frozen within 24 hours of screening until laboratory testing was undertaken. ASS screening was undertaken (by GeoCoastal marine) in accordance with current QASSIT requirements.

Sample locations are shown on the Site Plan (Figure 1).

8.0 STRATIGRAPHY

8.1 Holocene Facies

Field investigations revealed that the Holocene layer was generally quite shallow at the northern most end of the Option 1B footprint closest to Curtis Island and for much of the southern and central parts (i.e. 1.0m or less). The Holocene layer was thicker in the north-western corner and very southern most tip of the 1B (Part) footprint, typically 4.7m or more (Figure 2). The average depth of Holocene sediment occurred across the Option 1B (Part) footprint was 2.1m

The Holocene sediments were encountered at the surface of the deposition sequence at all locations.

The ultimate Holocene deposits found commonly along the tidal flats of Curtis Island and extending out from the mainland are silty clays historically washed down from nearby landforms and it is this that is the source of the Holocene alluvium extending to the adjacent seabed. These deposits are characteristic of suspension sediment accretion from estuarine/restricted marine settings. Deposits in the northern half of the footprint comprise mainly fine to coarse sand, with gravel and some clay fines, encountered in BH1B-02, BH1B-03, BH1B-08 to BH1B-11. Only shallow deposits were apparent in much of the central and southern part of the footprint area; these areas are regularly scoured by the mid-channel currents, resulting in a shallow and somewhat sparse Holocene layer. The deeper Holocene sediments occur in deeper water and are less vulnerable to being 'washed away' by ocean currents. Hence they are older, deeper deposits. These deposits are mostly sands.

Generally the Holocene layer in the remainder of the footprint comprised very dark greenish grey, moist, soft, medium to heavy clays with occasional sandy layers. This was consistent with the Holocene sediments encountered during investigations for the Option 2A footprint. These sediments are 'unripe' and are often incorrectly described as 'marine clays' because of their high visible shell content. They generally incorporate a high percentage of silt and non-reactive clays. Shell fragments were in evidence from the surface in the majority of cores taken.

The taxonomy of the sediments was generally quite consistent within specific areas of the footprint: fine to coarse sands (coarse textured soils) at the northern end and mainly light to medium clays with some heavy clays (fine and medium textured soils) towards the southern half of the footprint.

Figure 2 depicts the inferred depth of the Holocene layer, by using contours representing the depth of the Holocene PASS layer, with shading to indicate thickness of the deposit. Red represents greater than 4m thickness, orange/brown 2.0-4.0m, yellow 1.0-2.0m, green 0.2-1.0m and blue less than or equal to 0.2m.

8.2 Pre-Holocene Facies

The interface of pre-Holocene/Holocene aged sediments is generally characterised by a seaward declining continuation of the residual landscape (of Curtis Island at the northern end, and North Passage Island). The residual substrate was also encountered in the Option 1B (Part) footprint, extending from the eastern side of the mainland.

Pleistocene aged sediments are characteristically composed of grey / grey-brown / olive-grey, clays which are typically stiff to very stiff, moderate to high plasticity, and generally slightly gravelly. Residual soils were generally very stiff to hard and refusal was met by the vibro-corer at relatively shallow depths in the southern half of the footprint, except at BH1B-18 [just east of the actual footprint] , where the 'shelf' falls away and deeper Holocene sediments were encountered.

A shallow zone of discolouration immediately below the surface of the Holocene clays was observed in a few of the cores. This phenomenon has been observed commonly in Queensland pre-Holocene clays, and is interpreted as a zone of infiltration by overlying Holocene-age interstitial water and in some instances physical intrusion by intermixing where the underlying clays are soft and/or by Holocene sediments intruding via old mangrove root canals. This 'intermixing zone' was evident in cores taken from the Option 2A footprint (closer to Curtis Island) and was not nearly as common in the Option 1B footprint (present at only one location). This observation has significance in the discussion of the distribution of ASS conditions.

Pleistocene sediments generally contained less shell debris, but none the less, fragments and debris are present at a number of locations.

The taxonomy of the Pleistocene sediments encountered were generally quite consistent and included fine textured soils (mainly medium and heavy clays) with some coarse sandy layers.

The individual soil taxonomy units encountered are described using methods included in the 'Australian Soil & Land Survey Field Handbook' on laboratory test result summaries in Appendix C and in the summary in Table 3.

Graphical sections displaying the of the dredge footprint annotated with TAA and net acidity values for the samples analysed are included as Figures 4a and 4b.

9.0 LABORATORY TESTING

The laboratory testing program outlined below was carried out to assess actual and potential ASS conditions in sediments from the footprint area. The Holocene layer thickness was somewhat over estimated through the central and southern areas of the footprint, thus the overall number of screening sub-samples was considerably less than what had been originally estimated.

As the sediments were saturated, no actual acidity was expected to be detected.

9.1 Preliminary Screening

In all, 235 sub-samples were screened, 169 were from material logged as Holocene and 66 from material logged as Pleistocene or residual soils.

The pH_F values for samples from all locations generally indicated an absence of actual acidity, and ranged from 6.5 to 9.4, but were generally higher than 7.0, (as expected given the saturated state of the soils and that many samples contained inherent acid buffering capacity, in the form of shell material).

During logging and sub-sampling, shells were observed to be present in the soil matrix within the Holocene stratum and to a lesser extent in the Pleistocene.

The pH_{FOX} values of Holocene samples were generally greater than 4.5, indicating that the majority of the sediment was unlikely to contain potential acidity (or PASS). However, some samples from BH1B-03, BH1B-05, BH1B-09, BH1B-11, BH1B-12, BH1B-18 and BH1B-19 returned pH_{FOX} values as low as 1.6 indicating probable or positive results for the presence of PASS. Similarly, samples previously screened from BH2A-01 also returned positive indications for PASS. The pH_{FOX} values measured in the current study are not as persistent or low as the pH_{FOX} results measured for the Option 2A footprint, and it is interpreted that this is due mainly to the presence of higher levels of ANC throughout the Holocene sediments from the current study (i.e. Option 1B [Part]).

Only two samples collected from below the top of the Pleistocene in BH2A-01 and BH1B-04 were interpreted as representative of an infiltration / intermixing zone between the Holocene and the Pleistocene strata. Both samples reported neutral pH_{FOX} values.

The screening results from within the Pleistocene layer returned pH_{FOX} values ranging from 5.0 to 8.1, indicating an overall absence of PASS.

Tabulations of pH_F/pH_{FOX} screening tests are attached in Appendix C. The benign Pleistocene layer is shown shaded in pale green, and where present, the 'infiltration / intermixing' zone between the Holocene and Pleistocene layers is identified by shading in ochre. The Holocene sediments are not shaded.

9.2 Quantitative Analysis

Sub-samples from approximately 25% of the cores recovered (5) were collected at 0.5m vertical intervals. Sub-samples from the majority of the remaining cores (14) were collected at approximately 1.0m intervals, based on screening test results. The Holocene layer was absent in BH1B-16, however, one sample (of Pleistocene clay) was still analysed by the laboratory.

In all, 93 samples were selected to undergo laboratory analysis by the SPOCAS or S_{CR} test methods. Of these, 64 were Holocene and 29 were Pleistocene in origin.

Results of laboratory testing are included in Appendix C and summarised in Table 3. Samples from the north-western part and southern most tip of the Option 1B footprint, which returned higher net acidity concentrations above the adopted action criteria, have been separated out within the tabulation to allow meaningful statistical analysis of the test data. In addition, results from BH2A-01 are also included in the tabulation and treated separately for purposes of statistical analysis.

The results are compared to the 'Action Criteria' for disturbances of more than 1000 tonnes of material (i.e. 18 moles of acid / tonne). Values shown in **bold** exceed the adopted action criterion.

Table 3: Quantitative Analysis Results

Location	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole H^+/t)	pH_{OX}
Holocene Layer - 2A						
BH2A-01 0.00-0.50m	<2	245	LMC, dk grey, orgs	1.21*	**590**	--*
BH2A-01 0.50-1.00m	<2	266	MC, dk grey, orgs	1.44*	**720**	--*
BH2A-01 1.00-1.50m	<2	--	MC, dk grey, trace orgs	1.18	**680**	2.1
BH2A-01 1.50-1.80m	<2	--	MC, dk grey, trace orgs	1.91	**1180**	1.9
BH2A-01 1.80-2.25m	<2	--	MHC, dk grey	0.74	**390**	2.5
Averages	<2	n/a	Fine Textured		**712**	
Holocene Layer – Majority of 1B Footprint						
BH1B-01 0.00-0.01m	<2	506	LS dk olive grey	0.11*	<10	--*
BH1B-02 0.00-0.10m	<2	1800	LS dk green grey	<0.02*	<10	--*
BH1B-02 0.80-1.00m	<2	1750	LS dk green grey	0.12	<10	8.8
BH1B-02 2.30-2.50m	<2	2420	S grey	0.10	<10	9.8
BH1B-02 3.80-4.00m	<2	2660	S grey	0.08	<10	9.9
BH1B-03 0.00-0.10m	<2	2000	SL dk green grey	0.07*	<10	--*
BH1B-03 0.80-1.00m	<2	2340	SL dk green grey	0.28*	<10	--*
BH1B-03 1.80-2.00m	<2	2340	L dk green grey	0.52*	<10	--*
BH1B-04 0.00-0.10m	<2	2240	L dk green grey	0.11*	<10	--*
BH1B-05 0.00-0.10m	<2	3600	LC dk green grey	0.17*	<10	--*
BH1B-05 0.80-1.00m	<2	-	LC dk green grey	0.78	**251**	3.3
BH1B-05 1.80-2.00m	<2	409	LC dk green grey	0.46	<10	8.1
BH1B-06 0.00-0.10m	<2	1460	SCL dk green grey	0.32	<10	8.3
BH1B-07 0.00-0.10m	<2	1100	SL dk olive grey	0.11*	<10*	--*
BH1B-08 0.00-0.25m	<2	2010	LS brown	<0.02	<10	9.1
BH1B-08 0.50-1.00m	<2	1450	LS Dk olive grey	0.06*	<10	--*
BH1B-08 1.00-1.50m	<2	1500	LS Dk olive grey	0.07*	<10	--*
BH1B-08 1.50-2.00m	<2	2180	LS Dk olive grey	0.10*	<10	--*
BH1B-08 2.00-2.50m	<2	2920	LS Dk olive grey	0.11*	<10	--*
BH1B-08 2.50-3.00m	<2	3140	LS Dk olive grey	0.07*	<10	--*
BH1B-08 3.00-3.50m	<2	3570	LS Dk olive grey	0.03*	<10	--*
BH1B-08 3.50-4.00m	<2	1760	LS Dk olive grey	0.21*	<10	--*
BH1B-08 4.00-4.50m	<2	4310	LS Dk olive grey	0.16*	<10	--*
BH1B-08 4.50-5.00m	<2	119	MC green grey	<0.02	<10	7.9
BH1B-09 0.25-0.50m	<2	1130	SL dk green grey	0.15*	<10	--*
BH1B-09 2.25-2.50m	<2	1140	S dk olive grey	<0.02	<10	8.9
BH1B-09 3.75-4.00m	<2	4620	CS dk olive grey	0.58*	<10	--*
BH1B-09 4.75-5.00m	<2	310	SL dk green grey	0.74	<10	7.3
BH1B-10 0.00-0.10m	<2	1060	SL dk green grey	0.10*	<10	--*
BH1B-10 0.25-0.50m	<2	1480	SL dk green grey	0.25*	<10	--*

Table 3: Quantitative Analysis Results (Cont.)

Location	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole H^+/t)	pH_{OX}
Holocene Layer – Majority of 1B Footprint						
BH1B-10 0.75-1.00m	<2	1510	SL dk green grey	0.32*	<10	--*
BH1B-10 1.25-1.50m	<2	2790	SL dk green grey	0.24*	<10	--*
BH1B-10 1.75-2.00m	<2	591	SL dk green grey	0.13*	<10	--*
BH1B-10 2.25-2.50m	<2	3310	SL dk green grey	0.16*	<10	--*
BH1B-10 2.75-3.00m	<2	785	S dk olive grey	<0.02	<10	9.3
BH1B-10 3.25-3.50m	<2	948	S dk olive grey	<0.02	<10	9.0
BH1B-10 3.75-4.00m	<2	1960	SL dk green grey	0.16*	<10	--*
BH1B-10 4.25-4.50m	<2	3150	SL dk green grey	0.24*	<10	--*
BH1B-10 4.75-5.00m	<2	3990	CS dk olive grey	0.06*	<10	--*
BH1B-10 5.25-5.50m	<2	1510	CS dk olive grey	<0.02	<10	9.0
BH1B-10 5.75-6.00m	<2	698	CS dk olive grey	0.16	<10	8.4
BH1B-10 6.25-6.50m	<2	2210	SL dk green grey	1.17*	<10	--*
BH1B-11 0.00-0.10m	<2	438	SL dk green grey	0.10	<10	8.2
BH1B-11 0.75-1.00m	<2	238	SL dk green grey	0.20	<10	8.2
BH1B-11 1.75-2.00m	<2	775	SL dk green grey	0.09	<10	8.5
BH1B-11 2.75-3.00m	<2	1000	CS dk green grey	0.14	<10	8.4
BH1B-11 3.75-4.00m	<2	438	SL dk green grey	0.49	<10	7.8
BH1B-12 0.00-0.01m	<2	747	LC dk green grey	0.20*	<10	--*
BH1B-12 0.25-0.50m	<2	437	LC dk green grey	0.80*	**208**	--*
BH1B-12 0.75-1.00m	<2	2260	LC dk green grey	0.80*	<10	--*
BH1B-13 0.00-0.10m	<2	1150	LC dk green grey	0.20*	<10	--*
BH1B-14 0.00-0.10m	<2	2750	SL dk olive grey	0.07*	<10	--*
BH1B-15 0.00-0.10m	<2	509	LC dk green grey	0.25*	<10	--*
BH1B-17 0.00-0.10m	<2	3510	G, Gravel olive grey	0.04*	<10	--*
BH1B-19 0.00-0.10m	<2	1870	ZCL dk green grey	0.45*	<10	--*
BH1B-19 0.25-0.50m	<2	1150	ZCL dk green grey	0.57*	<10	--*
BH1B-19 0.75-1.00m	<2	552	ZCL dk green grey	0.63*	**23**	--*
Averages	<2	n/a	Medium Textured		13**	
Holocene Layer – Southern Tip of Footprint						
BH1B-18 0.00-0.10m	<2	-	LC dk green grey	0.66	**140**	6.5
BH1B-18 0.25-0.50m	<2	-	LC dk green grey	0.72	**256**	3.3
BH1B-18 0.75-1.00m	<2	-	LC dk green grey	0.63	**218**	3.5
BH1B-18 1.25-1.50m	<2	86	LC dk green grey	0.52	**51**	6.9
BH1B-18 1.65-1.90m	<2	123	LC dk green grey	0.55	**32**	7.3
Averages	<2	n/a	Medium Textured		**139**	

NOTE: ** Does not include results from BH1B-18 (which is located at the very southern tip of the investigation area).

Table 3: Quantitative Analysis Results (Cont.)

Location	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole H^+/t)	pH_{OX}
Holocene / Pleistocene Intrusion Zone						
BH2A-01 2.25-2.50m	<2	--	HC, dk grey	0.34	155	3.1
BH1B-04 0.30-0.50m	<2	42	MC dk grey	0.08	<10	7.2
Averages	<2	42	Fine - Medium Textured		80	
Pleistocene Layer						
BH1B-01 0.30-0.50m	<2	29	MC dk grey	0.04	<10	7.7
BH1B-01 0.80-1.00m	<2	30	HC grey	0.03	<10	7.2
BH1B-01 1.40-1.60m	<2	<10	HC grey	<0.02	<10	7.0
BH1B-02 4.80-5.00m	<2	225	HC dk grey brown	0.04	<10	8.6
BH1B-03 2.30-2.50m	<2	106	HC green grey	0.09	<10	8.1
BH1B-04 0.80-1.00m	<2	36	HC dk grey brown	0.02	<10	7.2
BH1B-04 1.80-2.00m	6	18	HC dk grey brown	<0.02	<10	7.3
BH1B-05 2.30-2.50m	<2	36	SCL green grey	0.05	<10	7.4
BH1B-06 0.20-0.40m	<2	1420	SCL dk green grey	0.47	<10	8.1
BH1B-07 0.25-0.50m	<2	<10	HC green grey	<0.02	<10	7.2
BH1B-07 1.35-1.60m	<2	760	MHC green grey	<0.02	<10	8.7
BH1B-08 5.00-5.30m	<2	32	MHC green grey	<0.02	<10	7.4
BH1B-09 5.35-5.60m	<2	70	HC green grey	0.04	<10	7.5
BH1B-10 6.95-7.20m	<2	125	MHC dk grey	<0.02	<10	7.7
BH1B-11 5.25-5.50m	<2	275	MHC green grey	<0.02	<10	7.0
BH1B-12 1.25-1.50m	<2	22	MHC green grey	<0.02	<10	6.6
BH1B-12 1.75-2.00m	<2	101	MHC green grey	0.02	<10	8.6
BH1B-13 0.25-0.50m	<2	82	MC dk yellow brown	<0.02	<10	8.4
BH1B-13 0.65-0.80m	<2	83	MC dk yellow brown	<0.02	<10	8.2
BH1B-14 0.25-0.50m	<2	125	MHC dk grey	<0.02	<10	7.9
BH1B-14 1.65-1.90m	<2	25	MHC dk grey	<0.02	<10	6.8
BH1B-15 0.25-0.50m	<2	75	HC olive grey	<0.02	<10	6.7
BH1B-15 1.00-1.20m	<2	191	HC olive grey	0.05*	<10	--*
BH1B-16 0.00-0.10m	<2	217	MC blue green grey	0.02*	<10	--*
BH1B-16 0.25-0.50m	<2	201	MC blue green grey	0.02*	<10	--*
BH1B-17 0.25-0.50m	<2	184	HC grey brown	<0.02*	<10	--*
BH1B-17 0.85-1.10m	<2	736	MHC green grey	<0.02*	<10	--*
BH1B-19 1.25-1.50m	<2	37	MHC dk green grey	<0.02	<10	7.4
BH1B-19 1.85-2.10m	<2	17	HC dk green grey	0.02	<10	7.2
Averages	<2	n/a	Fine Textured	<0.03	<10	n/a

NOTE: TAA - Total Actual Acidity, ANC_E – Excess Acid Neutralising Capacity, S_{POS} - Peroxide Oxidisable Sulfur, pHox (pH after peroxide oxidation), n/a - not applicable.
ANC is the 'as reported' value and reflects ANC by the S_{CR} method and 'excess' ANC if by SPOCAS.
* denotes analysis by S_{CR} Method - pH_{OX} is not analysed

Actual Acidity (TAA)

Test results indicate that the samples tested contained no appreciable total actual acidity with all TAA values less than the detection limits (i.e. <2 moles of acid/tonne in all but one sample). This was expected given the fact that the sediments have been submerged and therefore are unlikely to have undergone any oxidation.

Oxidisable Sulfur (S_{POS})

Results of Percent Oxidisable Sulfur (S_{POS}) and Chromium Reducible Sulfur (S_{CR}) tests indicated the presence of moderate to high levels of oxidisable Sulfur (Sulfides) in the five samples analysed from BH2A-01 (located at the northern most tip of the investigation area) and five samples from BH1B-18 (located at the southern most tip of the investigation area). The remaining 54 Holocene samples analysed returned an average S_{POS} concentration of 0.35%S. The highest individual result (apart from BH2A-01 and BH1B-16) was 1.17%S in BH1B-10 6.25-6.5m. The five samples analysed from BH2A-01 returned generally higher S_{POS} with an average of 1.30%S, while those from BH1B-18 had an average of 0.61%S.

As significant amounts of organic matter were present in a number of the Holocene samples selected for analysis, 39 samples were analysed by the S_{CR} test method instead of SPOCAS. Generally, samples analysed using the S_{CR} method did not appear to return significantly lower levels of oxidisable sulfur than samples analysed suing the SPOCAS method, indicating that acidity attributed by the organic matter present in the samples was not likely to be significant.

Results of S_{POS} testing of samples of Pleistocene sediments indicate the presence of a moderate concentration of oxidisable Sulfur in two samples (BH2A-01 2.25-2.5m and BH1B-06 0.2-0.4m). Two of these samples (BH2A-01 2.25-2.5m and BH1B-04_0.3-0.5) are the only samples that represent the Holocene/Pleistocene 'intermixing zone'. Lower levels were also found in a number of other samples (i.e. less than 0.09%S). The S_{POS} tests results ranged from <0.02 to 0.47%S, at an average of <0.03%S.

Acid Neutralising Capacity (ANC)

Test results indicate the presence of a large excess of Acid Neutralising Capacity (ANC) (acid buffering minerals) in the vast majority of the Holocene samples analysed. All of the Pleistocene samples contained excess ANC as well, but at lower concentrations.

ANC reported by the SPOCAS test method represents excess ANC (ANC_E), whereas that reported by the Chromium suite represents actual (total) ANC. Regardless, in all but 6 samples containing ANC, (2 from BH2A-01, 2 from BH1B-18 in areas of high PASS, BH1B-19 0.75-1.00m and BH1B-12 0.25-0.50m) the net acidity was <10 moles of acid / tonne, indicating adequate or excess ANC to neutralise the actual and potential acidity. The highest individual ANC was from BH1B-09 at 3.75-4.00m, at 4,620 moles of acid/tonne (equivalent to an excess of more than 4,200 moles/tonne).

Net Acidity

Given the high levels of ANC present in all but a few of the Holocene samples containing significant oxidisable Sulfur, 'net acidity' values generally did not exceed the appropriate QASSIT 'Action Criteria' of 18 moles of acid/tonne. The exceptions were samples from BH2A-01 and BH1B-18, at the extreme northern and southern ends of the dredge footprint, and only three other of the 69 of the samples of Holocene sediments analysed. All of the remaining samples returned ANC in excess of their relatively modest potential acidity. Note that 'net acidity', reported by ALS, incorporates a 'fineness' factor of 1.5.

The highest individual net acidity detected was 1,180 moles of acid/tonne in a sample of medium clay from BH2A-01 at 1.5m depth. An average net acidity of 712 moles of acid/tonne (exceeding the 'Action Criteria' of 18 moles/tonne) was present in the five samples of Holocene from BH2A-01. In addition, an average net acidity of 139 moles of acid/tonne (exceeding the 'Action Criteria' of 18 moles/tonne) was present in the five samples of Holocene from BH1B-18.

The average net acidity in the Holocene materials excluding BH2A-01 and BH1B-18 was 13 moles of acid/tonne.

One of the samples of Pleistocene sediment interpreted to be in the intermixing zone with the overlying Holocene sediments at BH2A-01 returned a net acidity of 155 moles of acid/tonne. While the samples analysed from the underlying Pleistocene clays returned negligible levels of net acidity of less than 10 moles/tonne. In general, the Pleistocene layer can be considered free of ASS/PASS material (refer to Sections A-A and B-B).

No analysis for retained acidity was undertaken as all samples analysed had initial pH values well above 4.5 (the usual trigger for retained acidity analysis).

10.0 ASSESSMENT

10.1 Soil Acidity Regime

Holocene Sediments

The results of screening and follow-up quantitative analysis of soils undertaken as part of the current overwater ASS investigation for Option 1B (Part) confirm that Holocene alluvium, present to depths of up to more than 5.7m, contains no actual acidity, but moderate to high levels of potential acidity.

Oxidisable Sulfur was detected in all but three samples analysed and from all depths throughout the Holocene layer. Results of the ASS analysis undertaken indicate that generally moderate to high levels of net acidity are present in samples of Holocene sediments analysed (up to 1180 moles of acid /tonne at BH2A-01 and 256 moles of acid/tonne elsewhere at the southern tip of the Option 1B footprint).

Actionable levels of net acidity are present in the immediate vicinity of BH2A-01 and at the southern tip of the Option 1B footprint at BH1B-18 [which lies just east of the amended footprint]. Actionable levels of net acidity were only found in three other samples from within the Option 1B footprint, i.e. BH1B-05, BH1B-12 and BH1B-19 (Figure 3). The remainder of the samples did not contain net acidity at reportable levels, due to the presence of generally very high levels of ANC.

The Holocene sediment layer appears shallow (average less than 1m) in all but the north-western portion and the southern tip of the Option 1B (Part) footprint, where it is deeper (over 4m in areas shaded red on Figure 2).

Pleistocene Sediments

Moderate levels of net acidity were indentified in the upper 0.25m of the underlying Pleistocene layer at the location of BH2A-01. It is understood that similar zones of Holocene influence / intermixing have been previously identified in marine ASS investigations in Queensland and were encountered in the Option 2A footprint. This infiltration effect appears confined to two locations in the Option 1B (Part) footprint.

Negligible levels of net acidity (less than 10 moles/tonne) were detected within the Pleistocene stratum at all other sampling locations. While low levels of potential acidity were detected, ANC present was more than enough to buffer any acidity.

Depiction of Acidity Regimes

The acidity regimes of the main soil layers are depicted on Figure 3 and on cross-sections included on Figures 4a and 4b. On Figure 3, the highest actual acidity (TAA) and highest 'net acidity' detected at each location is indicated in moles of acid / tonne. The locations where the highest levels of net acidity were detected (i.e. >400 moles of acid/tonne) are indicated with a red halo. Locations with high levels of net acidity (i.e. 62-400 moles of acid/tonne) are shown with an orange halo, low levels (18 -62 moles of acid/tonne) with a yellow halo, and negligible levels (<18 moles of acid/tonne) with a green halo. Assessment and depictions of the acidity regime have been limited to part of the full Option 1B footprint. It is understood that further ASS data will be made available for the remainder of the Option 1B footprint. This data will need to be incorporated with the findings of this report to form the basis for any further investigations and preparation of an ASS Environmental Management Plan (EMP), if Option 1B is adopted.

Should it be decided to adopt the Option 1B footprint, disturbance of all Holocene sediments and the underlying Pleistocene sediment in the vicinity of BH2A-01 and BH1B-18 only, within the proposed dredge footprint, will require either treatment with good quality agricultural lime to varying degrees, or replacement of the spoil permanently below the water table (i.e. ocean disposal) which is unlikely to be an acceptable treatment option in the immediate environmentally sensitive local. Preliminary lime application rates are discussed in Section 10.2. Liming rates are based on a bulk density of 1.5 tonne/m^3 and a factor of safety of 1.5.

The area shown hatched in blue on Figure 3, covering most of the dredge footprint, is considered essentially benign and does not appear to contain any actionable acidity. The spoil from this area will not require lime treatment, however, further confirmatory sampling and testing would be required in order to comply with regulatory sampling frequency requirements.

10.2 Spoil Volumes and Liming Rates

If Option 1B is adopted, dredging within the total 1B footprint would produce approximately 11,320,000m^3 of spoil (calculated volume supplied by WP). Dredging depth within the turning basins would range from a maximum of 13.5m at the northern end, down to 8m to reach -13m LAT. It has been calculated (by WP) that dredging within Option 1B (part) would produce a volume of approximately 4,551,059 m^3 (assessment of the remaining 6,768,941m^3 has not been included this report).

Test results indicate that moderate to very high levels of net acidity are associated with sediments from the northern and southern most parts of the investigation area. Moderate levels or net acidity are also associated with sediments in other isolated areas (refer to the orange and red 'halos' on Figure 3).

Liming of PASS spoil taken from the northern most area will be required at rates of up to 140 kg of lime/m^3, based on a factor of safety of 1.5 and a bulk density of 1.5 tonne/m^3. On the same basis, liming of PASS spoil taken from the other areas where moderate levels of PASS were encountered (BH1B-05, BH1B-12, BH1B-18 and BH1B-19) will be required at rates ranging from 3 to 40 kg of lime/m^3. If further assessment was undertaken to better delineate these sediments, reduced liming rates may be able to be adopted for some locations.

Sediments from the blue hatched area on Figure 3 have an excess of ANC and do not contain actionable levels of net acidity and should not require liming, subject to further confirmatory sampling and analysis.

10.3 Risk Assessment

Actionable levels of net acidity are present in Holocene sediments in less than 5% of the dredge footprint (approximately 2-3ha) containing moderate to high level PASS to the depth proposed for dredging. The remainder of the footprint appears to contain only benign, well buffered PASS. Hence, the proposed dredging activities are likely to generate acid in only a small part of the proposed footprint. As such, physical disturbance of sediments (in the affected areas) poses a moderate risk of adverse impact to the receiving environment if not properly managed. No consideration has been made for the risk associated with PASS sediments from areas of the Option 1B footprint not covered by this investigation; however, it is likely that further PASS would be present in these areas and would contribute additional risk.

Management measures that can reduce the risk of impact to the environment include neutralisation of spoil by addition of agricultural lime and first and foremost, avoidance, where possible of areas of highest PASS.

10.4 Recommendations

Should the Option 1B footprint be adopted, further ASS sampling and analysis (at a suitably higher testing frequency) will be required in areas of the Option 1B (Part) footprint were PASS have been identified and also in areas that appear to contain only buffered acidity (although sampling at a reduced rate in these areas to confirm the absence of actionable acidity may be suitable).

Holocene sediments appear to extend to the full proposed dredging depth in the northern and southern most parts of the Option 1B (Part) footprint. This indicates that less than 5% of the material to be dredged would contain actionable levels of PASS. However, this still represents a substantial volume of PASS (approximately 50,000m^3). Given the potential volume of PASS material to be dredged from these areas and the level of potential acidity present, the level of treatment required under the terms of the current State Planning Policy 2/02 (SPP) is deemed 'Extra High'. As such, specific strategies are required to be developed to manage ASS during proposed dredging activities. The strategies are required to be documented in a 'stand alone' Environmental Management Plan (EMP), following the requirements of Appendix 4 of the SPP 2/02. The EMP will need to be prepared once the final fate of the material is known.

The management of the proposed dredge material will ultimately be dependant on the final location of the dredge spoil. The final location of the dredge spoil should be assessed following completion of any further assessment(s). Much of the PASS spoil will ultimately need to be treated according to the liming rates outlined in section 10.2, although these could be further refined and included in the project ASS EMP.

We would be pleased to answer any questions about this important information from the reader of this report.

GOLDER ASSOCIATES PTY LTD

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HEP/YF

A.B.N. 64 006 107 857

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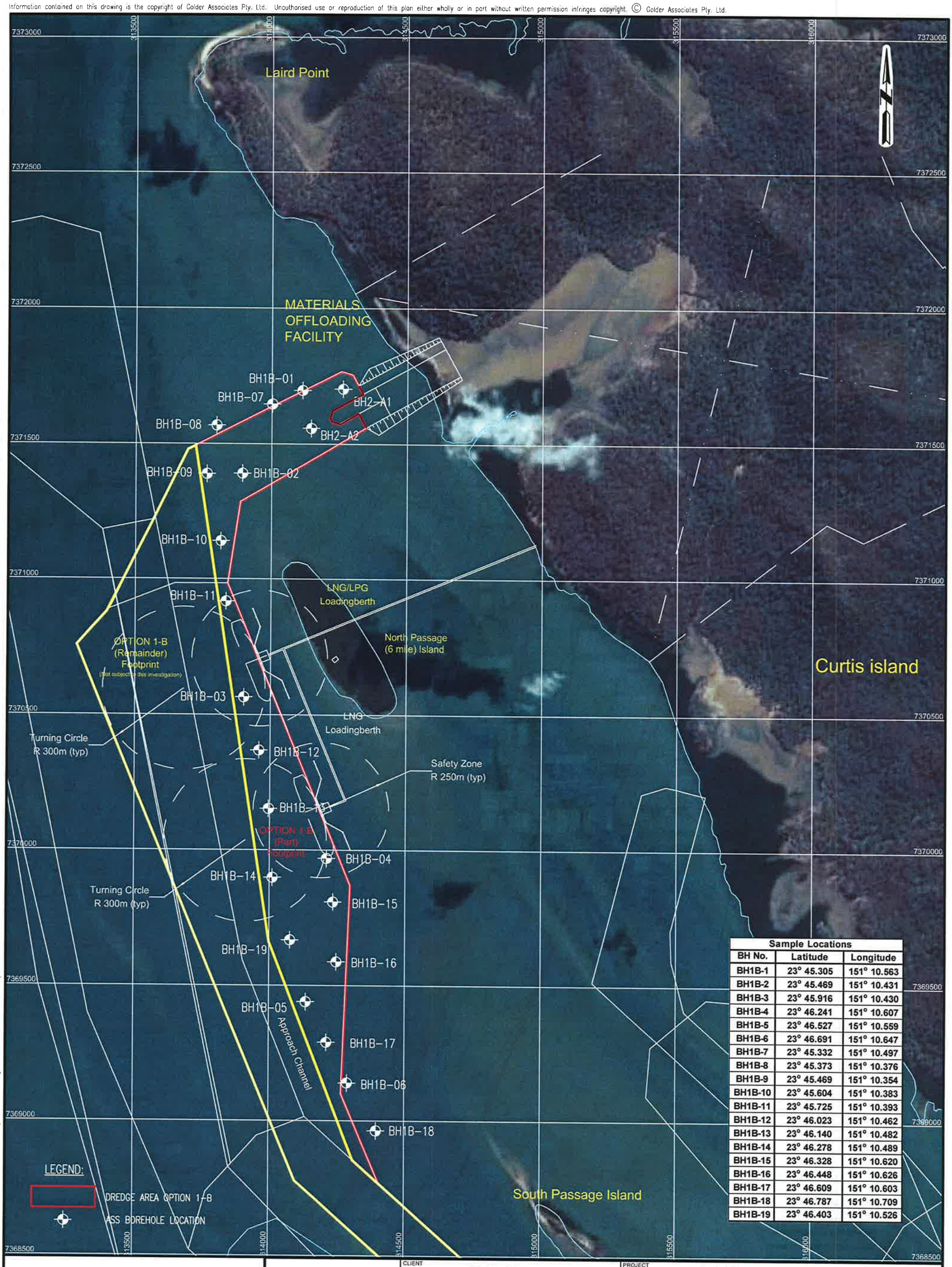
FIGURES

FIGURES

Checked by:.....

Date: 4/11/2009



Sample Locations		
BH No.	Latitude	Longitude
BH1B-1	23° 45.305	151° 10.563
BH1B-2	23° 45.469	151° 10.431
BH1B-3	23° 45.916	151° 10.430
BH1B-4	23° 46.241	151° 10.607
BH1B-5	23° 46.527	151° 10.559
BH1B-6	23° 46.691	151° 10.647
BH1B-7	23° 45.332	151° 10.497
BH1B-8	23° 45.373	151° 10.376
BH1B-9	23° 45.469	151° 10.354
BH1B-10	23° 45.604	151° 10.383
BH1B-11	23° 45.725	151° 10.393
BH1B-12	23° 46.023	151° 10.462
BH1B-13	23° 46.140	151° 10.482
BH1B-14	23° 46.278	151° 10.489
BH1B-15	23° 46.328	151° 10.620
BH1B-16	23° 46.448	151° 10.626
BH1B-17	23° 46.609	151° 10.603
BH1B-18	23° 46.787	151° 10.709
BH1B-19	23° 46.403	151° 10.526

NOTE:
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Golder Associates

CLIENT	Worley Parsons	PROJECT	Laird Point Dredge Option 1-B
DRAWN	GPG	DATE	23/10/09
CHECKED	*HEP	DATE	23/10/09
SCALE	1:12,500	TITLE	LOCALITY PLAN SHOWING EXTENT OF FOOTPRINT OPTION 1-B
PROJECT No	097633052-005	FIGURE No	1
REV No	3		A3

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.

K:\Env\2009\097633052\Figures\097633052-005-r-fig01_REV3.dwg Oct 27, 2009 - 2:27pm

MATERIALS
OFFLOADING
FACILITY

LNG/LPG
Loadingberth

North Passage
(6 mile) Island

LNG
Loadingberth

Safety Zone
R 250m (typ)

OPTION 1-B
(Remainder)
Footprint
(Not subject to this investigation)

OPTION 1-B
(Part)
Footprint

Turning Circle
R 300m (typ)

Turning Circle
R 300m (typ)

Approach Channel

South Passage Island

BH1B-01
BH1B-07
BH1B-08
BH1B-09
BH1B-02
BH1B-10
BH1B-11
BH1B-03
BH1B-12
BH1B-13
BH1B-04
BH1B-14
BH1B-15
BH1B-19
BH1B-16
BH1B-05
BH1B-17
BH1B-06
BH1B-18
BH2-A1
BH2-A2

LEGEND:

- OPTION 1-B (PART) INVESTIGATION AREA
- ASS BOREHOLE LOCATION
- >4m THICK HOLOCENE SEDIMENTS
- 2m – 4m THICK HOLOCENE SEDIMENTS
- 1m – 2m THICK HOLOCENE SEDIMENTS
- 0.2m – 1m THICK HOLOCENE SEDIMENTS
- <0.2m THICK HOLOCENE SEDIMENTS

1:5000 0 100 200 300 400 500 m

NOTE:
BASE PLAN DERIVED FROM BASE PLAN SUPPLIED BY "HALCROW PTY LTD"
DRAWING "LAIRD POINT CASE A OPTION 1-1, FIG 8", REV 4, DATE JUNE 2 2009

Golder Associates
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GOLDER ASSOCIATES PTY LTD

CLIENT	Worley Parsons	PROJECT	Laird Point Dredge Option 1-B
DRAWN	GPG	DATE	26/10/09
CHECKED	*HEP	DATE	26/10/09
SCALE	1:5000	TITLE	SITE PLAN SHOWING BOREHOLE LOCATIONS AND INFERRED THICKNESS OF HOLOCENE LAYER
PROJECT No	097633052-005	FIGURE No	02
REV No	3		A1

MATERIALS OFFLOADING FACILITY

LNG/LPG Loadingberth

North Passage (6 mile) Island

LNG Loadingberth

Safety Zone R 250m (typ)

Turning Circle R 300m (typ)

Turning Circle R 300m (typ)

OPTION 1-B (Remainder) Footprint
(Not subject to this investigation)

OPTION 1-B (Part) Footprint

Approach Channel

South Passage Island

BH1B-01 <2/<10
BH1B-02 <2/<10
BH1B-03 <2/<10
BH1B-04 <2/<10
BH1B-05 <2/2.1
BH1B-06 <2/<10
BH1B-07 <2/<10
BH1B-08 <2/<10
BH1B-09 <2/<10
BH1B-10 <2/<10
BH1B-11 <2/<10
BH1B-12 <2/2.6
BH1B-13 <2/<10
BH1B-14 <2/<10
BH1B-15 <2/<10
BH1B-16 <2/2.6
BH1B-17 <2/2.3
BH1B-18 <2/<10
BH2-A1 <2/<10
BH2-A2 <2/<10

LEGEND:

- OPTION 1-B (PART) FOOTPRINT
- NO LIMING REQUIRED DUE TO HIGH ANC
- ASS BOREHOLE LOCATION
- NEGLIGIBLE PASS
- MODERATE PASS
- HIGH PASS
- VERY HIGH PASS

TAA (mole H^+/t) / NET ACIDITY (mole H^+/t)

<2 /1.47

VALUE "IN RED" EXCEEDS THE "ACTION CRITERIA

1:5000

0 100 200 300 400 500 m

NOTE:
BASE PLAN DERIVED FROM BASE PLAN SUPPLIED BY "HALCROW PTY LTD"
DRAWING "LAIRD POINT CASE A OPTION 1-1, FIG 8", REV 4, DATE JUNE 2 2009

Golder Associates
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GOLDER ASSOCIATES PTY LTD

CLIENT	Worley Parsons		
DRAWN	GPG	DATE	26/10/09
CHECKED	*HEP	DATE	26/10/09
SCALE	1:5000		

PROJECT: Laird Point Dredge Option 1-B

TITLE: SITE PLAN - SHOWING BOREHOLE LOCATIONS AND HIGHEST INDIVIDUAL ASS TEST RESULTS

PROJECT No	FIGURE No	REV No	
097633052-005	03	3	A1

MHWS 4.14m CD

MLWS 0.71m CD

BH1B-08

BH1B-02 (Proj. 58.9)

BH1B-10 (Proj. -67.6)

BH1B-11 (Proj. -92.4)

BH1B-03 (Proj. -95.2)

BH1B-12 (Proj. -79.5)

BH1B-13 (Proj. -86.3)

BH1B-04 (Proj. 87.7)

BH1B-15 (Proj. 79.5)

BH1B-16 (Proj. 48.4)

BH1B-05 (Proj. -90.6)

BH1B-17 (Proj. -45.3)

BH1B-06

BH1B-18 (Proj. 70.5)

HOLOCENE SEDIMENTS (NEUTRALISED PASS)

PLEISTOCENE SEDIMENTS

HOLOCENE SEDIMENTS (PASS)

DREDGE TO -8.5m LAT

DREDGE TO -13.0m LAT (TURNING BASIN)

REDUCED LEVEL (m - LAT)

DISTANCE (m)

SECTION A-A

LEGEND

- Clayey SILT
- Gravelly Clayey SILT
- Silty CLAY
- Gravelly Silty CLAY
- SAND
- Clayey Silty SAND
- Gravelly SAND
- Clayey Gravelly SAND
- Silty Sandy GRAVEL
- HOLOCENE LAYER
- HOLOCENE LAYER (NEUTRALISED PASS)
- PLEISTOCENE LAYER

TAA (mole H^+/t) / Net Acidity (mole H^+/t)

<2/41

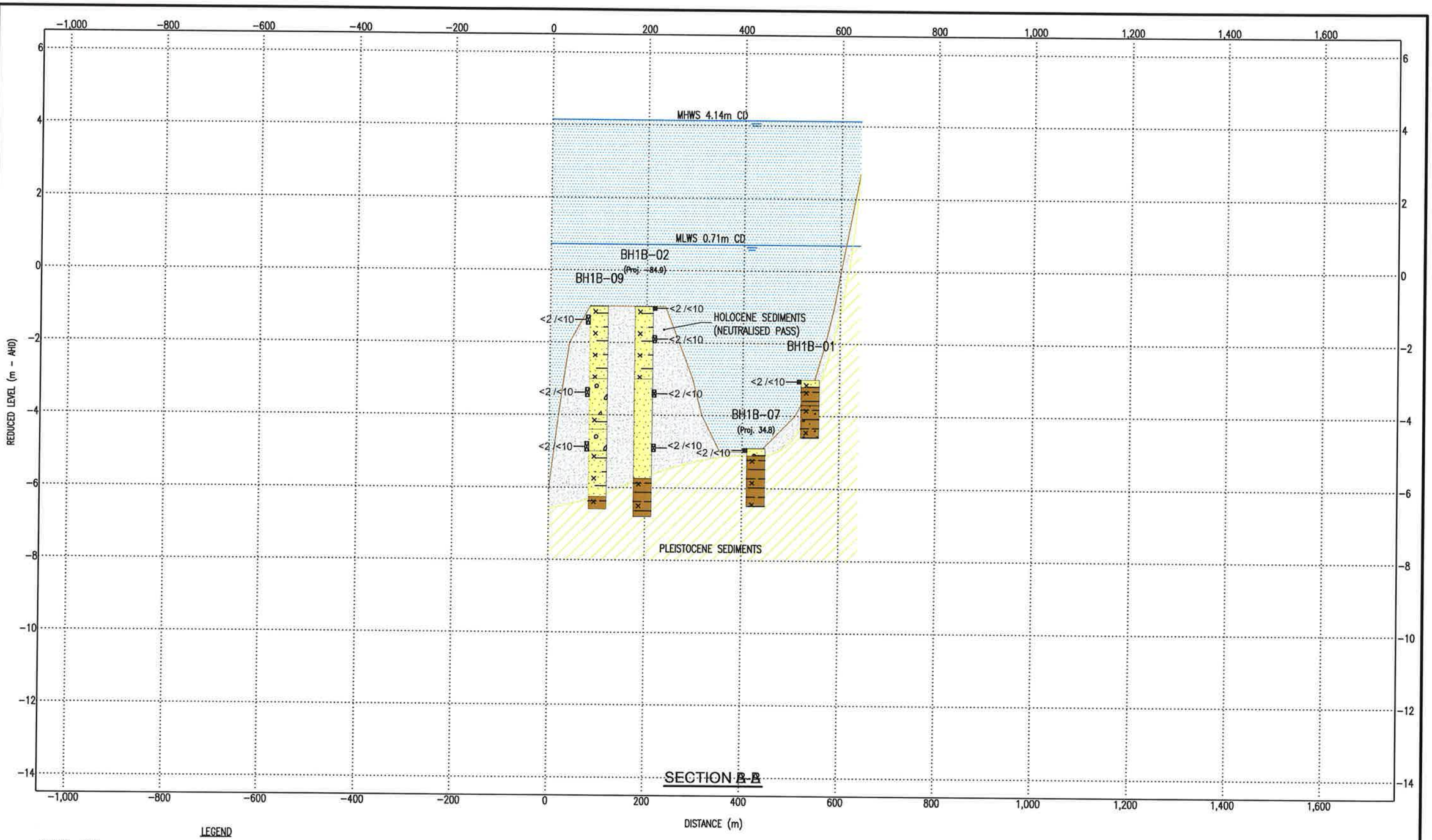
Value 'in red' exceeds the 'Action Criteria

CLIENT	Worley Parsons	PROJECT	Laird Point Dredge Option 1-B
DRAWN	GPG	DATE	13/10/2009
CHECKED	*HEP	DATE	13/10/2009
SCALE	H 1:8000 V 1:100	PROJECT No	097633052-005
TITLE	LONGITUDINAL SECTION A-A	FIGURE No	4A
REV No	2		A3

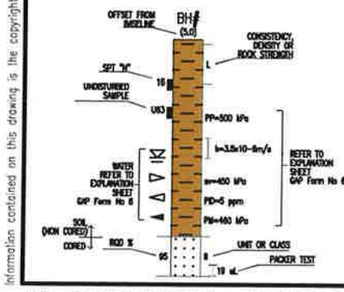
Golder Associates

K:\Env\2009\097633052\Figures\097633052-005-r-fig04a_rev2.dwg Oct 13, 2009 - 4:01pm

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.



SECTION B-B



LEGEND

- Silty CLAY
- Sandy Silty CLAY
- SAND
- Clayey Gravelly SAND
- Clayey Silty SAND
- Gravelly SAND

- HOLOCENE LAYER (NEUTRALISED PASS)
- PLEISTOCENE LAYER

TAA (mole H^+/t) — Net Acidity (mole H^+/t)

41 /41—[]

Value 'in red' exceeds the 'Action Criteria

NOTE:
SURFACE LEVEL DERIVED FROM CONTOURS SUPPLIED BY "HALCROW PTY LTD" DRAWING "LAIRD POINT CASE A OPTION 1-1, FIG 8", REV 4, DATE JUNE 2 2009

CLIENT: Worley Parsons		PROJECT: Laird Point Dredge Option 1-B	
DRAWN: GPG	DATE: 10/09/2009	TITLE: LONGITUDINAL SECTION B-B	
CHECKED: *HEP	DATE: 10/09/2009		
SCALE: H 1:8000 V 1:100		PROJECT No: 097633052-005	FIGURE No: 4B
REV No: 2	A3		

NOTE: THE * BESIDE THE TYPED INITIALS DENOTES THE ORIGINAL DRAWING ISSUE WAS SIGNED OR INITIALLED BY THAT RESPECTIVE PERSON.

K:\Env\2009\097633052\Figures\097633052-005-r-fig04b_rev2.dwg Oct 14, 2009 - 9.41am

APPENDIX A

Sediment Core Logs

BOREHOLE #BH1B-01

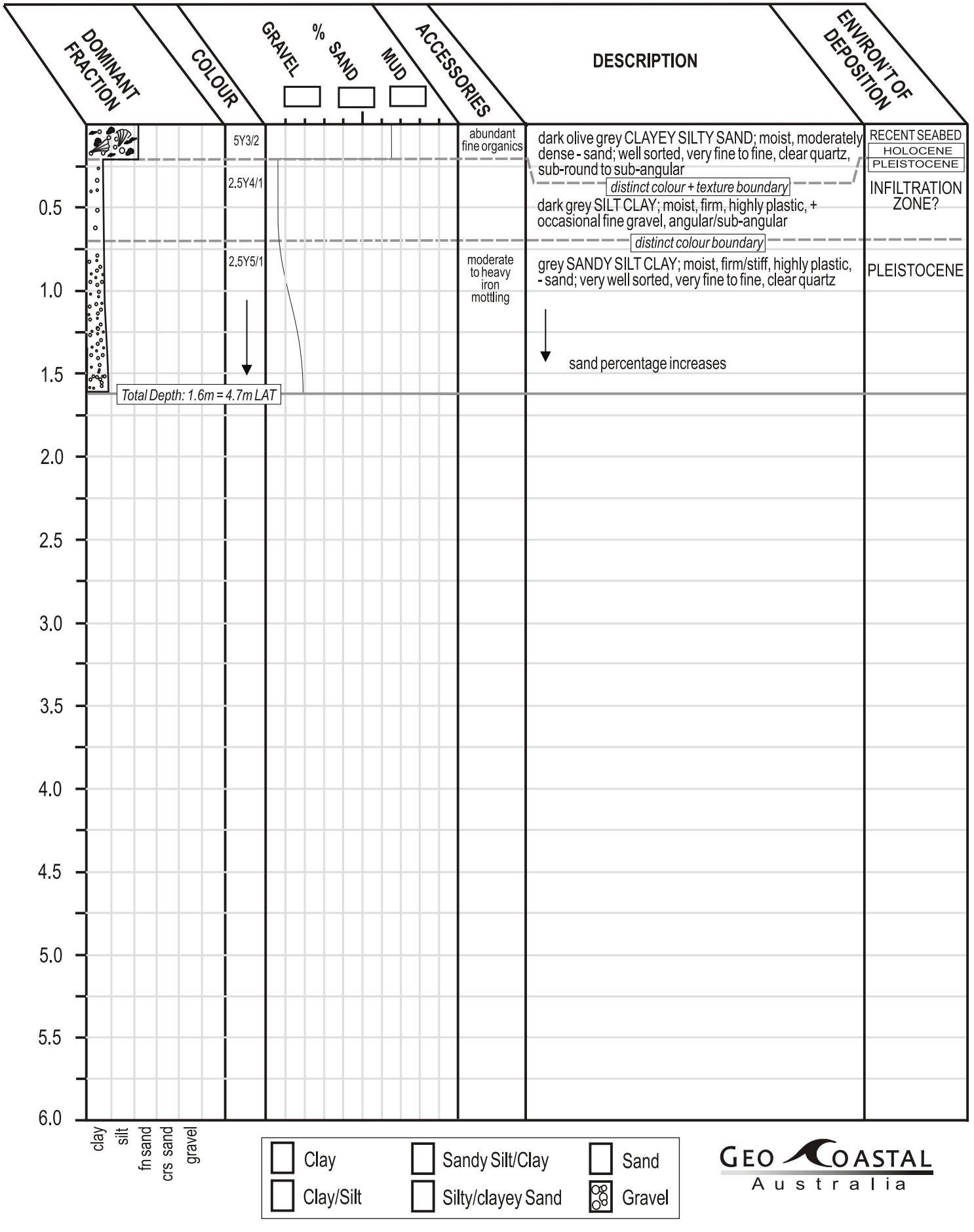
SITE: GC/BH1B-01

LOCATION: Port of Gladstone
23°45.306 **S** 151°10.562 **E**
R.L. 3.1 m L.A.T. (Port Datum)

DATE: 22/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-02

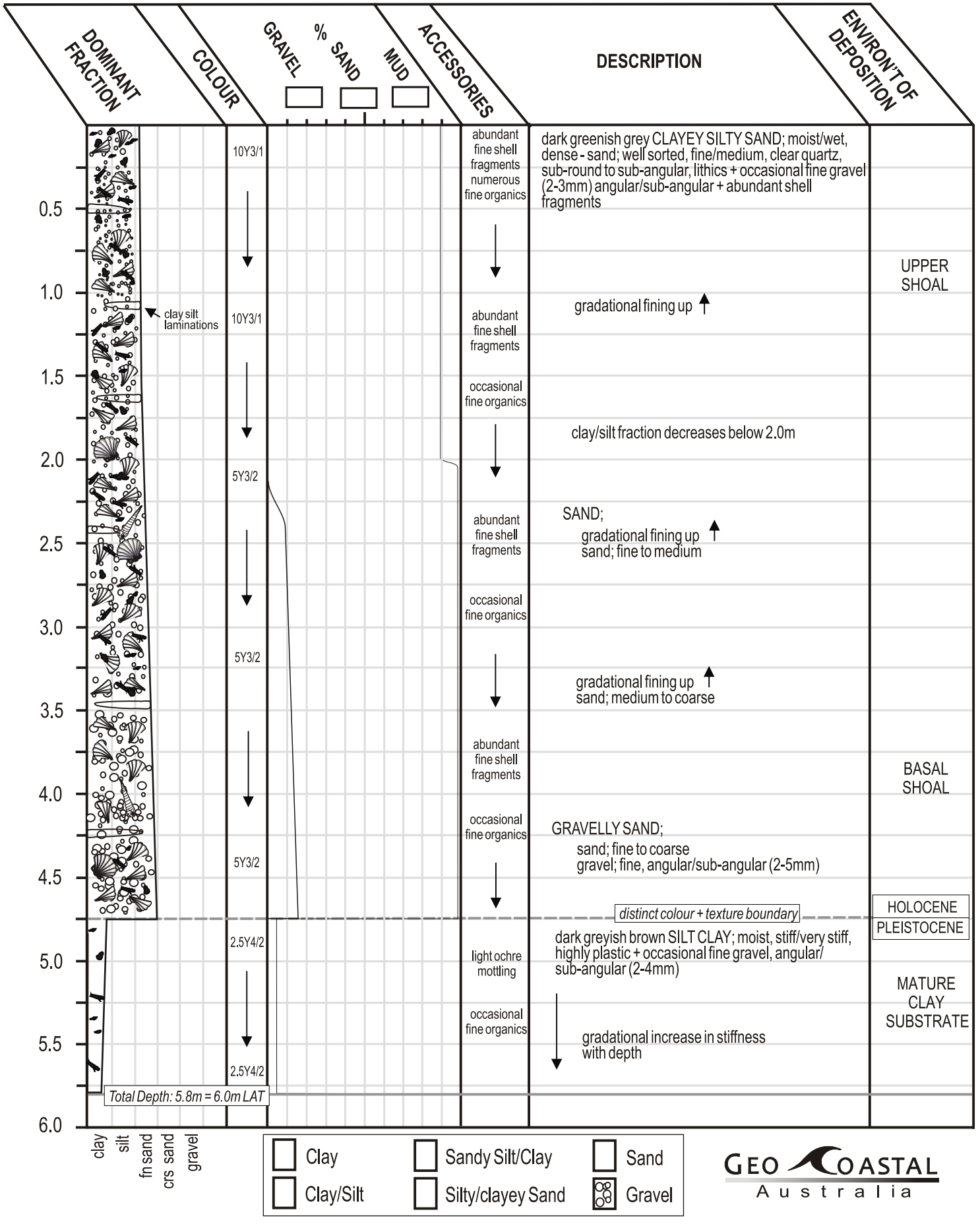
SITE: GC/BH1B-02

LOCATION: Port of Gladstone
23°45.471 **S** 151°10.432 **E**
R.L. 0.2 m L.A.T. (Port Datum)

DATE: 21/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-03

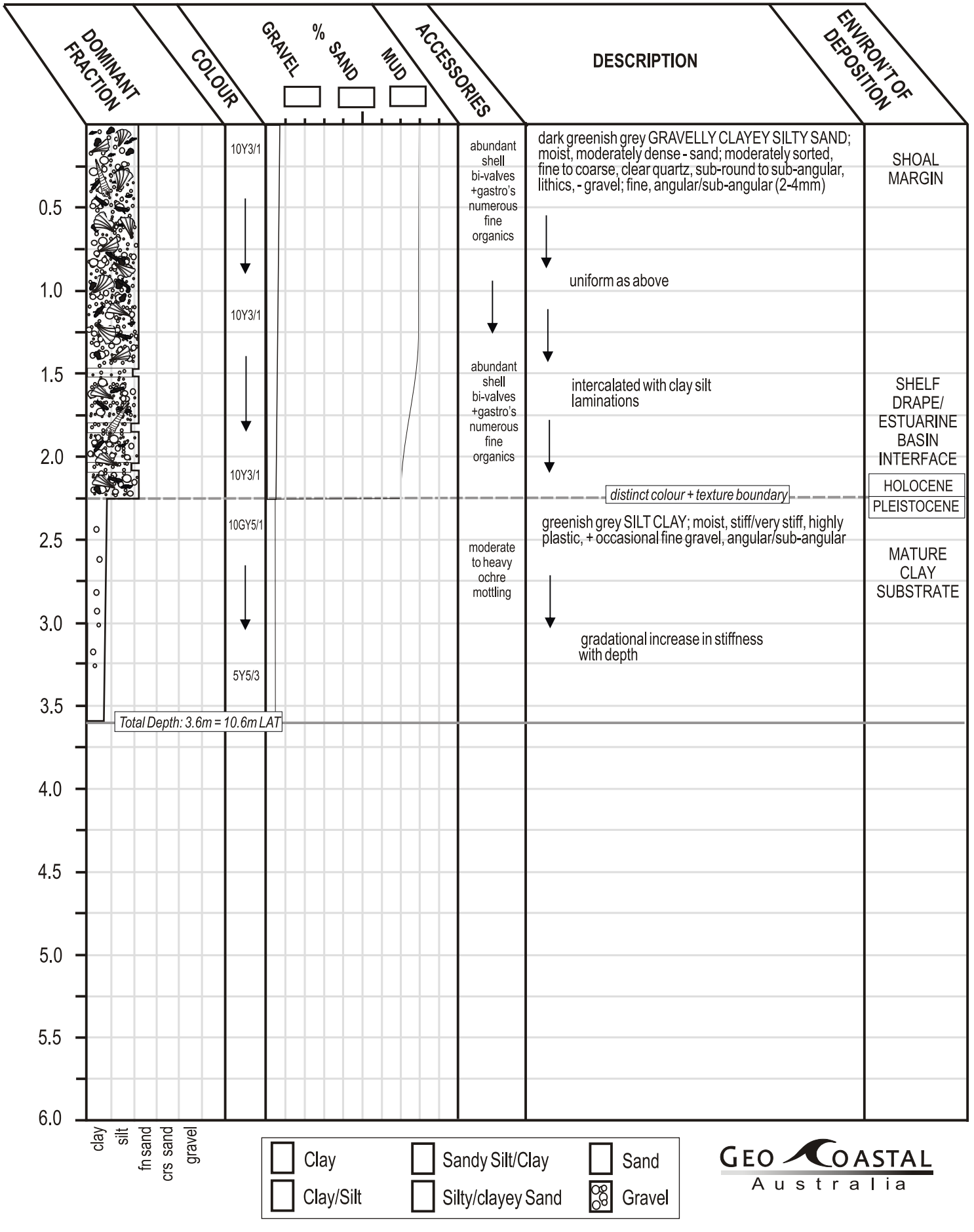
SITE: GC/BH1B-03

DATE: 22/09/09

LOCATION: Port of Gladstone
23°45.912 **S** 151°10.427 **E**
R.L. 7.0 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-04

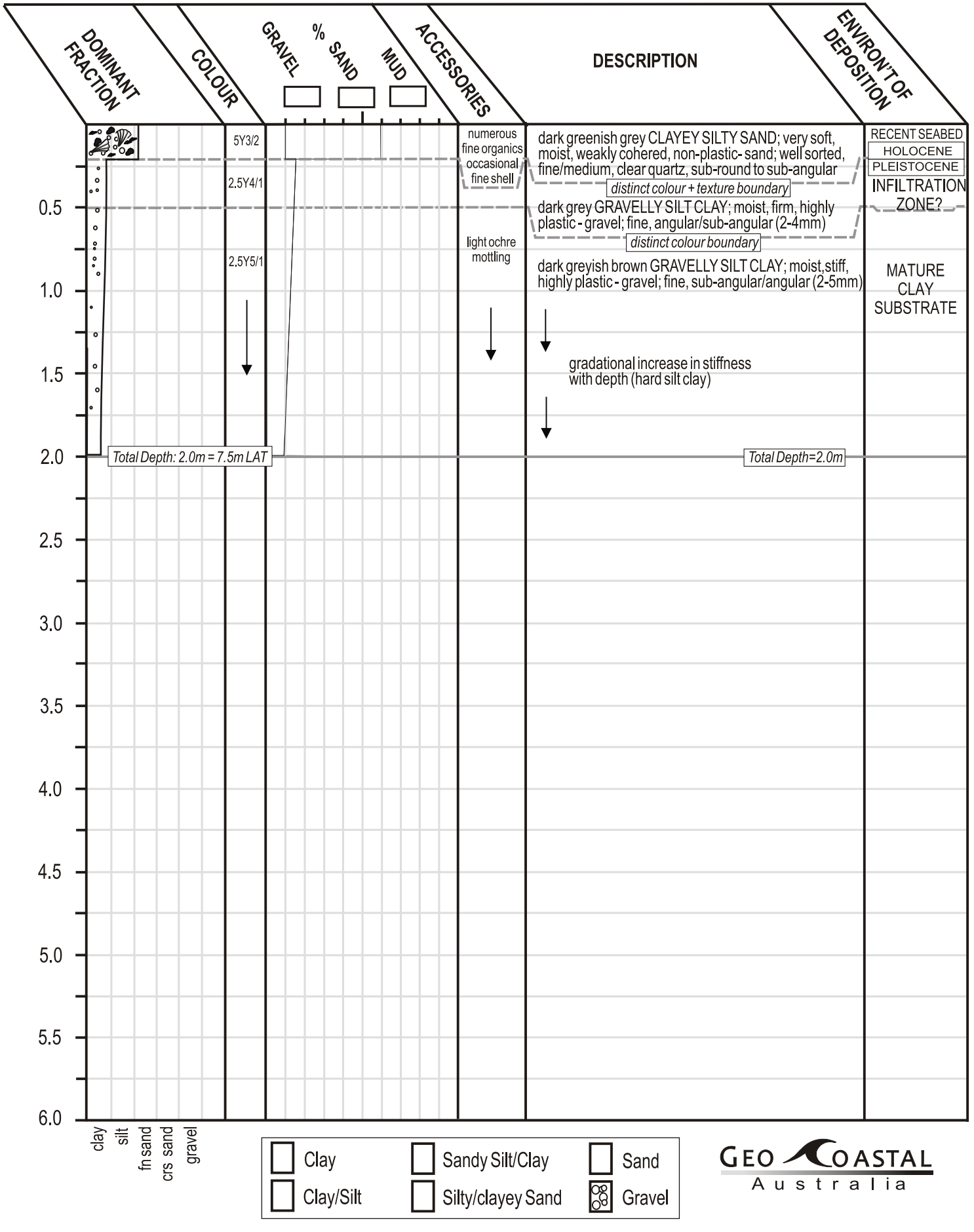
SITE: GC/BH1B-04

DATE: 22/09/09

LOCATION: Port of Gladstone
23°45.242 **S** 151°10.604 **E**
R.L. 5.5 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-05

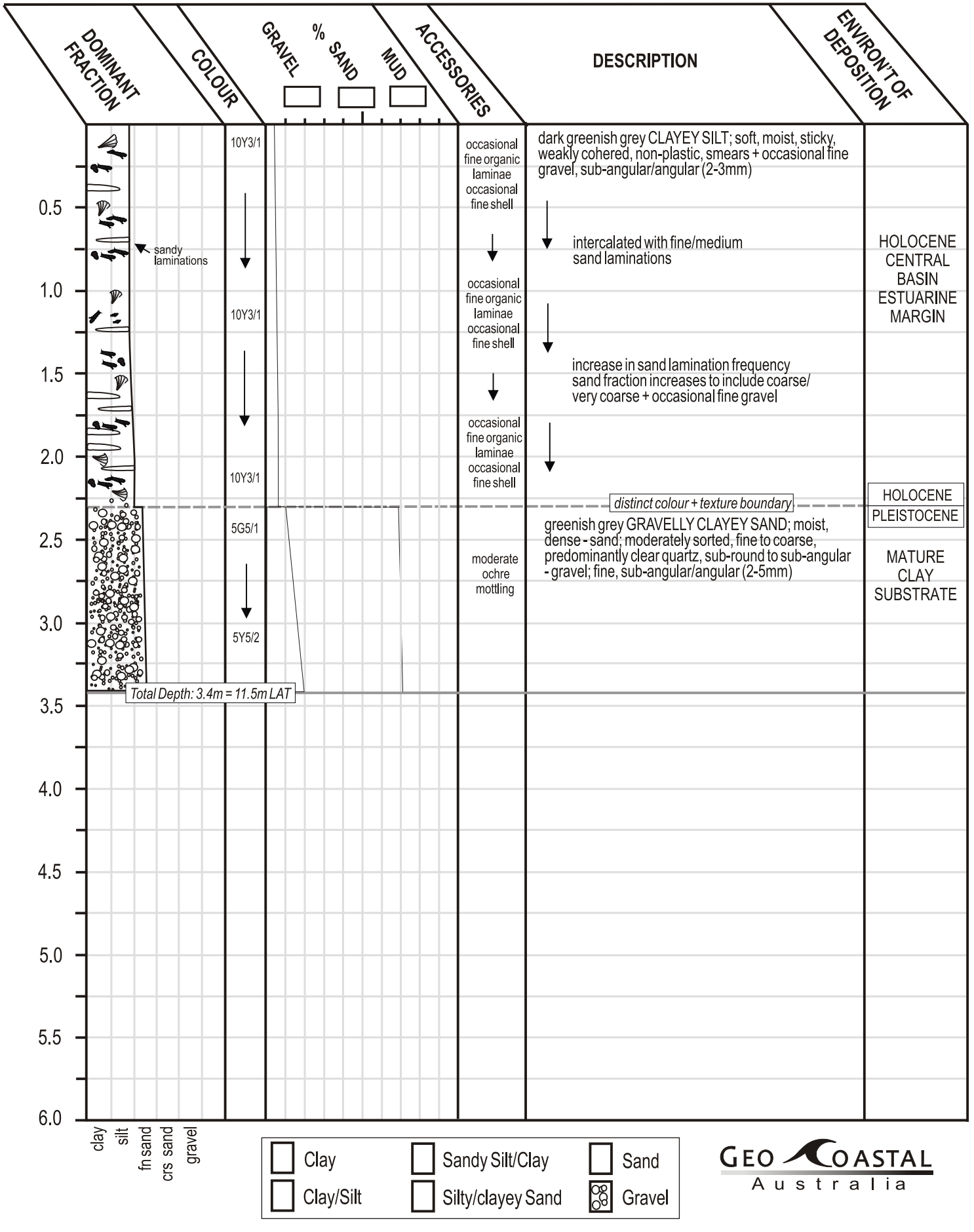
SITE: GC/BH1B-05

DATE: 21/09/09

LOCATION: Port of Gladstone
23°46.525 **S** 151°10.556 **E**
R.L. 8.1 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-06

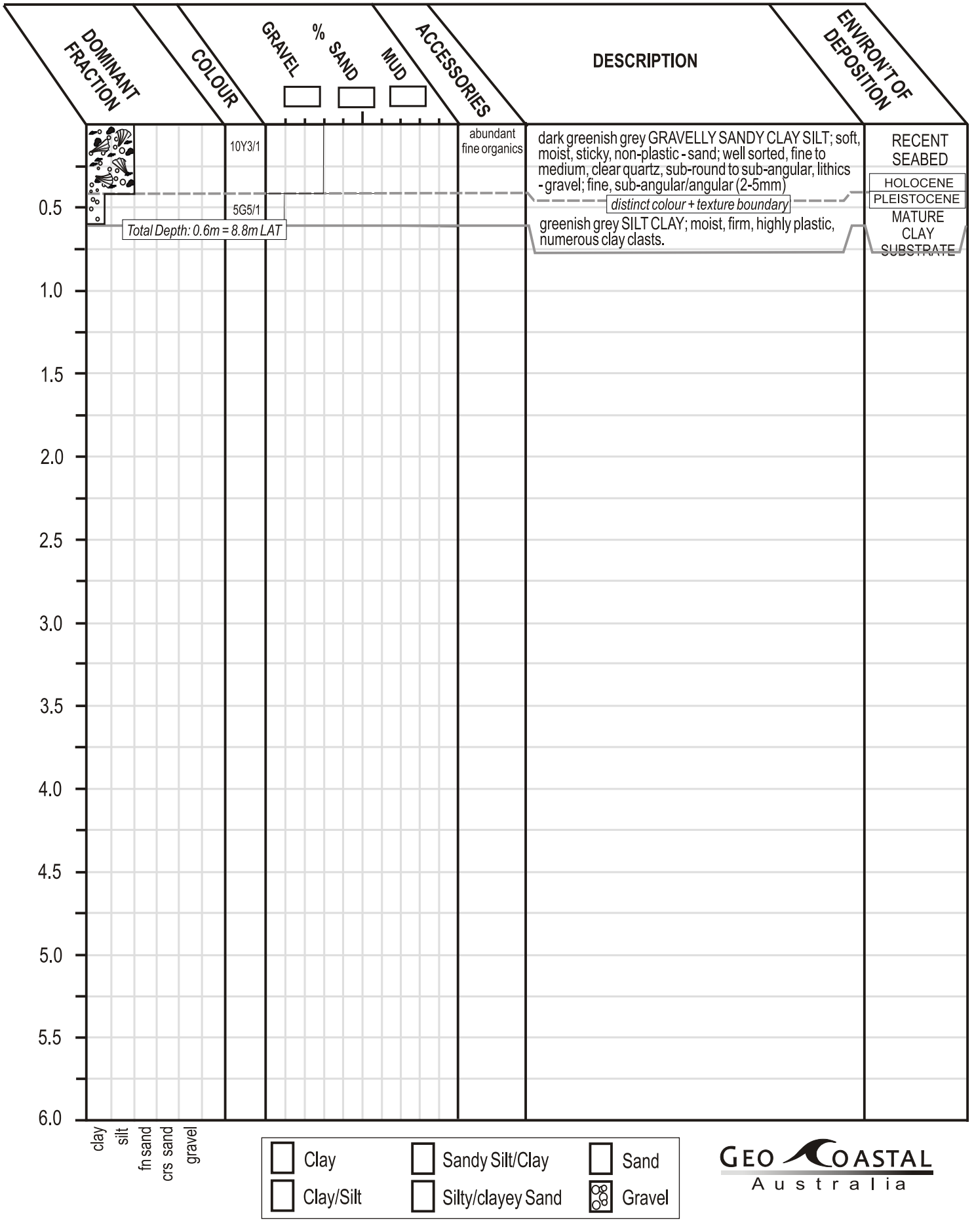
SITE: GC/BH1B-06

LOCATION: Port of Gladstone
23°46.689 **S** 151°10.646 **E**
R.L. 8.2 m L.A.T. (Port Datum)

DATE: 21/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-07

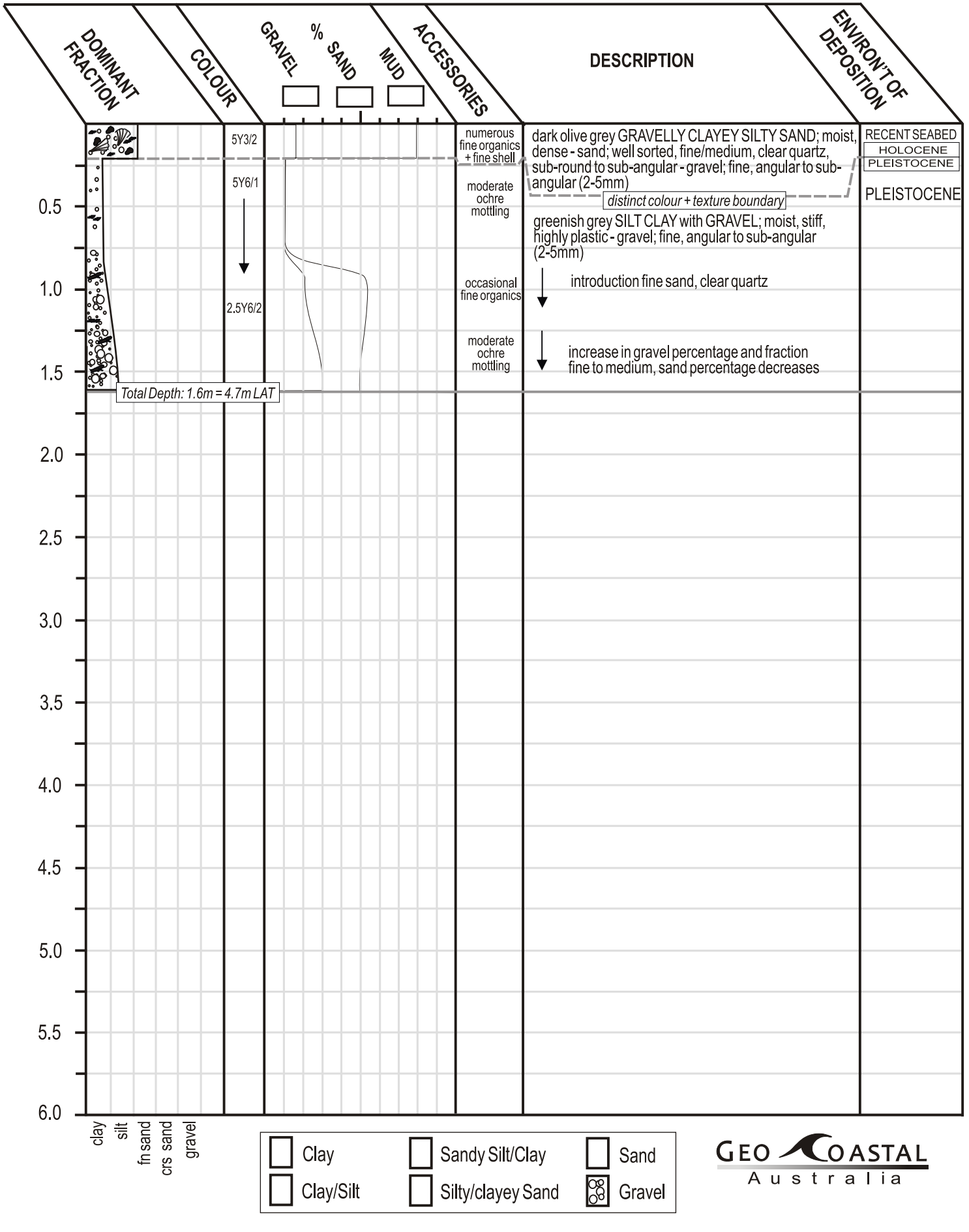
SITE: GC/BH1B-07

DATE: 28/09/09

LOCATION: Port of Gladstone
23°45.327 **S** 151°10.494 **E**
R.L. 3.1 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-08

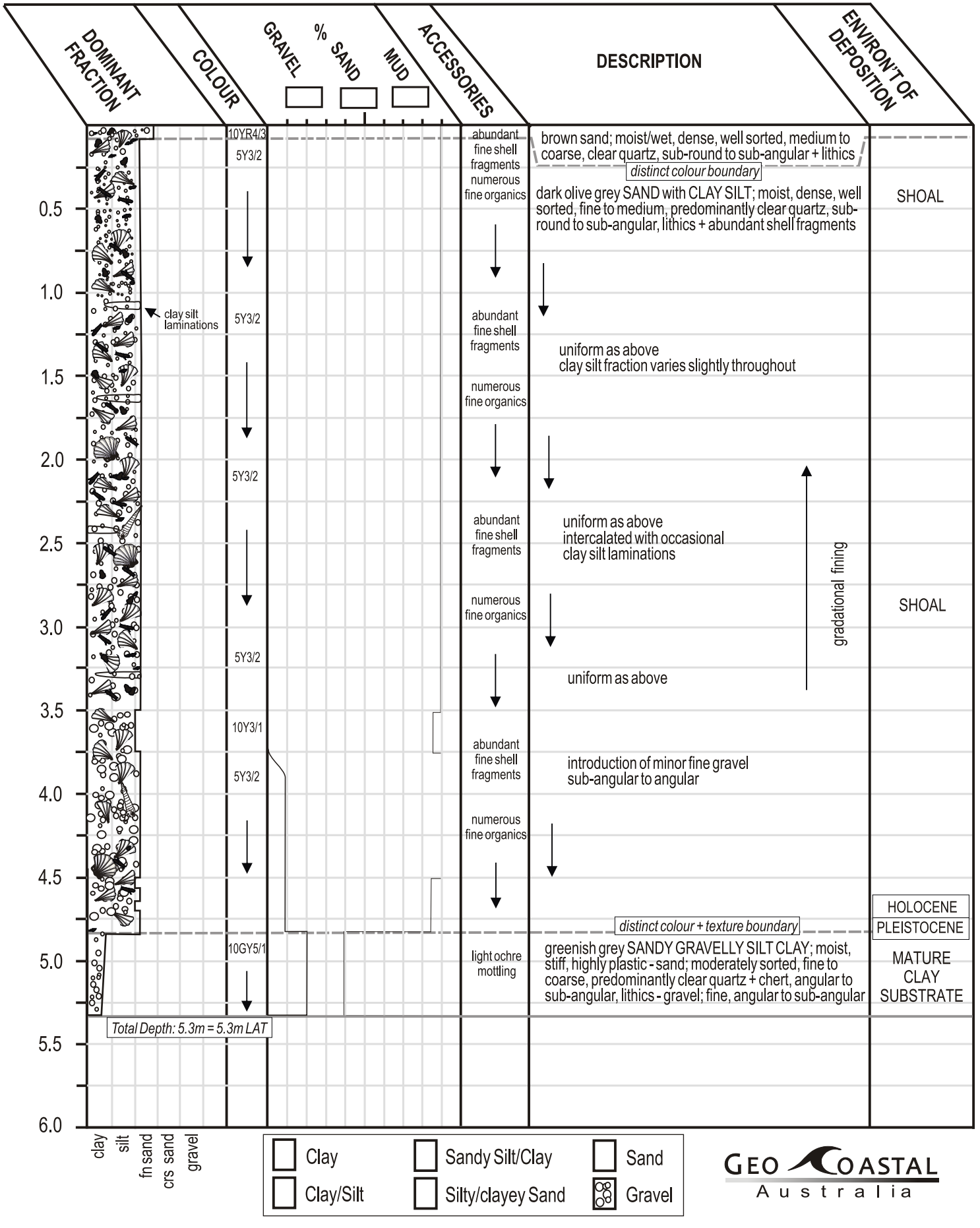
SITE: GC/BH1B-08

DATE: 30/09/09

LOCATION: Port of Gladstone
23°45.376 **S** 151°10.380 **E**
R.L. 0.0 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-09

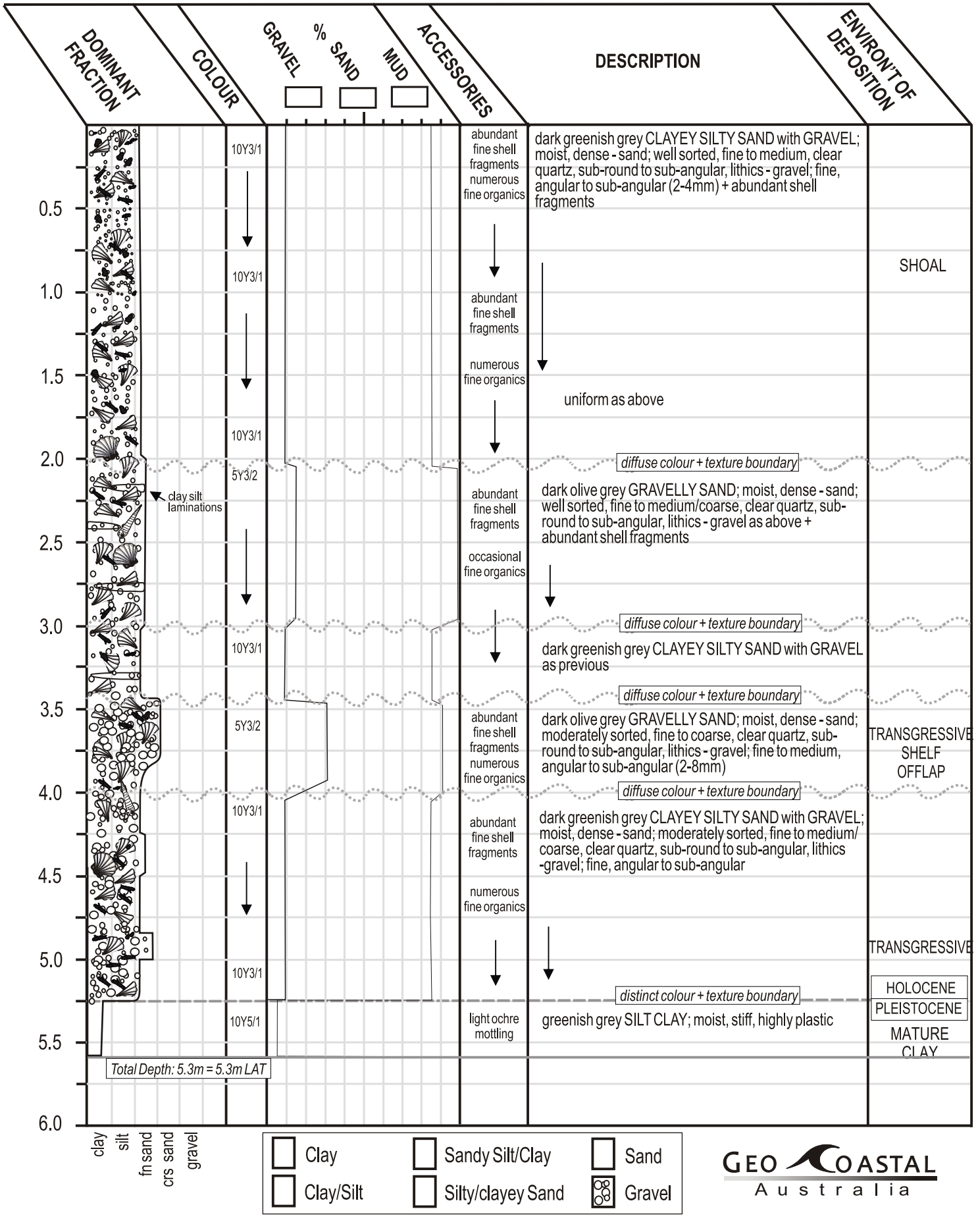
SITE: GC/BH1B-09

LOCATION: Port of Gladstone
23°45.468 **S** 151°10.356 **E**
R.L. 0.1 m L.A.T. (Port Datum)

DATE: 28/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B–10

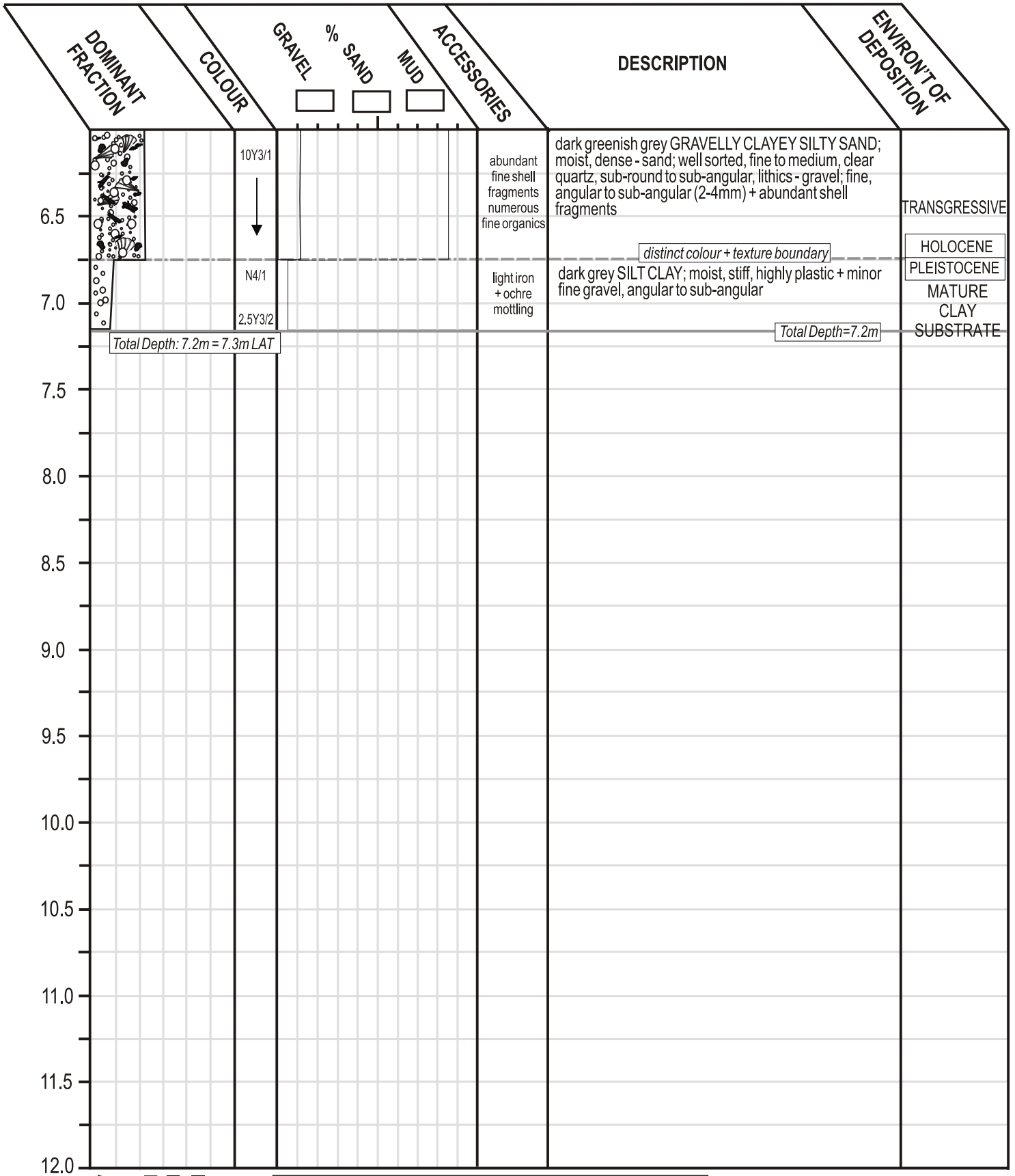
SITE: GC/ BH1B-10 Continued

DATE: 28/09/09

LOCATION: Port of Gladstone
23°45.606 **S** 151°10.382 **E**
R.L. 0.1 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-10

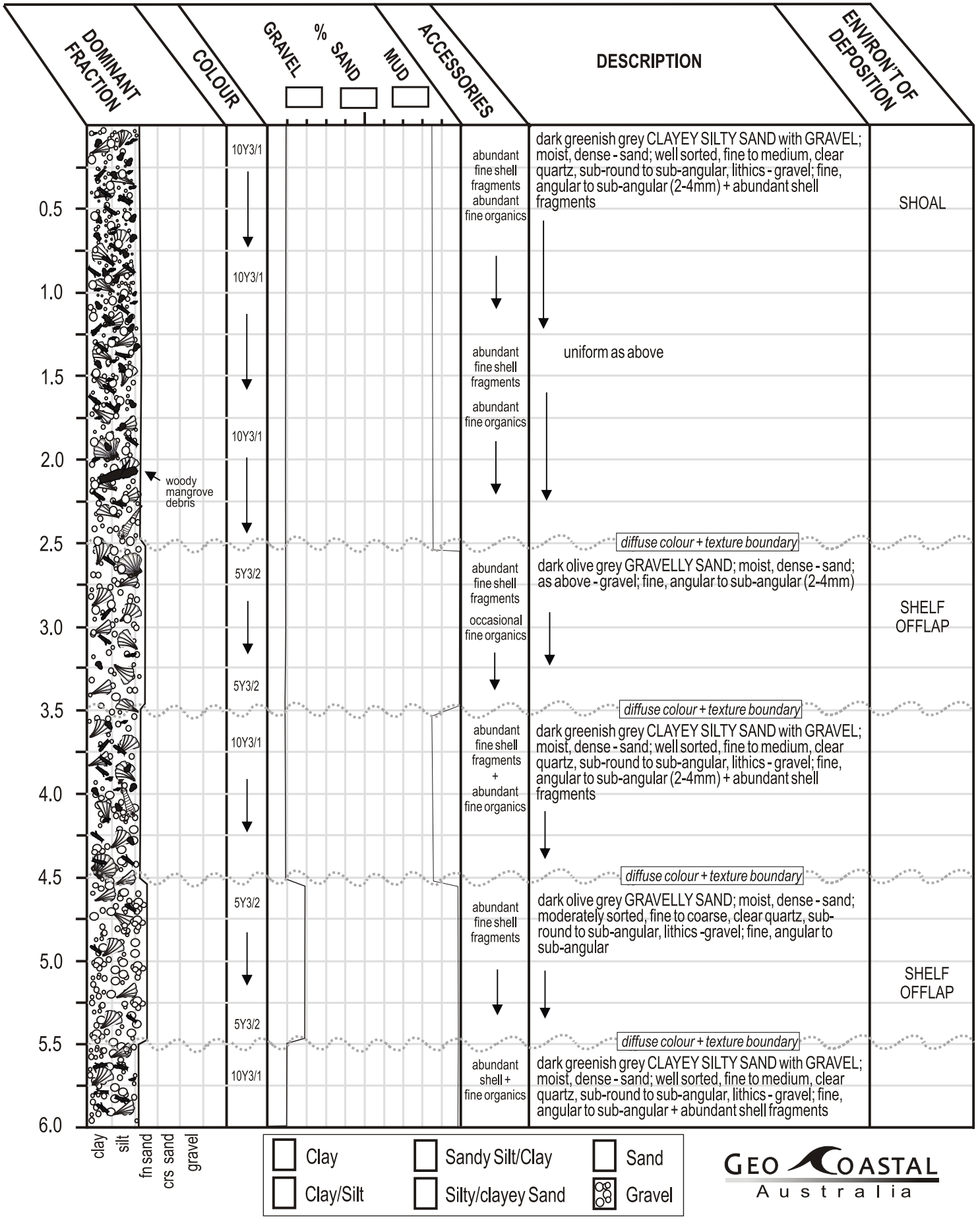
SITE: GC/BH1B-10

DATE: 28/09/09

LOCATION: Port of Gladstone
23°45.606 **S** 151°10.382 **E**
R.L. 0.1 m L.A.T. (Port Datum)

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B–11

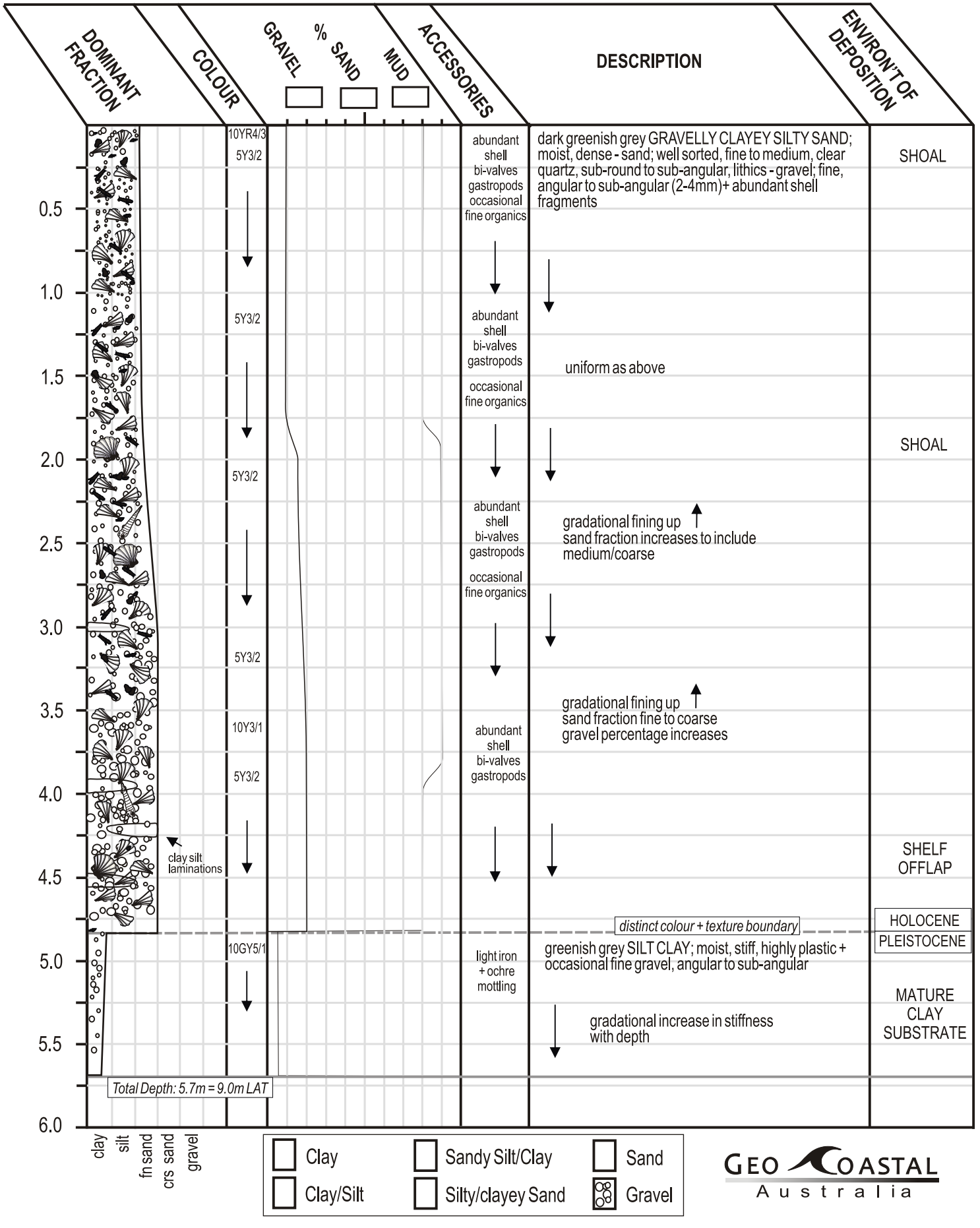
SITE: GC/BH1B-11

LOCATION: Port of Gladstone
23°45.726 **S** 151°10.396 **E**
R.L. 3.3 m L.A.T. (Port Datum)

DATE: 26/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-12

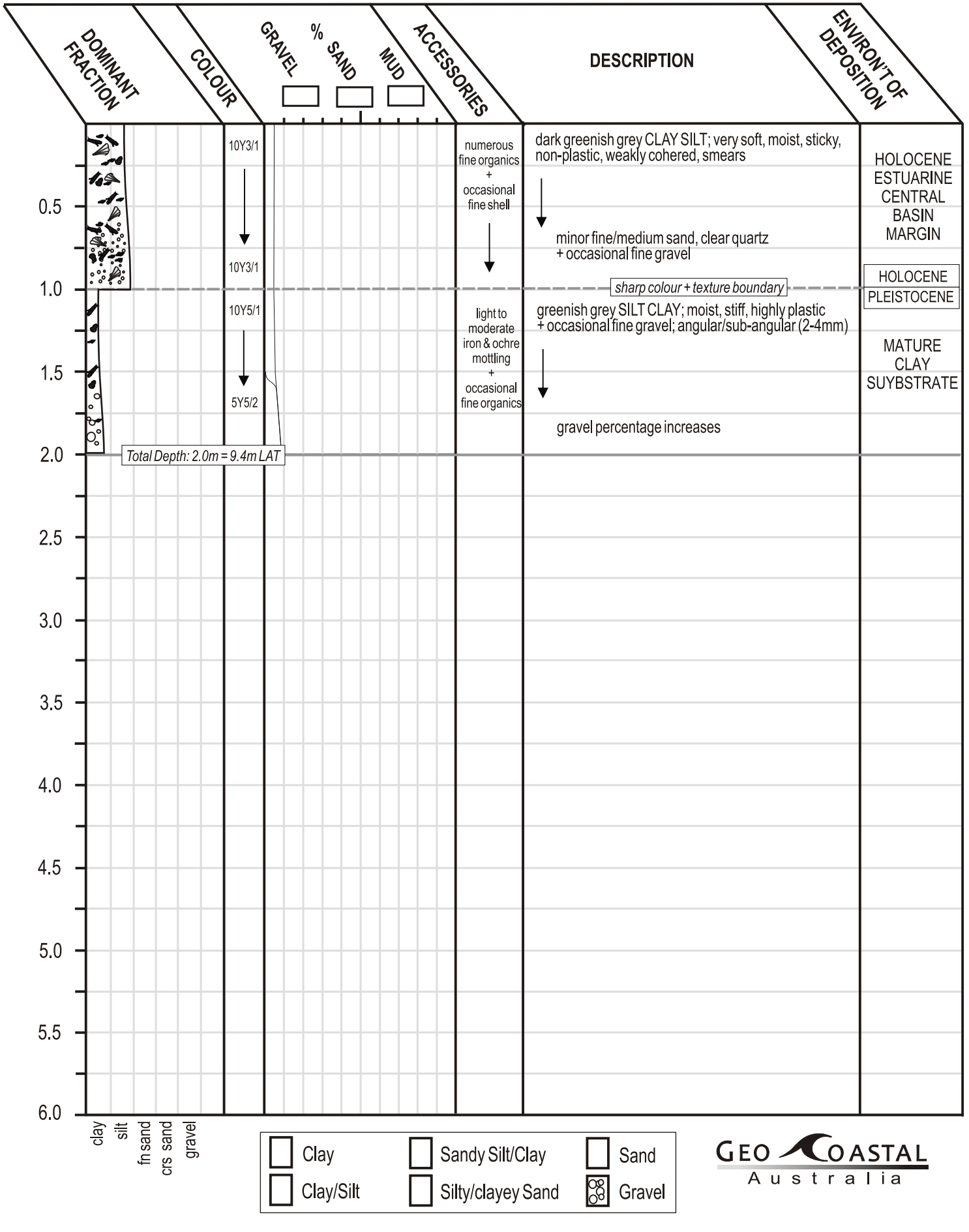
SITE: GC/BH1B-12

LOCATION: Port of Gladstone
23°46.015 **S** 151°10.464 **E**
R.L. 7.4 m L.A.T. (Port Datum)

DATE: 23/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B–13

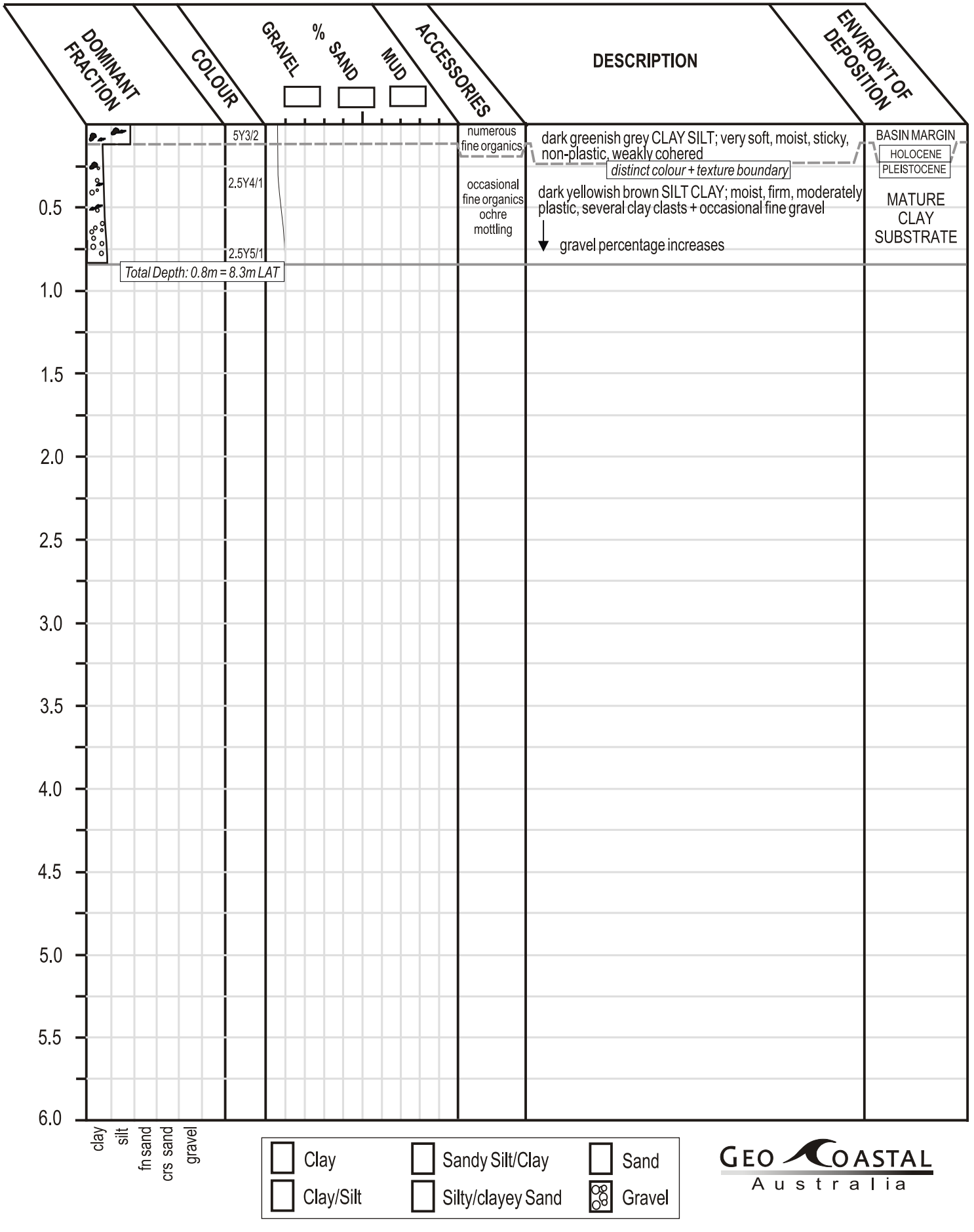
SITE: GC/BH1B-13

LOCATION: Port of Gladstone
23°46.150 **S** 151°10.466 **E**
R.L. 7.5 m L.A.T. (Port Datum)

DATE: 23/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-14

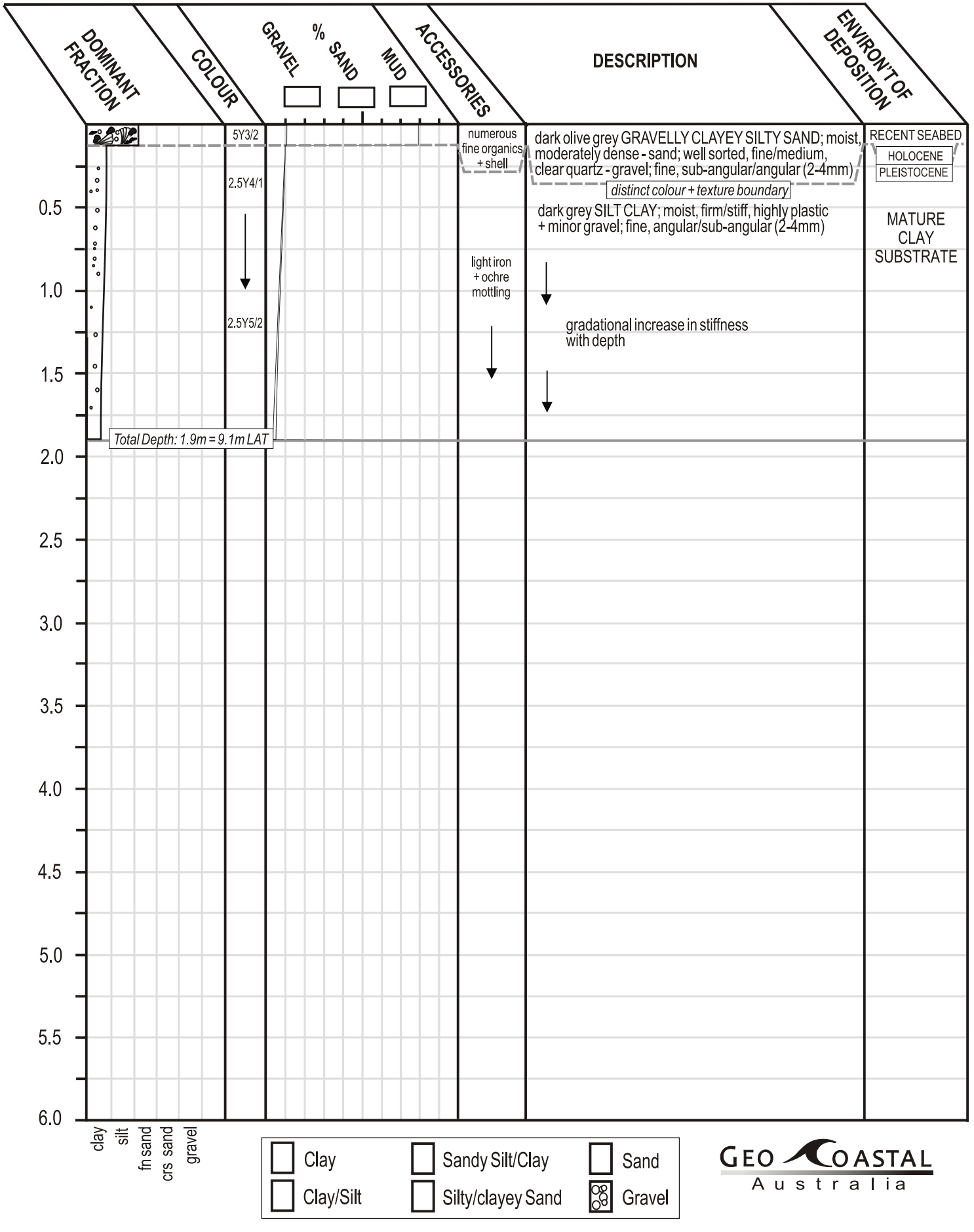
SITE: GC/BH1B-14

LOCATION: Port of Gladstone
23°46.272 **S** 151°10.495 **E**
R.L. 7.2 m L.A.T. (Port Datum)

DATE: 25/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B–15

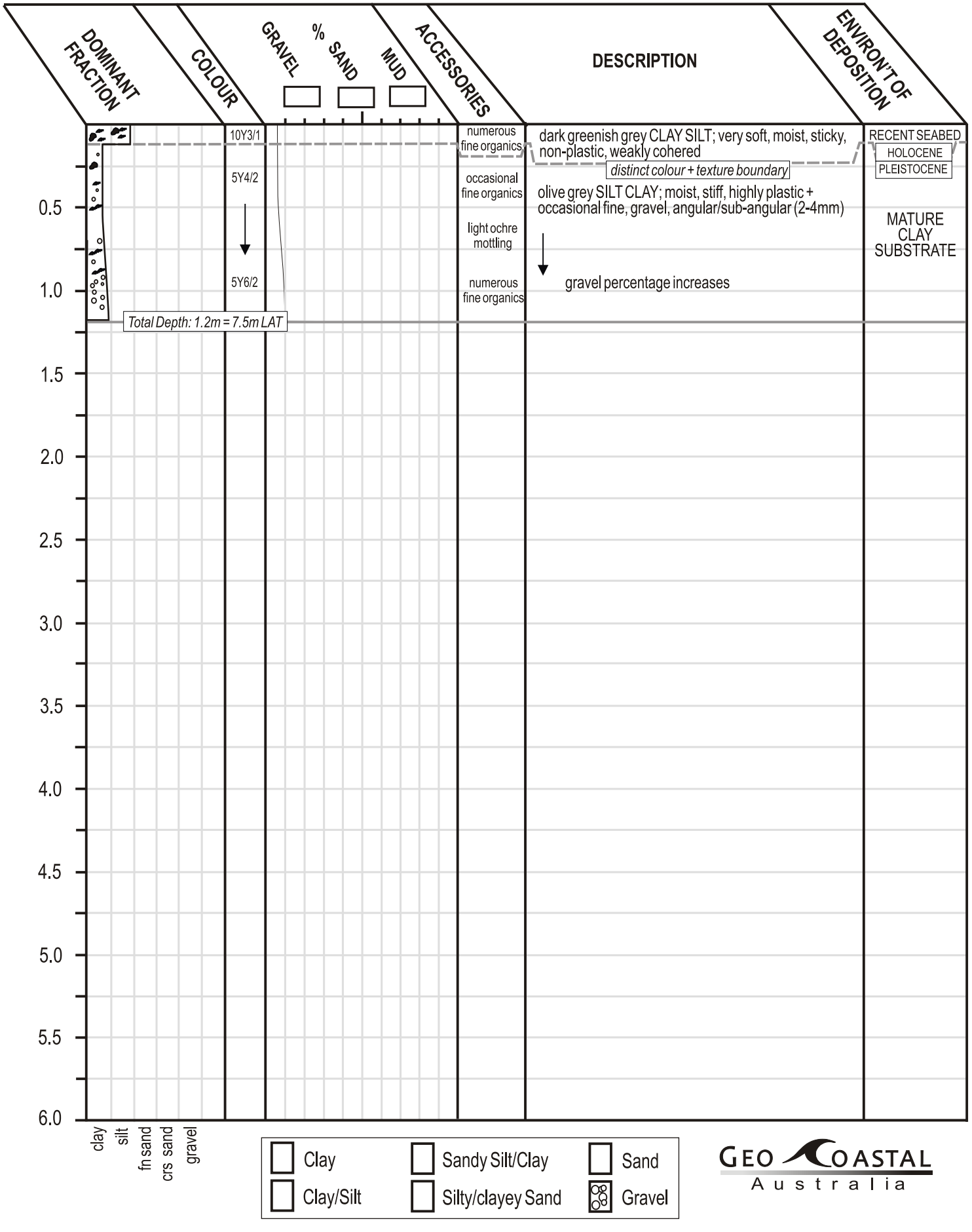
SITE: GC/BH1B-15

LOCATION: Port of Gladstone
23°46.327 **S** 151°10.621 **E**
R.L. 6.3 m L.A.T. (Port Datum)

DATE: 25/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B–16

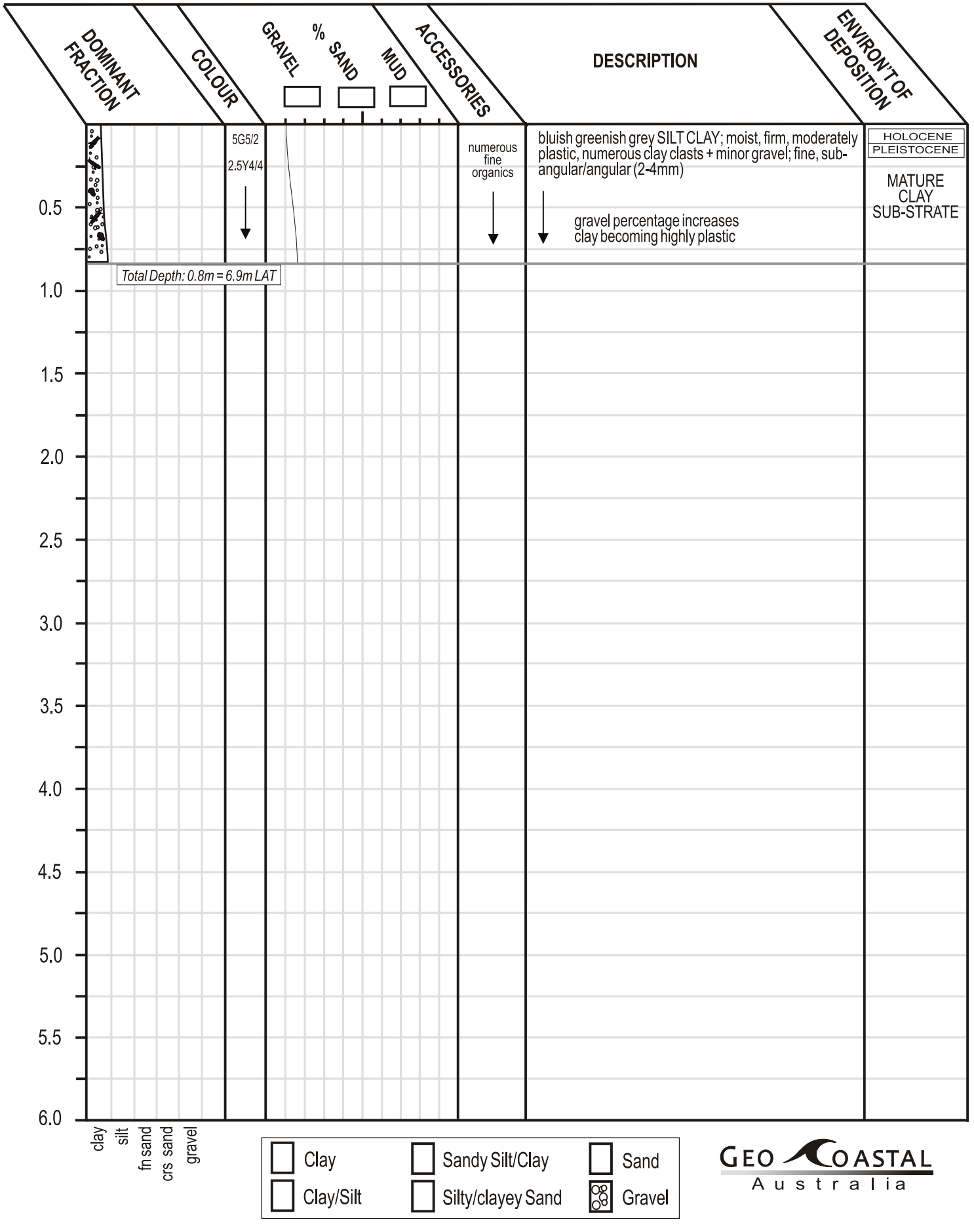
SITE: GC/BH1B-16

LOCATION: Port of Gladstone
23°46.452 **S** 151°10.618 **E**
R.L. 6.1 m L.A.T. (Port Datum)

DATE: 26/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-17

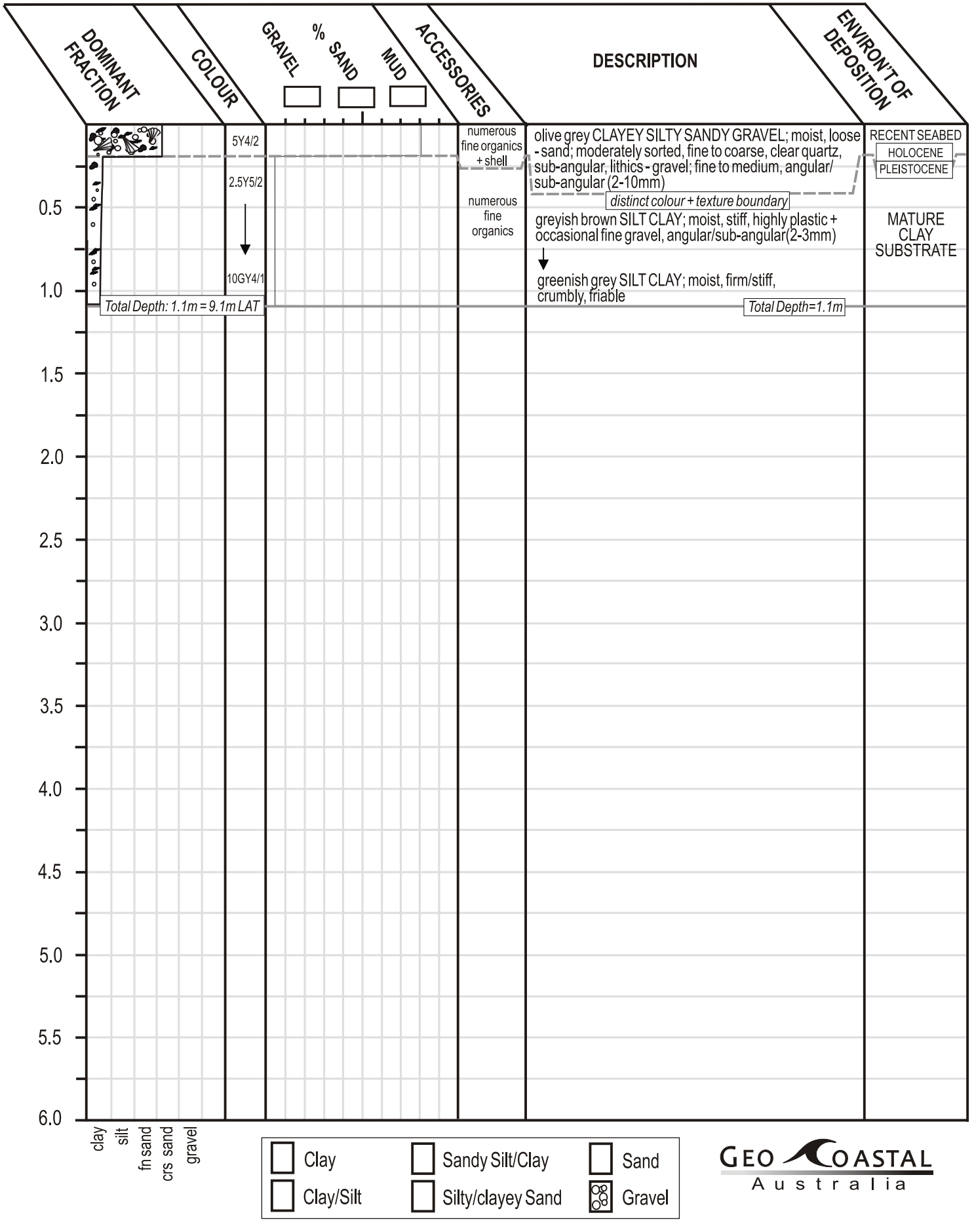
SITE: GC/BH1B-17

LOCATION: Port of Gladstone
23°46.610 **S** 151°10.605 **E**
R.L. 8.0 m L.A.T. (Port Datum)

DATE: 23/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-18

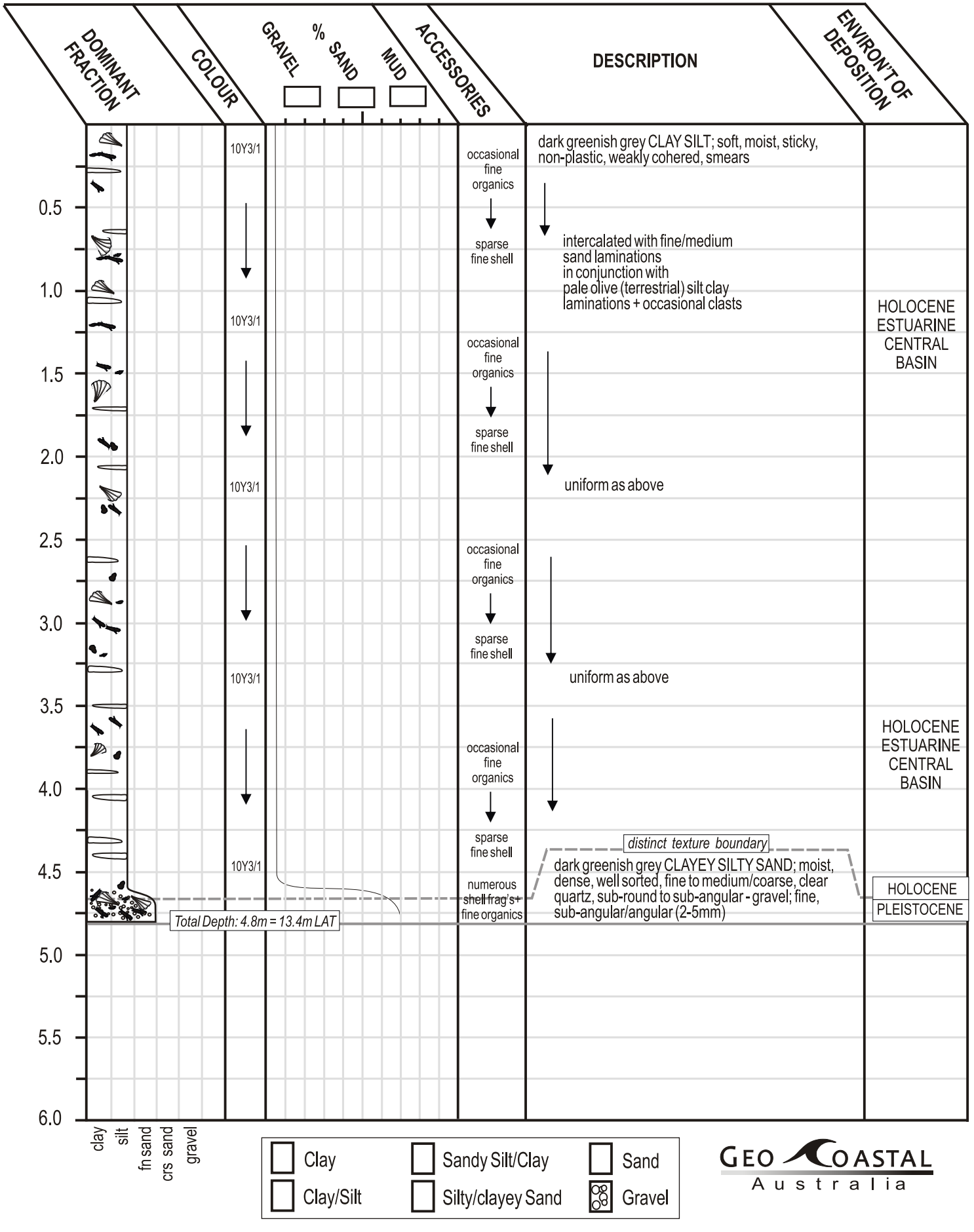
SITE: GC/BH1B-18

LOCATION: Port of Gladstone
23°46.791 **S** 151°10.705 **E**
R.L. 8.6 m L.A.T. (Port Datum)

DATE: 22/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

BOREHOLE #BH1B-19

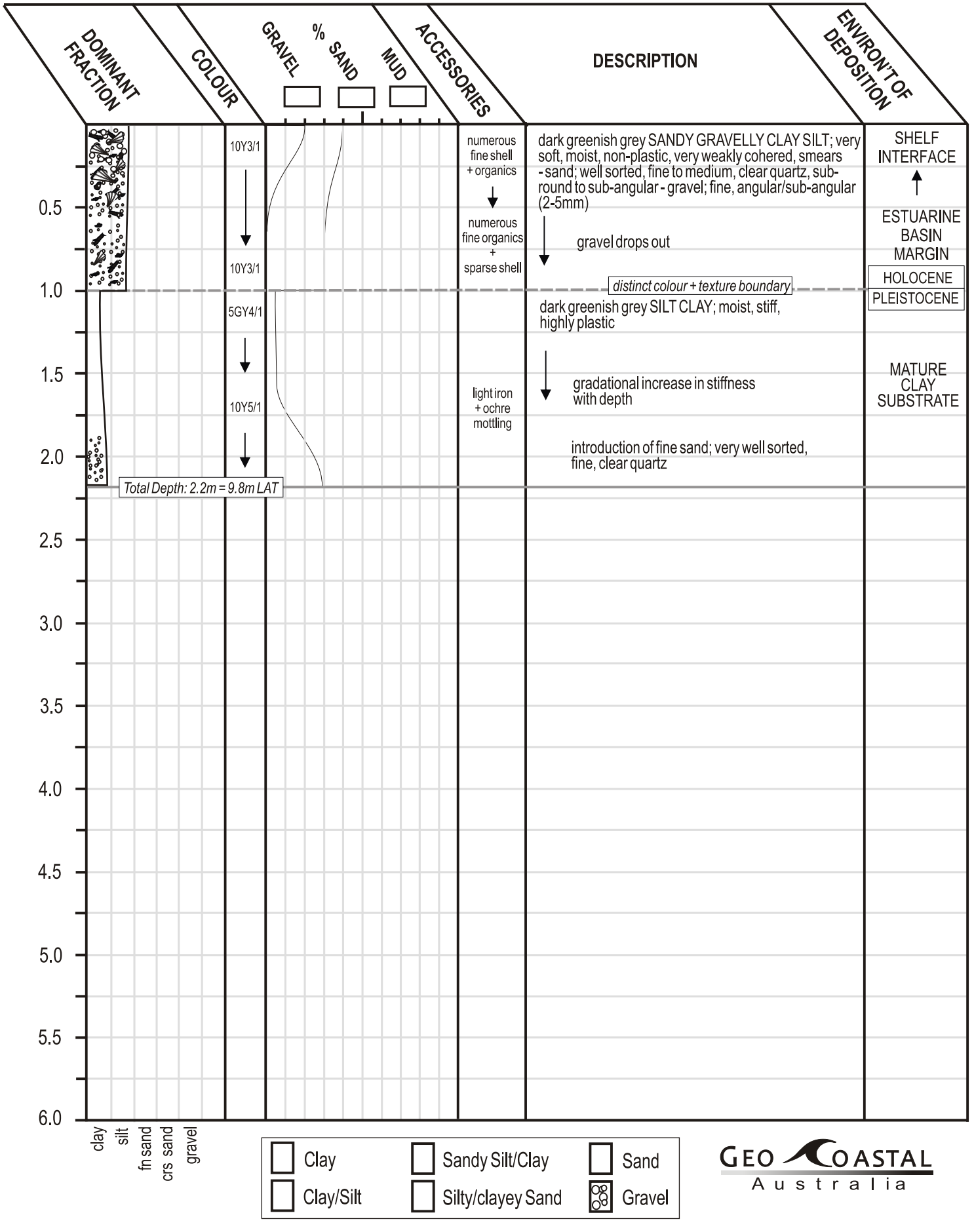
SITE: GC/BH1B-19

LOCATION: Port of Gladstone
23°46.405 **S** 151°10.522 **E**
R.L. 7.6 m L.A.T. (Port Datum)

DATE: 23/09/09

FEATURE: Shallow seabed

SAMPLING METHOD: GeoCoastal hydraulic vibra-vacuum corer



GEO COASTAL Australia

APPENDIX B

Laboratory Test Results

Golder Associates Pty Ltd
ABN: 64 006 107 857
(Brisbane Laboratory)

611 Coronation Drive
TOOWONG QLD 4066
(PO Box 1734, MILTON BC QLD 4064)
Telephone: (61-7) 3721 5400
Facsimile: (61-7) 3721 5401
http://www.golder.com

Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B / Option 2A		

pH_{FOX} Screening Test Results

16

Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**6/08/2009**			**Drilled:**	**4/08/2009**		
BH2A-01 0.00-0.25m	7.5	1.8	PASS	BH2A-02 0.00-0.25m	8.7	7.4	Nil ASS/PASS
BH2A-01 0.25-0.50m	7.8	1.8	PASS	BH2A-02 0.25-0.50m	8.2	7.6	Nil ASS/PASS
BH2A-01 0.50-0.75m	7.8	1.8	PASS	BH2A-02 0.50-0.75m	7.9	7.6	Nil ASS/PASS
BH2A-01 0.75-1.00m	7.8	2.3	Probable PASS	BH2A-02 0.75-0.90m	7.4	7.2	Nil ASS/PASS
BH2A-01 1.00-1.25m	7.9	1.9	PASS				
BH2A-01 1.25-1.50m	8.0	2.1	Probable PASS				
BH2A-01 1.50-1.80m	8.0	1.7	PASS				
BH2A-01 1.80-2.00m	8.1	2.7	Probable PASS				
BH2A-01 2.00-2.25m	8.2	3.4	Possible PASS				
BH2A-01 2.25-2.50m	8.4	6.8	Nil ASS/PASS				
BH2A-01 2.50-2.75m	8.5	8.2	Nil ASS/PASS				
BH2A-01 2.75-3.00m	8.5	7.9	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH2A-01 0.00-0.50m	18	<2	245	LMC, dk grey, orgs	1.21*	590	--*	66
BH2A-01 0.50-1.00m	18	<2	266	MC, dk grey, orgs	1.44*	720	--*	81
BH2A-01 1.00-1.50m	18	<2	--	MC, dk grey, trace orgs	1.18	680	2.1	76
BH2A-01 1.50-1.80m	18	<2	--	MC, dk grey, trace orgs	1.91	1180	1.9	132
BH2A-01 1.80-2.25m	18	<2	--	MHC, dk grey	0.74	390	2.5	44
BH2A-01 2.25-2.50m	18	<2	--	HC, dk grey	0.34	155	3.1	18

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
Samples denoted * have undergone the Chromium Reducible Sulfur analysis suite (S_{Cr}), pHox is not determined.
ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

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SL - Sandy loam	CLS - Clay loam, sandy	MHC - Medium heavy clay
L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

Prepared By: BSM | Checked By: HEP

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**22/09/2009**			**Drilled:**	**21/09/2009**		
BH1B-01 0.00-0.10m	8.6	6.4	Nil ASS/PASS	BH1B-02 2.00-2.25m	8.4	6.7	Nil ASS/PASS
BH1B-01 0.10-0.25m	8.7	6.8	Nil ASS/PASS	BH1B-02 2.25-2.50m	8.4	6.6	Nil ASS/PASS
BH1B-01 0.25-0.50m	8.5	6.5	Nil ASS/PASS	BH1B-02 2.50-2.75m	8.4	6.5	Nil ASS/PASS
BH1B-01 0.50-0.75m	8.3	6.2	Nil ASS/PASS	BH1B-02 2.75-3.00m	8.8	6.9	Nil ASS/PASS
BH1B-01 0.75-1.00m	8.1	6.0	Nil ASS/PASS	BH1B-02 3.00-3.25m	8.4	6.5	Nil ASS/PASS
BH1B-01 1.00-1.25m	7.4	6.0	Nil ASS/PASS	BH1B-02 3.25-3.50m	8.3	6.7	Nil ASS/PASS
BH1B-01 1.25-1.60m	8.1	6.1	Nil ASS/PASS	BH1B-02 3.50-3.80m	8.4	6.8	Nil ASS/PASS
				BH1B-02 3.80-4.00m	8.3	6.7	Nil ASS/PASS
Drilled:	**21/09/2009**			BH1B-02 4.00-4.25m	8.7	6.4	Nil ASS/PASS
BH1B-02 0.00-0.10m	8.5	6.1	Nil ASS/PASS	BH1B-02 4.25-4.50m	8.3	6.8	Nil ASS/PASS
BH1B-02 0.10-0.25m	8.7	6.2	Nil ASS/PASS	BH1B-02 4.50-4.75m	8.5	6.6	Nil ASS/PASS
BH1B-02 0.25-0.50m	8.3	8.0	Nil ASS/PASS	BH1B-02 4.75-5.00m	8.7	7.3	Nil ASS/PASS
BH1B-02 0.50-0.75m	9.0	5.8	Nil ASS/PASS	BH1B-02 5.00-5.25m	8.2	6.8	Nil ASS/PASS
BH1B-02 0.75-1.00m	8.7	6.1	Nil ASS/PASS	BH1B-02 5.25-5.50m	7.8	6.1	Nil ASS/PASS
BH1B-02 1.00-1.25m	8.6	5.7	Nil ASS/PASS	BH1B-02 5.50-5.75m	7.8	5.9	Nil ASS/PASS
BH1B-02 1.25-1.50m	8.5	6.5	Nil ASS/PASS				
BH1B-02 1.50-1.75m	8.8	6.2	Nil ASS/PASS				
BH1B-02 1.75-2.00m	8.7	6.4	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-01 0.00-0.01m	18	<2	506	LS dk olive grey	0.11*	<10	--*	Nil
BH1B-01 0.30-0.50m	18	<2	29	MC dk grey	0.04	<10	7.7	Nil
BH1B-01 0.80-1.00m	18	<2	30	HC grey	0.03	<10	7.2	Nil
BH1B-01 1.40-1.60m	18	<2	<10	HC grey	<0.02	<10	7	Nil
BH1B-02 0.00-0.10m	18	<2	1800	LS dk green grey	<0.02*	<10	--*	Nil
BH1B-02 0.80-1.00m	18	<2	1750	LS dk green grey	0.12	<10	8.8	Nil
BH1B-02 2.30-2.50m	18	<2	2420	S grey	0.10	<10	9.8	Nil
BH1B-02 3.80-4.00m	18	<2	2660	S grey	0.08	<10	9.9	Nil
BH1B-02 4.80-5.00m	18	<2	225	HC dk grey brown	0.04	<10	8.6	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
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Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**22/09/2009**			**Drilled:**	**22/09/2009**		
BH1B-03 0.00-0.10m	8.6	6.0	Nil ASS/PASS	BH1B-04 0.00-0.10m	9.1	6.4	Nil ASS/PASS
BH1B-03 0.10-0.25m	8.8	6.0	Nil ASS/PASS	BH1B-04 0.10-0.25m	9.2	7.0	Nil ASS/PASS
BH1B-03 0.25-0.50m	9.0	6.1	Nil ASS/PASS	BH1B-04 0.25-0.50m	8.7	6.4	Nil ASS/PASS
BH1B-03 0.50-0.75m	8.2	5.7	Nil ASS/PASS	BH1B-04 0.50-0.75m	7.3	6.0	Nil ASS/PASS
BH1B-03 0.75-1.00m	8.8	6.1	Nil ASS/PASS	BH1B-04 0.75-1.00m	7.0	5.7	Nil ASS/PASS
BH1B-03 1.00-1.25m	8.4	4.4	Improbable PASS	BH1B-04 1.00-1.25m	6.7	5.7	Nil ASS/PASS
BH1B-03 1.25-1.50m	8.2	3.3	Possible PASS	BH1B-04 1.25-1.50m	6.5	5.7	Nil ASS/PASS
BH1B-03 1.50-1.75m	8.2	2.6	Probable PASS	BH1B-04 1.50-1.75m	6.6	5.6	Nil ASS/PASS
BH1B-03 1.75-2.00m	7.9	2.4	Probable PASS	BH1B-04 1.75-2.00m	6.5	5.5	Nil ASS/PASS
BH1B-03 2.00-2.25m	8.1	2.3	Probable PASS				
BH1B-03 2.25-2.50m	8.5	6.4	Nil ASS/PASS				
BH1B-03 2.50-2.75m	7.1	5.4	Nil ASS/PASS				
BH1B-03 2.75-3.00m	7.2	5.7	Nil ASS/PASS				
BH1B-03 3.00-3.25m	7.1	5.7	Nil ASS/PASS				
BH1B-03 3.25-3.60m	7.3	7.8	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-03 0.00-0.10m	18	<2	2000	SL dk green grey	0.07*	<10	--*	Nil
BH1B-03 0.80-1.00m	18	<2	2340	SL dk green grey	0.28*	<10	--*	Nil
BH1B-03 1.80-2.00m	18	<2	2340	L dk green grey	0.52*	<10	--*	Nil
BH1B-03 2.30-2.50m	18	<2	106	HC green grey	0.09	<10	8.1	Nil
BH1B-04 0.00-0.10m	18	<2	2240	L dk green grey	0.11*	<10	--*	Nil
BH1B-04 0.30-0.50m	18	<2	42	MC dk grey	0.08	<10	7.2	Nil
BH1B-04 0.80-1.00m	18	<2	36	HC dk grey brown	0.02	<10	7.2	Nil
BH1B-04 1.80-2.00m	18	6	18	HC dk grey brown	<0.02	<10	7.3	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
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L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**21/09/2009**			**Drilled:**	**21/09/2009**		
BH1B-05 0.00-0.10m	8.9	2.2	Probable PASS	BH1B-06 0.00-0.10m	9.2	2.2	Probable PASS
BH1B-05 0.00-0.25m	9.0	1.7	PASS	BH1B-06 0.10-0.2m	8.9	6.0	Nil ASS/PASS
BH1B-05 0.25-0.50m	8.7	1.6	PASS	BH1B-06 0.2-0.40m	8.9	6.9	Nil ASS/PASS
BH1B-05 0.50-0.75m	8.5	1.9	PASS	BH1B-06 0.40-0.60m	8.7	6.4	Nil ASS/PASS
BH1B-05 0.75-1.00m	8.7	2.1	Probable PASS				
BH1B-05 1.00-1.25m	8.7	2.3	Probable PASS				
BH1B-05 1.25-1.50m	8.5	2.9	Probable PASS				
BH1B-05 1.50-1.75m	8.4	2.1	Probable PASS				
BH1B-05 1.75-2.00m	8.6	3.5	Possible PASS				
BH1B-05 2.00-2.25m	8.7	2.1	Probable PASS				
BH1B-05 2.25-2.50m	9.2	6.8	Nil ASS/PASS				
BH1B-05 2.50-2.75m	8.2	6.2	Nil ASS/PASS				
BH1B-05 2.75-3.00m	7.4	5.6	Nil ASS/PASS				
BH1B-05 3.00-3.25m	7.3	5.6	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-05 0.00-0.10m	18	<2	3600	LC dk green grey	0.17*	<10	--*	Nil
BH1B-05 0.80-1.00m	18	<2	-	LC dk green grey	0.78	251	3.3	28.5
BH1B-05 1.80-2.00m	18	<2	409	LC dk green grey	0.46	<10	8.1	Nil
BH1B-05 2.30-2.50m	18	<2	36	SCL green grey	0.05	<10	7.4	Nil
BH1B-06 0.00-0.10m	18	<2	1460	SCL dk green grey	0.32	<10	8.3	Nil
BH1B-06 0.20-0.40m	18	<2	1420	SCL dk green grey	0.47	<10	8.1	Nil

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Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

30

Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**28/09/2009**						
BH1B-07 0.00-0.10m	9.0	5.6	Nil ASS/PASS	BH1B-08 1.50-1.75m	8.5	7.1	Nil ASS/PASS
BH1B-07 0.10-0.25m	9.4	6.3	Nil ASS/PASS	BH1B-08 1.75-2.00m	8.6	6.4	Nil ASS/PASS
BH1B-07 0.25-0.50m	7.3	5.3	Nil ASS/PASS	BH1B-08 2.00-2.25m	8.8	6.4	Nil ASS/PASS
BH1B-07 0.50-0.75m	6.8	5.2	Nil ASS/PASS	BH1B-08 2.25-2.50m	8.6	6.7	Nil ASS/PASS
BH1B-07 0.75-1.00m	7.0	5.2	Nil ASS/PASS	BH1B-08 2.50-2.75m	8.5	6.9	Nil ASS/PASS
BH1B-07 1.00-1.25m	8.6	6.0	Nil ASS/PASS	BH1B-08 2.75-3.00m	8.5	7.2	Nil ASS/PASS
BH1B-07 1.25-1.50m	8.5	5.7	Nil ASS/PASS	BH1B-08 3.00-3.25m	8.3	6.7	Nil ASS/PASS
Drilled:	**30/09/2009**			BH1B-08 3.25-3.50m	8.5	7.0	Nil ASS/PASS
BH1B-08 0.00-0.10m	8.1	8.0	Nil ASS/PASS	BH1B-08 3.50-3.75m	8.6	5.9	Nil ASS/PASS
BH1B-08 0.10-0.25m	8.8	5.9	Nil ASS/PASS	BH1B-08 3.75-4.00m	8.4	6.6	Nil ASS/PASS
BH1B-08 0.25-0.50m	8.8	6.1	Nil ASS/PASS	BH1B-08 4.00-4.25m	8.3	6.7	Nil ASS/PASS
BH1B-08 0.50-0.75m	8.8	6.2	Nil ASS/PASS	BH1B-08 4.25-4.50m	8.3	6.6	Nil ASS/PASS
BH1B-08 0.75-1.00m	8.6	6.7	Nil ASS/PASS	BH1B-08 4.50-4.8m	8.4	5.8	Nil ASS/PASS
BH1B-08 1.00-1.25m	8.6	6.1	Nil ASS/PASS	BH1B-08 4.8-5.00m	9.2	6.6	Nil ASS/PASS
BH1B-08 1.25-1.50m	8.4	6.7	Nil ASS/PASS	BH1B-08 5.00-5.25m	7.5	6.3	Nil ASS/PASS

Quantitative Test Results

14

Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-07 0.00-0.10m	18	<2	1100	SL dk olive grey	0.11*	<10	--*	Nil
BH1B-07 0.25-0.50m	18	<2	<10	HC green grey	<0.02	<10	7.2	Nil
BH1B-07 1.35-1.60m	18	<2	760	MHC green grey	<0.02	<10	8.7	Nil
BH1B-08 0.00-0.25m	18	<2	2010	LS brown	<0.02	<10	9.1	Nil
BH1B-08 0.50-1.00m	18	<2	1450	LS Dk olive grey	0.06*	<10	--*	Nil
BH1B-08 1.00-1.50m	18	<2	1500	LS Dk olive grey	0.07*	<10	--*	Nil
BH1B-08 1.50-2.00m	18	<2	2180	LS Dk olive grey	0.10*	<10	--*	Nil
BH1B-08 2.00-2.50m	18	<2	2920	LS Dk olive grey	0.11*	<10	--*	Nil
BH1B-08 2.50-3.00m	18	<2	3140	LS Dk olive grey	0.07*	<10	--*	Nil
BH1B-08 3.00-3.50m	18	<2	3570	LS Dk olive grey	0.03*	<10	--*	Nil
BH1B-08 3.50-4.00m	18	<2	1760	LS Dk olive grey	0.21*	<10	--*	Nil
BH1B-08 4.00-4.50m	18	<2	4310	LS Dk olive grey	0.16*	<10	--*	Nil
BH1B-08 4.50-5.00m	18	<2	119	MC green grey	<0.02	<10	7.9	Nil
BH1B-08 5.00-5.30m	18	<2	32	MHC green grey	<0.02	<10	7.4	Nil

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Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**28/09/2009**						
BH1B-09 0.00-0.10m	8.7	6.1	Nil ASS/PASS	BH1B-09 3.75-4.00m	8.2	4.2	Improbable PASS
BH1B-09 0.10-0.25m	8.8	6.1	Nil ASS/PASS	BH1B-09 4.00-4.25m	8.0	6.3	Nil ASS/PASS
BH1B-09 0.25-0.50m	8.8	6.1	Nil ASS/PASS	BH1B-09 4.25-4.50m	8.1	4.3	Improbable PASS
BH1B-09 0.50-0.75m	8.7	5.9	Nil ASS/PASS	BH1B-09 4.50-4.75m	8.0	1.7	PASS
BH1B-09 0.75-1.00m	8.7	5.7	Nil ASS/PASS	BH1B-09 4.75-5.00m	8.0	5.8	Nil ASS/PASS
BH1B-09 1.00-1.25m	8.7	5.9	Nil ASS/PASS	BH1B-09 5.00-5.25m	9.1	6.4	Nil ASS/PASS
BH1B-09 1.25-1.50m	8.4	4.8	Nil ASS/PASS	BH1B-09 5.25-5.50m	8.9	6.4	Nil ASS/PASS
BH1B-09 1.50-1.75m	8.4	5.9	Nil ASS/PASS				
BH1B-09 1.75-2.00m	8.5	5.5	Nil ASS/PASS				
BH1B-09 2.00-2.25m	8.4	6.2	Nil ASS/PASS				
BH1B-09 2.25-2.50m	8.3	6.1	Nil ASS/PASS				
BH1B-09 2.50-2.75m	8.4	6.4	Nil ASS/PASS				
BH1B-09 2.75-3.00m	8.4	6.4	Nil ASS/PASS				
BH1B-09 3.00-3.25m	8.6	4.6	Nil ASS/PASS				
BH1B-09 3.25-3.50m	8.3	6.6	Nil ASS/PASS				
BH1B-09 3.50-3.75m	8.1	5.2	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-09 0.25-0.50m	18	<2	1130	SL dk green grey	0.15*	<10	--*	Nil
BH1B-09 2.25-2.50m	18	<2	1140	S dk olive grey	<0.02	<10	8.9	Nil
BH1B-09 3.75-4.00m	18	<2	4620	CS dk olive grey	0.58*	<10	--*	Nil
BH1B-09 4.75-5.00m	18	<2	310	SL dk green grey	0.74	<10	7.3	Nil
BH1B-09 5.35-5.60m	18	<2	70	HC green grey	0.04	<10	7.5	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
Samples denoted * have undergone the Chromium Reducible Sulfur analysis suite (S_{Cr}), pHox is not determined.
ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

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S - Sand	ZL - Silty loam	LC - Light clay
LS - Loamy sand	SCL - Sandy clay loam	LMC - Light medium clay
CS - Clayey sand	CL - Clay loam	MC - Medium clay
SL - Sandy loam	CLS - Clay loam, sandy	MHC - Medium heavy clay
L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

Prepared By:	BSM	Checked By:	HEP

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http://www.golder.com

Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**28/09/2009**						
BH1B-10 0.00-0.10m	8.6	5.9	Nil ASS/PASS	BH1B-10 3.50-3.75m	8.6	6.2	Nil ASS/PASS
BH1B-10 0.10-0.25m	8.6	6.0	Nil ASS/PASS	BH1B-10 3.75-4.00m	8.9	3.4	Possible PASS
BH1B-10 0.25-0.50m	8.9	5.9	Nil ASS/PASS	BH1B-10 4.00-4.25m	8.7	5.3	Nil ASS/PASS
BH1B-10 0.50-0.75m	8.9	6.1	Nil ASS/PASS	BH1B-10 4.25-4.50m	8.5	6.6	Nil ASS/PASS
BH1B-10 0.75-1.00m	8.9	6.0	Nil ASS/PASS	BH1B-10 4.50-4.75m	8.4	6.5	Nil ASS/PASS
BH1B-10 1.00-1.25m	8.9	5.9	Nil ASS/PASS	BH1B-10 4.75-5.00m	8.1	6.4	Nil ASS/PASS
BH1B-10 1.25-1.50m	8.8	6.2	Nil ASS/PASS	BH1B-10 5.00-5.25m	8.3	6.8	Nil ASS/PASS
BH1B-10 1.50-1.75m	8.8	6.3	Nil ASS/PASS	BH1B-10 5.25-5.50m	8.4	6.7	Nil ASS/PASS
BH1B-10 1.75-2.00m	8.7	6.1	Nil ASS/PASS	BH1B-10 5.50-5.75m	8.6	6.8	Nil ASS/PASS
BH1B-10 2.00-2.25m	8.6	6.0	Nil ASS/PASS	BH1B-10 5.75-6.00m	8.5	6.6	Nil ASS/PASS
BH1B-10 2.25-2.50m	8.4	6.4	Nil ASS/PASS	BH1B-10 6.00-6.25m	8.5	6.9	Nil ASS/PASS
BH1B-10 2.50-2.75m	8.5	6.3	Nil ASS/PASS	BH1B-10 6.25-6.50m	8.2	6.2	Nil ASS/PASS
BH1B-10 2.75-3.00m	8.1	6.4	Nil ASS/PASS	BH1B-10 6.50-6.75m	8.5	5.8	Nil ASS/PASS
BH1B-10 3.00-3.25m	8.3	6.2	Nil ASS/PASS	BH1B-10 6.75-7.00m	8.7	6.2	Nil ASS/PASS
BH1B-10 3.25-3.50m	8.7	5.9	Nil ASS/PASS	BH1B-10 7.00-7.20m	8.3	6.0	Nil ASS/PASS

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-10 0.00-0.10m	18	<2	1060	SL dk green grey	0.10*	<10	--*	Nil
BH1B-10 0.25-0.50m	18	<2	1480	SL dk green grey	0.25*	<10	--*	Nil
BH1B-10 0.75-1.00m	18	<2	1510	SL dk green grey	0.32*	<10	--*	Nil
BH1B-10 1.25-1.50m	18	<2	2790	SL dk green grey	0.24*	<10	--*	Nil
BH1B-10 1.75-2.00m	18	<2	591	SL dk green grey	0.13*	<10	--*	Nil
BH1B-10 2.25-2.50m	18	<2	3310	SL dk green grey	0.16*	<10	--*	Nil
BH1B-10 2.75-3.00m	18	<2	785	S dk olive grey	<0.02	<10	9.3	Nil
BH1B-10 3.25-3.50m	18	<2	948	S dk olive grey	<0.02	<10	9.0	Nil
BH1B-10 3.75-4.00m	18	<2	1960	SL dk green grey	0.16*	<10	--*	Nil
BH1B-10 4.25-4.50m	18	<2	3150	SL dk green grey	0.24*	<10	--*	Nil
BH1B-10 4.75-5.00m	18	<2	3990	CS dk olive grey	0.06*	<10	--*	Nil
BH1B-10 5.25-5.50m	18	<2	1510	CS dk olive grey	<0.02	<10	9.0	Nil
BH1B-10 5.75-6.00m	18	<2	698	CS dk olive grey	0.16	<10	8.4	Nil
BH1B-10 6.25-6.50m	18	<2	2210	SL dk green grey	1.17*	<10	--*	Nil
BH1B-10 6.95-7.20m	18	<2	125	MHC dk grey	<0.02	<10	7.7	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
Samples denoted * have undergone the Chromium Reducible Sulfur analysis suite (S_{Cr}), pHox is not determined.
ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

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SL - Sandy loam	CLS - Clay loam, sandy	MHC - Medium heavy clay
L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

Prepared By: BSM	Checked By: HEP

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**26/09/2009**						
BH1B-11 0.00-0.10m	8.7	6.1	Nil ASS/PASS	BH1B-11 4.00-4.25m	8.5	6.4	Nil ASS/PASS
BH1B-11 0.10-0.25m	8.8	6.1	Nil ASS/PASS	BH1B-11 4.25-4.50m	8.3	5.4	Nil ASS/PASS
BH1B-11 0.25-0.50m	9.0	6.1	Nil ASS/PASS	BH1B-11 4.50-4.75m	8.4	6.1	Nil ASS/PASS
BH1B-11 0.50-0.75m	8.8	6.1	Nil ASS/PASS	BH1B-11 4.75-5.00m	8.9	6.4	Nil ASS/PASS
BH1B-11 0.75-1.00m	8.8	1.6	PASS	BH1B-11 5.00-5.25m	7.4	5.6	Nil ASS/PASS
BH1B-11 1.00-1.25m	8.8	4.7	Nil ASS/PASS	BH1B-11 5.25-5.50m	7.1	5.4	Nil ASS/PASS
BH1B-11 1.25-1.50m	8.7	6.1	Nil ASS/PASS	**Drilled:**	**26/09/2009**		
BH1B-11 1.50-1.75m	8.7	6.2	Nil ASS/PASS	BH1B-12 0.00-0.10m	8.1	5.0	Nil ASS/PASS
BH1B-11 1.75-2.00m	8.7	6.3	Nil ASS/PASS	BH1B-12 0.10-0.25m	8.0	5.6	Nil ASS/PASS
BH1B-11 2.00-2.25m	8.7	6.2	Nil ASS/PASS	BH1B-12 0.25-0.50m	8.2	3.9	Possible PASS
BH1B-11 2.25-2.50m	8.4	6.3	Nil ASS/PASS	BH1B-12 0.50-0.75m	8.0	2.8	Probable PASS
BH1B-11 2.50-2.75m	8.5	6.4	Nil ASS/PASS	BH1B-12 0.75-1.00m	8.5	6.5	Nil ASS/PASS
BH1B-11 2.75-3.00m	8.6	4.9	Nil ASS/PASS	BH1B-12 1.00-1.25m	7.9	6.1	Nil ASS/PASS
BH1B-11 3.00-3.25m	8.5	5.6	Nil ASS/PASS	BH1B-12 1.25-1.50m	7.0	5.4	Nil ASS/PASS
BH1B-11 3.25-3.50m	8.3	6.1	Nil ASS/PASS	BH1B-12 1.50-1.75m	6.9	7.4	Nil ASS/PASS
BH1B-11 3.50-3.75m	8.5	6.0	Nil ASS/PASS	BH1B-12 1.75-2.00m	6.9	6.0	Nil ASS/PASS
BH1B-11 3.75-4.00m	8.7	5.9	Nil ASS/PASS				

Quantitative Test Results

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Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-11 0.00-0.10m	18	<2	438	SL dk green grey	0.10	<10	8.2	Nil
BH1B-11 0.75-1.00m	18	<2	238	SL dk green grey	0.20	<10	8.2	Nil
BH1B-11 1.75-2.00m	18	<2	775	SL dk green grey	0.09	<10	8.5	Nil
BH1B-11 2.75-3.00m	18	<2	1000	CS dk green grey	0.14	<10	8.4	Nil
BH1B-11 3.75-4.00m	18	<2	438	SL dk green grey	0.49	<10	7.8	Nil
BH1B-11 5.25-5.50m	18	<2	275	MHC green grey	<0.02	<10	7.0	Nil
BH1B-12 0.00-0.01m	18	<2	747	LC dk green grey	0.20*	<10	--*	Nil
BH1B-12 0.25-0.50m	18	<2	437	LC dk green grey	0.80*	208	--*	24
BH1B-12 0.75-1.00m	18	<2	2260	LC dk green grey	0.80*	<10	--*	Nil
BH1B-12 1.25-1.50m	18	<2	22	MHC green grey	<0.02	<10	6.6	Nil
BH1B-12 1.75-2.00m	18	<2	101	MHC green grey	0.02	<10	8.6	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
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ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

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Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

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Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**23/09/2009**			**Drilled:**	**25/09/2009**		
BH1B-13 0.00-0.10m	7.5	5.7	Nil ASS/PASS	BH1B-15 0.00-0.10m	7.7	5.4	Nil ASS/PASS
BH1B-13 0.10-0.25m	8.1	8.4	Nil ASS/PASS	BH1B-15 0.10-0.25m	7.3	5.7	Nil ASS/PASS
BH1B-13 0.25-0.50m	7.4	5.9	Nil ASS/PASS	BH1B-15 0.25-0.50m	7.1	5.5	Nil ASS/PASS
BH1B-13 0.50-0.75m	7.4	6.1	Nil ASS/PASS	BH1B-15 0.50-0.75m	6.9	5.4	Nil ASS/PASS
Drilled:	**25/09/2009**			BH1B-15 0.75-1.00m	7.1	5.6	Nil ASS/PASS
BH1B-14 0.00-0.10m	8.9	6.3	Nil ASS/PASS	BH1B-15 1.00-1.20m	6.8	7.6	Nil ASS/PASS
BH1B-14 0.10-0.25m	9.1	6.5	Nil ASS/PASS				
BH1B-14 0.25-0.50m	8.7	6.2	Nil ASS/PASS	**Drilled:**	**26/09/2009**		
BH1B-14 0.50-0.75m	8.8	6.1	Nil ASS/PASS	BH1B-16 0.00-0.10m	8.5	8.0	Nil ASS/PASS
BH1B-14 0.75-1.00m	7.9	5.8	Nil ASS/PASS	BH1B-16 0.10-0.25m	7.9	8.1	Nil ASS/PASS
BH1B-14 1.00-1.25m	7.8	5.9	Nil ASS/PASS	BH1B-16 0.25-0.50m	7.4	7.8	Nil ASS/PASS
BH1B-14 1.25-1.50m	6.9	5.6	Nil ASS/PASS	BH1B-16 0.50-0.75m	7.6	8.1	Nil ASS/PASS
BH1B-14 1.50-1.65m	6.9	5.5	Nil ASS/PASS				
BH1B-14 1.65-1.90m	8.9	6.5	Nil ASS/PASS				

Quantitative Test Results

11

Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-13 0.00-0.10m	18	<2	1150	LC dk green grey	0.20*	<10	--*	Nil
BH1B-13 0.25-0.50m	18	<2	82	MC dk yellow brown	<0.02	<10	8.4	Nil
BH1B-13 0.65-0.80m	18	<2	83	MC dk yellow brown	<0.02	<10	8.2	Nil
BH1B-14 0.00-0.10m	18	<2	2750	SL dk olive grey	0.07*	<10	--*	Nil
BH1B-14 0.25-0.50m	18	<2	125	MHC dk grey	<0.02	<10	7.9	Nil
BH1B-14 1.65-1.90m	18	<2	25	MHC dk grey	<0.02	<10	6.8	Nil
BH1B-15 0.00-0.10m	18	<2	509	LC dk green grey	0.25*	<10	--*	Nil
BH1B-15 0.25-0.50m	18	<2	75	HC olive grey	<0.02	<10	6.7	Nil
BH1B-15 1.00-1.20m	18	<2	191	HC olive grey	0.05*	<10	--*	Nil
BH1B-16 0.00-0.10m	18	<2	217	MC blue green grey	0.02*	<10	--*	Nil
BH1B-16 0.25-0.50m	18	<2	201	MC blue green grey	0.02*	<10	--*	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
Samples denoted * have undergone the Chromium Reducible Sulfur analysis suite (S_{Cr}), pHox is not determined.
ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

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L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

Prepared By:	BSM	Checked By:	HEP

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Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B - Resampled		

pH_{FOX} Screening Test Results

25

Location	pH_F	pH_{FOX}	Indication	Location	pH_F	pH_{FOX}	Indication
Drilled:	**23/09/2009**						
BH1B-17 0.00-0.10m	8.6	7.5	Nil ASS/PASS	BH1B-18 1.25-1.50m	8.4	4.4	Improbable PASS
BH1B-17 0.10-0.25m	7.5	6.0	Nil ASS/PASS	BH1B-18 1.50-1.75m	8.5	3.7	Possible PASS
BH1B-17 0.25-0.50m	7.4	5.9	Nil ASS/PASS	BH1B-18 1.75-2.00m	8.6	2.9	Probable PASS
BH1B-17 0.50-0.75m	7.4	6.1	Nil ASS/PASS	**Drilled:**		**23/09/2009**	
BH1B-17 0.75-1.00m	8.9	7.2	Nil ASS/PASS	BH1B-19 0.00-0.10m	8.8	4.2	Improbable PASS
BH1B-17 1.00-1.10m	9.4	6.7	Nil ASS/PASS	BH1B-19 0.10-0.25m	7.9	3.2	Possible PASS
				BH1B-19 0.25-0.50m	8.7	3.4	Possible PASS
Drilled:	**22/09/2009**			BH1B-19 0.50-0.75m	8.8	1.8	PASS
BH1B-18 0.00-0.10m	9.1	3.0	Possible PASS	BH1B-19 0.75-1.00m	8.9	2.1	Probable PASS
BH1B-18 0.10-0.25m	8.9	2.8	Probable PASS	BH1B-19 1.00-1.25m	9.0	6.2	Nil ASS/PASS
BH1B-18 0.25-0.50m	8.6	2.9	Probable PASS	BH1B-19 1.25-1.50m	7.7	6.3	Nil ASS/PASS
BH1B-18 0.50-0.75m	8.7	4.1	Improbable PASS	BH1B-19 1.50-1.75m	7.5	6.3	Nil ASS/PASS
BH1B-18 0.75-1.00m	8.7	2.5	Probable PASS	BH1B-19 1.75-2.00m	7.3	5.6	Nil ASS/PASS
BH1B-18 1.00-1.25m	8.5	7.4	Nil ASS/PASS	BH1B-19 2.00-2.10m	7.5	6.0	Nil ASS/PASS

Quantitative Test Results

13

Location	Action Criteria (mole H^+/t)	TAA (mole H^+/t)	ANC (mole H^+/t)	Texture Description	S_{POS} (%)	'Net Acidity' (mole	pH_{OX}	Lime Rate (kg/m^3)
BH1B-17 0.00-0.10m	18	<2	3510	G, Gravel, olive grey	0.04*	<10	--*	Nil
BH1B-17 0.25-0.50m	18	<2	184	HC grey brown	<0.02*	<10	--*	Nil
BH1B-17 0.85-1.10m	18	<2	736	MHC gren grey	<0.02*	<10	--*	Nil
BH1B-18 0.00-0.10m	18	<2	-	LC dk green grey	0.66	140	6.5	15
BH1B-18 0.25-0.50m	18	<2	-	LC dk green grey	0.72	256	3.3	28.5
BH1B-18 0.75-1.00m	18	<2	-	LC dk green grey	0.63	218	3.5	24
BH1B-18 1.25-1.50m	18	<2	86	LC dk green grey	0.52	51	6.9	6
BH1B-18 1.65-1.90m	18	<2	123	LC dk green grey	0.55	32	7.3	3
BH1B-19 0.00-0.10m	18	<2	1870	ZCL dk green grey	0.45*	<10	--*	Nil
BH1B-19 0.25-0.50m	18	<2	1150	ZCL dk green grey	0.57*	<10	--*	Nil
BH1B-19 0.75-1.00m	18	<2	552	ZCL dk green grey	0.63*	23	--*	3
BH1B-19 1.25-1.50m	18	<2	37	MHC dk green grey	<0.02	<10	7.4	Nil
BH1B-19 1.85-2.10m	18	<2	17	HC dk green grey	0.02	<10	7.2	Nil

Remarks: TAA - Total Actual Acidity, ANC - Acid Neutralisng Capacity, SPOS - Peroxide Oxidisable Sulfur
Liming rates are indicative and based on a FOS of 1.5, assumed density of 1.5 and 1.7 tonne/m^3 for clay and sand respectively and 'net potential acidity' as determined by analysis.
Samples denoted * have undergone the Chromium Reducible Sulfur analysis suite (S_{Cr}), pHox is not determined. ANC is the 'as reported' value and reflects ANC by the S_{Cr} method and 'excess' ANC by SPOCAS.

Australian Soil and Land Survey Field Handbook (3rd ed) - Field texture grade

S - Sand	ZL - Silty loam	LC - Light clay
LS - Loamy sand	SCL - Sandy clay loam	LMC - Light medium clay
CS - Clayey sand	CL - Clay loam	MC - Medium clay
SL - Sandy loam	CLS - Clay loam, sandy	MHC - Medium heavy clay
L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Test Procedures: pH_{FOX} "ASS Screening Test" (rapid oxidation with Hydrogen Peroxide) – Golder Associates
SPOCAS and S_{Cr} Methods – ALS Brisbane

Prepared By:	BSM	Checked By:	HEP

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0915229**	Page	: 1 of 20
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRETT McLENNAN	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: bmclennan@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 25-SEP-2009
Sampler	: Lyndon Gordon	Issue Date	: 01-OCT-2009
Site	: Laird Point Dredge Study		
		No. of samples received	: 44
Quote number	: BN/354/09 V2	No. of samples analysed	: 44

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **[EA029 SPOCAS] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA029 SPOCAS] Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **[EA033 Chromium Reducible Sulfur] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA033 Chromium Reducible Sulfur] Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 0.0-0.1 m	BH1-B 02 0.8-1.0 m	BH1-B 02 2.3-2.5 m	BH1-B 02 3.8-4.0 m	BH1-B 02 4.8-5.0 m
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					EB0915229-001	EB0915229-002	EB0915229-003	EB0915229-004	EB0915229-005
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		----	**9.3**	**9.5**	**9.6**	**8.8**
pH OX (23B)	----	0.1	pH Unit		----	**8.8**	**9.8**	**9.9**	**8.6**
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		----	<2	<2	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		----	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		----	<0.02	<0.02	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		----	<0.02	<0.02	<0.02	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		----	<0.02	<0.02	<0.02	<0.02
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		----	**0.05**	<0.02	<0.02	<0.02
Peroxide Sulfur (23De)	----	0.02	% S		----	**0.17**	**0.10**	**0.08**	**0.04**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		----	**0.12**	**0.10**	**0.08**	**0.04**
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		----	**77**	**63**	**52**	**24**
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		----	**0.15**	**0.13**	**0.14**	**0.20**
Peroxide Calcium (23Wh)	----	0.02	% Ca		----	**3.71**	**4.93**	**5.56**	**0.62**
Acid Reacted Calcium (23X)	----	0.02	% Ca		----	**3.55**	**4.80**	**5.42**	**0.42**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		----	**1770**	**2390**	**2700**	**209**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		----	**2.84**	**3.84**	**4.34**	**0.34**
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		----	**0.04**	<0.02	<0.02	**0.10**
Peroxide Magnesium (23Tm)	----	0.02	% Mg		----	**0.14**	**0.13**	**0.13**	**0.14**
Acid Reacted Magnesium (23U)	----	0.02	% Mg		----	**0.10**	**0.13**	**0.13**	**0.04**
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		----	**82**	**105**	**108**	**36**
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		----	**0.13**	**0.17**	**0.17**	**0.06**
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		----	**8.76**	**12.1**	**13.3**	**1.13**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		----	**1750**	**2420**	**2660**	**225**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		----	**2.80**	**3.88**	**4.26**	**0.36**
EA029-H: Acid Base Accounting									

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 02 0.0-0.1 m	BH1-B 02 0.8-1.0 m	BH1-B 02 2.3-2.5 m	BH1-B 02 3.8-4.0 m	BH1-B 02 4.8-5.0 m
			Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				EB0915229-001	EB0915229-002	EB0915229-003	EB0915229-004	EB0915229-005
EA029-H: Acid Base Accounting - Continued								
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
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.4	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	9.03	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1800	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.89	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 05 0.0-0.1 m	BH1-B 05 0.8-1.0 m	BH1-B 05 1.8-2.0 m	BH1-B 05 2.3-2.5 m	BH1-B 06 0.0-0.1 m
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					EB0915229-006	EB0915229-007	EB0915229-008	EB0915229-009	EB0915229-010
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		----	8.5	8.8	8.3	9.0
pH OX (23B)	----	0.1	pH Unit		----	3.3	8.1	7.4	8.3
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		----	133	<2	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		----	133	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		----	<0.02	<0.02	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		----	0.21	<0.02	<0.02	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		----	0.21	<0.02	<0.02	<0.02
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		----	0.09	0.07	<0.02	0.06
Peroxide Sulfur (23De)	----	0.02	% S		----	0.88	0.52	0.05	0.39
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		----	0.78	0.46	0.05	0.32
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		----	488	284	30	203
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		----	0.24	0.24	0.06	0.20
Peroxide Calcium (23Wh)	----	0.02	% Ca		----	0.58	1.46	0.09	3.34
Acid Reacted Calcium (23X)	----	0.02	% Ca		----	0.34	1.22	0.03	3.14
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		----	167	609	16	1560
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		----	0.27	0.98	0.03	2.51
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		----	0.16	0.09	0.08	0.10
Peroxide Magnesium (23Tm)	----	0.02	% Mg		----	0.29	0.17	0.13	0.21
Acid Reacted Magnesium (23U)	----	0.02	% Mg		----	0.13	0.07	0.05	0.11
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		----	109	60	42	90
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		----	0.18	0.10	0.07	0.14
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		----	----	2.05	0.18	7.32
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		----	----	409	36	1460
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		----	----	0.66	0.06	2.34
EA029-H: Acid Base Accounting									

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 05 0.0-0.1 m	BH1-B 05 0.8-1.0 m	BH1-B 05 1.8-2.0 m	BH1-B 05 2.3-2.5 m	BH1-B 06 0.0-0.1 m
			Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				EB0915229-006	EB0915229-007	EB0915229-008	EB0915229-009	EB0915229-010
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	**0.40**	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	**251**	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	----	**19**	<1	<1	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.0**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.17**	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**106**	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**18.0**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**3600**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**5.77**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 06 0.2-0.4 m	BH1-B 01 0.0-0.1 m	BH1-B 01 0.3-0.5 m	BH1-B 01 0.8-1.0 m	BH1-B 01 1.4-1.6 m
			Client sampling date / time	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-011	EB0915229-012	EB0915229-013	EB0915229-014	EB0915229-015
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	----	**8.1**	**6.5**	**6.5**
pH OX (23B)	----	0.1	pH Unit	**8.1**	----	**7.7**	**7.2**	**7.0**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	<2	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	**0.07**	----	**0.02**	<0.02	<0.02
Peroxide Sulfur (23De)	----	0.02	% S	**0.54**	----	**0.06**	**0.03**	<0.02
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	**0.47**	----	**0.04**	**0.03**	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	**294**	----	**22**	**18**	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.22**	----	**0.14**	**0.06**	**0.04**
Peroxide Calcium (23Wh)	----	0.02	% Ca	**3.50**	----	**0.20**	**0.09**	**0.06**
Acid Reacted Calcium (23X)	----	0.02	% Ca	**3.27**	----	**0.06**	**0.03**	**0.02**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	**1630**	----	**33**	**14**	**10**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	**2.62**	----	**0.05**	**0.02**	<0.02
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	**0.10**	----	**0.12**	**0.09**	**0.07**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	**0.21**	----	**0.19**	**0.12**	**0.10**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	**0.11**	----	**0.06**	**0.03**	**0.02**
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	**94**	----	**53**	**25**	**18**
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	**0.15**	----	**0.08**	**0.04**	**0.03**
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	**7.13**	----	**0.15**	**0.15**	<0.02
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**1420**	----	**29**	**30**	<10
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	**2.28**	----	**0.05**	**0.05**	<0.02
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 06 0.2-0.4 m	BH1-B 01 0.0-0.1 m	BH1-B 01 0.3-0.5 m	BH1-B 01 0.8-1.0 m	BH1-B 01 1.4-1.6 m
			Client sampling date / time	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-011	EB0915229-012	EB0915229-013	EB0915229-014	EB0915229-015
EA029-H: Acid Base Accounting - Continued								
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
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	8.8	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	----	0.11	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	67	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	2.53	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	506	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.81	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 0.0-0.1 m	BH1-B 03 0.8-1.0 m	BH1-B 03 1.8-2.0 m	BH1-B 03 2.3-2.5 m	BH1-B 04 0.0-0.1 m
Client sampling date / time				22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-016	EB0915229-017	EB0915229-018	EB0915229-019	EB0915229-020
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	**8.5**	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	**8.1**	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	<0.02	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	<0.02	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	<0.02	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	<0.02	----
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	**0.09**	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	**0.09**	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	**58**	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	**0.27**	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	**0.38**	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	**0.11**	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	**54**	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	**0.09**	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	**0.11**	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	**0.17**	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	**0.05**	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	**44**	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	**0.07**	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	----	----	**0.53**	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	**106**	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	----	----	**0.17**	----
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 0.0-0.1 m	BH1-B 03 0.8-1.0 m	BH1-B 03 1.8-2.0 m	BH1-B 03 2.3-2.5 m	BH1-B 04 0.0-0.1 m
			Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-016	EB0915229-017	EB0915229-018	EB0915229-019	EB0915229-020
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	<1	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.0	9.0	8.7	----	8.9
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<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	0.07	0.28	0.52	----	0.11
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	41	175	324	----	71
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	10.0	11.7	11.7	----	11.2
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2000	2340	2340	----	2240
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.20	3.76	3.76	----	3.59
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

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 0.3-0.5 m	BH1-B 04 0.8-1.0 m	BH1-B 04 1.8-2.0 m	BH1-B 18 0.0-0.1 m	BH1-B 18 0.25-0.5 m
			Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-021	EB0915229-022	EB0915229-023	EB0915229-024	EB0915229-025
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	7.7	6.8	6.0	8.5	8.5
pH OX (23B)	----	0.1	pH Unit	7.2	7.2	7.3	6.5	3.3
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	6	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	<2	4	158
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	<2	4	158
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	0.25
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	0.25
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	<0.02	<0.02	0.10	0.08
Peroxide Sulfur (23De)	----	0.02	% S	0.08	0.02	<0.02	0.75	0.80
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.08	0.02	<0.02	0.66	0.72
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	53	16	<10	411	452
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.09	0.11	0.08	0.25	0.23
Peroxide Calcium (23Wh)	----	0.02	% Ca	0.12	0.14	0.11	0.88	0.44
Acid Reacted Calcium (23X)	----	0.02	% Ca	0.03	0.03	0.03	0.64	0.21
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	17	14	16	318	106
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	0.03	0.02	0.02	0.51	0.17
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.15	0.15	0.13	0.18	0.18
Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.19	0.17	0.16	0.30	0.29
Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.04	0.02	0.03	0.12	0.10
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	36	21	22	98	86
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.06	0.03	0.04	0.16	0.14
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.21	0.18	0.09	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	42	36	18	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.07	0.06	0.03	----	----
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 0.3-0.5 m	BH1-B 04 0.8-1.0 m	BH1-B 04 1.8-2.0 m	BH1-B 18 0.0-0.1 m	BH1-B 18 0.25-0.5 m
			Client sampling date / time:	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				EB0915229-021	EB0915229-022	EB0915229-023	EB0915229-024	EB0915229-025
EA029-H: Acid Base Accounting - Continued								
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	**0.22**	**0.41**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	**140**	**256**
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	**10**	**19**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 18 0.75-1.0 m	BH1-B 18 1.25-1.5 m	BH1-B 18 1.65-1.9 m	BH1-B 19 0.0-0.1 m	BH1-B 19 0.25-0.5 m
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
					EB0915229-026	EB0915229-027	EB0915229-028	EB0915229-029	EB0915229-030
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		**8.3**	**8.5**	**8.5**	----	----
pH OX (23B)	----	0.1	pH Unit		**3.5**	**6.9**	**7.3**	----	----
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		**130**	<2	<2	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		**130**	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		**0.21**	<0.02	<0.02	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		**0.21**	<0.02	<0.02	----	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		**0.07**	**0.06**	**0.09**	----	----
Peroxide Sulfur (23De)	----	0.02	% S		**0.70**	**0.58**	**0.64**	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		**0.63**	**0.52**	**0.55**	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		**394**	**326**	**344**	----	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		**0.20**	**0.25**	**0.28**	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca		**0.34**	**0.70**	**0.83**	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca		**0.14**	**0.45**	**0.55**	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		**68**	**223**	**273**	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		**0.11**	**0.36**	**0.44**	----	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		**0.20**	**0.18**	**0.22**	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg		**0.32**	**0.32**	**0.34**	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg		**0.12**	**0.14**	**0.12**	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		**98**	**112**	**100**	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		**0.16**	**0.18**	**0.16**	----	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		----	**0.43**	**0.62**	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		----	**86**	**123**	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		----	**0.14**	**0.20**	----	----
EA029-H: Acid Base Accounting									

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 18 0.75-1.0 m	BH1-B 18 1.25-1.5 m	BH1-B 18 1.65-1.9 m	BH1-B 19 0.0-0.1 m	BH1-B 19 0.25-0.5 m
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
					EB0915229-026	EB0915229-027	EB0915229-028	EB0915229-029	EB0915229-030
EA029-H: Acid Base Accounting - Continued									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S		0.35	0.08	0.05	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		218	51	32	----	----
Liming Rate	----	1	kg CaCO3/t		16	4	2	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		----	----	----	8.8	8.7
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		----	----	----	0.45	0.57
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		----	----	----	278	354
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		----	----	----	9.38	5.75
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		----	----	----	1870	1150
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		----	----	----	3.00	1.84
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

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 19 0.75-1.0 m	BH1-B 19 1.25-1.5 m	BH1-B 19 1.85-2.1 m	BH1-B 17 0.0-0.1 m	BH1-B 17 0.25-0.5 m
			Client sampling date / time	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
				EB0915229-031	EB0915229-032	EB0915229-033	EB0915229-034	EB0915229-035
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	**7.4**	**6.7**	----	----
pH OX (23B)	----	0.1	pH Unit	----	**7.4**	**7.2**	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	<2	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	**0.03**	<0.02	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	**0.05**	**0.02**	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	<0.02	**0.02**	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	<10	**16**	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	**0.13**	**0.09**	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	**0.13**	**0.08**	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	<0.02	<0.02	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	<10	<10	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	<0.02	<0.02	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	**0.21**	**0.13**	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	**0.22**	**0.13**	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	<0.02	<0.02	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	<10	<10	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	<0.02	<0.02	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	**0.19**	**0.09**	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	**37**	**17**	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	**0.06**	**0.03**	----	----
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 19 0.75-1.0 m	BH1-B 19 1.25-1.5 m	BH1-B 19 1.85-2.1 m	BH1-B 17 0.0-0.1 m	BH1-B 17 0.25-0.5 m
			Client sampling date / time	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
				EB0915229-031	EB0915229-032	EB0915229-033	EB0915229-034	EB0915229-035
EA029-H: Acid Base Accounting - Continued								
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	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.6	----	----	9.1	7.0
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	<2	<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	0.63	----	----	0.04	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	391	----	----	28	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.76	----	----	17.6	0.92
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	552	----	----	3510	184
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.88	----	----	5.62	0.29
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	23	----	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	2	----	----	<1	<1

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 17 0.85-1.1 m	BH1-B 12 0.0-0.1 m	BH1-B 12 0.25-0.5 m	BH1-B 12 0.75-1.0 m	BH1-B 12 1.25-1.5 m
Client sampling date / time				23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
				EB0915229-036	EB0915229-037	EB0915229-038	EB0915229-039	EB0915229-040
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	**6.5**
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	**6.6**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	----	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	**0.02**
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	----	**0.04**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	----	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	**11**
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	----	**0.24**
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	----	**0.23**
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	----	<0.02
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	<10
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	----	<0.02
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	----	**0.16**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	----	**0.16**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	----	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	----	<0.02
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	----	----	----	**0.11**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	----	**22**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	----	----	----	**0.03**
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 17 0.85-1.1 m	BH1-B 12 0.0-0.1 m	BH1-B 12 0.25-0.5 m	BH1-B 12 0.75-1.0 m	BH1-B 12 1.25-1.5 m
			Client sampling date / time	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00
				EB0915229-036	EB0915229-037	EB0915229-038	EB0915229-039	EB0915229-040
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	----	----	----	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.6**	**8.2**	**8.1**	**8.3**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<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	**0.20**	**0.80**	**0.80**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**124**	**499**	**497**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**3.68**	**3.74**	**2.18**	**11.3**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**736**	**747**	**437**	**2260**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.18**	**1.20**	**0.70**	**3.63**	----
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	**0.33**	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**208**	<10	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	**16**	<1	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 12 1.75-2.0 m	BH1-B 13 0.0-0.1 m	BH1-B 13 0.25-0.5 m	BH1-B 13 0.65-0.8 m	----
				Client sampling date / time	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	----
					EB0915229-041	EB0915229-042	EB0915229-043	EB0915229-044	----
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		**6.8**	----	**6.7**	**7.9**	----
pH OX (23B)	----	0.1	pH Unit		**8.6**	----	**8.4**	**8.2**	----
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	----	<2	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		<2	----	<2	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		<2	----	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	----	<0.02	<0.02	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		<0.02	----	<0.02	<0.02	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		<0.02	----	<0.02	<0.02	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		<0.02	----	**0.03**	**0.03**	----
Peroxide Sulfur (23De)	----	0.02	% S		**0.02**	----	**0.02**	**0.04**	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		**0.02**	----	<0.02	<0.02	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		**14**	----	<10	<10	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		**0.25**	----	**0.11**	**0.18**	----
Peroxide Calcium (23Wh)	----	0.02	% Ca		**0.24**	----	**0.12**	**0.23**	----
Acid Reacted Calcium (23X)	----	0.02	% Ca		<0.02	----	<0.02	**0.05**	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		<10	----	<10	**26**	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		<0.02	----	<0.02	**0.04**	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		**0.13**	----	**0.15**	**0.15**	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg		**0.12**	----	**0.15**	**0.18**	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg		<0.02	----	<0.02	**0.02**	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		<10	----	<10	**21**	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		<0.02	----	<0.02	**0.03**	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		**0.50**	----	**0.41**	**0.42**	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		**101**	----	**82**	**83**	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		**0.16**	----	**0.13**	**0.13**	----
EA029-H: Acid Base Accounting									

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 12 1.75-2.0 m	BH1-B 13 0.0-0.1 m	BH1-B 13 0.25-0.5 m	BH1-B 13 0.65-0.8 m	----
				Client sampling date / time: 23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	23-SEP-2009 15:00	----
				EB0915229-041	EB0915229-042	EB0915229-043	EB0915229-044	----
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	<1	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**8.4**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	----	**0.20**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	**124**	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**5.75**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**1150**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**1.84**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	<1	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB0915229**	Page	: 1 of 9
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRETT McLENNAN	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: bmclennan@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Laird Point Dredge Study		
C-O-C number	: ----	Date Samples Received	: 25-SEP-2009
Sampler	: Lyndon Gordon	Issue Date	: 01-OCT-2009
Order number	: ----		
		No. of samples received	: 44
Quote number	: BN/354/09 V2	No. of samples analysed	: 44

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-A: pH Measurements (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	8.8	8.8	0.0	0% - 20%
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: pH KCl (23A)	----	0.1	pH Unit	6.5	6.8	4.5	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.2	7.2	0.0	0% - 20%
EA029-A: pH Measurements (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: pH KCl (23A)	----	0.1	pH Unit	8.5	8.5	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.3	7.4	1.4	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-B: Acidity Trail (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.05	0.04	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-C: Sulfur Trail (QC Lot: 1115772) - continued									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.17	0.19	6.6	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.12	0.14	13.4	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	77	88	13.4	No Limit
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.03	0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.03	0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	18	16	14.4	No Limit
EA029-C: Sulfur Trail (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.09	0.08	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.64	0.66	2.5	0% - 20%
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.55	0.58	4.5	0% - 20%
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	344	359	4.5	0% - 20%
EA029-D: Calcium Values (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.15	0.15	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	3.71	3.79	2.3	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	3.55	3.64	2.5	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	2.84	2.91	2.5	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	1770	1820	2.5	0% - 20%
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.06	0.06	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.09	0.08	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.03	0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	14	10	31.6	No Limit
EA029-D: Calcium Values (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.28	0.26	6.9	0% - 50%
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.83	0.84	1.9	0% - 20%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.55	0.58	6.2	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	0.44	0.46	6.2	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	273	290	6.2	0% - 20%
EA029-E: Magnesium Values (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.04	0.04	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.14	0.16	11.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.10	0.12	17.2	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.13	0.16	17.2	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-E: Magnesium Values (QC Lot: 1115772) - continued									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	82	98	17.2	No Limit
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.09	0.08	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.12	0.11	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.03	0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.04	0.03	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	25	20	19.9	No Limit
EA029-E: Magnesium Values (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.22	0.20	6.5	0% - 50%
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.34	0.35	0.0	0% - 50%
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.12	0.14	16.1	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.16	0.19	16.1	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	100	117	16.1	0% - 50%
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1115772)									
EB0915229-002	BH1-B 02 0.8-1.0 m	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	8.76	8.70	0.7	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	2.80	2.78	0.7	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	1750	1740	0.7	0% - 20%
EB0915229-014	BH1-B 01 0.8-1.0 m	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.15	0.16	0.0	No Limit
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.05	0.05	0.0	No Limit
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	30	32	6.0	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1115773)									
EB0915229-028	BH1-B 18 1.65-1.9 m	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.62	0.62	0.0	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.20	0.20	0.0	0% - 50%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	123	124	0.0	0% - 50%
EA033-A: Actual Acidity (QC Lot: 1115763)									
EB0915229-001	BH1-B 02 0.0-0.1 m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.4	9.5	1.0	0% - 20%
EB0915229-034	BH1-B 17 0.0-0.1 m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1115763) - continued									
EB0915229-034	BH1-B 17 0.0-0.1 m	EA033: pH KCl (23A)	----	0.1	pH Unit	9.1	9.0	1.1	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1115763)									
EB0915229-001	BH1-B 02 0.0-0.1 m	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB0915229-034	BH1-B 17 0.0-0.1 m	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.04	0.05	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	28	30	8.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1115763)									
EB0915229-001	BH1-B 02 0.0-0.1 m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	9.03	9.09	0.6	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.89	2.91	0.6	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1800	1820	0.6	0% - 20%
EB0915229-034	BH1-B 17 0.0-0.1 m	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	17.6	17.6	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.62	5.62	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3510	3510	0.0	0% - 20%

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-B: Acidity Trail (QCLot: 1115772)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-B: Acidity Trail (QCLot: 1115773)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1115772)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1115773)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1115772)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-D: Calcium Values (QCLot: 1115773)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA029-D: Calcium Values (QCLot: 1115773) - continued								
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1115772)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1115773)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1115772)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.02	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1115773)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.02	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1115763)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1115763)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1115763)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0915229**

Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: EB2009GOLASS0340 (BN/354/09 V2)
Site	: Laird Point Dredge Study		
Sampler	: Lyndon Gordon	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 25-SEP-2009	Issue Date	: 25-SEP-2009 16:04
Client Requested Due Date	: 02-OCT-2009	Scheduled Reporting Date	: **02-OCT-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 1.6°C - Ice present
No. of coolers/boxes	: 1 Large	No. of samples received	: 44
Sercurity Seal	: Intact.	No. of samples analysed	: 44

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA029 SPOCAS	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB0915229-001	21-SEP-2009 15:00	BH1-B 02 0.0-0.1 m		✓
EB0915229-002	21-SEP-2009 15:00	BH1-B 02 0.8-1.0 m	✓	
EB0915229-003	21-SEP-2009 15:00	BH1-B 02 2.3-2.5 m	✓	
EB0915229-004	21-SEP-2009 15:00	BH1-B 02 3.8-4.0 m	✓	
EB0915229-005	21-SEP-2009 15:00	BH1-B 02 4.8-5.0 m	✓	
EB0915229-006	21-SEP-2009 15:00	BH1-B 05 0.0-0.1 m		✓
EB0915229-007	21-SEP-2009 15:00	BH1-B 05 0.8-1.0 m	✓	
EB0915229-008	21-SEP-2009 15:00	BH1-B 05 1.8-2.0 m	✓	
EB0915229-009	21-SEP-2009 15:00	BH1-B 05 2.3-2.5 m	✓	
EB0915229-010	21-SEP-2009 15:00	BH1-B 06 0.0-0.1 m	✓	
EB0915229-011	21-SEP-2009 15:00	BH1-B 06 0.2-0.4 m	✓	
EB0915229-012	22-SEP-2009 15:00	BH1-B 01 0.0-0.1 m		✓
EB0915229-013	22-SEP-2009 15:00	BH1-B 01 0.3-0.5 m	✓	
EB0915229-014	22-SEP-2009 15:00	BH1-B 01 0.8-1.0 m	✓	
EB0915229-015	22-SEP-2009 15:00	BH1-B 01 1.4-1.6 m	✓	
EB0915229-016	22-SEP-2009 15:00	BH1-B 03 0.0-0.1 m		✓
EB0915229-017	22-SEP-2009 15:00	BH1-B 03 0.8-1.0 m		✓
EB0915229-018	22-SEP-2009 15:00	BH1-B 03 1.8-2.0 m		✓
EB0915229-019	22-SEP-2009 15:00	BH1-B 03 2.3-2.5 m	✓	
EB0915229-020	22-SEP-2009 15:00	BH1-B 04 0.0-0.1 m		✓
EB0915229-021	22-SEP-2009 15:00	BH1-B 04 0.3-0.5 m	✓	
EB0915229-022	22-SEP-2009 15:00	BH1-B 04 0.8-1.0 m	✓	
EB0915229-023	22-SEP-2009 15:00	BH1-B 04 1.8-2.0 m	✓	
EB0915229-024	22-SEP-2009 15:00	BH1-B 18 0.0-0.1 m	✓	
EB0915229-025	22-SEP-2009 15:00	BH1-B 18 0.25-0.5 m	✓	
EB0915229-026	22-SEP-2009 15:00	BH1-B 18 0.75-1.0 m	✓	
EB0915229-027	22-SEP-2009 15:00	BH1-B 18 1.25-1.5 m	✓	
EB0915229-028	22-SEP-2009 15:00	BH1-B 18 1.65-1.9 m	✓	
EB0915229-029	23-SEP-2009 15:00	BH1-B 19 0.0-0.1 m		✓
EB0915229-030	23-SEP-2009 15:00	BH1-B 19 0.25-0.5 m		✓
EB0915229-031	23-SEP-2009 15:00	BH1-B 19 0.75-1.0 m		✓
EB0915229-032	23-SEP-2009 15:00	BH1-B 19 1.25-1.5 m	✓	
EB0915229-033	23-SEP-2009 15:00	BH1-B 19 1.85-2.1 m	✓	
EB0915229-034	23-SEP-2009 15:00	BH1-B 17 0.0-0.1 m		✓
EB0915229-035	23-SEP-2009 15:00	BH1-B 17 0.25-0.5 m		✓

			SOIL - EA029 SPOCAS	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB0915229-036	23-SEP-2009 15:00	BH1-B 17 0.85-1.1 m		✓
EB0915229-037	23-SEP-2009 15:00	BH1-B 12 0.0-0.1 m		✓
EB0915229-038	23-SEP-2009 15:00	BH1-B 12 0.25-0.5 m		✓
EB0915229-039	23-SEP-2009 15:00	BH1-B 12 0.75-1.0 m		✓
EB0915229-040	23-SEP-2009 15:00	BH1-B 12 1.25-1.5 m	✓	
EB0915229-041	23-SEP-2009 15:00	BH1-B 12 1.75-2.0 m	✓	
EB0915229-042	23-SEP-2009 15:00	BH1-B 13 0.0-0.1 m		✓
EB0915229-043	23-SEP-2009 15:00	BH1-B 13 0.25-0.5 m	✓	
EB0915229-044	23-SEP-2009 15:00	BH1-B 13 0.65-0.8 m	✓	

Requested Deliverables

MR BRETT McLENNAN

- *AU Certificate of Analysis - NATA (COA)	Email	bmclennan@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bmclennan@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bmclennan@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	bmclennan@golder.com.au
- Default - Chain of Custody (COC)	Email	bmclennan@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	bmclennan@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	bmclennan@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	bmclennan@golder.com.au
- EDI Format - XTab (XTAB)	Email	bmclennan@golder.com.au

MR MARTIN CROSSLEY

- *AU Certificate of Analysis - NATA (COA)	Email	mcrossley@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mcrossley@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mcrossley@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	mcrossley@golder.com.au
- Default - Chain of Custody (COC)	Email	mcrossley@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	mcrossley@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	mcrossley@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	mcrossley@golder.com.au
- EDI Format - XTab (XTAB)	Email	mcrossley@golder.com.au

THE ACCOUNTS PAYABLE (BRISANE)

- A4 - AU Tax Invoice (INV)	Email	apbrisbane@golder.com.au

SAMPLE CHAIN OF CUSTODY DOCUMENTATION - SOIL

Project ID:	097633052	**Quote/Order No.:**	BN/354/09
Site Location:	Option 1-B - Laird Point Dredge Study	**Lab Name:**	ALS
Sampled By:	Lyndon Gordon		
Turnaround (Days):	Per quotation BN/354/09	**BY:**	

Report Format: HARD ☐ FAX ☐ DISK ☐ EMAIL ☐ BULLETIN BOARD ☐

Email Format: PDF ☑ Excel ☑ Other ☐ Email Address:

GOLDER ASSOCIATES PTY LTD
611 Coronation Drive, Toowong, Qld 4066
Phone: (07) 3721 5400
Fax: (07) 3721 5401
Invoice to be sent to Accounts Brisbane: apbrisbane@golder.com.au
Project Manager: Martin Crossley: mcrossley@golder.com.au
Contact Phone: 07 3721 5400 **Email:** hparsons@golder.com.au

Comments/Special Instructions: Excel required format ESDAT
Copy results to: Henry Parsons hparsons@golder.com.au; bmclennan@golder.com.au

Samples from a declared Fire Ant Area: N
Samples taken from a known Weed and or Pest Area: N

ANALYSIS REQUIRED

	SAMPLE ID	Location & Depth	SAMPLE MATRIX	SAMPLE DATE	SAMPLE TIME	CONTAINER/ PRESERVATIVE		No CONTAINERS	POSSIBLE HIGH CONCENTRATION	EA029 - SPOCAS suite	EA-033 Chromium Suite
1	BH1-B 02	0.0-0.1	sediment	21/09/2009		bag	frozen	1			X
2	BH1-B 02	0.8-1.0	sediment	21/09/2009		bag	frozen	1		X	
3	BH1-B 02	2.3-2.5	sediment	21/09/2009		bag	frozen	1		X	
4	BH1-B 02	3.8-4.0	sediment	21/09/2009		bag	frozen	1		X	
5	BH1-B 02	4.8-5.0	sediment	21/09/2009		bag	frozen	1		X	
6	BH1-B 05	0.0-0.1	sediment	21/09/2009		bag	frozen	1	√		X
7	BH1-B 05	0.8-1.0	sediment	21/09/2009		bag	frozen	1	√	X	
8	BH1-B 05	1.8-2.0	sediment	21/09/2009		bag	frozen	1	√	X	
9	BH1-B 05	2.3-2.5	sediment	21/09/2009		bag	frozen	1		X	
10	BH1-B 06	0.0-0.1	sediment	21/09/2009		bag	frozen	1	√	X	
11	BH1-B 06	0.2-0.4	sediment	21/09/2009		bag	frozen	1		X	
12	BH1-B 01	0.0-0.1	sediment	22/09/2009		bag	frozen	1			X
13	BH1-B 01	0.3-0.5	sediment	22/09/2009		bag	frozen	1		X	
14	BH1-B 01	0.8-1.0	sediment	22/09/2009		bag	frozen	1		X	
15	BH1-B 01	1.4-1.6	sediment	22/09/2009		bag	frozen	1		X	
16	BH1-B 03	0.0-0.1	sediment	22/09/2009		bag	frozen	1			X
17	BH1-B 03	0.8-1.0	sediment	22/09/2009		bag	frozen	1			X
18	BH1-B 03	1.8-2.0	sediment	22/09/2009		bag	frozen	1	√		X
19	BH1-B 03	2.3-2.5	sediment	22/09/2009		bag	frozen	1		X	
20	BH1-B 04	0.0-0.1	sediment	22/09/2009		bag	frozen	1			X
21	BH1-B 04	0.3-0.5	sediment	22/09/2009		bag	frozen	1		X	
22	BH1-B 04	0.8-1.0	sediment	22/09/2009		bag	frozen	1		X	
23	BH1-B 04	1.8-2.0	sediment	22/09/2009		bag	frozen	1		X	

Environmental Division
Brisbane
Work Order
EB0915229

Telephone : +61-7-3243 7222

SAMPLE MATRIX = Soil/Sediment/Fill/Other **SAMPLE TYPE** = Core(CR) **HIGH CONCENTRATION:** Tick box and circle expected parameters in analysis list

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; VC = Hydrochloric Preserved Vial; VS = Sulphuric Acid

	SIGNATURE	COMPANY	DATE	TIME
RELEASED BY	[signature]	GeoCoastal	24/09/09	13:52
RECEIVED BY	Jonathon Angell	ALS.	24/9/09.	13:52.
RELEASED BY				
RECEIVED BY	[signature]	ALS	25.09.09	8:35
RELEASED BY				
RECEIVED BY				

	SIGNATURE	COMPANY	DATE	TIME	Shipment Method
RELEASED BY	Jonathon Angell	ALS.	24/09/09	14:30.	Shipping Ref:
RECEIVED BY					

To Be Filled Out By Analysing Laboratory **LAB. BATCH NUMBER**

Security Seal		Chilled		Bill to:	
Suitable Containers		Frozen		Address	
Cool Box		Ambient			

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

SAMPLE CHAIN OF CUSTODY DOCUMENTATION - SOIL

Project ID:	097633052	Quote/Order No.:	BN/354/09
Site/Location:	Option 1-B - Laird Point Dredge Study	Lab Name:	ALS
Sampled By:	Lyndon Gordon		
Turnaround (Days)	Per quotation BN/354/09	BY:	
Report Format:	HARD ☐ FAX ☐ DISK ☐ EMAIL ☐ BULLETIN BOARD ☐		
Email Format:	PDF ☑ Excel ☑ Other ☐ Email Address:		

GOLDER ASSOCIATES PTY LTD
611 Coronation Drive, Toowong, Qld 4066
Phone: (07) 3721 5400
Fax: (07) 3721 5401
Invoice to be sent to Accounts Brisbane: apbrisbane@golder.com.au
Project Manager: Martin Crossley: mcrossley@golder.com.au
Contact Phone: 07 3721 5400
Email: hparsons@golder.com.au

Golder Associates

Comments/Special Instructions: Excel required format ESDAT
Copy results to: Henry Parsons hparsons@golder.com.au bmclennan@golder.com.au

Samples from a declared Fire Ant Area: N
Samples taken from a known Weed and or Pest Area: N

	SAMPLE ID	Location & Depth	SAMPLE MATRIX	SAMPLE DATE	SAMPLE TIME	CONTAINER/ PRESERVATIVE		No CONTAINERS	POSSIBLE HIGH CONCENTRATION	ANALYSIS REQUIRED: EA029 - SPOCAS suite	ANALYSIS REQUIRED: EA-033 Chromium Suite
24	BH1-B 18	0.0-0.1m	sediment	22/09/2009		bag	frozen	1	√	X	
25	BH1-B 18	0.25-0.5m	sediment	22/09/2009		bag	frozen	1	√	X	
26	BH1-B 18	0.75-1.0m	sediment	22/09/2009		bag	frozen	1	√	X	
27	BH1-B 18	1.25-1.5m	sediment	22/09/2009		bag	frozen	1		X	
28	BH1-B 18	1.65-1.9m	sediment	22/09/2009		bag	frozen	1		X	
29	BH1-B 19	0.0-0.1m	sediment	23/09/2009		bag	frozen	1			X
30	BH1-B 19	0.25-0.5m	sediment	23/09/2009		bag	frozen	1			X
31	BH1-B 19	0.75-1.0m	sediment	23/09/2009		bag	frozen	1	√		X
32	BH1-B 19	1.25-1.5m	sediment	23/09/2009		bag	frozen	1		X	
33	BH1-B 19	1.85-2.1	sediment	23/09/2009		bag	frozen	1		X	
34	BH1-B 17	0.0-0.1m	sediment	23/09/2009		bag	frozen	1			X
35	BH1-B 17	0.25-0.5m	sediment	23/09/2009		bag	frozen	1			X
36	BH1-B 17	0.85-1.1m	sediment	23/09/2009		bag	frozen	1			X
37	BH1-B 12	0.0-0.1m	sediment	23/09/2009		bag	frozen	1			X
38	BH1-B 12	0.25-0.5m	sediment	23/09/2009		bag	frozen	1			X
39	BH1-B 12	0.75-1.0m	sediment	23/09/2009		bag	frozen	1			X
40	BH1-B 12	1.25-1.5m	sediment	23/09/2009		bag	frozen	1		X	
41	BH1-B 12	1.75-2.0m	sediment	23/09/2009		bag	frozen	1		X	
42	BH1-B 13	0.0-0.1m	sediment	23/09/2009		bag	frozen	1			X
43	BH1-B 13	0.25-0.5m	sediment	23/09/2009		bag	frozen	1		X	
44	BH1-B 13	0.65-0.8m	sediment	23/09/2009		bag	frozen	1		X	

SAMPLE MATRIX = Soil/Sediment/Fill/Other **SAMPLE TYPE** = Core(CR) **HIGH CONCENTRATION:** Tick box and circle expected parameters in analysis list

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; VC = Hydrochloric Preserved Vial; VS = Sulphuric Acid

	SIGNATURE	COMPANY	DATE	TIME
RELEASED BY		GeoCoastal		
RECEIVED BY				
RELEASED BY				
RECEIVED BY	Christian	ACS	25.09.09	8:35
RELEASED BY				
RECEIVED BY				

	SIGNATURE	COMPANY	DATE	TIME	Shipment Method
RELEASED BY					Shipping Ref:
RECEIVED BY					

To Be Filled Out By Analysing Laboratory **LAB. BATCH NUMBER**

Security Seal		Chilled		Bill to:	
Suitable Containers		Frozen		Address	
Cool Box		Ambient			

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

CERTIFICATE OF ANALYSIS

Work Order	: **EB0915382**	Page	: 1 of 8
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-SEP-2009
Sampler	: Lyndon Gordon	Issue Date	: 06-OCT-2009
Site	: Option 1-B-Laird Point Dredge		
		No. of samples received	: 14
Quote number	: BN/354/09 V2	No. of samples analysed	: 14

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **[EA029 SPOCAS] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA029 SPOCAS] Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **[EA033 Chromium Reducible Sulfur] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA033 Chromium Reducible Sulfur] Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 14 0.0-0.1	BH1-B 14 0.25-0.5	BH1-B 14 1.65-1.9	BH1-B 15 0.0-0.1	BH1-B 15 0.25-0.5
				Client sampling date / time: 25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00
				EB0915382-001	EB0915382-002	EB0915382-003	EB0915382-004	EB0915382-005
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	**8.3**	**6.7**	----	**6.3**
pH OX (23B)	----	0.1	pH Unit	----	**7.9**	**6.8**	----	**6.7**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	<2	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	**0.04**	**0.03**	----	**0.02**
Peroxide Sulfur (23De)	----	0.02	% S	----	**0.04**	**0.03**	----	<0.02
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	<10	<10	----	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	**0.17**	**0.10**	----	**0.07**
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	**0.25**	**0.11**	----	**0.07**
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	**0.08**	<0.02	----	<0.02
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	**42**	<10	----	<10
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	**0.07**	<0.02	----	<0.02
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	**0.13**	**0.15**	----	**0.14**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	**0.18**	**0.15**	----	**0.14**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	**0.05**	<0.02	----	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	**40**	<10	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	**0.06**	<0.02	----	<0.02
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	**0.62**	**0.12**	----	**0.38**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	**125**	**25**	----	**75**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	**0.20**	**0.04**	----	**0.12**
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	----	**1.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 14 0.0-0.1	BH1-B 14 0.25-0.5	BH1-B 14 1.65-1.9	BH1-B 15 0.0-0.1	BH1-B 15 0.25-0.5
				Client sampling date / time: 25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00	25-SEP-2009 15:00
				EB0915382-001	EB0915382-002	EB0915382-003	EB0915382-004	EB0915382-005
EA029-H: Acid Base Accounting - Continued								
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	----	----	**8.3**	----
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	**0.07**	----	----	**0.25**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**44**	----	----	**156**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**13.7**	----	----	**2.55**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2750**	----	----	**509**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**4.40**	----	----	**0.82**	----
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	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 15 1.0-1.2	BH1-B 16 0.0-0.1	BH1-B 16 0.25-0.5	BH1-B 11 0.0-0.1	BH1-B 11 0.75-1.0
				Client sampling date / time: 25-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00
				EB0915382-006	EB0915382-007	EB0915382-008	EB0915382-009	EB0915382-010
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	**8.8**	**8.9**
pH OX (23B)	----	0.1	pH Unit	----	----	----	**8.2**	**8.2**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	<0.02	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	<0.02	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	<0.02	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	**0.10**	**0.09**
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	**0.20**	**0.29**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	**0.10**	**0.20**
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	**62**	**125**
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	**0.23**	**0.22**
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	**1.28**	**1.06**
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	**1.05**	**0.85**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	**524**	**422**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	**0.84**	**0.68**
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	**0.15**	**0.10**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	**0.20**	**0.13**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	**0.05**	**0.03**
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	**44**	**24**
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	**0.07**	**0.04**
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	----	----	**2.19**	**1.19**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	**438**	**238**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	----	----	**0.70**	**0.38**
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	**1.5**	**1.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 15 1.0-1.2	BH1-B 16 0.0-0.1	BH1-B 16 0.25-0.5	BH1-B 11 0.0-0.1	BH1-B 11 0.75-1.0
				Client sampling date / time: 25-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00
				EB0915382-006	EB0915382-007	EB0915382-008	EB0915382-009	EB0915382-010
EA029-H: Acid Base Accounting - Continued								
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
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.9**	**8.2**	**7.2**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<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	**0.05**	**0.02**	**0.02**	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**32**	**14**	**16**	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.96**	**1.09**	**1.01**	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**191**	**217**	**201**	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.30**	**0.35**	**0.32**	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	----	----

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BH1-B 11 1.75-2.0	BH1-B 11 2.75-3.0	BH1-B 11 3.75-4.0	BH1-B 11 5.25-5.5	----
			Client sampling date / time	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	----
Compound	CAS Number	LOR	Unit	EB0915382-011	EB0915382-012	EB0915382-013	EB0915382-014	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	9.1	9.0	8.8	7.2	----
pH OX (23B)	----	0.1	pH Unit	8.5	8.4	7.8	7.0	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	<2	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.12	0.10	0.09	0.02	----
Peroxide Sulfur (23De)	----	0.02	% S	0.20	0.24	0.59	<0.02	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.09	0.14	0.49	<0.02	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	56	87	308	<10	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.20	0.22	0.24	0.08	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	2.01	2.50	1.78	0.10	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	1.81	2.28	1.54	<0.02	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	905	1140	768	<10	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	1.45	1.82	1.23	<0.02	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.07	0.08	0.14	0.12	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.06	0.10	0.20	0.13	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	0.02	0.07	<0.02	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	17	56	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	0.03	0.09	<0.02	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	3.88	5.00	2.19	1.38	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	775	1000	438	275	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	1.24	1.60	0.70	0.44	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	----

Analytical Results

Sub-Matrix: SOIL			Client sample ID	BH1-B 11 1.75-2.0	BH1-B 11 2.75-3.0	BH1-B 11 3.75-4.0	BH1-B 11 5.25-5.5	----
			Client sampling date / time	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	26-SEP-2009 15:00	----
Compound	CAS Number	LOR	Unit	EB0915382-011	EB0915382-012	EB0915382-013	EB0915382-014	----
EA029-H: Acid Base Accounting - Continued								
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	----

QUALITY CONTROL REPORT

Work Order	: **EB0915382**	Page	: 1 of 8
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Option 1-B-Laird Point Dredge		
C-O-C number	: ----	Date Samples Received	: 29-SEP-2009
Sampler	: Lyndon Gordon	Issue Date	: 06-OCT-2009
Order number	: ----		
		No. of samples received	: 14
Quote number	: BN/354/09 V2	No. of samples analysed	: 14

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-A: pH Measurements (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: pH KCl (23A)	----	0.1	pH Unit	8.3	8.4	1.2	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.9	8.0	1.2	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.04	0.03	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.17	0.17	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.25	0.23	11.3	0% - 50%
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.08	0.06	34.6	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	0.07	0.05	34.6	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	42	30	34.6	No Limit
EA029-E: Magnesium Values (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.13	0.13	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.18	0.16	12.4	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.05	0.03	43.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.06	0.04	43.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	40	26	43.0	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1118758)									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.62	0.62	0.0	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	0.20	0.20	0.0	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1118758) - continued									
EB0915382-002	BH1-B 14 0.25-0.5	EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	125	125	0.0	0% - 50%
EA033-A: Actual Acidity (QC Lot: 1118756)									
EB0915360-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.1	9.1	0.0	0% - 20%
EB0915360-011	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.8	1.1	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1118757)									
EB0915382-004	BH1-B 15 0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1118756)									
EB0915360-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.18	0.19	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	114	119	4.0	0% - 50%
EB0915360-011	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.48	0.47	0.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	298	292	1.9	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1118757)									
EB0915382-004	BH1-B 15 0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.25	0.26	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	156	161	2.9	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1118756)									
EB0915360-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	14.9	15.0	0.7	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	4.78	4.81	0.7	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2980	3000	0.7	0% - 20%
EB0915360-011	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	9.98	9.95	0.3	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.20	3.19	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1990	1990	0.3	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1118757)									
EB0915382-004	BH1-B 15 0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.55	2.49	2.1	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.82	0.80	2.1	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1118757) - continued									
EB0915382-004	BH1-B 15 0.0-0.1	EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	509	498	2.1	0% - 20%

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-B: Acidity Trail (QCLot: 1118758)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1118758)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1118758)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1118758)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1118758)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.02	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1118756)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1118757)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-B: Potential Acidity (QCLot: 1118756)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1118757)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1118756)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1118757)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0915382**

Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: EB2009GOLASS0340 (BN/354/09 V2)
Site	: Option 1-B-Laird Point Dredge		
Sampler	: Lyndon Gordon	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 29-SEP-2009	Issue Date	: 29-SEP-2009 16:04
Client Requested Due Date	: 06-OCT-2009	Scheduled Reporting Date	: **06-OCT-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: -1.9C - Ice present
No. of coolers/boxes	: 1 MEDIUM	No. of samples received	: 14
Sercurity Seal	: Intact.	No. of samples analysed	: 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA029 SPOCAS	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB0915382-001	25-SEP-2009 15:00	BH1-B 14 0.0-0.1		✓
EB0915382-002	25-SEP-2009 15:00	BH1-B 14 0.25-0.5	✓	
EB0915382-003	25-SEP-2009 15:00	BH1-B 14 1.65-1.9	✓	
EB0915382-004	25-SEP-2009 15:00	BH1-B 15 0.0-0.1		✓
EB0915382-005	25-SEP-2009 15:00	BH1-B 15 0.25-0.5	✓	
EB0915382-006	25-SEP-2009 15:00	BH1-B 15 1.0-1.2		✓
EB0915382-007	26-SEP-2009 15:00	BH1-B 16 0.0-0.1		✓
EB0915382-008	26-SEP-2009 15:00	BH1-B 16 0.25-0.5		✓
EB0915382-009	26-SEP-2009 15:00	BH1-B 11 0.0-0.1	✓	
EB0915382-010	26-SEP-2009 15:00	BH1-B 11 0.75-1.0	✓	
EB0915382-011	26-SEP-2009 15:00	BH1-B 11 1.75-2.0	✓	
EB0915382-012	26-SEP-2009 15:00	BH1-B 11 2.75-3.0	✓	
EB0915382-013	26-SEP-2009 15:00	BH1-B 11 3.75-4.0	✓	
EB0915382-014	26-SEP-2009 15:00	BH1-B 11 5.25-5.5	✓	

Requested Deliverables

MR MARTIN CROSSLEY

- *AU Certificate of Analysis - NATA (COA)	Email	mcrossley@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mcrossley@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mcrossley@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	mcrossley@golder.com.au
- Default - Chain of Custody (COC)	Email	mcrossley@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	mcrossley@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	mcrossley@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	mcrossley@golder.com.au

THE ACCOUNTS PAYABLE (BRISANE)

- A4 - AU Tax Invoice (INV)	Email	apbrisbane@golder.com.au

SAMPLE CHAIN OF CUSTODY DOCUMENTATION - SOIL

Project ID:	097633052	**Quote/Order No.:**	BN/354/09
Site Location:	Option 1-B - Laird Point Dredge Study	**Lab Name:**	ALS
Sampled By:	Lyndon Gordon		
Turnaround (Days):	Per quotation BN/354/09	**BY:**	
Report Format:	HARD ☐ FAX ☐ DISK ☐ EMAIL ☐ BULLETIN BOARD ☐		
Email Format:	PDF ☑ Excel ☑ Other ☐ Email Address:		

GOLDER ASSOCIATES PTY LTD Phone: (07) 3721 5400
611 Coronation Drive, Toowong, Qld 4066 Fax: (07) 3721 5401
Invoice to be sent to Accounts Brisbane: apbrisbane@golder.com.au
Project Manager: Martin Crossley: mcrossley@golder.com.au
Contact Phone: 07 3721 5400 **Email:** hparsons@golder.com.au

Comments/Special Instructions: Excel required format ESDAT
Copy results to: Henry Parsons hparsons@golder.com.au
bmclennan@golder.com.au

Samples from a declared Fire Ant Area: N
Samples taken from a known Weed and or Pest Area: N

ANALYSIS REQUIRED

	SAMPLE ID	Location & Depth	SAMPLE MATRIX	SAMPLE DATE	SAMPLE TIME	CONTAINER/ PRESERVATIVE		No CONTAINERS	POSSIBLE HIGH CONCENTRATION	EA029 - SPOCAS suite	EA-033 Chromium Suite
1	BH1-B 14	0.0-0.1	sediment	25/09/2009		bag	frozen	1			X
2	BH1-B 14	0.25-0.5	sediment	25/09/2009		bag	frozen	1		X	
3	BH1-B 14	1.65-1.9	sediment	25/09/2009		bag	frozen	1		X	
4	BH1-B 15	0.0-0.1	sediment	25/09/2009		bag	frozen	1			X
5	BH1-B 15	0.25-0.5	sediment	25/09/2009		bag	frozen	1		X	
6	BH1-B 15	1.0-1.2	sediment	25/09/2009		bag	frozen	1			X
7	BH1-B 16	0.0-0.1	sediment	26/09/2009		bag	frozen	1			X
8	BH1-B 16	0.25-0.5	sediment	26/09/2009		bag	frozen	1			X
9	BH1-B 11	0.0-0.1	sediment	26/09/2009		bag	frozen	1		X	
10	BH1-B 11	0.75-1.0	sediment	26/09/2009		bag	frozen	1		X	
11	BH1-B 11	1.75-2.0	sediment	26/09/2009		bag	frozen	1		X	
12	BH1-B 11	2.75-3.0	sediment	26/09/2009		bag	frozen	1		X	
13	BH1-B 11	3.75-4.0	sediment	26/09/2009		bag	frozen	1		X	
14	BH1-B 11	5.25-5.5	sediment	26/09/2009		bag	frozen	1		X	

Environmental Division
Brisbane
Work Order
EB0915382
Telephone : +61-7-3243 7222

SAMPLE MATRIX = Soil/Sediment/Fill/Other **SAMPLE TYPE** = Core(CR) **HIGH CONCENTRATION:** Tick box and circle expected parameters in analysis list

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; VC = Hydrochloric Preserved Vial; VS = Sulphuric Acid

	SIGNATURE	COMPANY	DATE	TIME
RELEASED BY	L.MANLEY	GeoCoastal	28/9/09	14:00
RECEIVED BY	Jonathon Angell	ALS.	28/9/09.	14:00
RELEASED BY	N-KIN	ALS	29/9/09	0815
RECEIVED BY				
RELEASED BY				
RECEIVED BY				

	SIGNATURE	COMPANY	DATE	TIME	Shipment Method
RELEASED BY	Jonathon Angell	ALS	28/9/09	14:30	Shipping Ref:
RECEIVED BY					

To Be Filled Out By Analysing Laboratory **LAB. BATCH NUMBER**

Security Seal		Chilled		Bill to:	
Suitable Containers		Frozen		Address	
Cool Box		Ambient			

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

CERTIFICATE OF ANALYSIS

Work Order	: **EB0915516**	Page	: 1 of 12
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 01-OCT-2009
Sampler	: Lyndon Gordon	Issue Date	: 08-OCT-2009
Site	: Option 1-B- Laird Point Dredge		
		No. of samples received	: 23
Quote number	: BN/354/09 V2	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **[EA029 SPOCAS] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA029 SPOCAS] Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **[EA033 Chromium Reducible Sulfur] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA033 Chromium Reducible Sulfur] Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 07 0.0-0.1	BH1-B 07 0.25-0.5	BH1-B 07 1.35-1.6	BH1-B 09 0.25-0.5	BH1-B 09 2.25-2.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-001	EB0915516-002	EB0915516-003	EB0915516-004	EB0915516-005
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	**6.6**	**8.7**	----	**9.4**
pH OX (23B)	----	0.1	pH Unit	----	**7.2**	**8.7**	----	**8.9**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	<2	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	<2	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	<0.02	<0.02	----	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	**0.06**	**0.02**	----	**0.08**
Peroxide Sulfur (23De)	----	0.02	% S	----	**0.02**	<0.02	----	**0.08**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	<10	<10	----	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	**0.10**	**0.28**	----	**0.18**
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	**0.10**	**1.75**	----	**2.44**
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	<0.02	**1.47**	----	**2.27**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	<10	**732**	----	**1130**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	<0.02	**1.17**	----	**1.81**
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	**0.12**	**0.08**	----	**0.05**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	**0.12**	**0.08**	----	**0.04**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	<0.02	<0.02	----	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	<10	<10	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	**0.05**	**3.80**	----	**5.68**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	<10	**760**	----	**1140**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	<0.02	**1.22**	----	**1.82**
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	----	**1.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 07 0.0-0.1	BH1-B 07 0.25-0.5	BH1-B 07 1.35-1.6	BH1-B 09 0.25-0.5	BH1-B 09 2.25-2.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-001	EB0915516-002	EB0915516-003	EB0915516-004	EB0915516-005
EA029-H: Acid Base Accounting - Continued								
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	----	<10
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.7**	----	----	**9.0**	----
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	**0.11**	----	----	**0.15**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**71**	----	----	**92**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**5.49**	----	----	**5.65**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1100**	----	----	**1130**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.76**	----	----	**1.81**	----
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	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 09 3.75-4.0	BH1-B 09 4.75-5.0	BH1-B 09 5.35-5.6	BH1-B 10 0.0-0.1	BH1-B 10 0.25-0.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-006	EB0915516-007	EB0915516-008	EB0915516-009	EB0915516-010
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	**8.6**	**8.3**	----	----
pH OX (23B)	----	0.1	pH Unit	----	**7.3**	**7.5**	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	<2	<2	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	**0.14**	**0.05**	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	**0.88**	**0.09**	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	**0.74**	**0.04**	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	**459**	**23**	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	**0.26**	**0.16**	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	**1.97**	**0.19**	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	**1.71**	**0.04**	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	**853**	**19**	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	**1.37**	**0.03**	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	**0.08**	**0.10**	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	**0.12**	**0.14**	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	**0.04**	**0.03**	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	**29**	**25**	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	**0.05**	**0.04**	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	**1.55**	**0.35**	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	**310**	**70**	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	**0.50**	**0.11**	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 09 3.75-4.0	BH1-B 09 4.75-5.0	BH1-B 09 5.35-5.6	BH1-B 10 0.0-0.1	BH1-B 10 0.25-0.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-006	EB0915516-007	EB0915516-008	EB0915516-009	EB0915516-010
EA029-H: Acid Base Accounting - Continued								
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	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.0**	----	----	**8.9**	**8.9**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	<2	<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	**0.58**	----	----	**0.10**	**0.25**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**361**	----	----	**64**	**154**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**23.1**	----	----	**5.33**	**7.40**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4620**	----	----	**1060**	**1480**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.41**	----	----	**1.71**	**2.37**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	----	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 10 0.75-1.0	BH1-B 10 1.25-1.5	BH1-B 10 1.75-2.0	BH1-B 10 2.25-2.5	BH1-B 10 2.75-3.0
Client sampling date / time				28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-011	EB0915516-012	EB0915516-013	EB0915516-014	EB0915516-015
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	**9.5**
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	**9.3**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	----	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	**0.07**
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	----	**0.07**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	----	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	----	**0.17**
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	----	**1.84**
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	----	**1.68**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	**837**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	----	**1.34**
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	----	**0.04**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	----	<0.02
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	----	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	----	<0.02
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	----	----	----	**3.93**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	----	**785**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	----	----	----	----	**1.26**
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	----	**1.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 10 0.75-1.0	BH1-B 10 1.25-1.5	BH1-B 10 1.75-2.0	BH1-B 10 2.25-2.5	BH1-B 10 2.75-3.0
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-011	EB0915516-012	EB0915516-013	EB0915516-014	EB0915516-015
EA029-H: Acid Base Accounting - Continued								
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	**9.1**	**9.3**	**9.2**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<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	**0.32**	**0.24**	**0.13**	**0.16**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**200**	**149**	**83**	**103**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**7.56**	**14.0**	**2.96**	**16.6**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1510**	**2790**	**591**	**3310**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**2.42**	**4.48**	**0.95**	**5.30**	----
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	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 10 3.25-3.5	BH1-B 10 3.75-4.0	BH1-B 10 4.25-4.5	BH1-B 10 4.75-5.0	BH1-B 10 5.25-5.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-016	EB0915516-017	EB0915516-018	EB0915516-019	EB0915516-020
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**9.4**	----	----	----	**9.3**
pH OX (23B)	----	0.1	pH Unit	**9.0**	----	----	----	**9.0**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	<0.02
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	**0.08**	----	----	----	**0.08**
Peroxide Sulfur (23De)	----	0.02	% S	**0.08**	----	----	----	**0.11**
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	**0.03**
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	**20**
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.21**	----	----	----	**0.24**
Peroxide Calcium (23Wh)	----	0.02	% Ca	**1.94**	----	----	----	**3.67**
Acid Reacted Calcium (23X)	----	0.02	% Ca	**1.74**	----	----	----	**3.42**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	**867**	----	----	----	**1710**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	**1.39**	----	----	----	**2.74**
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	**0.07**	----	----	----	**0.11**
Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	**0.03**
Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	<0.02
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	<0.02
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	**4.74**	----	----	----	**7.56**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**948**	----	----	----	**1510**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	**1.52**	----	----	----	**2.42**
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	**1.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 10 3.25-3.5	BH1-B 10 3.75-4.0	BH1-B 10 4.25-4.5	BH1-B 10 4.75-5.0	BH1-B 10 5.25-5.5
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00
				EB0915516-016	EB0915516-017	EB0915516-018	EB0915516-019	EB0915516-020
EA029-H: Acid Base Accounting - Continued								
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
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.1**	**9.0**	**9.4**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<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	----	**0.16**	**0.24**	**0.06**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	**103**	**147**	**34**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**9.80**	**15.8**	**20.0**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**1960**	**3150**	**3990**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**3.14**	**5.05**	**6.40**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	----	<0.02	<0.02	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	<10	<10	<10	----
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 10 5.75-6.0	BH1-B 10 6.25-6.5	BH1-B 10 6.95-7.2	----	----
				Client sampling date / time: 28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	----	----
				EB0915516-021	EB0915516-022	EB0915516-023	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**9.0**	----	**7.8**	----	----
pH OX (23B)	----	0.1	pH Unit	**8.4**	----	**7.7**	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	<2	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	<0.02	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	<0.02	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	**0.08**	----	**0.04**	----	----
Peroxide Sulfur (23De)	----	0.02	% S	**0.24**	----	**0.04**	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	**0.16**	----	<0.02	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	**98**	----	<10	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.22**	----	**0.13**	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	**1.97**	----	**0.17**	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	**1.75**	----	**0.04**	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	**875**	----	**18**	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	**1.40**	----	**0.03**	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	**0.07**	----	**0.13**	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	**0.05**	----	**0.16**	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	**0.02**	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	**21**	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	**0.03**	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	**3.49**	----	**0.63**	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**698**	----	**125**	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	**1.12**	----	**0.20**	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	----	----

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH1-B 10 5.75-6.0	BH1-B 10 6.25-6.5	BH1-B 10 6.95-7.2	----	----
				Client sampling date / time	28-SEP-2009 15:00	28-SEP-2009 15:00	28-SEP-2009 15:00	----	----
Compound	CAS Number	LOR	Unit		EB0915516-021	EB0915516-022	EB0915516-023	----	----
EA029-H: Acid Base Accounting - Continued									
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	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		----	**8.4**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		----	<0.02	----	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		----	**1.17**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		----	**731**	----	----	----
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		----	**11.1**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		----	**2210**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		----	**3.55**	----	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		----	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t		----	<1	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB0915516**	Page	: 1 of 7
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Option 1-B- Laird Point Dredge		
C-O-C number	: ----	Date Samples Received	: 01-OCT-2009
Sampler	: Lyndon Gordon	Issue Date	: 08-OCT-2009
Order number	: ----		
		No. of samples received	: 23
Quote number	: BN/354/09 V2	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-A: pH Measurements (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: pH KCl (23A)	----	0.1	pH Unit	6.6	6.6	0.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	7.2	7.2	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
EA029-C: Sulfur Trail (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.06	0.04	46.8	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.02	0.03	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.10	0.11	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.10	0.10	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-E: Magnesium Values (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.12	0.13	12.1	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.12	0.12	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1121973)									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	0.05	0.06	23.0	No Limit
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1121973) - continued									
EB0915516-002	BH1-B 07 0.25-0.5	EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	12	19.0	No Limit
EA033-A: Actual Acidity (QC Lot: 1121970)									
EB0915516-001	BH1-B 07 0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.8	1.1	0% - 20%
EB0915516-018	BH1-B 10 4.25-4.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.0	9.1	1.1	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1121970)									
EB0915516-001	BH1-B 07 0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.11	0.11	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	71	67	6.7	No Limit
EB0915516-018	BH1-B 10 4.25-4.5	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.24	0.22	4.8	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	147	140	4.8	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1121970)									
EB0915516-001	BH1-B 07 0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.49	5.57	1.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.76	1.78	1.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1100	1110	1.4	0% - 20%
EB0915516-018	BH1-B 10 4.25-4.5	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	15.8	15.6	0.9	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.05	5.00	0.9	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3150	3120	0.9	0% - 20%

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-B: Acidity Trail (QCLot: 1121973)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1121973)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1121973)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1121973)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1121973)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.02	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1121970)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1121970)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 1121970)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0915516**

Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR BRETT McLENNAN	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: bmclennan@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: EM2009GOLASS0333 (EN/002/09)
Site	: Option 1-B- Laird Point Dredge		
Sampler	: Lyndon Gordon	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 01-OCT-2009	Issue Date	: 02-OCT-2009 09:42
Client Requested Due Date	: 08-OCT-2009	Scheduled Reporting Date	: **08-OCT-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: -1.7,-1.1,-1.8'C - Ice present
No. of coolers/boxes	: 6 MEDIUM	No. of samples received	: 23
Sercurity Seal	: Intact.	No. of samples analysed	: 23

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA029 SPOCAS	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB0915516-001	28-SEP-2009 15:00	BH1-B 07 0.0-0.1		✓
EB0915516-002	28-SEP-2009 15:00	BH1-B 07 0.25-0.5	✓	
EB0915516-003	28-SEP-2009 15:00	BH1-B 07 1.35-1.6	✓	
EB0915516-004	28-SEP-2009 15:00	BH1-B 09 0.25-0.5		✓
EB0915516-005	28-SEP-2009 15:00	BH1-B 09 2.25-2.5	✓	
EB0915516-006	28-SEP-2009 15:00	BH1-B 09 3.75-4.0		✓
EB0915516-007	28-SEP-2009 15:00	BH1-B 09 4.75-5.0	✓	
EB0915516-008	28-SEP-2009 15:00	BH1-B 09 5.35-5.6	✓	
EB0915516-009	28-SEP-2009 15:00	BH1-B 10 0.0-0.1		✓
EB0915516-010	28-SEP-2009 15:00	BH1-B 10 0.25-0.5		✓
EB0915516-011	28-SEP-2009 15:00	BH1-B 10 0.75-1.0		✓
EB0915516-012	28-SEP-2009 15:00	BH1-B 10 1.25-1.5		✓
EB0915516-013	28-SEP-2009 15:00	BH1-B 10 1.75-2.0		✓
EB0915516-014	28-SEP-2009 15:00	BH1-B 10 2.25-2.5		✓
EB0915516-015	28-SEP-2009 15:00	BH1-B 10 2.75-3.0	✓	
EB0915516-016	28-SEP-2009 15:00	BH1-B 10 3.25-3.5	✓	
EB0915516-017	28-SEP-2009 15:00	BH1-B 10 3.75-4.0		✓
EB0915516-018	28-SEP-2009 15:00	BH1-B 10 4.25-4.5		✓
EB0915516-019	28-SEP-2009 15:00	BH1-B 10 4.75-5.0		✓
EB0915516-020	28-SEP-2009 15:00	BH1-B 10 5.25-5.5	✓	
EB0915516-021	28-SEP-2009 15:00	BH1-B 10 5.75-6.0	✓	
EB0915516-022	28-SEP-2009 15:00	BH1-B 10 6.25-6.5		✓
EB0915516-023	28-SEP-2009 15:00	BH1-B 10 6.95-7.2	✓	

Requested Deliverables

MR BRETT McLENNAN

- *AU Certificate of Analysis - NATA (COA)	Email	bmclennan@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bmclennan@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bmclennan@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	bmclennan@golder.com.au
- Default - Chain of Custody (COC)	Email	bmclennan@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	bmclennan@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	bmclennan@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	bmclennan@golder.com.au
- EDI Format - XTab (XTAB)	Email	bmclennan@golder.com.au

MR HENRY PARSONS

- *AU Certificate of Analysis - NATA (COA)	Email	hparsons@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	hparsons@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	hparsons@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	hparsons@golder.com.au
- Default - Chain of Custody (COC)	Email	hparsons@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	hparsons@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	hparsons@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	hparsons@golder.com.au
- EDI Format - XTab (XTAB)	Email	hparsons@golder.com.au

MR MARTIN CROSSLEY

- *AU Certificate of Analysis - NATA (COA)	Email	mcrossley@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mcrossley@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mcrossley@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	mcrossley@golder.com.au
- Default - Chain of Custody (COC)	Email	mcrossley@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	mcrossley@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	mcrossley@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	mcrossley@golder.com.au
- EDI Format - XTab (XTAB)	Email	mcrossley@golder.com.au

THE ACCOUNTS PAYABLE (BRISANE)

- A4 - AU Tax Invoice (INV)	Email	apbrisbane@golder.com.au

SAMPLE CHAIN OF CUSTODY DOCUMENTATION - SOIL

Project ID:	097633052	Quote/Order No.:	BN/354/09
Site Location:	Option 1-B - Laird Point Dredge Study	Lab Name:	ALS
Sampled By:	Lyndon Gordon		
Turnaround (Days):	Per quotation BN/354/09	BY:	
Report Format:	HARD ☐ FAX ☐ DISK ☐ EMAIL ☐ BULLETIN BOARD ☐		
Email Format:	PDF ☑ Excel ☑ Other ☐ Email Address:		

GOLDER ASSOCIATES PTY LTD
611 Coronation Drive, Toowong, Qld 4066
Phone: (07) 3721 5400
Fax: (07) 3721 5401
Invoice to be sent to Accounts Brisbane: apbrisbane@golder.com.au
Project Manager: Martin Crossley: mcrossley@golder.com.au
Contact Phone: 07 3721 5400
Email: hparsons@golder.com.au

Golder Associates

Comments/Special Instructions: Excel required format ESDAT
Copy results to: Henry Parsons hparsons@golder.com.au bmclennan@golder.com.au

Samples from a declared Fire Ant Area: N
Samples taken from a known Weed and or Pest Area: N

ANALYSIS REQUIRED

	SAMPLE ID	Location & Depth	SAMPLE MATRIX	SAMPLE DATE	SAMPLE TIME	CONTAINER/ PRESERVATIVE		No CONTAINERS	POSSIBLE HIGH CONCENTRATION	EA029 - SPOCAS suite	EA-033 Chromium Suite
1	BH1-B 07	0.0-0.1	sediment	28/09/2009		bag	frozen	1			X
2	BH1-B 07	0.25-0.5	sediment	28/09/2009		bag	frozen	1		X	
3	BH1-B 07	1.35-1.6	sediment	28/09/2009		bag	frozen	1		X	
4	BH1-B 09	0.25-0.5	sediment	28/09/2009		bag	frozen	1			X
5	BH1-B 09	2.25-2.5	sediment	28/09/2009		bag	frozen	1		X	
6	BH1-B 09	3.75-4.0	sediment	28/09/2009		bag	frozen	1			X
7	BH1-B 09	4.75-5.0	sediment	28/09/2009		bag	frozen	1	√	X	
8	BH1-B 09	5.35-5.6	sediment	28/09/2009		bag	frozen	1		X	
9	BH1-B 10	0.0-0.1	sediment	28/09/2009		bag	frozen	1			X
10	BH1-B 10	0.25-0.5	sediment	28/09/2009		bag	frozen	1			X
11	BH1-B 10	0.75-1.0	sediment	28/09/2009		bag	frozen	1			X
12	BH1-B 10	1.25-1.5	sediment	28/09/2009		bag	frozen	1			X
13	BH1-B 10	1.75-2.0	sediment	28/09/2009		bag	frozen	1			X
14	BH1-B 10	2.25-2.5	sediment	28/09/2009		bag	frozen	1			X
15	BH1-B 10	2.75-3.0	sediment	28/09/2009		bag	frozen	1		X	
16	BH1-B 10	3.25-3.5	sediment	28/09/2009		bag	frozen	1		X	
17	BH1-B 10	3.75-4.0	sediment	28/09/2009		bag	frozen	1			X
18	BH1-B 10	4.25-4.5	sediment	28/09/2009		bag	frozen	1			X
19	BH1-B 10	4.75-5.0	sediment	28/09/2009		bag	frozen	1			X
20	BH1-B 10	5.25-5.5	sediment	28/09/2009		bag	frozen	1		X	
21	BH1-B 10	5.75-6.0	sediment	28/09/2009		bag	frozen	1		X	
22	BH1-B 10	6.25-6.5	sediment	28/09/2009		bag	frozen	1			X
23	BH1-B 10	6.95-7.2	sediment	28/09/2009		bag	frozen	1		X	

Environmental Division
Brisbane
Work Order
EB0915516

Telephone : +61-7-3243 7222

SAMPLE MATRIX = Soil/Sediment/Fill/Other **SAMPLE TYPE** = Core(CR) **HIGH CONCENTRATION:** Tick box and circle expected parameters in analysis list

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; VC = Hydrochloric Preserved Vial; VS = Sulphuric Acid

	SIGNATURE	COMPANY	DATE	TIME
RELEASED BY	L.MANLEY	GeoCoastal	30/09/09	14.15
RECEIVED BY	Jonathon Angell	ALS.	30/09/09	14:15.
RELEASED BY				
RECEIVED BY				
RELEASED BY				
RECEIVED BY				

	SIGNATURE	COMPANY	DATE	TIME	Shipment Method
RELEASED BY	Jonathon Angell	ALS	30/09	15:30	Shipping Ref:
RECEIVED BY	A. ROBERTS	ALS	1/10/09	8:20	

To Be Filled Out By Analysing Laboratory — **LAB. BATCH NUMBER**

Security Seal — Chilled — Bill to:
Suitable Containers — Frozen — Address
Cool Box — Ambient

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

CERTIFICATE OF ANALYSIS

Work Order	: **EB0915596**	Page	: 1 of 8
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-OCT-2009
Sampler	: Lyndon Gordon	Issue Date	: 09-OCT-2009
Site	: Option 1-B-Laird Point Dredge		
		No. of samples received	: 11
Quote number	: BN/354/09 V2	No. of samples analysed	: 11

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **[EA029 SPOCAS] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA029 SPOCAS] Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **[EA033 Chromium Reducible Sulfur] 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. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **[EA033 Chromium Reducible Sulfur] Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 08 0.0-0.25	BH1-B 08 0.5-1.0	BH1-B 08 1.0-1.5	BH1-B 08 1.5-2.0	BH1-B 08 2.0-2.5
				Client sampling date / time: 30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00
				EB0915596-001	EB0915596-002	EB0915596-003	EB0915596-004	EB0915596-005
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**9.5**	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	**9.1**	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	**0.30**	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	**0.07**	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.17**	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	**4.06**	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	**3.89**	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	**1940**	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	**3.11**	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	**0.03**	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	**0.10**	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	**0.07**	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	**61**	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	**0.10**	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	**10.0**	----	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**2010**	----	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	**3.22**	----	----	----	----
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 08 0.0-0.25	BH1-B 08 0.5-1.0	BH1-B 08 1.0-1.5	BH1-B 08 1.5-2.0	BH1-B 08 2.0-2.5
				Client sampling date / time: 30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00
				EB0915596-001	EB0915596-002	EB0915596-003	EB0915596-004	EB0915596-005
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	----	**9.3**	**9.4**	**9.3**	**9.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	<2	<2	<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	----	**0.06**	**0.07**	**0.10**	**0.11**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	**39**	**46**	**62**	**67**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**7.24**	**7.51**	**10.9**	**14.6**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**1450**	**1500**	**2180**	**2920**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**2.32**	**2.40**	**3.49**	**4.68**
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

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 08 2.5-3.0	BH1-B 08 3.0-3.5	BH1-B 08 3.5-4.0	BH1-B 08 4.0-4.5	BH1-B 08 4.85-5.0
				Client sampling date / time	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00
					EB0915596-006	EB0915596-007	EB0915596-008	EB0915596-009	EB0915596-010
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		----	----	----	----	**8.7**
pH OX (23B)	----	0.1	pH Unit		----	----	----	----	**7.9**
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		----	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		----	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		----	----	----	----	<0.02
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		----	----	----	----	<0.02
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		----	----	----	----	<0.02
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		----	----	----	----	**0.03**
Peroxide Sulfur (23De)	----	0.02	% S		----	----	----	----	<0.02
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		----	----	----	----	<0.02
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		----	----	----	----	<10
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		----	----	----	----	**0.21**
Peroxide Calcium (23Wh)	----	0.02	% Ca		----	----	----	----	**0.27**
Acid Reacted Calcium (23X)	----	0.02	% Ca		----	----	----	----	**0.06**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		----	----	----	----	**29**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		----	----	----	----	**0.05**
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		----	----	----	----	**0.06**
Peroxide Magnesium (23Tm)	----	0.02	% Mg		----	----	----	----	**0.09**
Acid Reacted Magnesium (23U)	----	0.02	% Mg		----	----	----	----	**0.03**
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		----	----	----	----	**27**
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		----	----	----	----	**0.04**
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		----	----	----	----	**0.59**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		----	----	----	----	**119**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		----	----	----	----	**0.19**
EA029-H: Acid Base Accounting									

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 08 2.5-3.0	BH1-B 08 3.0-3.5	BH1-B 08 3.5-4.0	BH1-B 08 4.0-4.5	BH1-B 08 4.85-5.0
				Client sampling date / time: 30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00	30-SEP-2009 15:00
				EB0915596-006	EB0915596-007	EB0915596-008	EB0915596-009	EB0915596-010
EA029-H: Acid Base Accounting - Continued								
ANC Fineness Factor	----	0.5	-	----	----	----	----	1.5
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.4	9.4	9.1	9.2	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<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	0.07	0.03	0.21	0.16	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	44	21	131	101	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	15.7	17.9	8.81	21.6	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3140	3570	1760	4310	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.04	5.72	2.82	6.91	----
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	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 08 5.0-5.3	----	----	----	----
			Client sampling date / time	30-SEP-2009 15:00	----	----	----	----
				EB0915596-011	----	----	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**7.4**	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	**7.4**	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.12**	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	**0.11**	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	**0.08**	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	**0.09**	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	**0.16**	----	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**32**	----	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	**0.05**	----	----	----	----
EA029-H: Acid Base Accounting								

Analytical Results

Sub-Matrix: SOIL	Client sample ID	BH1-B 08 5.0-5.3	----	----	----	----
	Client sampling date / time	30-SEP-2009 15:00	----	----	----	----
Compound / CAS Number	LOR / Unit	EB0915596-011	----	----	----	----
EA029-H: Acid Base Accounting - Continued						
ANC Fineness Factor ----	0.5 -	**1.5**	----	----	----	----
Net Acidity (sulfur units) ----	0.02 % S	<0.02	----	----	----	----
Net Acidity (acidity units) ----	10 mole H+ / t	<10	----	----	----	----
Liming Rate ----	1 kg CaCO3/t	<1	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB0915596**	Page	: 1 of 8
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Option 1-B-Laird Point Dredge		
C-O-C number	: ----	Date Samples Received	: 02-OCT-2009
Sampler	: Lyndon Gordon	Issue Date	: 09-OCT-2009
Order number	: ----		
		No. of samples received	: 11
Quote number	: BN/354/09 V2	No. of samples analysed	: 11

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-A: pH Measurements (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: pH KCl (23A)	----	0.1	pH Unit	9.5	9.6	1.0	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	9.1	9.1	0.0	0% - 20%
ES0914603-001	Anonymous	EA029: pH KCl (23A)	----	0.1	pH Unit	5.2	5.3	1.9	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	3.0	3.0	0.0	0% - 20%
EA029-B: Acidity Trail (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	0.0	No Limit
ES0914603-001	Anonymous	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.02	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	0.24	0.26	6.7	0% - 50%
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	0.21	0.23	9.0	0% - 50%
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	17	15	13.4	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	149	159	6.7	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	132	144	9.0	0% - 20%
EA029-C: Sulfur Trail (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.30	0.21	36.0	0% - 50%
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.07	0.09	23.2	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.0	No Limit
ES0914603-001	Anonymous	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-D: Calcium Values (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.17	0.17	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	4.06	4.24	4.3	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-D: Calcium Values (QC Lot: 1122551) - continued									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	3.89	4.07	4.4	0% - 20%
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	3.11	3.25	4.4	0% - 20%
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	1940	2030	4.4	0% - 20%
ES0914603-001	Anonymous	EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.06	0.06	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.09	0.06	35.6	No Limit
		EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.03	<0.02	45.1	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	16	<10	44.9	No Limit
EA029-E: Magnesium Values (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	0.03	<0.02	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.10	0.11	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.07	0.09	17.1	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.10	0.12	17.1	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	61	72	17.1	No Limit
ES0914603-001	Anonymous	EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA029-F: Excess Acid Neutralising Capacity (QC Lot: 1122551)									
EB0915596-001	BH1-B 08 0.0-0.25	EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	10.0	10.0	0.0	0% - 20%
		EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	3.22	3.22	0.0	0% - 20%
		EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	2010	2010	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1122595)									
EB0915596-002	BH1-B 08 0.5-1.0	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1122595)									
EB0915596-002	BH1-B 08 0.5-1.0	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.06	0.05	30.5	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	39	29	30.5	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1122595)									
EB0915596-002	BH1-B 08 0.5-1.0	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	7.24	7.30	0.7	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1122595) - continued									
EB0915596-002	BH1-B 08 0.5-1.0	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.32	2.34	0.7	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1450	1460	0.7	0% - 20%

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-B: Acidity Trail (QCLot: 1122551)								
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 1122551)								
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.02	----	----	----	----
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.02	----	----	----	----
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029-D: Calcium Values (QCLot: 1122551)								
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.02	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.02	----	----	----	----
EA029-E: Magnesium Values (QCLot: 1122551)								
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.02	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.02	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity (QCLot: 1122551)								
EA029: Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	<0.02	----	----	----	----
EA029: acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	<10	----	----	----	----
EA029: sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1122595)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1122595)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 1122595)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0915596**

Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Brisbane
Contact	: MR MARTIN CROSSLEY	Contact	: Tim Kilmister
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: mcrossley@golder.com.au	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3721 5401	Facsimile	: +61-7-3243 7218
Project	: 097633052	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: EM2009GOLASS0333 (EN/002/09)
Site	: Option 1-B-Laird Point Dredge		
Sampler	: Lyndon Gordon	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 02-OCT-2009	Issue Date	: 02-OCT-2009 15:38
Client Requested Due Date	: 09-OCT-2009	Scheduled Reporting Date	: **09-OCT-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 0.4c - Ice present
No. of coolers/boxes	: 1 MEDIUM	No. of samples received	: 11
Sercurity Seal	: Intact.	No. of samples analysed	: 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA029 SPOCAS	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB0915596-001	30-SEP-2009 15:00	BH1-B 08 0.0-0.25	✓	
EB0915596-002	30-SEP-2009 15:00	BH1-B 08 0.5-1.0		✓
EB0915596-003	30-SEP-2009 15:00	BH1-B 08 1.0-1.5		✓
EB0915596-004	30-SEP-2009 15:00	BH1-B 08 1.5-2.0		✓
EB0915596-005	30-SEP-2009 15:00	BH1-B 08 2.0-2.5		✓
EB0915596-006	30-SEP-2009 15:00	BH1-B 08 2.5-3.0		✓
EB0915596-007	30-SEP-2009 15:00	BH1-B 08 3.0-3.5		✓
EB0915596-008	30-SEP-2009 15:00	BH1-B 08 3.5-4.0		✓
EB0915596-009	30-SEP-2009 15:00	BH1-B 08 4.0-4.5		✓
EB0915596-010	30-SEP-2009 15:00	BH1-B 08 4.85-5.0	✓	
EB0915596-011	30-SEP-2009 15:00	BH1-B 08 5.0-5.3	✓	

Requested Deliverables

MR MARTIN CROSSLEY

- *AU Certificate of Analysis - NATA (COA)	Email	mcrossley@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mcrossley@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mcrossley@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	mcrossley@golder.com.au
- Default - Chain of Custody (COC)	Email	mcrossley@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	mcrossley@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	mcrossley@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	mcrossley@golder.com.au

THE ACCOUNTS PAYABLE (BRISANE)

- A4 - AU Tax Invoice (INV)	Email	apbrisbane@golder.com.au

SAMPLE CHAIN OF CUSTODY DOCUMENTATION - SOIL

Sheet 1 of 1

Project No:	097633052	Quote/Order No.:	BN/354/09
Site Location:	Option 1-B - Laird Point Dredge Study	Lab Name:	ALS
Sampled By:	Lyndon Gordon		
Turnaround (Days)	Per quotation BN/354/09	BY:	
Report Format:	HARD ☐ FAX ☐ DISK ☐ EMAIL ☐ BULLETIN BOARD ☐		
Email Format:	PDF ☑ Excel ☑ Other ☐ Email Address:		

GOLDER ASSOCIATES PTY LTD
611 Coronation Drive, Toowong, Qld 4066
Phone: (07) 3721 5400
Fax: (07) 3721 5401
Invoice to be sent to Accounts Brisbane: apbrisbane@golder.com.au
Project Manager: Martin Crossley: mcrossley@golder.com.au
Contact Phone: 07 3721 5400
Email: hparsons@golder.com.au

Golder Associates

Comments/Special Instructions: Excel required format ESDAT
Copy results to: Henry Parsons hparsons@golder.com.au bmclennan@golder.com.au

Samples from a declared Fire Ant Area: N
Samples taken from a known Weed and or Pest Area: N

ANALYSIS REQUIRED

SAMPLE ID	Location & Depth	SAMPLE MATRIX	SAMPLE DATE	SAMPLE TIME	CONTAINER/ PRESERVATIVE		No CONTAINERS	POSSIBLE HIGH CONCENTRATION	EA029 - SPOCAS suite	EA-033 Chromium Suite
BH1-B 08	1 0.0-0.25	sediment	30/09/2009		bag	frozen	1		X	
BH1-B 08	2 0.5-1.0	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	3 1.0-1.5	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	4 1.5-2.0	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	5 2.0-2.5	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	6 2.5-3.0	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	7 3.0-3.5	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	8 3.5-4.0	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	9 4.0-4.5	sediment	30/09/2009		bag	frozen	1			X
BH1-B 08	10 4.85-5.0	sediment	30/09/2009		bag	frozen	1		X	
BH1-B 08	11 5.0-5.3	sediment	30/09/2009		bag	frozen	1		X	

Environmental Division
Brisbane
Work Order
EB0915596

Telephone : +61-7-3243 7222

SAMPLE MATRIX = Soil/Sediment/Fill/Other
SAMPLE TYPE = Core(CR)
HIGH CONCENTRATION: Tick box and circle expected parameters in analysis list

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; VC = Hydrochloric Preserved Vial; VS = Sulphuric Acid

	SIGNATURE	COMPANY	DATE	TIME
RELEASED BY	I. MANLEY	GeoCoastal	01/10/09	14.15
RECEIVED BY	Jonathan Argall	ALS	01/10/09	14:15.
RELEASED BY				
RECEIVED BY				
RELEASED BY				
RECEIVED BY				

	SIGNATURE	COMPANY	DATE	TIME	Shipment Method
RELEASED BY	Jonathan Argall	ALS.	01/10/09	15.15.	Shipping Ref:
RECEIVED BY		ALS	2/10/09	08.55	

To Be Filled Out By Analysing Laboratory

LAB. BATCH NUMBER

Security Seal		Chilled		Bill to:	
Suitable Containers		Frozen		Address	
Cool Box		Ambient			

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

APPENDIX C

Study Limitations

LIMITATIONS

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Golder Associates

Appendix 3 Particle Size Analysis Reports (ALS)

Certificate of Analysis

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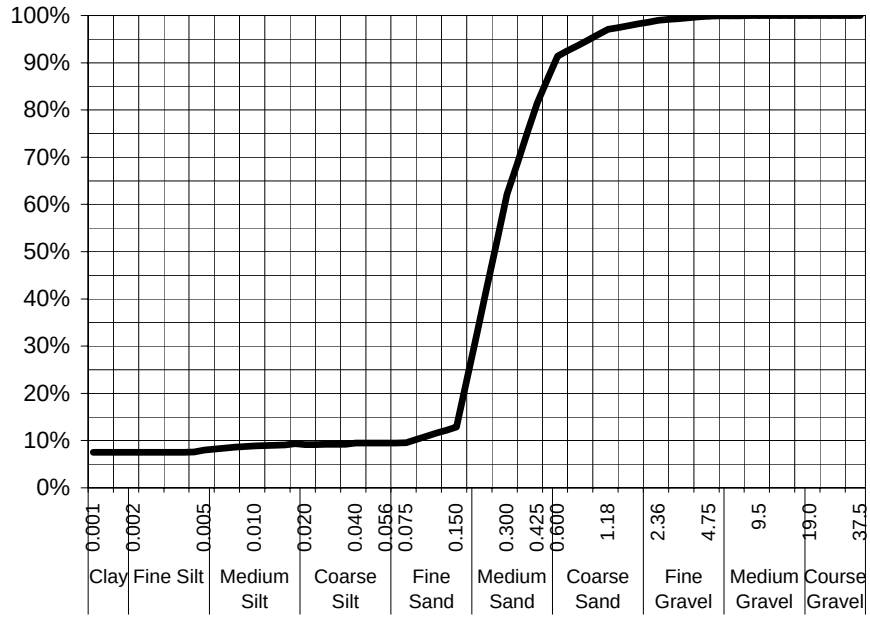
pH 02 4968 9433
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental

Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-001 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 0.0-0.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	97%
0.600	91%
0.425	82%
0.300	62%
0.150	13%
0.075	10%
Particle Size (microns)	
56	9%
40	9%
20	9%
10	9%
5	8%
4	8%
1	8%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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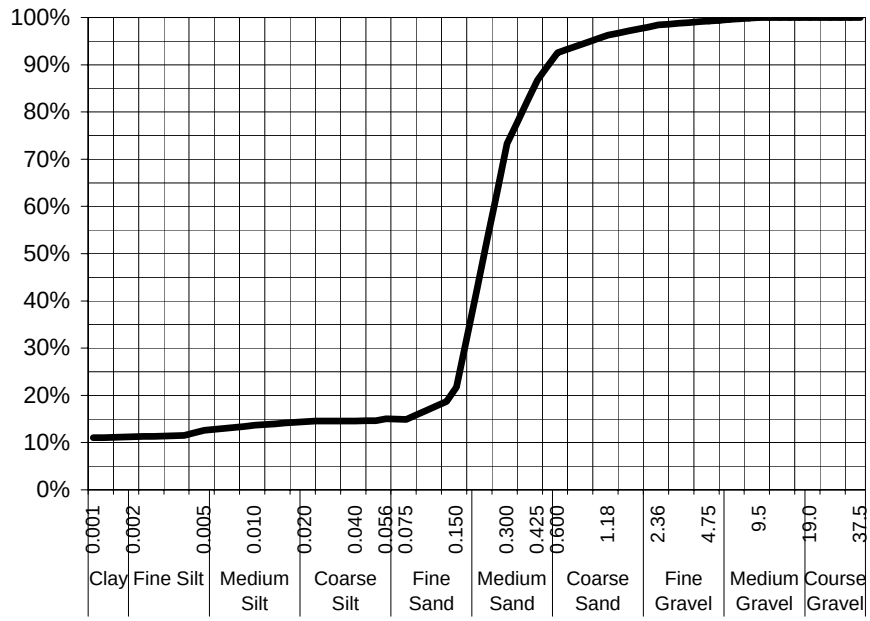
ALS Environmental

Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-002 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 0.5-1.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	99%
2.36	98%
1.18	96%
0.600	93%
0.425	87%
0.300	73%
0.150	22%
0.075	15%
Particle Size (microns)	
56	15%
40	15%
20	14%
10	14%
5	13%
4	11%
1	11%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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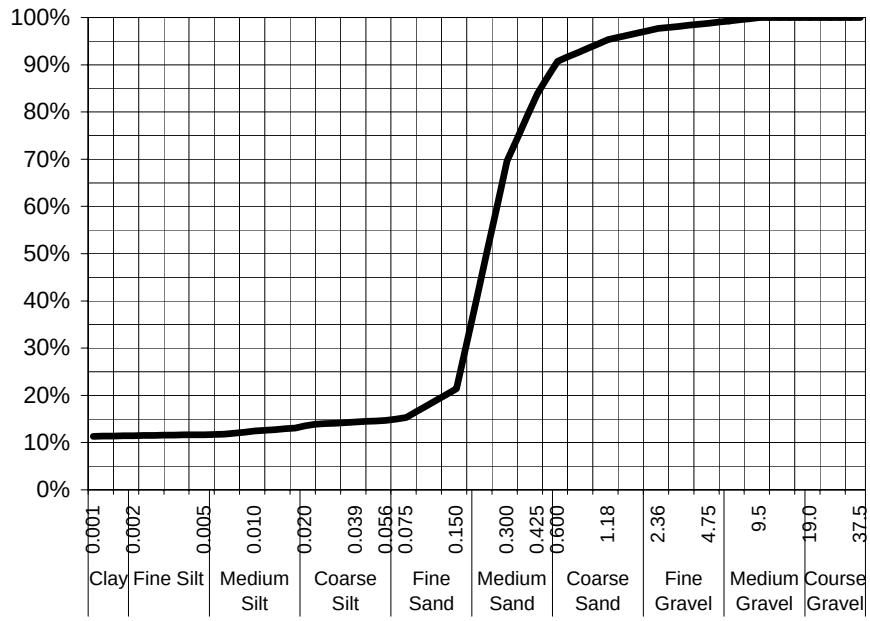
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-003 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 1.0-2.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	99%
2.36	98%
1.18	95%
0.600	91%
0.425	84%
0.300	70%
0.150	21%
0.075	15%
Particle Size (microns)	
56	15%
39	14%
20	14%
10	12%
5	12%
4	12%
1	11%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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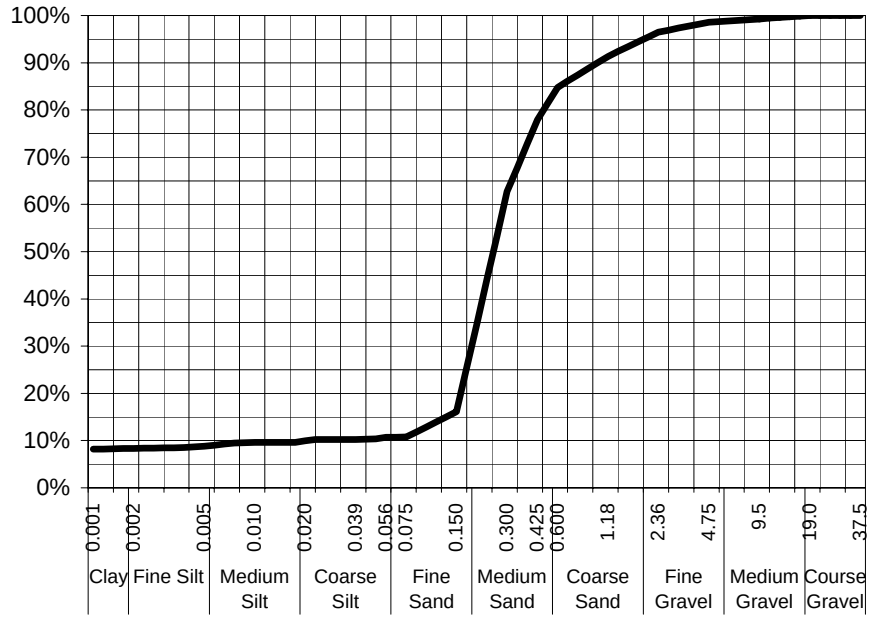
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-004 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 2.0-3.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	99%
4.75	99%
2.36	96%
1.18	91%
0.600	85%
0.425	78%
0.300	63%
0.150	16%
0.075	11%
Particle Size (microns)	
56	11%
39	10%
20	10%
10	10%
5	9%
4	9%
1	8%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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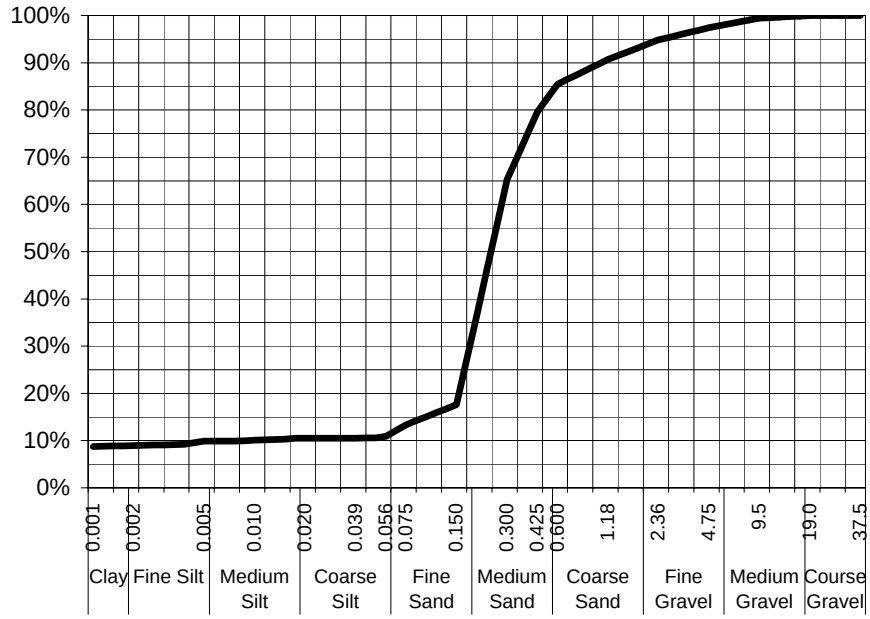
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-005 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 3.0-4.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	99%
4.75	97%
2.36	95%
1.18	91%
0.600	85%
0.425	80%
0.300	65%
0.150	18%
0.075	13%
Particle Size (microns)	
56	11%
39	11%
20	11%
10	10%
5	10%
4	9%
1	9%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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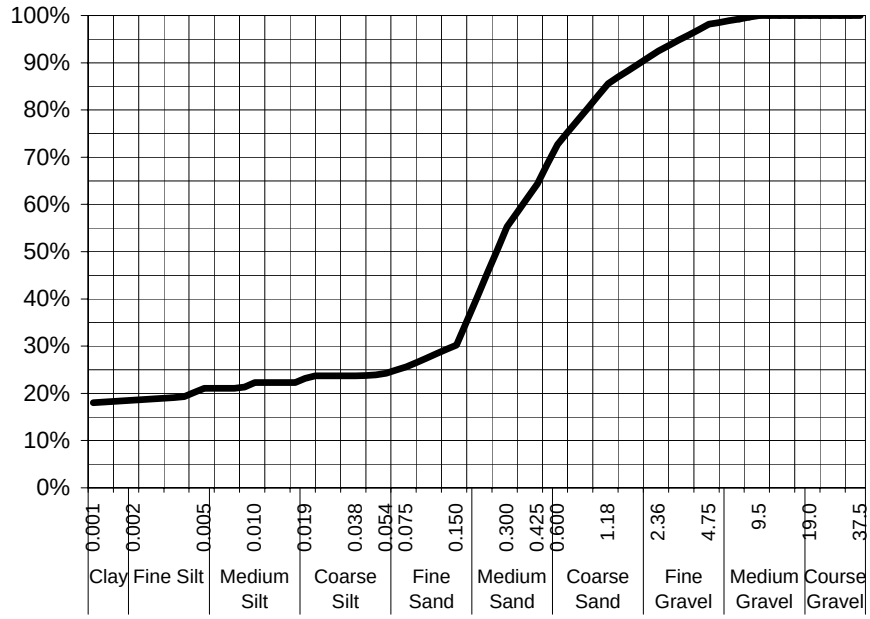
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-006 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 4.0-4.75

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	98%
2.36	93%
1.18	86%
0.600	73%
0.425	64%
0.300	55%
0.150	30%
0.075	26%
Particle Size (microns)	
54	24%
38	24%
19	23%
10	22%
5	21%
3	19%
1	18%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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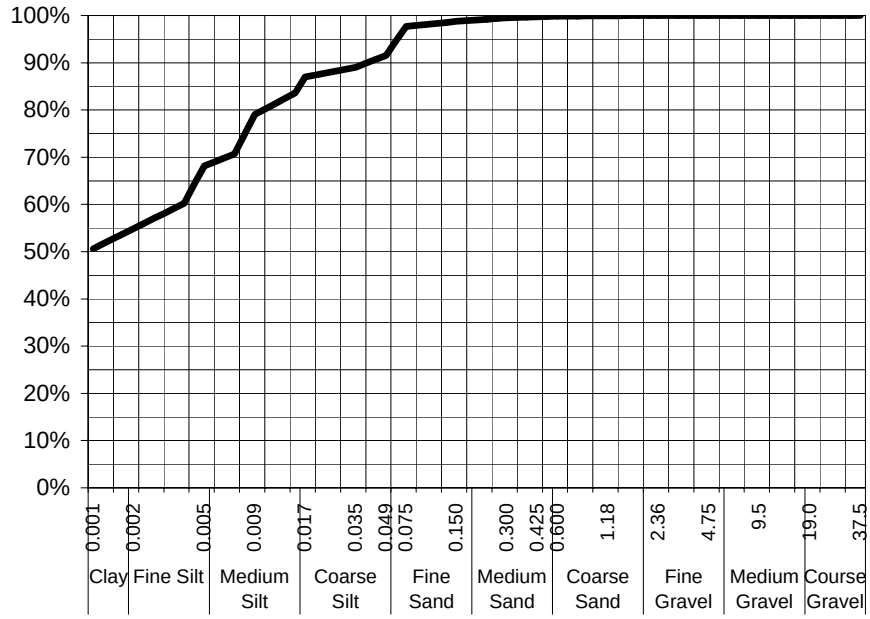
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-007 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 02 4.75-5.8

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	100%
0.425	100%
0.300	100%
0.150	99%
0.075	98%
Particle Size (microns)	
49	92%
35	89%
17	87%
9	79%
5	68%
3	60%
1	51%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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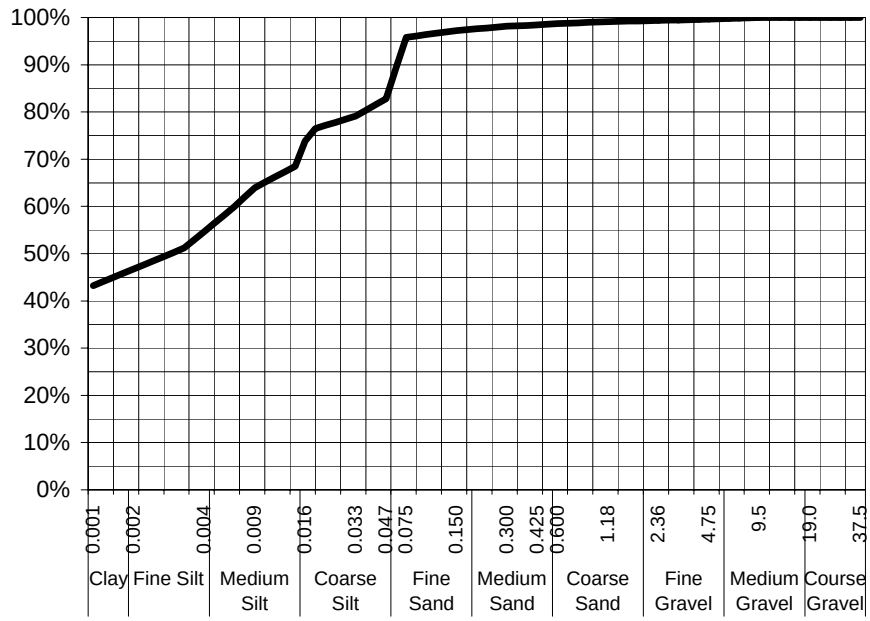
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-008 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 05 0.0-0.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	99%
0.600	99%
0.425	98%
0.300	98%
0.150	97%
0.075	96%
Particle Size (microns)	
47	83%
33	79%
16	74%
9	64%
4	55%
3	51%
1	43%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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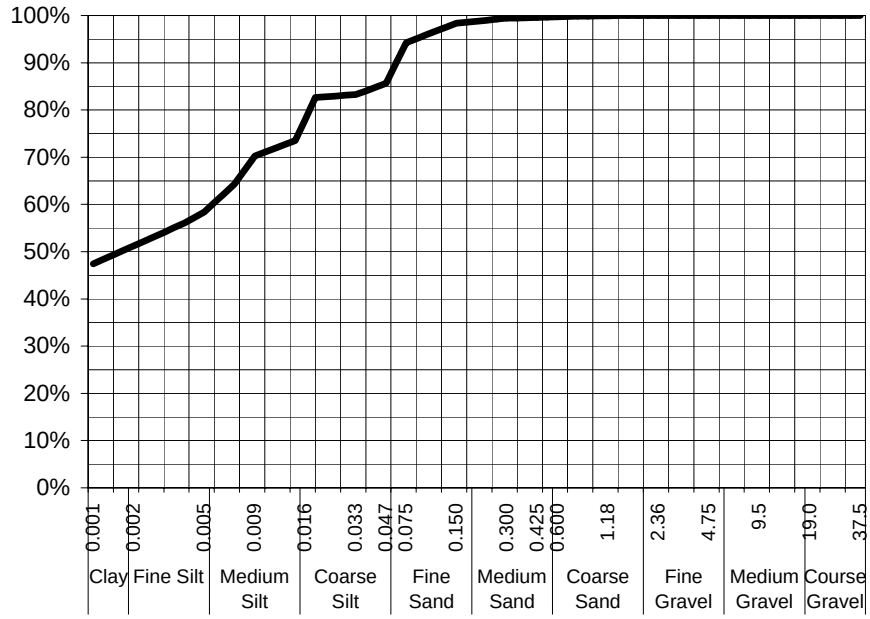
Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-009 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 05 0.5-1.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	100%
0.425	100%
0.300	99%
0.150	98%
0.075	94%
Particle Size (microns)	
47	86%
33	83%
16	78%
9	70%
5	58%
3	56%
1	47%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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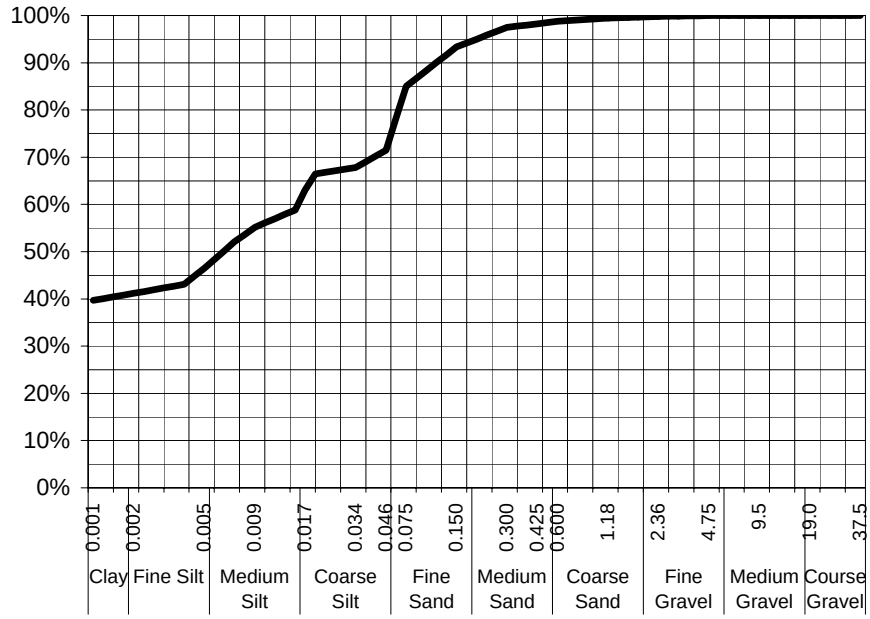
Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-010 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 05 1.0-1.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	99%
0.600	99%
0.425	98%
0.300	98%
0.150	93%
0.075	85%
Particle Size (microns)	
46	72%
34	68%
17	63%
9	55%
5	46%
3	43%
1	40%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay, silt & sand	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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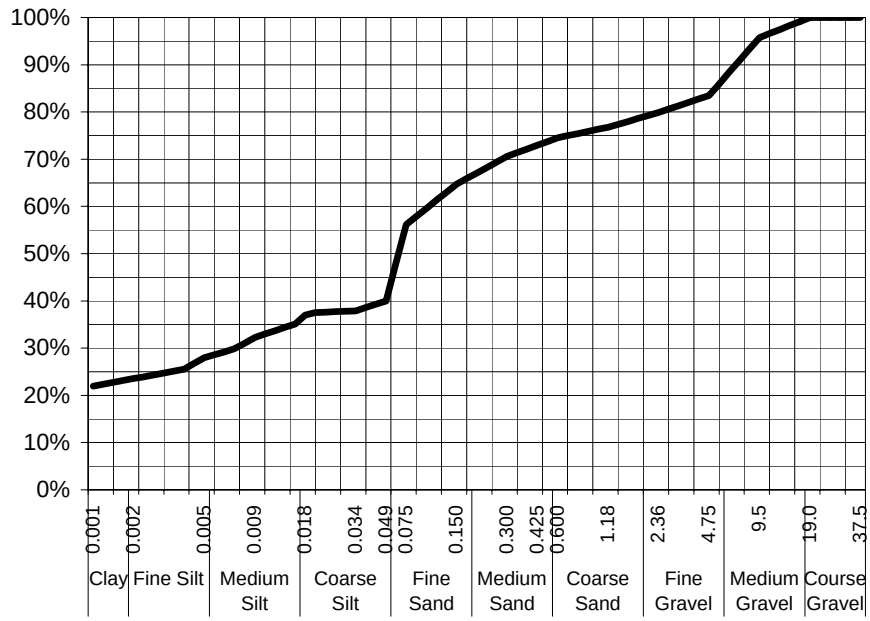
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-011 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 06 0.0-0.4

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	96%
4.75	83%
2.36	80%
1.18	77%
0.600	75%
0.425	73%
0.300	71%
0.150	65%
0.075	56%
Particle Size (microns)	
49	40%
34	38%
18	37%
9	32%
5	28%
3	26%
1	22%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Silt, sand, clay & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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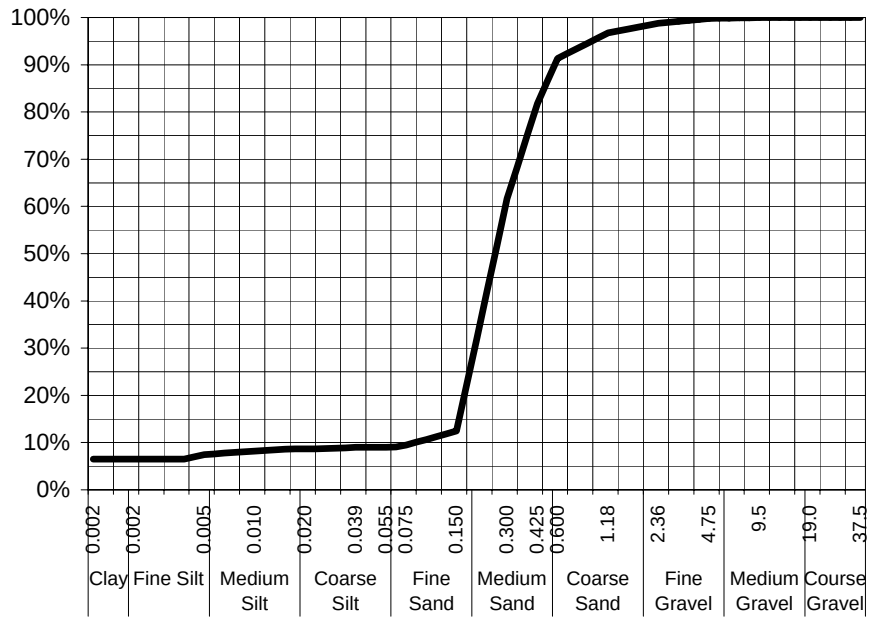
CLIENT:	Martin Crossley	**DATE REPORTED:**	30-Sep-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	22-Sep-2009
ADDRESS:	P O Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914365-013 / PSD
PROJECT:	97633052	**SAMPLE ID:**	QC 5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	97%
0.600	91%
0.425	82%
0.300	62%
0.150	12%
0.075	9%
Particle Size (microns)	
55	9%
39	9%
20	9%
10	8%
5	7%
4	7%
2	7%

Samples analysed as received.

Sample Comments:		**Analysed:**	25-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, fines & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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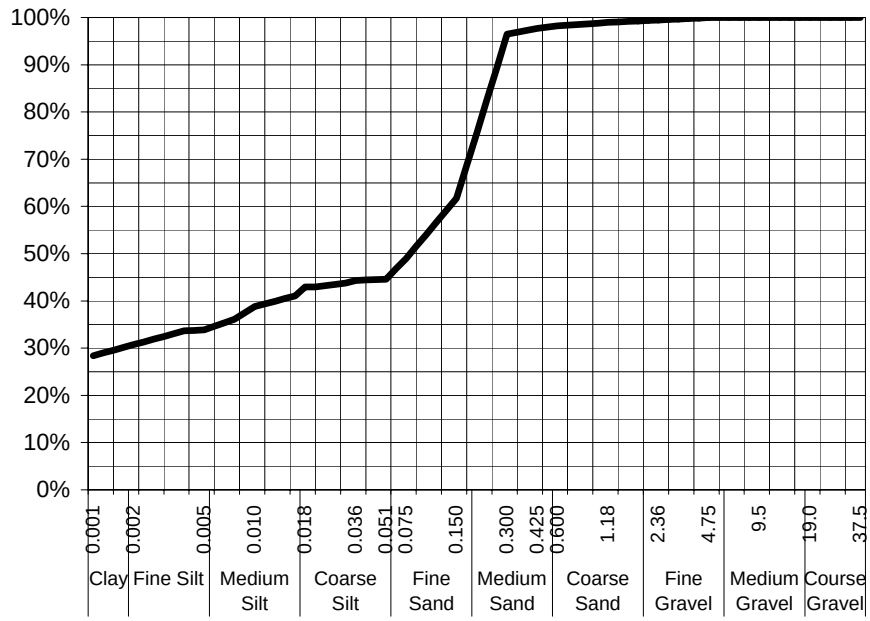
ALS Environmental

Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-001 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 01 0.0-0.2

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	99%
0.600	98%
0.425	98%
0.300	96%
0.150	62%
0.075	49%
Particle Size (microns)	
51	45%
36	44%
18	43%
10	39%
5	34%
3	34%
1	28%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Fine sand, clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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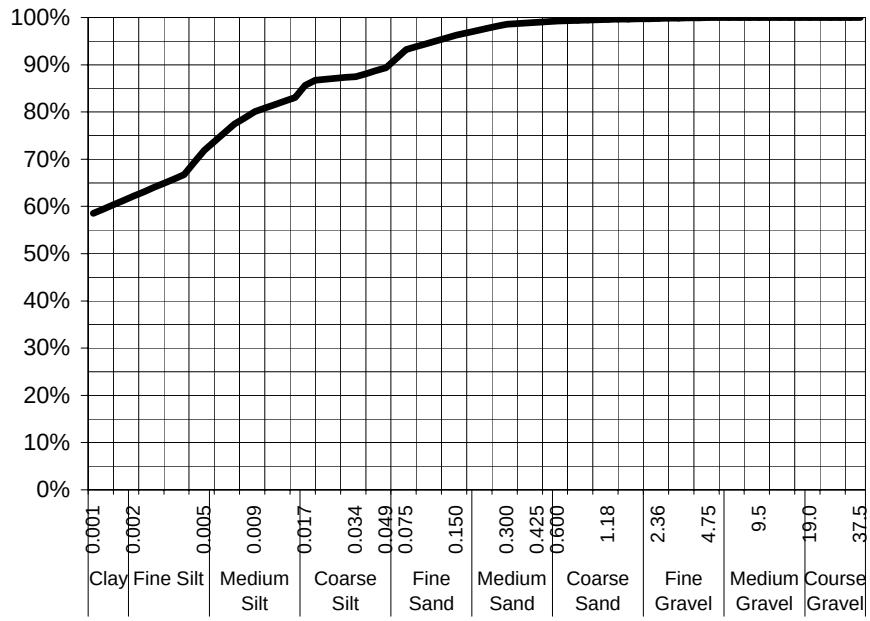
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-002 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 01 0.2-0.7

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	96%
0.075	93%
Particle Size (microns)	
49	89%
34	87%
17	86%
9	80%
5	72%
3	67%
1	59%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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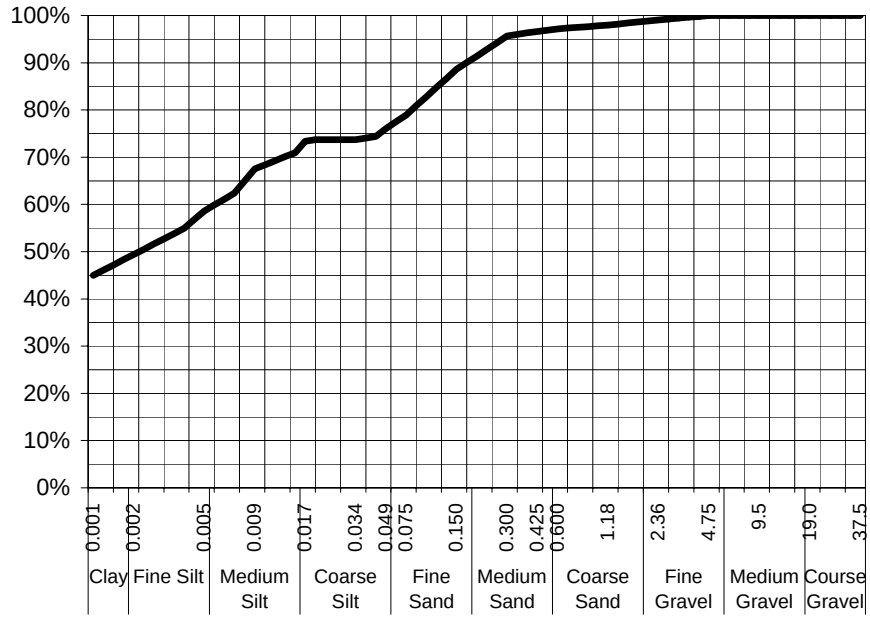
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-003 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 01 0.7-1.6

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	99%
1.18	98%
0.600	97%
0.425	97%
0.300	96%
0.150	89%
0.075	79%
Particle Size (microns)	
49	76%
34	74%
17	73%
9	68%
5	59%
3	55%
1	45%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay, silt & fine sand	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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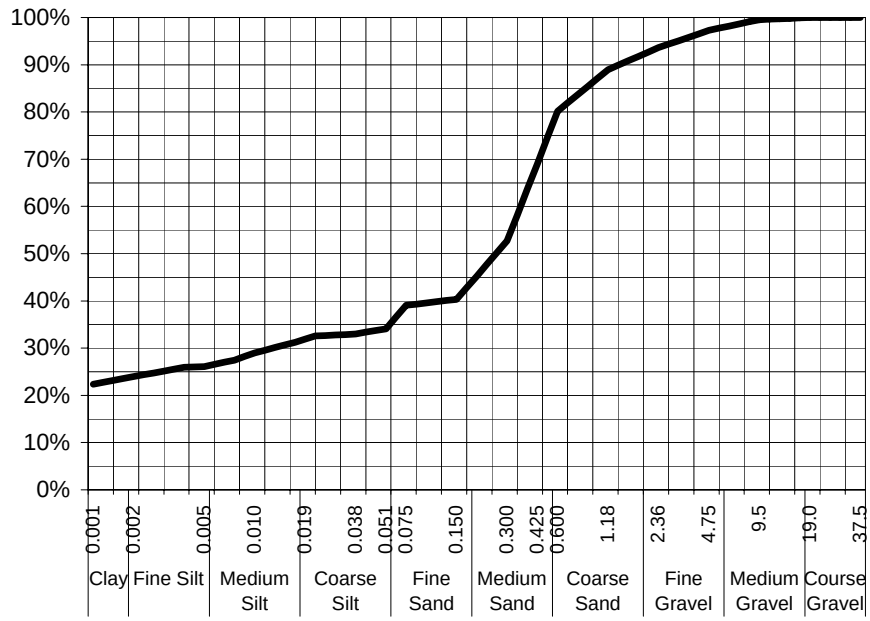
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-004 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 03 0.0-0.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	94%
1.18	89%
0.600	80%
0.425	69%
0.300	53%
0.150	40%
0.075	39%
Particle Size (microns)	
51	34%
38	33%
19	32%
10	29%
5	26%
3	26%
1	22%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay, silt & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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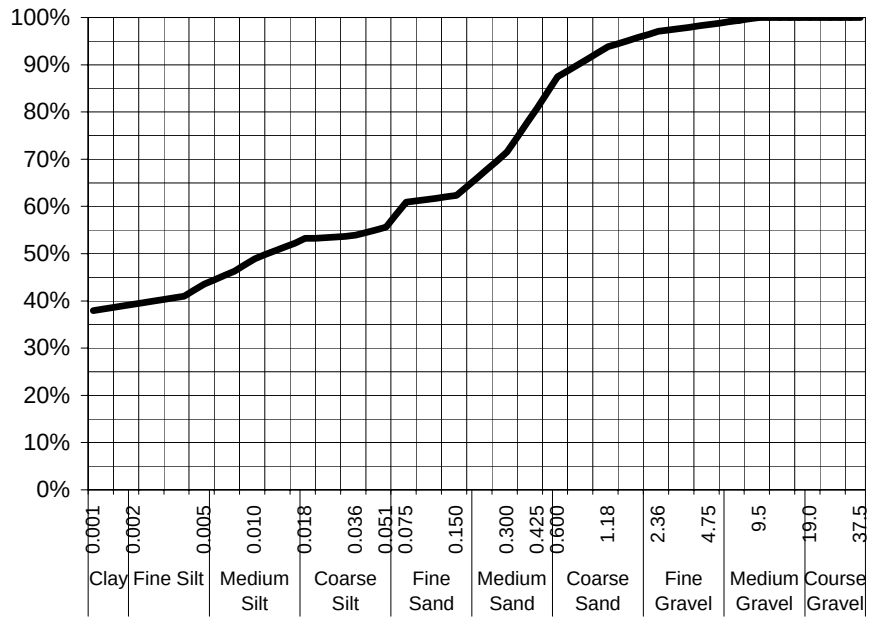
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-005 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 03 0.5-1.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	98%
2.36	97%
1.18	94%
0.600	87%
0.425	81%
0.300	72%
0.150	62%
0.075	61%
Particle Size (microns)	
51	56%
36	54%
18	53%
10	49%
5	44%
3	41%
1	38%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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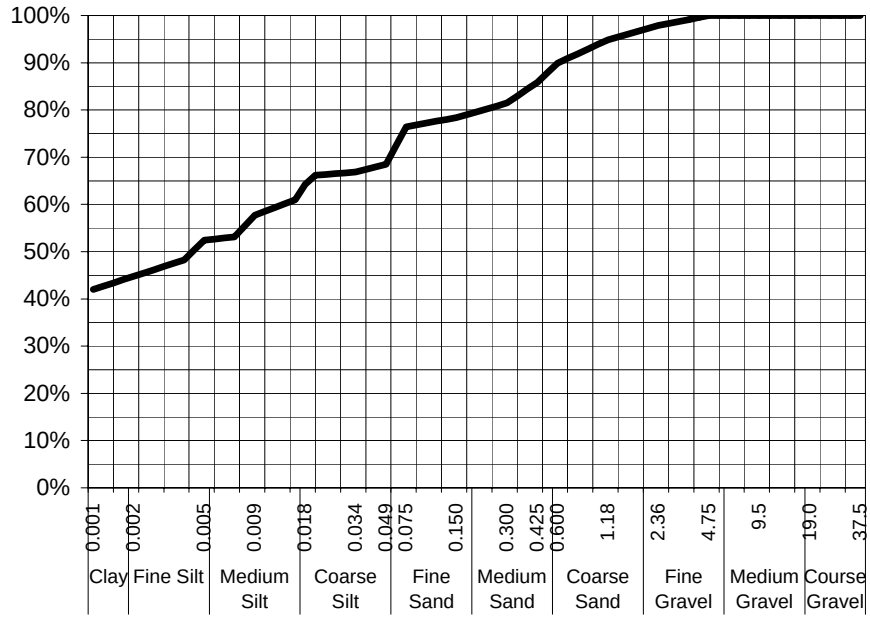
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-006 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 03 1.0-2.25

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	98%
1.18	95%
0.600	90%
0.425	86%
0.300	81%
0.150	78%
0.075	76%
Particle Size (microns)	
49	68%
34	67%
18	64%
9	58%
5	52%
3	48%
1	42%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay, silt & sand	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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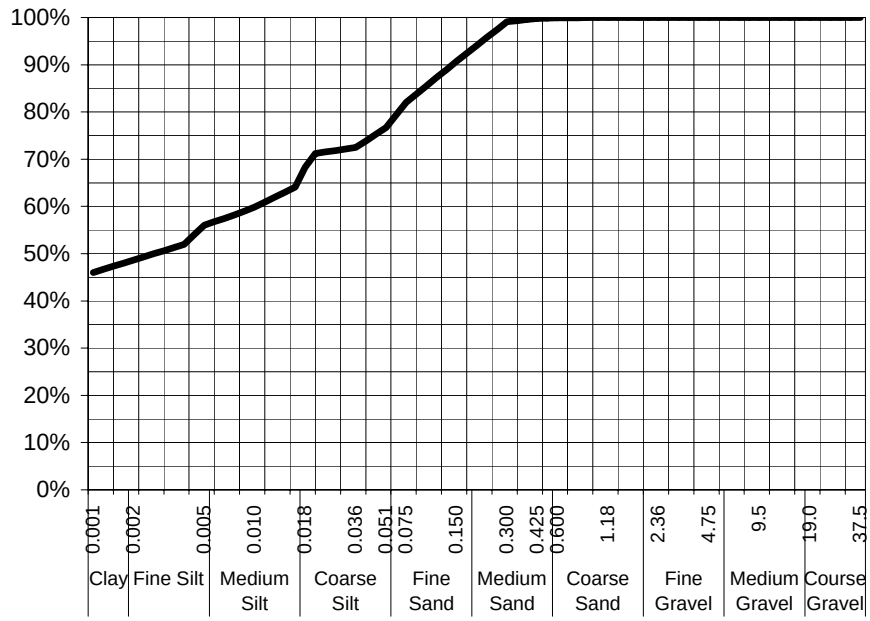
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-007 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 03 2.5-3.6

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	100%
0.425	100%
0.300	99%
0.150	91%
0.075	82%
Particle Size (microns)	
51	77%
36	72%
18	68%
10	60%
5	56%
3	52%
1	46%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay, silt & sand	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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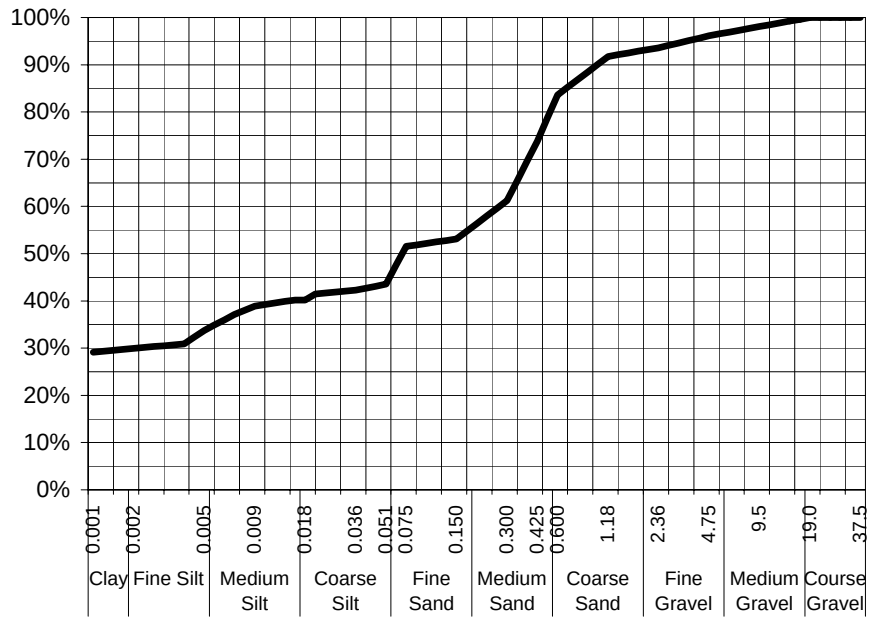
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-008 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 04 0.0-0.2

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	98%
4.75	96%
2.36	94%
1.18	92%
0.600	84%
0.425	74%
0.300	61%
0.150	53%
0.075	52%
Particle Size (microns)	
51	44%
36	42%
18	40%
9	39%
5	34%
3	31%
1	29%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay, silt & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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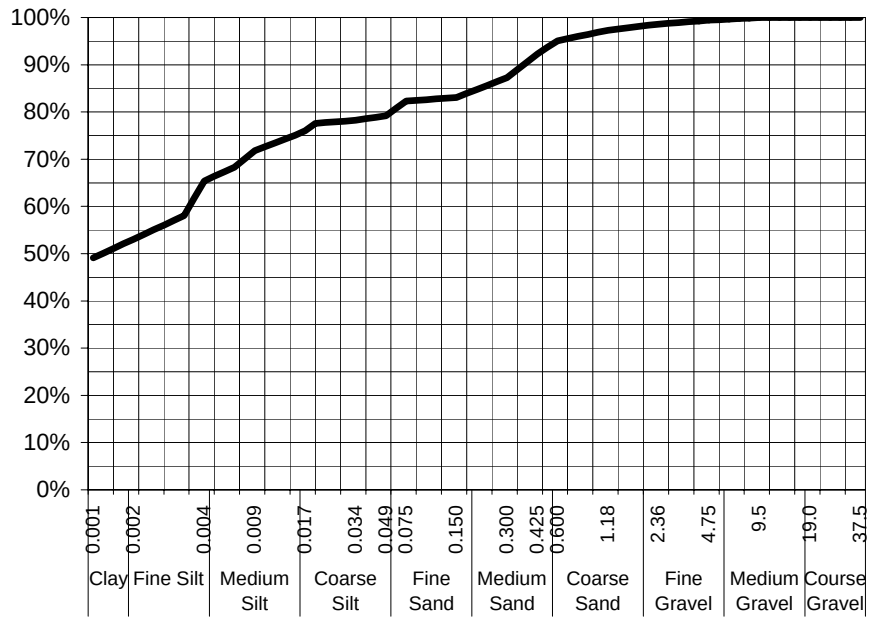
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-009 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 04 0.2-0.5

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	99%
2.36	99%
1.18	97%
0.600	95%
0.425	92%
0.300	87%
0.150	83%
0.075	82%
Particle Size (microns)	
49	79%
34	78%
17	76%
9	72%
4	65%
3	58%
1	49%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Clay, silt, sand & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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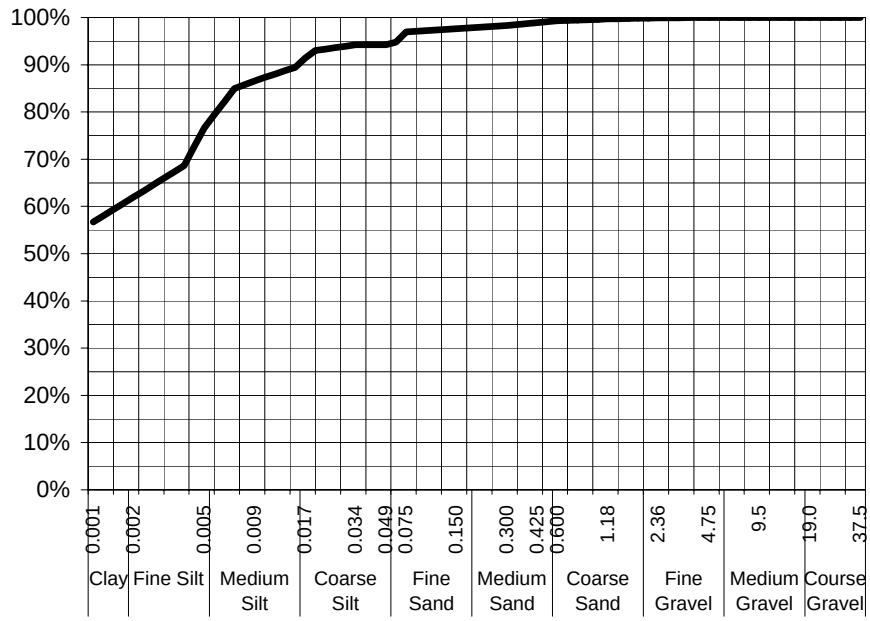
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-010 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 04 0.5-1.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	99%
0.425	99%
0.300	98%
0.150	98%
0.075	97%
Particle Size (microns)	
49	94%
34	94%
17	91%
9	87%
5	77%
3	69%
1	57%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Silty clay	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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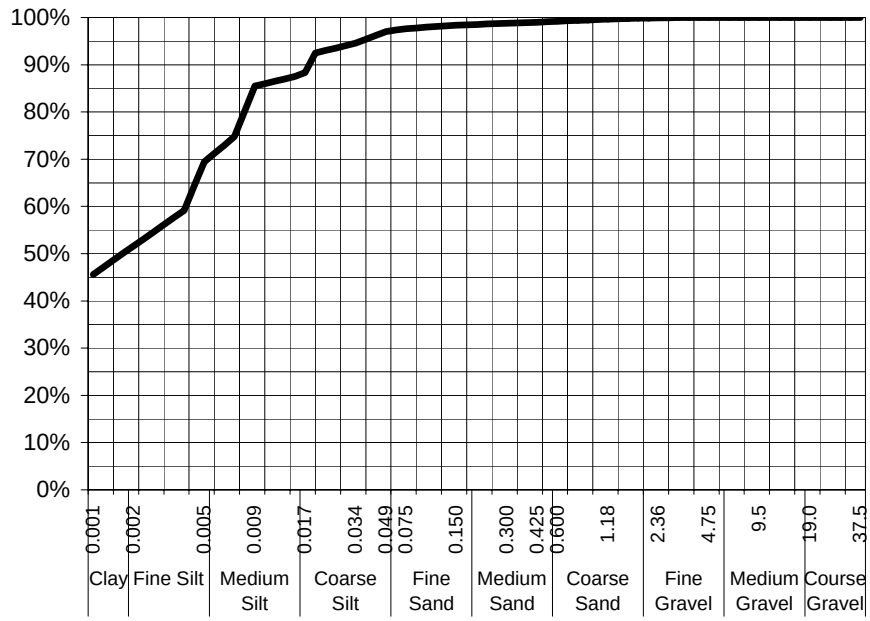
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-011 / PSD
PROJECT:	97633052	**SAMPLE ID:**	BH1-B 04 1.0-2.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	100%
2.36	100%
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	98%
Particle Size (microns)	
49	97%
34	95%
17	88%
9	85%
5	69%
3	59%
1	46%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Silty clay	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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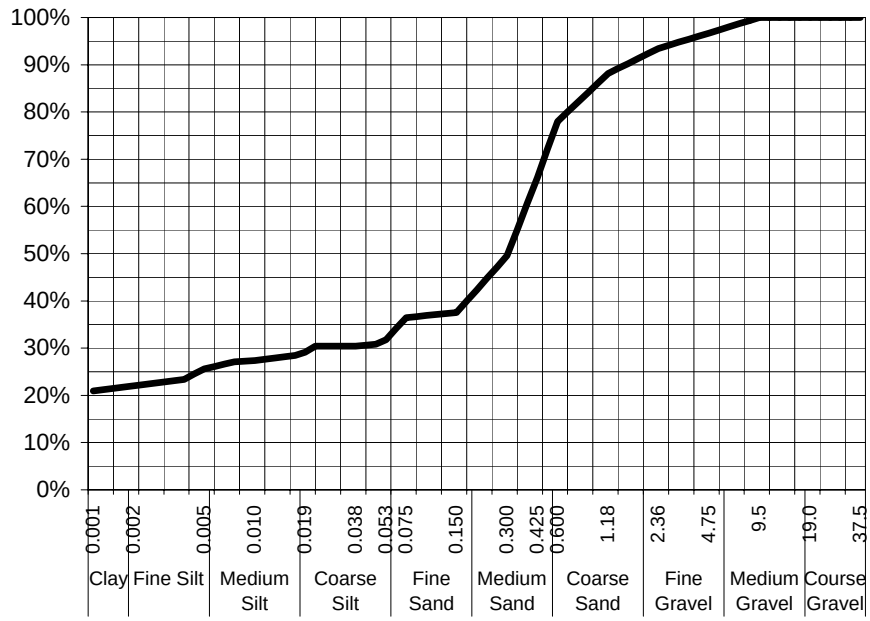
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-015 / PSD
PROJECT:	97633052	**SAMPLE ID:**	QC8

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	97%
2.36	93%
1.18	88%
0.600	78%
0.425	66%
0.300	50%
0.150	38%
0.075	36%
Particle Size (microns)	
53	32%
38	30%
19	29%
10	27%
5	26%
3	23%
1	21%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay, silt & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

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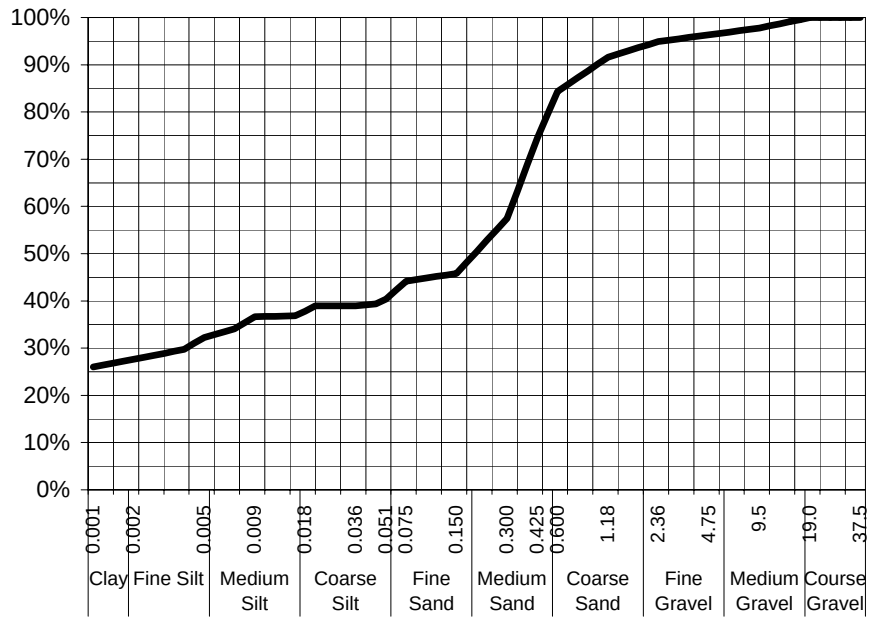
CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-016 / PSD
PROJECT:	97633052	**SAMPLE ID:**	QC9

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	98%
4.75	96%
2.36	95%
1.18	92%
0.600	84%
0.425	75%
0.300	57%
0.150	46%
0.075	44%
Particle Size (microns)	
51	40%
36	39%
18	38%
9	37%
5	32%
3	30%
1	26%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Fine sand, clay & silt	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

NATA Accreditation: 825 Site: Newcastle
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Dianne Blane
Senior Analyst
Authorised Signatory

Certificate of Analysis

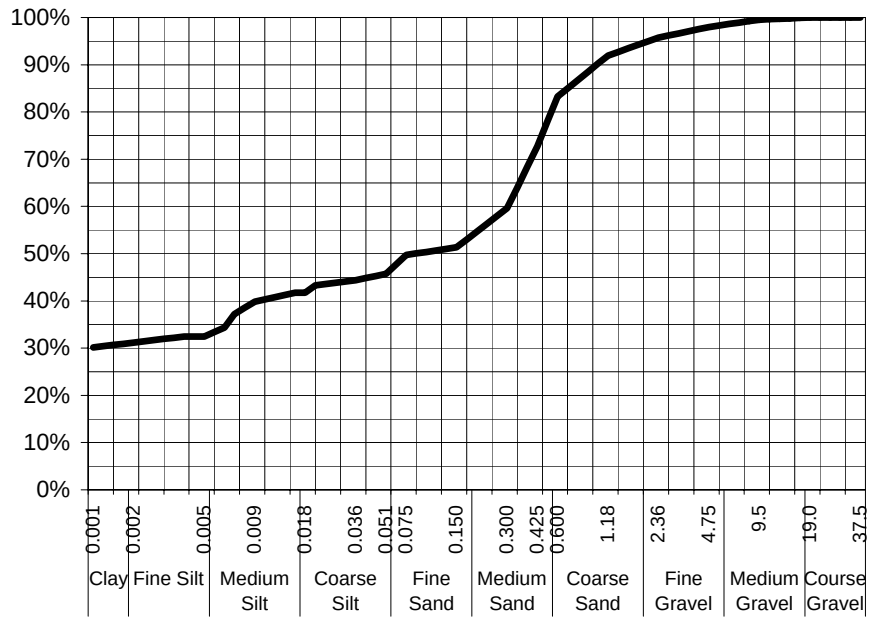
ALS Laboratory Group Pty Ltd
5 Rosegum Road
Warabrook, NSW 2304
pH 02 4968 9433
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental

Newcastle, NSW

CLIENT:	Martin Crossley	**DATE REPORTED:**	2-Oct-2009
COMPANY:	Golder Associates	**DATE RECEIVED:**	23-Sep-2009
ADDRESS:	PO Box 1734 Milton, Qld, Australia 4064	**REPORT NO:**	ES0914450-017 / PSD
PROJECT:	97633052	**SAMPLE ID:**	QC10

Particle Size Distribution



Particle Size (mm)	Percent Passing
19.0	100%
9.5	100%
4.75	98%
2.36	96%
1.18	92%
0.600	83%
0.425	73%
0.300	60%
0.150	51%
0.075	50%
Particle Size (microns)	
51	46%
36	44%
18	42%
9	40%
5	32%
3	32%
1	30%

Samples analysed as received.

Sample Comments:		**Analysed:**	29-Sep-09
Loss on Pretreatment	NA	**Limit of Reporting:**	1%
Sample Description:	Sand, clay, silt & shell	**Dispersion Method**	Shaker
Test Method:	AS1289.3.6.2/AS1289.3.6.3	**Hydrometer Type**	ASTM E100
Soil Particle Density	2.65 Assumed		

NATA Accreditation: 825 Site: Newcastle
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Dianne Blane
Senior Analyst
Authorised Signatory

Appendix 4 Primary Laboratory Reports (ALS)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0914365**	Page	: 1 of 19
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 22-SEP-2009
Sampler	: ----	Issue Date	: 30-SEP-2009
Site	: OPTION 1-B-LAIRD POINT DREDGE		
		No. of samples received	: 13
Quote number	: BN/354/09 V2	No. of samples analysed	: 13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Organics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane		Newcastle
Edwandy Fadjar	Senior Organic Chemist	Organics
Hoa Nguyen	Inorganic Chemist	Inorganics
Matt Frost	Organic Instrument Chemist	Inorganics
Matt Frost	Organic Instrument Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY
Wisam Abou-Maraseh	Spectroscopist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EP130, EP131A+B: Poor matrix spike recovery due to sample matrix interference.**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 0.0-0.5	BH1-B 02 0.5-1.0	BH1-B 02 1.0-2.0	BH1-B 02 2.0-3.0	BH1-B 02 3.0-4.0
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-001	ES0914365-002	ES0914365-003	ES0914365-004	ES0914365-005
EA150: Particle Sizing									
+75µm	----	1	%		90	85	85	89	87
+150µm	----	1	%		87	78	79	84	83
+300µm	----	1	%		37	27	31	37	35
+425µm	----	1	%		18	13	16	22	21
+600µm	----	1	%		8	7	10	15	15
+1180µm	----	1	%		3	4	5	8	10
+2.36mm	----	1	%		1	1	3	3	6
+4.75mm	----	1	%		<1	1	1	1	3
+9.5mm	----	1	%		<1	<1	<1	<1	1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		21.0	26.6	26.0	21.4	19.3
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%		8	11	11	8	9
Silt (2-60 µm)	----	1	%		1	3	3	2	4
Sand (0.06-2.00 mm)	----	1	%		90	84	84	86	82
Gravel (>2mm)	----	1	%		1	2	2	4	5
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EG005-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		2270	3990	----	----	----
Iron	7439-89-6	50	mg/kg		10200	12200	----	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		----	----	2700	2020	1690
Antimony	7440-36-0	5	mg/kg		----	----	<5	<5	<5
Arsenic	7440-38-2	5	mg/kg		----	----	9	16	13
Cadmium	7440-43-9	1	mg/kg		----	----	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		----	----	6	5	4
Cobalt	7440-48-4	2	mg/kg		----	----	7	8	7
Copper	7440-50-8	5	mg/kg		----	----	<5	<5	<5
Iron	7439-89-6	50	mg/kg		----	----	10700	12300	11400
Lead	7439-92-1	5	mg/kg		----	----	<5	<5	<5
Manganese	7439-96-5	5	mg/kg		----	----	890	2290	1570
Nickel	7440-02-0	2	mg/kg		----	----	4	4	3
Selenium	7782-49-2	5	mg/kg		----	----	<5	<5	<5
Silver	7440-22-4	2	mg/kg		----	----	<2	<2	<2

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 02 0.0-0.5	BH1-B 02 0.5-1.0	BH1-B 02 1.0-2.0	BH1-B 02 2.0-3.0	BH1-B 02 3.0-4.0
Client sampling date / time				21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				ES0914365-001	ES0914365-002	ES0914365-003	ES0914365-004	ES0914365-005
EG005T: Total Metals by ICP-AES - Continued								
Vanadium	7440-62-2	5	mg/kg	----	----	**25**	**30**	**27**
Zinc	7440-66-6	5	mg/kg	----	----	**10**	**8**	**8**
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	----	----	----
Arsenic	7440-38-2	1.00	mg/kg	**9.54**	**9.17**	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----
Chromium	7440-47-3	1.0	mg/kg	**5.0**	**7.7**	----	----	----
Copper	7440-50-8	1.0	mg/kg	**2.8**	**5.2**	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	**7.5**	**8.0**	----	----	----
Lead	7439-92-1	1.0	mg/kg	**1.6**	**2.7**	----	----	----
Manganese	7439-96-5	10	mg/kg	**758**	**662**	----	----	----
Nickel	7440-02-0	1.0	mg/kg	**3.6**	**4.8**	----	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.2**	**0.4**	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	**0.1**	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	**21.7**	**25.6**	----	----	----
Zinc	7440-66-6	1.0	mg/kg	**10.7**	**13.9**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	<0.01	**0.01**	----	----	----
Mercury	7439-97-6	0.1	mg/kg	----	----	**0.2**	<0.1	<0.1
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	**0.14**	**0.31**	**0.29**	**0.17**	**0.06**
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C15 - C28 Fraction	----	3	mg/kg	**10**	<3	<3	**4**	**4**
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	----	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 0.0-0.5	BH1-B 02 0.5-1.0	BH1-B 02 1.0-2.0	BH1-B 02 2.0-3.0	BH1-B 02 3.0-4.0
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-001	ES0914365-002	ES0914365-003	ES0914365-004	ES0914365-005
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued									
Carbophenothion	786-19-6	10	µg/kg		<10	<10	<10	<10	<10
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg		<10.0	<10.0	<10.0	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg		<10	<10	<10	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg		<10	<10	<10	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg		<10	<10	<10	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg		<10	<10	<10	<10	<10
Diazinon	333-41-5	10	µg/kg		<10	<10	<10	<10	<10
Dichlorvos	62-73-7	10	µg/kg		<10	<10	<10	<10	<10
Dimethoate	60-51-5	10	µg/kg		<10	<10	<10	<10	<10
Ethion	563-12-2	10	µg/kg		<10	<10	<10	<10	<10
Fenamiphos	22224-92-6	10	µg/kg		<10	<10	<10	<10	<10
Fenthion	55-38-9	10	µg/kg		<10	<10	<10	<10	<10
Malathion	121-75-5	10	µg/kg		<10	<10	<10	<10	<10
Azinphos Methyl	----	10	µg/kg		<10	<10	<10	<10	<10
Monocrotophos	6923-22-4	10	µg/kg		<10	<10	<10	<10	<10
Parathion	56-38-2	10	µg/kg		<10	<10	<10	<10	<10
Parathion-methyl	298-00-0	10	µg/kg		<10	<10	<10	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg		<10	<10	<10	<10	<10
Prothiofos	34643-46-4	10	µg/kg		<10	<10	<10	<10	<10
EP131A: Organochlorine Pesticides									
Aldrin	309-00-2	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 02 0.0-0.5	BH1-B 02 0.5-1.0	BH1-B 02 1.0-2.0	BH1-B 02 2.0-3.0	BH1-B 02 3.0-4.0
				Client sampling date / time: 21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				ES0914365-001	ES0914365-002	ES0914365-003	ES0914365-004	ES0914365-005
EP131A: Organochlorine Pesticides - Continued								
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 02 0.0-0.5	BH1-B 02 0.5-1.0	BH1-B 02 1.0-2.0	BH1-B 02 2.0-3.0	BH1-B 02 3.0-4.0
				Client sampling date / time: 21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				ES0914365-001	ES0914365-002	ES0914365-003	ES0914365-004	ES0914365-005
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<4
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**109**	**111**	**116**	**110**	**111**
Toluene-D8	2037-26-5	0.1	%	**112**	**115**	**112**	**115**	**119**
4-Bromofluorobenzene	460-00-4	0.1	%	**116**	**113**	**115**	**115**	**110**
EP090S: Organotin Surrogate								
Tripropyltin	----	0.1	%	**156**	**110**	----	----	----
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	**62.9**	**66.6**	**66.5**	**66.2**	**67.1**
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	**48.0**	**45.6**	**47.8**	**44.5**	**37.4**
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**46.3**	**46.6**	**44.5**	**47.8**	**37.5**
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**123**	**100**	**127**	**117**	**112**
Anthracene-d10	1719-06-8	0.1	%	**91.1**	**93.6**	**96.5**	**112**	**99.6**
4-Terphenyl-d14	1718-51-0	0.1	%	**91.8**	**92.9**	**93.6**	**117**	**104**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 4.0-4.75	BH1-B 02 4.75-5.8	BH1-B 05 0.0-0.5	BH1-B 05 0.5-1.0	BH1-B 05 1.0-1.5
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-006	ES0914365-007	ES0914365-008	ES0914365-009	ES0914365-010
EA150: Particle Sizing									
+75µm	----	1	%		74	2	4	6	15
+150µm	----	1	%		69	1	3	2	7
+300µm	----	1	%		44	<1	2	1	3
+425µm	----	1	%		35	<1	1	1	2
+600µm	----	1	%		27	<1	1	<1	1
+1180µm	----	1	%		14	<1	1	<1	1
+2.36mm	----	1	%		7	<1	<1	<1	<1
+4.75mm	----	1	%		1	<1	<1	<1	<1
+9.5mm	----	1	%		<1	<1	<1	<1	<1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		20.4	20.4	45.5	44.2	44.7
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%		18	51	43	47	40
Silt (2-60 µm)	----	1	%		7	43	50	43	41
Sand (0.06-2.00 mm)	----	1	%		68	6	6	10	19
Gravel (>2mm)	----	1	%		7	<1	1	<1	<1
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EG005-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		----	----	19400	17200	----
Iron	7439-89-6	50	mg/kg		----	----	31400	27700	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		2480	8930	----	----	16300
Antimony	7440-36-0	5	mg/kg		<5	<5	----	----	<5
Arsenic	7440-38-2	5	mg/kg		20	<5	----	----	11
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	<1
Chromium	7440-47-3	2	mg/kg		8	12	----	----	26
Cobalt	7440-48-4	2	mg/kg		8	5	----	----	12
Copper	7440-50-8	5	mg/kg		<5	18	----	----	26
Iron	7439-89-6	50	mg/kg		13800	18600	----	----	29100
Lead	7439-92-1	5	mg/kg		<5	8	----	----	9
Manganese	7439-96-5	5	mg/kg		1780	55	----	----	408
Nickel	7440-02-0	2	mg/kg		5	6	----	----	12
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	<5
Silver	7440-22-4	2	mg/kg		<2	<2	----	----	<2

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 02 4.0-4.75	BH1-B 02 4.75-5.8	BH1-B 05 0.0-0.5	BH1-B 05 0.5-1.0	BH1-B 05 1.0-1.5
Client sampling date / time				21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
				ES0914365-006	ES0914365-007	ES0914365-008	ES0914365-009	ES0914365-010
EG005T: Total Metals by ICP-AES - Continued								
Vanadium	7440-62-2	5	mg/kg	**34**	**41**	----	----	**56**
Zinc	7440-66-6	5	mg/kg	**9**	**20**	----	----	**40**
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	----	----	<0.50	<0.50	----
Arsenic	7440-38-2	1.00	mg/kg	----	----	**9.87**	**9.46**	----
Cadmium	7440-43-9	0.1	mg/kg	----	----	<0.1	<0.1	----
Chromium	7440-47-3	1.0	mg/kg	----	----	**26.8**	**24.8**	----
Copper	7440-50-8	1.0	mg/kg	----	----	**27.6**	**21.0**	----
Cobalt	7440-48-4	0.5	mg/kg	----	----	**13.1**	**11.1**	----
Lead	7439-92-1	1.0	mg/kg	----	----	**8.9**	**8.4**	----
Manganese	7439-96-5	10	mg/kg	----	----	**436**	**465**	----
Nickel	7440-02-0	1.0	mg/kg	----	----	**13.2**	**11.4**	----
Selenium	7782-49-2	0.1	mg/kg	----	----	**0.9**	**0.7**	----
Silver	7440-22-4	0.1	mg/kg	----	----	<0.1	<0.1	----
Vanadium	7440-62-2	2.0	mg/kg	----	----	**55.6**	**47.5**	----
Zinc	7440-66-6	1.0	mg/kg	----	----	**45.0**	**38.1**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	----	----	**0.02**	**0.02**	----
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	<0.1
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	**0.24**	**0.11**	**0.69**	**0.63**	**0.68**
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	**3**
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	**16**
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	**5**	**14**
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	<0.5	<0.5	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 4.0-4.75	BH1-B 02 4.75-5.8	BH1-B 05 0.0-0.5	BH1-B 05 0.5-1.0	BH1-B 05 1.0-1.5
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-006	ES0914365-007	ES0914365-008	ES0914365-009	ES0914365-010
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued									
Carbophenothion	786-19-6	10	µg/kg		<10	<10	<10	<10	<10
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg		<10.0	<10.0	<10.0	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg		<10	<10	<10	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg		<10	<10	<10	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg		<10	<10	<10	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg		<10	<10	<10	<10	<10
Diazinon	333-41-5	10	µg/kg		<10	<10	<10	<10	<10
Dichlorvos	62-73-7	10	µg/kg		<10	<10	<10	<10	<10
Dimethoate	60-51-5	10	µg/kg		<10	<10	<10	<10	<10
Ethion	563-12-2	10	µg/kg		<10	<10	<10	<10	<10
Fenamiphos	22224-92-6	10	µg/kg		<10	<10	<10	<10	<10
Fenthion	55-38-9	10	µg/kg		<10	<10	<10	<10	<10
Malathion	121-75-5	10	µg/kg		<10	<10	<10	<10	<10
Azinphos Methyl	----	10	µg/kg		<10	<10	<10	<10	<10
Monocrotophos	6923-22-4	10	µg/kg		<10	<10	<10	<10	<10
Parathion	56-38-2	10	µg/kg		<10	<10	<10	<10	<10
Parathion-methyl	298-00-0	10	µg/kg		<10	<10	<10	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg		<10	<10	<10	<10	<10
Prothiofos	34643-46-4	10	µg/kg		<10	<10	<10	<10	<10
EP131A: Organochlorine Pesticides									
Aldrin	309-00-2	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 4.0-4.75	BH1-B 02 4.75-5.8	BH1-B 05 0.0-0.5	BH1-B 05 0.5-1.0	BH1-B 05 1.0-1.5
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-006	ES0914365-007	ES0914365-008	ES0914365-009	ES0914365-010
EP131A: Organochlorine Pesticides - Continued									
Heptachlor epoxide	1024-57-3	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)									
^ Total Polychlorinated biphenyls	----	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	5	µg/kg		<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg		<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg		<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg		<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg		<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg		<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg		<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg		<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg		<4	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg		<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg		<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg		<4	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg		<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg		<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg		<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg		<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg		<4	<4	<4	<4	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg		<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg		<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 02 4.0-4.75	BH1-B 02 4.75-5.8	BH1-B 05 0.0-0.5	BH1-B 05 0.5-1.0	BH1-B 05 1.0-1.5
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00
					ES0914365-006	ES0914365-007	ES0914365-008	ES0914365-009	ES0914365-010
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Coronene	191-07-1	5	µg/kg		<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg		<4	<4	<4	<4	<4
EP080-SD: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**118**	**116**	**102**	**105**	**105**
Toluene-D8	2037-26-5	0.1	%		**116**	**100**	**111**	**109**	**114**
4-Bromofluorobenzene	460-00-4	0.1	%		**112**	**114**	**100**	**97.5**	**104**
EP090S: Organotin Surrogate									
Tripropyltin	----	0.1	%		----	----	**103**	**84.9**	----
EP130S: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		**80.0**	**41.8**	**61.1**	**70.0**	**69.6**
EP131S: OC Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		**56.9**	**68.3**	**45.5**	**38.1**	**20.5**
EP131T: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**56.4**	**67.0**	**42.6**	**37.6**	**23.2**
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**110**	**124**	**110**	**105**	**111**
Anthracene-d10	1719-06-8	0.1	%		**102**	**88.8**	**84.4**	**90.3**	**95.8**
4-Terphenyl-d14	1718-51-0	0.1	%		**106**	**97.5**	**86.4**	**93.8**	**98.1**

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 06 0.0-0.4	BH1-B 06 0.4-0.6	QC5	----	----
				Client sampling date / time: 21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----
				ES0914365-011	ES0914365-012	ES0914365-013	----	----
EA150: Particle Sizing								
+75µm	----	1	%	**44**	----	**91**	----	----
+150µm	----	1	%	**35**	----	**88**	----	----
+300µm	----	1	%	**30**	----	**39**	----	----
+425µm	----	1	%	**27**	----	**19**	----	----
+600µm	----	1	%	**26**	----	**9**	----	----
+1180µm	----	1	%	**23**	----	**4**	----	----
+2.36mm	----	1	%	**20**	----	**2**	----	----
+4.75mm	----	1	%	**17**	----	**1**	----	----
+9.5mm	----	1	%	**4**	----	<1	----	----
+19.0mm	----	1	%	<1	----	<1	----	----
+37.5mm	----	1	%	<1	----	<1	----	----
+75.0mm	----	1	%	<1	----	<1	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**42.8**	**25.2**	**22.5**	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	**22**	----	**7**	----	----
Silt (2-60 µm)	----	1	%	**32**	----	**1**	----	----
Sand (0.06-2.00 mm)	----	1	%	**26**	----	**91**	----	----
Gravel (>2mm)	----	1	%	**20**	----	**1**	----	----
Cobbles (>6cm)	----	1	%	<1	----	<1	----	----
EG005-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**12100**	**17300**	**2220**	----	----
Iron	7439-89-6	50	mg/kg	**24800**	**38100**	**10400**	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	----	----
Arsenic	7440-38-2	1.00	mg/kg	**12.8**	**1.84**	**10.7**	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Chromium	7440-47-3	1.0	mg/kg	**20.5**	**21.5**	**5.0**	----	----
Copper	7440-50-8	1.0	mg/kg	**14.7**	**36.0**	**2.8**	----	----
Cobalt	7440-48-4	0.5	mg/kg	**13.1**	**14.7**	**7.7**	----	----
Lead	7439-92-1	1.0	mg/kg	**6.5**	**5.6**	**1.6**	----	----
Manganese	7439-96-5	10	mg/kg	**391**	**413**	**816**	----	----
Nickel	7440-02-0	1.0	mg/kg	**9.4**	**16.3**	**3.6**	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.7**	**1.0**	**0.3**	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Vanadium	7440-62-2	2.0	mg/kg	**49.4**	**96.8**	**23.4**	----	----
Zinc	7440-66-6	1.0	mg/kg	**33.1**	**53.2**	**10.1**	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 06 0.0-0.4	BH1-B 06 0.4-0.6	QC5	----	----
			Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----
				ES0914365-011	ES0914365-012	ES0914365-013	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	**0.01**	<0.01	<0.01	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	**0.56**	**0.17**	**0.34**	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	----	<3	----	----
C10 - C14 Fraction	----	3	mg/kg	----	----	<3	----	----
C15 - C28 Fraction	----	3	mg/kg	----	----	**8**	----	----
C29 - C36 Fraction	----	5	mg/kg	----	----	<5	----	----
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	----	----	<0.2	----	----
Toluene	108-88-3	0.2	mg/kg	----	----	<0.2	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	<0.2	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	<0.2	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	<0.2	----	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	<10	----	----
Carbophenothion	786-19-6	10	µg/kg	----	----	<10	----	----
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	----	<10.0	----	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	----	<10	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	<10	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	<10	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	<10	----	----
Diazinon	333-41-5	10	µg/kg	----	----	<10	----	----
Dichlorvos	62-73-7	10	µg/kg	----	----	<10	----	----
Dimethoate	60-51-5	10	µg/kg	----	----	<10	----	----
Ethion	563-12-2	10	µg/kg	----	----	<10	----	----
Fenamiphos	22224-92-6	10	µg/kg	----	----	<10	----	----
Fenthion	55-38-9	10	µg/kg	----	----	<10	----	----
Malathion	121-75-5	10	µg/kg	----	----	<10	----	----
Azinphos Methyl	----	10	µg/kg	----	----	<10	----	----
Monocrotophos	6923-22-4	10	µg/kg	----	----	<10	----	----
Parathion	56-38-2	10	µg/kg	----	----	<10	----	----
Parathion-methyl	298-00-0	10	µg/kg	----	----	<10	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	<10	----	----

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 06 0.0-0.4	BH1-B 06 0.4-0.6	QC5	----	----
				Client sampling date / time: 21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----
				ES0914365-011	ES0914365-012	ES0914365-013	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Prothiofos	34643-46-4	10	µg/kg	----	----	<10	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	----	----	<0.50	----	----
alpha-BHC	319-84-6	0.50	µg/kg	----	----	<0.50	----	----
beta-BHC	319-85-7	0.50	µg/kg	----	----	<0.50	----	----
delta-BHC	319-86-8	0.50	µg/kg	----	----	<0.50	----	----
4.4`-DDD	72-54-8	0.50	µg/kg	----	----	<0.50	----	----
4.4`-DDE	72-55-9	0.50	µg/kg	----	----	<0.50	----	----
4.4`-DDT	50-29-3	0.50	µg/kg	----	----	<0.50	----	----
^ DDT (total)	----	0.50	µg/kg	----	----	<0.50	----	----
Dieldrin	60-57-1	0.50	µg/kg	----	----	<0.50	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	<0.50	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	<0.50	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	<0.50	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	<0.50	----	----
Endrin	72-20-8	0.50	µg/kg	----	----	<0.50	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	<0.50	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	<0.50	----	----
Heptachlor	76-44-8	0.50	µg/kg	----	----	<0.50	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	<0.50	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	<0.50	----	----
gamma-BHC	58-89-9	0.25	µg/kg	----	----	<0.25	----	----
Methoxychlor	72-43-5	0.50	µg/kg	----	----	<0.50	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	<0.25	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	<0.25	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	<0.25	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	<0.50	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	<5.0	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	<5.0	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 06 0.0-0.4	BH1-B 06 0.4-0.6	QC5	----	----
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----
					ES0914365-011	ES0914365-012	ES0914365-013	----	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Naphthalene	91-20-3	5	µg/kg		<5	<5	<5	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg		<5	<5	<5	----	----
Acenaphthylene	208-96-8	4	µg/kg		<4	<4	<4	----	----
Acenaphthene	83-32-9	4	µg/kg		<4	<4	<4	----	----
Fluorene	86-73-7	4	µg/kg		<4	<4	<4	----	----
Phenanthrene	85-01-8	4	µg/kg		**5**	<4	<4	----	----
Anthracene	120-12-7	4	µg/kg		<4	<4	<4	----	----
Fluoranthene	206-44-0	4	µg/kg		<4	<4	<4	----	----
Pyrene	129-00-0	4	µg/kg		<4	<4	<4	----	----
Benz(a)anthracene	56-55-3	4	µg/kg		<4	<4	<4	----	----
Chrysene	218-01-9	4	µg/kg		<4	<4	<4	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg		<4	<4	<4	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg		<4	<4	<4	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg		<4	<4	<4	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg		<4	<4	<4	----	----
Perylene	198-55-0	4	µg/kg		<4	<4	<4	----	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg		<4	<4	<4	----	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg		<4	<4	<4	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg		<4	<4	<4	----	----
Coronene	191-07-1	5	µg/kg		<5	<5	<5	----	----
^ Sum of PAHs	----	4	µg/kg		**5**	<4	<4	----	----
EP080-SD: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	----	**107**	----	----
Toluene-D8	2037-26-5	0.1	%		----	----	**118**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		----	----	**109**	----	----
EP090S: Organotin Surrogate									
Tripropyltin	----	0.1	%		**91.9**	**98.4**	**84.7**	----	----
EP130S: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		----	----	**65.5**	----	----
EP131S: OC Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		----	----	**47.8**	----	----
EP131T: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	**46.8**	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**123**	**115**	**123**	----	----
Anthracene-d10	1719-06-8	0.1	%		**97.9**	**91.4**	**86.4**	----	----

Analytical Results

Sub-Matrix: SEDIMENT	Client sample ID	BH1-B 06 0.0-0.4	BH1-B 06 0.4-0.6	QC5	----	----
	Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----
Compound / CAS Number / LOR / Unit		ES0914365-011	ES0914365-012	ES0914365-013	----	----
EP132T: Base/Neutral Extractable Surrogates - Continued						
4-Terphenyl-d14 1718-51-0 0.1 %		**100**	**97.1**	**89.4**	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	74.7	127
Toluene-D8	2037-26-5	74.8	129
4-Bromofluorobenzene	460-00-4	75.3	127
EP090S: Organotin Surrogate			
Tripropyltin	----	34	108
EP130S: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	51.3	136.9
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	136
EP131T: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	10	164
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0914365**	Page	: 1 of 17
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: OPTION 1-B-LAIRD POINT DREDGE		
C-O-C number	: ----	Date Samples Received	: 22-SEP-2009
Sampler	: ----	Issue Date	: 30-SEP-2009
Order number	: ----		
		No. of samples received	: 13
Quote number	: BN/354/09 V2	No. of samples analysed	: 13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Organics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane		Newcastle
Edwandy Fadjar	Senior Organic Chemist	Organics
Hoa Nguyen	Inorganic Chemist	Inorganics
Matt Frost	Organic Instrument Chemist	Inorganics
Matt Frost	Organic Instrument Chemist	Organics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY
Wisam Abou-Maraseh	Spectroscopist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 1111585)									
EB0915025-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	20.0	24.0	18.4	0% - 20%
ES0914365-002	BH1-B 02 0.5-1.0	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	26.6	26.3	0.8	0% - 20%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1114904)									
ES0914365-001	BH1-B 02 0.0-0.5	EG005-SD: Aluminium	7429-90-5	50	mg/kg	2270	2380	4.8	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	10200	10400	2.1	0% - 20%
ES0914450-005	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	7150	7080	0.9	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	15800	15700	0.4	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1114510)									
ES0914365-003	BH1-B 02 1.0-2.0	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	11	21.8	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	890	756	16.3	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	25	26	4.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	2700	2630	2.7	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	10700	11300	5.9	0% - 20%
ES0914384-007	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	8	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	14	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	17	10.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	179	180	0.7	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	24	25	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 1114510) - continued									
ES0914384-007	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	49	57	14.4	0% - 50%
		EG005T: Aluminium	7429-90-5	50	mg/kg	5390	4790	11.8	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	18400	18900	2.6	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1114512)									
ES0914450-011	Anonymous	EG005T: Manganese	7439-96-5	5	mg/kg	132	116	12.9	0% - 20%
ES0914524-002	Anonymous	EG005T: Manganese	7439-96-5	5	mg/kg	62	73	16.0	0% - 50%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1114903)									
ES0914365-001	BH1-B 02 0.0-0.5	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.2	0.3	35.9	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	7.5	7.3	2.6	0% - 50%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	5.0	5.2	2.0	No Limit
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	2.8	2.7	0.0	No Limit
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	1.6	1.8	10.1	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	3.6	3.5	0.0	No Limit
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	10.7	10.1	6.2	0% - 50%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	9.54	8.96	6.2	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	758	838	10.0	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	21.7	21.6	0.0	0% - 50%
ES0914450-005	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	9.8	9.7	0.0	0% - 50%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	14.8	14.8	0.0	0% - 50%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	14.2	13.9	2.1	0% - 50%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	6.6	6.5	0.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	9.9	10.0	1.3	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	27.0	27.3	1.2	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	11.4	11.3	0.6	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	239	235	1.5	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	35.5	36.1	1.5	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114511)									
ES0914365-003	BH1-B 02 1.0-2.0	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	84.9	No Limit
ES0914384-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114902)									
ES0914365-001	BH1-B 02 0.0-0.5	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.0	No Limit
ES0914450-005	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.01	0.01	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP005: Total Organic Carbon (TOC) (QC Lot: 1114336)									
ES0914365-001	BH1-B 02 0.0-0.5	EP005: Total Organic Carbon	----	0.02	%	0.14	0.13	9.2	No Limit
ES0914365-011	BH1-B 06 0.0-0.4	EP005: Total Organic Carbon	----	0.02	%	0.56	0.57	2.6	0% - 20%
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1110280)									
ES0914365-001	BH1-B 02 0.0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	6	72.1	No Limit
ES0914365-013	QC5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1110977)									
ES0914365-001	BH1-B 02 0.0-0.5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	10	8	12.7	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	6	0.0	No Limit
ES0914365-013	QC5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	8	8	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.0	No Limit
EP080-SD: BTEX (QC Lot: 1110280)									
ES0914365-001	BH1-B 02 0.0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES0914365-013	QC5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP090: Organotin Compounds (QC Lot: 1111152)									
ES0914365-001	BH1-B 02 0.0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1110277)									
ES0914365-001	BH1-B 02 0.0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1110277) - continued									
ES0914365-001	BH1-B 02 0.0-0.5	EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	----	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
ES0914365-013	QC5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	----	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 1110278)									
ES0914365-001	BH1-B 02 0.0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP131A: Organochlorine Pesticides (QC Lot: 1110278) - continued									
ES0914365-001	BH1-B 02 0.0-0.5	EP131A: 4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
ES0914365-013	QC5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1110279)									
ES0914365-001	BH1-B 02 0.0-0.5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
ES0914365-013	QC5	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1110976)									
ES0914365-001	BH1-B 02 0.0-0.5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES0914365-013	QC5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1110976) - continued									
ES0914365-013	QC5	EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1114904)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 1114510)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	13.1 mg/kg	114	90.1	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2.76 mg/kg	101	83.3	111
EG005T: Chromium	7440-47-3	2	mg/kg	<2	60.9 mg/kg	106	89.2	117
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	24.5 mg/kg	101	70	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	54.7 mg/kg	102	90.1	114
EG005T: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Lead	7439-92-1	5	mg/kg	<5	55.2 mg/kg	100	85.2	111
EG005T: Manganese	7439-96-5	5	mg/kg	<5	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	54.8 mg/kg	106	88.3	116
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	----	----	----	----
EG005T: Zinc	7440-66-6	5	mg/kg	<5	104 mg/kg	102	88.9	112
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1114903)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	100	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	91.7	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	93.5	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	97.0	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	96.1	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	88.5	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	91.8	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	92.7	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	78.8	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	34 mg/kg	93.4	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	96.3	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	1.4 mg/kg	80.2	67	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114902)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	88.8	74.2	126
EP005: Total Organic Carbon (TOC) (QCLot: 1114336)								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	100	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1110280)								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	91.3	68.4	128
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1110977)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	112	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	98.0	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	103	72.6	117
EP080-SD: BTEX (QCLot: 1110280)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	104	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	108	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	110	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	2 mg/kg	113	66.5	124
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	114	66.7	123
EP090: Organotin Compounds (QCLot: 1111152)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	12.5 µgSn/kg	59.6	24.1	129
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1110277)								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	79.6	36.9	142
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	48.2	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	78.1	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	67.4	55.9	152
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	78.8	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	86.8	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	# 13.4	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	74.0	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	64.0	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	65.3	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	99.0	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	80.5	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	76.3	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	77.9	38.1	143
EP130: Azinphos Methyl	----	10	µg/kg	<10	50 µg/kg	64.8	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	20.0	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	95.3	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	85.0	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	84.2	47.1	141

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1110277) - continued								
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	88.5	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1110278)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	94.2	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	131	24.5	150
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	114	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	112	38.2	137
EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	121	42.5	141
EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	71.2	34.8	140
EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	91.2	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	94.6	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	87.1	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	95.3	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	93.8	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	93.4	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	70.4	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	82.3	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	101	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	89.1	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	85.9	18.6	146
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	82.2	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	98.5	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	113	22.3	145
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	81.2	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1110279)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	85.7	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1110976)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	90.8	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	124	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	81.5	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1110976) - continued								
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	86.3	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	76.9	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	90.4	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	82.9	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	95.4	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	103	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	81.7	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	87.7	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	83.7	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	92.4	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	78.0	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	86.2	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	76.4	----	----
EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	97.6	----	----
EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	84.4	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	88.7	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	83.1	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1114510)							
ES0914365-003	BH1-B 02 1.0-2.0	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.7	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	104	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.7	70	130
		EG005T: Selenium	7782-49-2	50 mg/kg	101	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.4	70	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1114903)							
ES0914365-001	BH1-B 02 0.0-0.5	EG020-SD: Arsenic	7440-38-2	50 mg/kg	91.7	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	92.6	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	93.5	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	88.4	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	85.8	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	91.0	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	91.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)							
ES0914365-003	BH1-B 02 1.0-2.0	EG035T: Mercury	7439-97-6	5 mg/kg	93.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114902)							
ES0914365-001	BH1-B 02 0.0-0.5	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	113	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1110280)							
ES0914365-001	BH1-B 02 0.0-0.5	EP080-SD: C6 - C9 Fraction	----	26 mg/kg	83.0	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1110977)							
ES0914365-001	BH1-B 02 0.0-0.5	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	105	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	99.2	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	115	70	130
EP080-SD: BTEX (QCLot: 1110280)							
ES0914365-001	BH1-B 02 0.0-0.5	EP080-SD: Benzene	71-43-2	2.5 mg/kg	76.6	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	86.2	70	130
		EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	90.3	70	130
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	92.0	70	130
		EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	93.2	70	130
EP090: Organotin Compounds (QCLot: 1111152)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP090: Organotin Compounds (QCLot: 1111152) - continued							
ES0914365-002	BH1-B 02 0.5-1.0	EP090: Tributyltin	56573-85-4	12.5 µgSn/kg	62.7	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1110277)							
ES0914365-001	BH1-B 02 0.0-0.5	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	57.1	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	77.2	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	79.4	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	60.0	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	79.3	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	52.9	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	40.7	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	67.1	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	59.7	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	60.9	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	79.3	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	87.0	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	49.4	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	62.3	38.1	143
		EP130: Azinphos Methyl	----	50 µg/kg	61.7	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	83.0	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	64.3	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	57.2	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	73.6	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	74.8	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1110278)							
ES0914365-001	BH1-B 02 0.0-0.5	EP131A: Aldrin	309-00-2	5 µg/kg	41.1	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	52.6	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	51.6	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	49.2	38.2	137
		EP131A: 4.4`-DDD	72-54-8	5 µg/kg	65.4	42.5	141
		EP131A: 4.4`-DDE	72-55-9	5 µg/kg	38.0	34.8	140
		EP131A: 4.4`-DDT	50-29-3	5 µg/kg	53.9	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	43.8	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	41.5	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	46.7	35.8	138
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	49.3	7.45	158
		EP131A: Endrin	72-20-8	5 µg/kg	46.4	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	40.0	19.3	131
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	40.0	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	56.9	31	153

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP131A: Organochlorine Pesticides (QCLot: 1110278) - continued							
ES0914365-001	BH1-B 02 0.0-0.5	EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	40.7	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	35.1	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	34.0	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	59.3	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	42.7	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	# 39.4	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1110279)							
ES0914365-001	BH1-B 02 0.0-0.5	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	# 39.1	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1110976)							
ES0914365-001	BH1-B 02 0.0-0.5	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	77.6	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	125	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	84.8	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	87.2	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	82.9	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	86.1	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	82.4	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	89.8	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	88.4	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	83.8	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	84.4	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	104	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	84.7	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	75.4	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	77.0	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	73.2	70	130
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	25 µg/kg	89.3	70	130
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	25 µg/kg	88.5	70	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	87.9	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	78.9	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0914365**	Page	: 1 of 11
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: OPTION 1-B-LAIRD POINT DREDGE		
C-O-C number	: ----	Date Samples Received	: 22-SEP-2009
Sampler	: ----	Issue Date	: 30-SEP-2009
Order number	: ----		
		No. of samples received	: 13
Quote number	: BN/354/09 V2	No. of samples analysed	: 13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**----**	----	----	**24-SEP-2009**	28-SEP-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
BH1-B 06 - 0.0-0.4,	QC5							
Soil Glass Jar - Unpreserved								
BH1-B 06 - 0.4-0.6		**21-SEP-2009**	**----**	----	----	**30-SEP-2009**	28-SEP-2009	×
EA150: Particle Sizing								
Snap Lock Bag								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**---**	---	----	**25-SEP-2009**	20-MAR-2010	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
BH1-B 06 - 0.0-0.4,	QC5							
EA150: Soil Classification based on Particle Size								
Snap Lock Bag								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**---**	---	----	**25-SEP-2009**	20-MAR-2010	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
BH1-B 06 - 0.0-0.4,	QC5							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005-SD: Total Metals in Sediments by ICP-AES							
Soil Glass Jar - Unpreserved							
BH1-B 02 - 0.0-0.5, BH1-B 02 - 0.5-1.0, BH1-B 05 - 0.0-0.5, BH1-B 05 - 0.5-1.0, BH1-B 06 - 0.0-0.4, BH1-B 06 - 0.4-0.6, QC5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**29-SEP-2009**	20-MAR-2010	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved							
BH1-B 02 - 1.0-2.0, BH1-B 02 - 2.0-3.0, BH1-B 02 - 3.0-4.0, BH1-B 02 - 4.0-4.75, BH1-B 02 - 4.75-5.8, BH1-B 05 - 1.0-1.5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**29-SEP-2009**	20-MAR-2010	✓
EG020-SD: Total Metals in Sediments by ICPMS							
Soil Glass Jar - Unpreserved							
BH1-B 02 - 0.0-0.5, BH1-B 02 - 0.5-1.0, BH1-B 05 - 0.0-0.5, BH1-B 05 - 0.5-1.0, BH1-B 06 - 0.0-0.4, BH1-B 06 - 0.4-0.6, QC5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**29-SEP-2009**	20-MAR-2010	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved							
BH1-B 02 - 1.0-2.0, BH1-B 02 - 2.0-3.0, BH1-B 02 - 3.0-4.0, BH1-B 02 - 4.0-4.75, BH1-B 02 - 4.75-5.8, BH1-B 05 - 1.0-1.5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**28-SEP-2009**	19-OCT-2009	✓
Soil Glass Jar - Unpreserved							
BH1-B 02 - 0.0-0.5, BH1-B 02 - 0.5-1.0, BH1-B 05 - 0.0-0.5, BH1-B 05 - 0.5-1.0, BH1-B 06 - 0.0-0.4, BH1-B 06 - 0.4-0.6, QC5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**29-SEP-2009**	19-OCT-2009	✓
EP005: Total Organic Carbon (TOC)							
Soil Glass Jar - Unpreserved							
BH1-B 02 - 0.0-0.5, BH1-B 02 - 0.5-1.0, BH1-B 02 - 1.0-2.0, BH1-B 02 - 2.0-3.0, BH1-B 02 - 3.0-4.0, BH1-B 02 - 4.0-4.75, BH1-B 02 - 4.75-5.8, BH1-B 05 - 0.0-0.5, BH1-B 05 - 0.5-1.0, BH1-B 05 - 1.0-1.5, BH1-B 06 - 0.0-0.4, BH1-B 06 - 0.4-0.6, QC5	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**28-SEP-2009**	19-OCT-2009	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**23-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	05-OCT-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**24-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	03-NOV-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**23-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	05-OCT-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**25-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	04-NOV-2009	✓
BH1-B 05 - 0.0-0.5,	BH1-B 05 - 0.5-1.0,							
BH1-B 06 - 0.0-0.4,	BH1-B 06 - 0.4-0.6,							
QC5								
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**23-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	02-NOV-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**23-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	02-NOV-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**23-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	02-NOV-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
QC5								
EP132B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved								
BH1-B 02 - 0.0-0.5,	BH1-B 02 - 0.5-1.0,	**21-SEP-2009**	**24-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	03-NOV-2009	✓
BH1-B 02 - 1.0-2.0,	BH1-B 02 - 2.0-3.0,							
BH1-B 02 - 3.0-4.0,	BH1-B 02 - 4.0-4.75,							
BH1-B 02 - 4.75-5.8,	BH1-B 05 - 0.0-0.5,							
BH1-B 05 - 0.5-1.0,	BH1-B 05 - 1.0-1.5,							
BH1-B 06 - 0.0-0.4,	BH1-B 06 - 0.4-0.6,							
QC5								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	7	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	7	**14.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	7	**14.3**	**5.0**	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures 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 in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)

Analytical Methods	Method	Matrix	Method Descriptions
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quanitified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na2SO4 and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP130A: Organophosphorus Pesticides (Ultra-trace)	1278481-002	----	**Demeton-S-methyl**	919-86-8	13.4 %	36.6-172%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
EP131A: Organochlorine Pesticides	ES0914365-001	BH1-B 02 0.0-0.5	**trans-Chlordane**	5103-74-2	39.4 %	42.4-139%	**Recovery less than lower data quality objective**
EP131B: Polychlorinated Biphenyls (as Aroclors)	ES0914365-001	BH1-B 02 0.0-0.5	**Aroclor 1254**	11097-69-1	39.1 %	61.3-121%	**Recovery less than lower data quality objective**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**

Regular Sample Surrogates

Sub-Matrix: **SEDIMENT**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP130S: Organophosphorus Pesticide Surrogate	ES0914365-007	BH1-B 02 4.75-5.8	**DEF**	78-48-8	41.8 %	51.3-136.9 %	**Recovery less than lower data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-001	BH1-B 02 0.0-0.5	**2-Fluorobiphenyl**	321-60-8	123 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-003	BH1-B 02 1.0-2.0	**2-Fluorobiphenyl**	321-60-8	127 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-007	BH1-B 02 4.75-5.8	**2-Fluorobiphenyl**	321-60-8	124 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-011	BH1-B 06 0.0-0.4	**2-Fluorobiphenyl**	321-60-8	123 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-004	BH1-B 02 2.0-3.0	**2-Fluorobiphenyl**	321-60-8	117 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-012	BH1-B 06 0.4-0.6	**2-Fluorobiphenyl**	321-60-8	115 %	30-115 %	**Recovery greater than upper data quality objective**
EP132T: Base/Neutral Extractable Surrogates	ES0914365-013	QC5	**2-Fluorobiphenyl**	321-60-8	123 %	30-115 %	**Recovery greater than upper data quality objective**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content						
Soil Glass Jar - Unpreserved						
BH1-B 06 - 0.4-0.6	----	----	----	30-SEP-2009	28-SEP-2009	**2**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0914448**	Page	: 1 of 3
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 30-SEP-2009
Site	: OPTION 1-B-LAIRD POINT DREDGE		
		No. of samples received	: 2
Quote number	: BN/354/09 V2	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH1-B 05 1.5-2.3	BH1-B 05 2.3-3.3	----	----	----
				Client sampling date / time	21-SEP-2009 15:00	21-SEP-2009 15:00	----	----	----
Compound	CAS Number	LOR	Unit		ES0914448-001	ES0914448-002	----	----	----
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		**41.8**	**19.6**	----	----	----
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		**16700**	**7040**	----	----	----
Antimony	7440-36-0	5	mg/kg		<5	<5	----	----	----
Arsenic	7440-38-2	5	mg/kg		**13**	**7**	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		**25**	**15**	----	----	----
Cobalt	7440-48-4	2	mg/kg		**13**	**6**	----	----	----
Copper	7440-50-8	5	mg/kg		**24**	**10**	----	----	----
Iron	7439-89-6	50	mg/kg		**27800**	**25500**	----	----	----
Lead	7439-92-1	5	mg/kg		**9**	**6**	----	----	----
Manganese	7439-96-5	5	mg/kg		**594**	**57**	----	----	----
Nickel	7440-02-0	2	mg/kg		**12**	**4**	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg		<2	<2	----	----	----
Vanadium	7440-62-2	5	mg/kg		**53**	**27**	----	----	----
Zinc	7440-66-6	5	mg/kg		**38**	**18**	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	----	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0914448**	Page	: 1 of 6
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: OPTION 1-B-LAIRD POINT DREDGE		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 30-SEP-2009
Order number	: ----		
		No. of samples received	: 2
Quote number	: BN/354/09 V2	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 1113242)									
ES0914448-001	BH1-B 05 1.5-2.3	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	41.8	41.4	0.8	0% - 20%
ES0914450-007	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	18.3	16.8	8.1	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1114510)									
ES0914365-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	11	21.8	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	890	756	16.3	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	25	26	4.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	2700	2630	2.7	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	10700	11300	5.9	0% - 20%
ES0914384-007	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	8	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	14	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	17	10.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	179	180	0.7	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	24	25	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	49	57	14.4	0% - 50%
		EG005T: Aluminium	7429-90-5	50	mg/kg	5390	4790	11.8	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	18400	18900	2.6	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114511)									
ES0914365-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	84.9	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114511) - continued									
ES0914384-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1114510)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	13.1 mg/kg	114	90.1	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2.76 mg/kg	101	83.3	111
EG005T: Chromium	7440-47-3	2	mg/kg	<2	60.9 mg/kg	106	89.2	117
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	24.5 mg/kg	101	70	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	54.7 mg/kg	102	90.1	114
EG005T: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Lead	7439-92-1	5	mg/kg	<5	55.2 mg/kg	100	85.2	111
EG005T: Manganese	7439-96-5	5	mg/kg	<5	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	54.8 mg/kg	106	88.3	116
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	----	----	----	----
EG005T: Zinc	7440-66-6	5	mg/kg	<5	104 mg/kg	102	88.9	112
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	1.4 mg/kg	80.2	67	118

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1114510)							
ES0914365-003	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.7	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	104	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.7	70	130
		EG005T: Selenium	7782-49-2	50 mg/kg	101	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.4	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)							
ES0914365-003	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	93.5	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0914448**	Page	: 1 of 5
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: OPTION 1-B-LAIRD POINT DREDGE		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 30-SEP-2009
Order number	: ----		
		No. of samples received	: 2
Quote number	: BN/354/09 V2	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content								
Soil Glass Jar - Unpreserved								
BH1-B 05 - 1.5-2.3,	BH1-B 05 - 2.3-3.3	**21-SEP-2009**	**----**	----	----	**25-SEP-2009**	28-SEP-2009	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved								
BH1-B 05 - 1.5-2.3,	BH1-B 05 - 2.3-3.3	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**29-SEP-2009**	20-MAR-2010	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
BH1-B 05 - 1.5-2.3,	BH1-B 05 - 2.3-3.3	**21-SEP-2009**	**28-SEP-2009**	19-OCT-2009	✓	**28-SEP-2009**	19-OCT-2009	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures 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 in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)

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

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0914450**	Page	: 1 of 22
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 06-OCT-2009
Site	: Option 1-B-Laird Point Dredge		
		No. of samples received	: 18
Quote number	: BN/354/09 V2	No. of samples analysed	: 18

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Organics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane		Newcastle
Edwandy Fadjar	Senior Organic Chemist	Organics
Hoa Nguyen	Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Organics
Wisam Abou-Maraseh	Spectroscopist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EG005T: Poor precision was obtained for Iron and Aluminium on sample ES0914450#5 due to sample heterogeneity.**
- **EG005T: Poor precision was obtained for Lead on sample ES0914524#2 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.**
- **EP080-SD: Poor matrix spike recovery due to sample matrix interferences. Confirmed by re-extraction and re-analysis.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 01 0.0-0.2	BH1-B 01 0.2-0.7	BH1-B 01 0.7-1.6	BH1-B 03 0.0-0.5	BH1-B 03 0.5-1.0
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
					ES0914450-001	ES0914450-002	ES0914450-003	ES0914450-004	ES0914450-005
EA150: Particle Sizing									
+75µm	----	1	%		51	7	21	61	39
+150µm	----	1	%		38	4	11	60	38
+300µm	----	1	%		4	2	4	47	28
+425µm	----	1	%		2	1	3	31	19
+600µm	----	1	%		2	1	3	20	12
+1180µm	----	1	%		1	1	2	11	6
+2.36mm	----	1	%		1	<1	1	6	3
+4.75mm	----	1	%		<1	<1	<1	3	1
+9.5mm	----	1	%		<1	<1	<1	1	<1
+19.0mm	----	1	%		<1	<1	<1	<1	<1
+37.5mm	----	1	%		<1	<1	<1	<1	<1
+75.0mm	----	1	%		<1	<1	<1	<1	<1
EA055: Moisture Content									
^ Moisture Content (dried @ 103°C)	----	1.0	%		43.2	30.0	23.3	36.1	40.3
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%		28	59	45	22	38
Silt (2-60 µm)	----	1	%		20	32	30	16	22
Sand (0.06-2.00 mm)	----	1	%		51	9	24	56	37
Gravel (>2mm)	----	1	%		1	<1	1	6	3
Cobbles (>6cm)	----	1	%		<1	<1	<1	<1	<1
EG005-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		8600	11800	----	7230	7150
Iron	7439-89-6	50	mg/kg		17200	10200	----	17400	15800
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		----	----	9450	----	----
Antimony	7440-36-0	5	mg/kg		----	----	<5	----	----
Arsenic	7440-38-2	5	mg/kg		----	----	<5	----	----
Cadmium	7440-43-9	1	mg/kg		----	----	<1	----	----
Chromium	7440-47-3	2	mg/kg		----	----	11	----	----
Cobalt	7440-48-4	2	mg/kg		----	----	<2	----	----
Copper	7440-50-8	5	mg/kg		----	----	141	----	----
Iron	7439-89-6	50	mg/kg		----	----	15800	----	----
Lead	7439-92-1	5	mg/kg		----	----	6	----	----
Manganese	7439-96-5	5	mg/kg		----	----	19	----	----
Nickel	7440-02-0	2	mg/kg		----	----	3	----	----
Selenium	7782-49-2	5	mg/kg		----	----	<5	----	----
Silver	7440-22-4	2	mg/kg		----	----	<2	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 01 0.0-0.2	BH1-B 01 0.2-0.7	BH1-B 01 0.7-1.6	BH1-B 03 0.0-0.5	BH1-B 03 0.5-1.0
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-001	ES0914450-002	ES0914450-003	ES0914450-004	ES0914450-005
EG005T: Total Metals by ICP-AES - Continued								
Vanadium	7440-62-2	5	mg/kg	----	----	**45**	----	----
Zinc	7440-66-6	5	mg/kg	----	----	**13**	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	----	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	**11.2**	**1.16**	----	**8.28**	**11.4**
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	**13.0**	**11.6**	----	**12.6**	**14.8**
Copper	7440-50-8	1.0	mg/kg	**10.7**	**33.5**	----	**8.4**	**14.2**
Cobalt	7440-48-4	0.5	mg/kg	**7.8**	**1.8**	----	**8.8**	**9.8**
Lead	7439-92-1	1.0	mg/kg	**5.1**	**5.0**	----	**3.4**	**6.6**
Manganese	7439-96-5	10	mg/kg	**208**	**13**	----	**403**	**239**
Nickel	7440-02-0	1.0	mg/kg	**6.8**	**2.9**	----	**7.1**	**9.9**
Selenium	7782-49-2	0.1	mg/kg	**0.4**	**0.6**	----	**0.4**	**0.6**
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	----	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	**38.1**	**40.7**	----	**37.3**	**35.5**
Zinc	7440-66-6	1.0	mg/kg	**24.5**	**13.2**	----	**19.6**	**27.0**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	**0.02**	<0.01	----	<0.01	**0.01**
Mercury	7439-97-6	0.1	mg/kg	----	----	<0.1	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	<0.02	<0.02	<0.02	<0.02	<0.02
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	----	----	<3	<3
C10 - C14 Fraction	----	3	mg/kg	----	----	----	<3	<3
C15 - C28 Fraction	----	3	mg/kg	----	----	----	**7**	**8**
C29 - C36 Fraction	----	5	mg/kg	----	----	----	**9**	**10**
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	----	----	----	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	----	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	----	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	----	<0.2	<0.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	----	<0.5	<0.5
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	<10	<10

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 01 0.0-0.2	BH1-B 01 0.2-0.7	BH1-B 01 0.7-1.6	BH1-B 03 0.0-0.5	BH1-B 03 0.5-1.0
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
					ES0914450-001	ES0914450-002	ES0914450-003	ES0914450-004	ES0914450-005
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued									
Carbophenothion	786-19-6	10	µg/kg		----	----	----	<10	<10
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg		----	----	----	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg		----	----	----	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg		----	----	----	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg		----	----	----	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg		----	----	----	<10	<10
Diazinon	333-41-5	10	µg/kg		----	----	----	<10	<10
Dichlorvos	62-73-7	10	µg/kg		----	----	----	<10	<10
Dimethoate	60-51-5	10	µg/kg		----	----	----	<10	<10
Ethion	563-12-2	10	µg/kg		----	----	----	<10	<10
Fenamiphos	22224-92-6	10	µg/kg		----	----	----	<10	<10
Fenthion	55-38-9	10	µg/kg		----	----	----	<10	<10
Malathion	121-75-5	10	µg/kg		----	----	----	<10	<10
Azinphos Methyl	----	10	µg/kg		----	----	----	<10	<10
Monocrotophos	6923-22-4	10	µg/kg		----	----	----	<10	<10
Parathion	56-38-2	10	µg/kg		----	----	----	<10	<10
Parathion-methyl	298-00-0	10	µg/kg		----	----	----	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg		----	----	----	<10	<10
Prothiofos	34643-46-4	10	µg/kg		----	----	----	<10	<10
EP131A: Organochlorine Pesticides									
Aldrin	309-00-2	0.50	µg/kg		----	----	----	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg		----	----	----	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg		----	----	----	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg		----	----	----	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg		----	----	----	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg		----	----	----	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg		----	----	----	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg		----	----	----	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg		----	----	----	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg		----	----	----	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg		----	----	----	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg		----	----	----	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg		----	----	----	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg		----	----	----	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg		----	----	----	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg		----	----	----	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg		----	----	----	<0.50	<0.50

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 01 0.0-0.2	BH1-B 01 0.2-0.7	BH1-B 01 0.7-1.6	BH1-B 03 0.0-0.5	BH1-B 03 0.5-1.0
Client sampling date / time				22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-001	ES0914450-002	ES0914450-003	ES0914450-004	ES0914450-005
EP131A: Organochlorine Pesticides - Continued								
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	<5.0	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	BH1-B 01 0.0-0.2	BH1-B 01 0.2-0.7	BH1-B 01 0.7-1.6	BH1-B 03 0.0-0.5	BH1-B 03 0.5-1.0
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
					ES0914450-001	ES0914450-002	ES0914450-003	ES0914450-004	ES0914450-005
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Coronene	191-07-1	5	µg/kg		<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg		<4	<4	<4	<4	<4
EP080-SD: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	----	----	**93.9**	**85.8**
Toluene-D8	2037-26-5	0.1	%		----	----	----	**96.6**	**103**
4-Bromofluorobenzene	460-00-4	0.1	%		----	----	----	**87.8**	**96.2**
EP090S: Organotin Surrogate									
Tripropyltin	----	0.1	%		**124**	**105**	----	**105**	**105**
EP130S: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		----	----	----	**70.6**	**41.2**
EP131S: OC Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		----	----	----	**55.4**	**52.8**
EP131T: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	**57.0**	**51.6**
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**97.8**	**92.9**	**89.3**	**86.7**	**86.6**
Anthracene-d10	1719-06-8	0.1	%		**88.8**	**81.7**	**80.4**	**86.2**	**83.3**
4-Terphenyl-d14	1718-51-0	0.1	%		**89.0**	**90.6**	**86.2**	**89.6**	**88.6**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 1.0-2.25	BH1-B 03 2.5-3.6	BH1-B 04 0.0-0.2	BH1-B 04 0.2-0.5	BH1-B 04 0.5-1.0
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-006	ES0914450-007	ES0914450-008	ES0914450-009	ES0914450-010
EA150: Particle Sizing								
+75µm	----	1	%	24	18	48	18	3
+150µm	----	1	%	22	9	46	17	2
+300µm	----	1	%	19	1	38	13	2
+425µm	----	1	%	15	<1	26	8	1
+600µm	----	1	%	11	<1	16	5	1
+1180µm	----	1	%	6	<1	8	3	<1
+2.36mm	----	1	%	3	<1	6	2	<1
+4.75mm	----	1	%	<1	<1	3	1	<1
+9.5mm	----	1	%	<1	<1	1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	47.0	18.3	43.6	28.0	28.2
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	42	46	29	49	57
Silt (2-60 µm)	----	1	%	31	28	22	33	39
Sand (0.06-2.00 mm)	----	1	%	25	26	43	17	4
Gravel (>2mm)	----	1	%	2	<1	6	1	<1
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EG005-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	10800	15900	17900
Iron	7439-89-6	50	mg/kg	----	----	19700	20700	34200
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	18100	10100	----	----	----
Antimony	7440-36-0	5	mg/kg	<5	<5	----	----	----
Arsenic	7440-38-2	5	mg/kg	15	12	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	28	17	----	----	----
Cobalt	7440-48-4	2	mg/kg	13	14	----	----	----
Copper	7440-50-8	5	mg/kg	27	15	----	----	----
Iron	7439-89-6	50	mg/kg	31200	24000	----	----	----
Lead	7439-92-1	5	mg/kg	8	9	----	----	----
Manganese	7439-96-5	5	mg/kg	484	153	----	----	----
Nickel	7440-02-0	2	mg/kg	15	10	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 1.0-2.25	BH1-B 03 2.5-3.6	BH1-B 04 0.0-0.2	BH1-B 04 0.2-0.5	BH1-B 04 0.5-1.0
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-006	ES0914450-007	ES0914450-008	ES0914450-009	ES0914450-010
EG005T: Total Metals by ICP-AES - Continued								
Vanadium	7440-62-2	5	mg/kg	**61**	**41**	----	----	----
Zinc	7440-66-6	5	mg/kg	**45**	**26**	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	----	----	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	----	----	**8.22**	**1.96**	**3.05**
Cadmium	7440-43-9	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	----	----	**17.2**	**16.4**	**20.1**
Copper	7440-50-8	1.0	mg/kg	----	----	**13.1**	**53.5**	**32.8**
Cobalt	7440-48-4	0.5	mg/kg	----	----	**9.9**	**3.7**	**8.1**
Lead	7439-92-1	1.0	mg/kg	----	----	**5.4**	**9.4**	**7.2**
Manganese	7439-96-5	10	mg/kg	----	----	**456**	**40**	**96**
Nickel	7440-02-0	1.0	mg/kg	----	----	**9.6**	**5.9**	**9.6**
Selenium	7782-49-2	0.1	mg/kg	----	----	**0.6**	**1.0**	**0.7**
Silver	7440-22-4	0.1	mg/kg	----	----	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	----	----	**41.4**	**76.5**	**84.8**
Zinc	7440-66-6	1.0	mg/kg	----	----	**30.5**	**23.9**	**38.7**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	----	----	**0.02**	**0.01**	<0.01
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	<0.02	<0.02	<0.02	<0.02	<0.02
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	----	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	<3	----	----	----
C15 - C28 Fraction	----	3	mg/kg	**16**	**5**	----	----	----
C29 - C36 Fraction	----	5	mg/kg	**15**	**6**	----	----	----
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	----	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	----	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	----	----	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	<0.5	<0.5	<0.5
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 1.0-2.25	BH1-B 03 2.5-3.6	BH1-B 04 0.0-0.2	BH1-B 04 0.2-0.5	BH1-B 04 0.5-1.0
Client sampling date / time				22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-006	ES0914450-007	ES0914450-008	ES0914450-009	ES0914450-010
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Carbophenothion	786-19-6	10	µg/kg	<10	<10	----	----	----
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	----	----	----
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	----	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	----	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	----	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	----	----	----
Diazinon	333-41-5	10	µg/kg	<10	<10	----	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	<10	----	----	----
Dimethoate	60-51-5	10	µg/kg	<10	<10	----	----	----
Ethion	563-12-2	10	µg/kg	<10	<10	----	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	----	----	----
Fenthion	55-38-9	10	µg/kg	<10	<10	----	----	----
Malathion	121-75-5	10	µg/kg	<10	<10	----	----	----
Azinphos Methyl	----	10	µg/kg	<10	<10	----	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	----	----	----
Parathion	56-38-2	10	µg/kg	<10	<10	----	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	----	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	----	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	<10	----	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	----	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	----	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	----	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	----	----	----
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	----	----	----
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	----	----	----
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	----	----	----
^ DDT (total)	----	0.50	µg/kg	<0.50	<0.50	----	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	----	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	----	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	----	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	----	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	----	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	----	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 1.0-2.25	BH1-B 03 2.5-3.6	BH1-B 04 0.0-0.2	BH1-B 04 0.2-0.5	BH1-B 04 0.5-1.0
Client sampling date / time				22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-006	ES0914450-007	ES0914450-008	ES0914450-009	ES0914450-010
EP131A: Organochlorine Pesticides - Continued								
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	----	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	----	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	----	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	----	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	----	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	----	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	----	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 03 1.0-2.25	BH1-B 03 2.5-3.6	BH1-B 04 0.0-0.2	BH1-B 04 0.2-0.5	BH1-B 04 0.5-1.0
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-006	ES0914450-007	ES0914450-008	ES0914450-009	ES0914450-010
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<4
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**103**	**88.2**	----	----	----
Toluene-D8	2037-26-5	0.1	%	**102**	**100**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**90.7**	**98.9**	----	----	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.1	%	----	----	**108**	**107**	**90.0**
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	**46.1**	**52.6**	----	----	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	**68.4**	**64.8**	----	----	----
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**62.7**	**67.2**	----	----	----
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**96.9**	**82.7**	**91.2**	**82.8**	**84.4**
Anthracene-d10	1719-06-8	0.1	%	**80.4**	**85.0**	**87.1**	**85.5**	**84.1**
4-Terphenyl-d14	1718-51-0	0.1	%	**82.7**	**86.5**	**93.0**	**87.0**	**84.6**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 1.0-2.0	TRIP BLANK	TRIP SPIKE	QC6	QC8
				Client sampling date / time: 22-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-011	ES0914450-012	ES0914450-013	ES0914450-014	ES0914450-015
EA150: Particle Sizing								
+75µm	----	1	%	2	----	----	----	64
+150µm	----	1	%	1	----	----	----	63
+300µm	----	1	%	1	----	----	----	51
+425µm	----	1	%	1	----	----	----	34
+600µm	----	1	%	<1	----	----	----	22
+1180µm	----	1	%	<1	----	----	----	12
+2.36mm	----	1	%	<1	----	----	----	7
+4.75mm	----	1	%	<1	----	----	----	4
+9.5mm	----	1	%	<1	----	----	----	<1
+19.0mm	----	1	%	<1	----	----	----	<1
+37.5mm	----	1	%	<1	----	----	----	<1
+75.0mm	----	1	%	<1	----	----	----	<1
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	26.9	----	----	24.9	35.8
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	46	----	----	----	21
Silt (2-60 µm)	----	1	%	49	----	----	----	15
Sand (0.06-2.00 mm)	----	1	%	5	----	----	----	57
Gravel (>2mm)	----	1	%	<1	----	----	----	7
Cobbles (>6cm)	----	1	%	<1	----	----	----	<1
EG005-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	3900	7040
Iron	7439-89-6	50	mg/kg	----	----	----	11700	15000
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	17500	----	----	----	----
Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	19	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	10	----	----	----	----
Copper	7440-50-8	5	mg/kg	39	----	----	----	----
Iron	7439-89-6	50	mg/kg	33500	----	----	----	----
Lead	7439-92-1	5	mg/kg	8	----	----	----	----
Manganese	7439-96-5	5	mg/kg	132	----	----	----	----
Nickel	7440-02-0	2	mg/kg	12	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 1.0-2.0	TRIP BLANK	TRIP SPIKE	QC6	QC8
			Client sampling date / time	22-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-011	ES0914450-012	ES0914450-013	ES0914450-014	ES0914450-015
EG005T: Total Metals by ICP-AES - Continued								
Vanadium	7440-62-2	5	mg/kg	**85**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**50**	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	----	----	----	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	----	----	----	**9.14**	**8.55**
Cadmium	7440-43-9	0.1	mg/kg	----	----	----	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	----	----	----	**7.3**	**12.9**
Copper	7440-50-8	1.0	mg/kg	----	----	----	**4.6**	**7.8**
Cobalt	7440-48-4	0.5	mg/kg	----	----	----	**7.8**	**7.4**
Lead	7439-92-1	1.0	mg/kg	----	----	----	**2.2**	**3.4**
Manganese	7439-96-5	10	mg/kg	----	----	----	**744**	**376**
Nickel	7440-02-0	1.0	mg/kg	----	----	----	**4.5**	**7.5**
Selenium	7782-49-2	0.1	mg/kg	----	----	----	**0.3**	**0.4**
Silver	7440-22-4	0.1	mg/kg	----	----	----	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	----	----	----	**25.5**	**30.8**
Zinc	7440-66-6	1.0	mg/kg	----	----	----	**14.0**	**18.5**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	----	----	----	<0.01	<0.01
Mercury	7439-97-6	0.1	mg/kg	**0.2**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	<0.02	----	----	<0.02	<0.02
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	<3	**228**	<3	<3
C10 - C14 Fraction	----	3	mg/kg	----	<3	<3	<3	<3
C15 - C28 Fraction	----	3	mg/kg	----	**3**	<3	**8**	**8**
C29 - C36 Fraction	----	5	mg/kg	----	<5	<5	**6**	**9**
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	**3.6**	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	----	<0.2	**56.6**	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	----	<0.2	**6.9**	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	<0.2	**41.9**	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	----	<0.2	**14.4**	<0.2	<0.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	----	<0.5	<0.5
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	<10	<10

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 1.0-2.0	TRIP BLANK	TRIP SPIKE	QC6	QC8
Client sampling date / time				22-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-011	ES0914450-012	ES0914450-013	ES0914450-014	ES0914450-015
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Carbophenothion	786-19-6	10	µg/kg	----	----	----	<10	<10
Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	----	----	----	<10.0	<10.0
Chlorfenvinphos (Z)	470-90-8	10	µg/kg	----	----	----	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	----	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	----	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	----	<10	<10
Diazinon	333-41-5	10	µg/kg	----	----	----	<10	<10
Dichlorvos	62-73-7	10	µg/kg	----	----	----	<10	<10
Dimethoate	60-51-5	10	µg/kg	----	----	----	<10	<10
Ethion	563-12-2	10	µg/kg	----	----	----	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	----	----	----	<10	<10
Fenthion	55-38-9	10	µg/kg	----	----	----	<10	<10
Malathion	121-75-5	10	µg/kg	----	----	----	<10	<10
Azinphos Methyl	----	10	µg/kg	----	----	----	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	----	----	----	<10	<10
Parathion	56-38-2	10	µg/kg	----	----	----	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	----	----	----	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	----	<10	<10
Prothiofos	34643-46-4	10	µg/kg	----	----	----	<10	<10
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	----	----	----	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	----	----	----	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg	----	----	----	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	----	----	----	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg	----	----	----	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg	----	----	----	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg	----	----	----	<0.50	<0.50
^ DDT (total)	----	0.50	µg/kg	----	----	----	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	----	----	----	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	----	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	----	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	----	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	----	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	----	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	----	----	----	<0.50	<0.50

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: BH1-B 04 1.0-2.0	TRIP BLANK	TRIP SPIKE	QC6	QC8
Client sampling date / time				22-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
				ES0914450-011	ES0914450-012	ES0914450-013	ES0914450-014	ES0914450-015
EP131A: Organochlorine Pesticides - Continued								
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1016	12974-11-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	<5.0	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	----	----	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	----	----	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	----	----	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	----	----	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	----	----	<4	<4
Phenanthrene	85-01-8	4	µg/kg	<4	----	----	<4	<4
Anthracene	120-12-7	4	µg/kg	<4	----	----	<4	<4
Fluoranthene	206-44-0	4	µg/kg	<4	----	----	<4	<4
Pyrene	129-00-0	4	µg/kg	<4	----	----	<4	<4
Benz(a)anthracene	56-55-3	4	µg/kg	<4	----	----	<4	<4
Chrysene	218-01-9	4	µg/kg	<4	----	----	<4	<4
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	----	----	<4	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	----	----	<4	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	----	----	<4	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	----	----	<4	<4
Perylene	198-55-0	4	µg/kg	<4	----	----	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	----	----	<4	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	----	----	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	----	----	<4	<4

Analytical Results

Sub-Matrix: SOIL				Client sample ID	BH1-B 04 1.0-2.0	TRIP BLANK	TRIP SPIKE	QC6	QC8
				Client sampling date / time	22-SEP-2009 15:00	21-SEP-2009 15:00	21-SEP-2009 15:00	22-SEP-2009 15:00	22-SEP-2009 15:00
Compound	CAS Number	LOR	Unit		ES0914450-011	ES0914450-012	ES0914450-013	ES0914450-014	ES0914450-015
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Coronene	191-07-1	5	µg/kg		<5	----	----	<5	<5
^ Sum of PAHs	----	4	µg/kg		<4	----	----	<4	<4
EP080-SD: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	111	85.5	107	86.7
Toluene-D8	2037-26-5	0.1	%		----	125	82.2	101	89.0
4-Bromofluorobenzene	460-00-4	0.1	%		----	116	83.9	111	86.9
EP090S: Organotin Surrogate									
Tripropyltin	----	0.1	%		----	----	----	99.6	137
EP130S: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		----	----	----	60.0	57.0
EP131S: OC Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		----	----	----	53.2	68.6
EP131T: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	----	52.0	63.8
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		88.2	----	----	103	88.4
Anthracene-d10	1719-06-8	0.1	%		87.2	----	----	85.9	93.5
4-Terphenyl-d14	1718-51-0	0.1	%		96.7	----	----	85.2	93.5

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: QC9	QC10	TSC	----	----
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	21-SEP-2009 15:00	----	----
				ES0914450-016	ES0914450-017	ES0914450-018	----	----
EA150: Particle Sizing								
+75µm	----	1	%	**56**	**50**	----	----	----
+150µm	----	1	%	**54**	**48**	----	----	----
+300µm	----	1	%	**43**	**40**	----	----	----
+425µm	----	1	%	**26**	**27**	----	----	----
+600µm	----	1	%	**16**	**16**	----	----	----
+1180µm	----	1	%	**9**	**8**	----	----	----
+2.36mm	----	1	%	**5**	**4**	----	----	----
+4.75mm	----	1	%	**4**	**2**	----	----	----
+9.5mm	----	1	%	**2**	<1	----	----	----
+19.0mm	----	1	%	<1	<1	----	----	----
+37.5mm	----	1	%	<1	<1	----	----	----
+75.0mm	----	1	%	<1	<1	----	----	----
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**47.7**	**42.0**	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	**26**	**30**	----	----	----
Silt (2-60 µm)	----	1	%	**18**	**19**	----	----	----
Sand (0.06-2.00 mm)	----	1	%	**51**	**47**	----	----	----
Gravel (>2mm)	----	1	%	**5**	**4**	----	----	----
Cobbles (>6cm)	----	1	%	<1	<1	----	----	----
EG005-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**10400**	**10800**	----	----	----
Iron	7439-89-6	50	mg/kg	**17500**	**19100**	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	----	----	----
Arsenic	7440-38-2	1.00	mg/kg	**9.90**	**9.18**	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	----	----	----
Chromium	7440-47-3	1.0	mg/kg	**17.1**	**17.3**	----	----	----
Copper	7440-50-8	1.0	mg/kg	**16.2**	**13.5**	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	**8.3**	**10.1**	----	----	----
Lead	7439-92-1	1.0	mg/kg	**4.8**	**5.4**	----	----	----
Manganese	7439-96-5	10	mg/kg	**409**	**462**	----	----	----
Nickel	7440-02-0	1.0	mg/kg	**8.9**	**9.7**	----	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.5**	**0.7**	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	**36.1**	**41.5**	----	----	----
Zinc	7440-66-6	1.0	mg/kg	**28.8**	**28.2**	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: QC9	QC10	TSC	----	----
				Client sampling date / time: 22-SEP-2009 15:00	22-SEP-2009 15:00	21-SEP-2009 15:00	----	----
				ES0914450-016	ES0914450-017	ES0914450-018	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	**0.01**	**0.02**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	0.02	%	<0.02	<0.02	----	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	----	**258**	----	----
C10 - C14 Fraction	----	3	mg/kg	----	----	<3	----	----
C15 - C28 Fraction	----	3	mg/kg	----	----	**3**	----	----
C29 - C36 Fraction	----	5	mg/kg	----	----	<5	----	----
EP080-SD: BTEX								
Benzene	71-43-2	0.2	mg/kg	----	----	**3.8**	----	----
Toluene	108-88-3	0.2	mg/kg	----	----	**61.7**	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	**7.7**	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	**44.8**	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	**15.0**	----	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	----	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	----	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	----	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	<4	----	----	----
Fluorene	86-73-7	4	µg/kg	<4	<4	----	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	<4	----	----	----
Anthracene	120-12-7	4	µg/kg	<4	<4	----	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	<4	----	----	----
Pyrene	129-00-0	4	µg/kg	<4	<4	----	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	----	----	----
Chrysene	218-01-9	4	µg/kg	<4	<4	----	----	----
Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	----	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	----	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	----	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	----	----	----
Perylene	198-55-0	4	µg/kg	<4	<4	----	----	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	----	----	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	----	----	----
Coronene	191-07-1	5	µg/kg	<5	<5	----	----	----

Analytical Results

Sub-Matrix: SOIL				Client sample ID	QC9	QC10	TSC	----	----
				Client sampling date / time	22-SEP-2009 15:00	22-SEP-2009 15:00	21-SEP-2009 15:00	----	----
Compound	CAS Number	LOR	Unit		ES0914450-016	ES0914450-017	ES0914450-018	----	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Sum of PAHs	----	4	µg/kg		<4	<4	----	----	----
EP080-SD: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	----	**92.2**	----	----
Toluene-D8	2037-26-5	0.1	%		----	----	**94.1**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		----	----	**91.9**	----	----
EP090S: Organotin Surrogate									
Tripropyltin	----	0.1	%		**134**	**125**	----	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**106**	**83.0**	----	----	----
Anthracene-d10	1719-06-8	0.1	%		**86.9**	**84.2**	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**87.2**	**83.2**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	74.7	127
Toluene-D8	2037-26-5	74.8	129
4-Bromofluorobenzene	460-00-4	75.3	127
EP090S: Organotin Surrogate			
Tripropyltin	----	34	108
EP130S: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	51.3	136.9
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	136
EP131T: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	10	164
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	30	115
Anthracene-d10	1719-06-8	27	133
4-Terphenyl-d14	1718-51-0	18	137

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0914450**	Page	: 1 of 17
Client	: **GOLDER ASSOCIATES**	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Option 1-B-Laird Point Dredge		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 06-OCT-2009
Order number	: ----		
		No. of samples received	: 18
Quote number	: BN/354/09 V2	No. of samples analysed	: 18

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Organics
Celine Conceicao	Spectroscopist	Inorganics
Dianne Blane		Newcastle
Edwandy Fadjar	Senior Organic Chemist	Organics
Hoa Nguyen	Inorganic Chemist	Inorganics
Kim McCabe	Senior Inorganic Chemist	Stafford Minerals - AY
Matt Frost	Organic Instrument Chemist	Organics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Organics
Wisam Abou-Maraseh	Spectroscopist	Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insuffient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates 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%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 1113242)									
ES0914448-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	41.8	41.4	0.8	0% - 20%
ES0914450-007	BH1-B 03 2.5-3.6	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	18.3	16.8	8.1	0% - 50%
EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1114904)									
ES0914365-001	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	2270	2380	4.8	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	10200	10400	2.1	0% - 20%
ES0914450-005	BH1-B 03 0.5-1.0	EG005-SD: Aluminium	7429-90-5	50	mg/kg	7150	7080	0.9	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	15800	15700	0.4	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1114510)									
ES0914365-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	7	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	11	21.8	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	890	756	16.3	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	25	26	4.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	10	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	2700	2630	2.7	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	10700	11300	5.9	0% - 20%
ES0914384-007	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	8	8	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	14	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	17	10.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	179	180	0.7	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	24	25	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 1114510) - continued									
ES0914384-007	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	49	57	14.4	0% - 50%
		EG005T: Aluminium	7429-90-5	50	mg/kg	5390	4790	11.8	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	18400	18900	2.6	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1114512)									
ES0914450-011	BH1-B 04 1.0-2.0	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	18	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	9	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	39	35	9.7	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	7	0.0	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	132	116	12.9	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	85	68	21.8	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	50	49	0.0	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	17500	17900	2.2	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	33500	30400	9.8	0% - 20%
ES0914524-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	5	6	20.1	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	11	0.0	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	2	0.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Antimony	7440-36-0	5	mg/kg	30	19	45.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	17	33	63.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	29	32	11.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	481	845	# 54.9	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	62	73	16.0	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	33	34	3.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	602	680	12.1	0% - 20%
		EG005T: Aluminium	7429-90-5	50	mg/kg	3090	3260	5.4	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	19400	18900	2.6	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1114903)									
ES0914365-001	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.2	0.3	35.9	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	7.5	7.3	2.6	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1114903) - continued									
ES0914365-001	Anonymous	EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	5.0	5.2	2.0	No Limit
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	2.8	2.7	0.0	No Limit
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	1.6	1.8	10.1	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	3.6	3.5	0.0	No Limit
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	10.7	10.1	6.2	0% - 50%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	9.54	8.96	6.2	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	758	838	10.0	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	21.7	21.6	0.0	0% - 50%
ES0914450-005	BH1-B 03 0.5-1.0	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.0	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	9.8	9.7	0.0	0% - 50%
		EG020-SD: Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	0.0	No Limit
		EG020-SD: Chromium	7440-47-3	1.0	mg/kg	14.8	14.8	0.0	0% - 50%
		EG020-SD: Copper	7440-50-8	1.0	mg/kg	14.2	13.9	2.1	0% - 50%
		EG020-SD: Lead	7439-92-1	1.0	mg/kg	6.6	6.5	0.0	No Limit
		EG020-SD: Nickel	7440-02-0	1.0	mg/kg	9.9	10.0	1.3	0% - 50%
		EG020-SD: Zinc	7440-66-6	1.0	mg/kg	27.0	27.3	1.2	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1.00	mg/kg	11.4	11.3	0.6	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	239	235	1.5	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2.0	mg/kg	35.5	36.1	1.5	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114511)									
ES0914365-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	84.9	No Limit
ES0914384-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114513)									
ES0914450-011	BH1-B 04 1.0-2.0	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1114902)									
ES0914365-001	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.0	No Limit
ES0914450-005	BH1-B 03 0.5-1.0	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.01	0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 1120253)									
ES0914450-001	BH1-B 01 0.0-0.2	EP005: Total Organic Carbon	----	0.02	%	<0.02	<0.02	0.0	No Limit
ES0914450-011	BH1-B 04 1.0-2.0	EP005: Total Organic Carbon	----	0.02	%	<0.02	<0.02	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1112948)									
ES0914450-004	BH1-B 03 0.0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 1112959)									
ES0914450-005	BH1-B 03 0.5-1.0	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.0	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	8	9	0.0	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	10	10	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080-SD: BTEX (QC Lot: 1112948)									
ES0914450-004	BH1-B 03 0.0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP090: Organotin Compounds (QC Lot: 1112819)									
EM0909165-001	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	1.0	<0.5	67.9	No Limit
ES0914450-014	QC6	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 1112950)									
ES0914450-005	BH1-B 03 0.5-1.0	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Azinphos Methyl	----	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.0	No Limit
		EP130: Chlorfenvinphos (E)	470-90-6	10.0	µg/kg	<10.0	<10.0	0.0	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 1112951)									
ES0914450-005	BH1-B 03 0.5-1.0	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.0	No Limit
		EP131A: Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP131A: Organochlorine Pesticides (QC Lot: 1112951) - continued									
ES0914450-005	BH1-B 03 0.5-1.0	EP131A: 4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: DDT (total)	----	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
		EP131A: Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	0.0	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1112952)									
ES0914450-005	BH1-B 03 0.5-1.0	EP131B: Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1016	12974-11-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
		EP131B: Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	0.0	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1112958)									
ES0914450-005	BH1-B 03 0.5-1.0	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1112958) - continued									
ES0914450-005	BH1-B 03 0.5-1.0	EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit
ES0914450-011	BH1-B 04 1.0-2.0	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.0	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.0	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.0	No Limit

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

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 parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1114904)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 1114510)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	13.1 mg/kg	114	90.1	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2.76 mg/kg	101	83.3	111
EG005T: Chromium	7440-47-3	2	mg/kg	<2	60.9 mg/kg	106	89.2	117
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	24.5 mg/kg	101	70	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	54.7 mg/kg	102	90.1	114
EG005T: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Lead	7439-92-1	5	mg/kg	<5	55.2 mg/kg	100	85.2	111
EG005T: Manganese	7439-96-5	5	mg/kg	<5	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	54.8 mg/kg	106	88.3	116
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	----	----	----	----
EG005T: Zinc	7440-66-6	5	mg/kg	<5	104 mg/kg	102	88.9	112
EG005T: Total Metals by ICP-AES (QCLot: 1114512)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	----	----	----	----
EG005T: Antimony	7440-36-0	5	mg/kg	<5	----	----	----	----
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	13.1 mg/kg	112	90.1	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2.76 mg/kg	99.8	83.3	111
EG005T: Chromium	7440-47-3	2	mg/kg	<2	60.9 mg/kg	106	89.2	117
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	24.5 mg/kg	100	70	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	54.7 mg/kg	102	90.1	114
EG005T: Iron	7439-89-6	50	mg/kg	<50	----	----	----	----
EG005T: Lead	7439-92-1	5	mg/kg	<5	55.2 mg/kg	100	85.2	111
EG005T: Manganese	7439-96-5	5	mg/kg	<5	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	54.8 mg/kg	106	88.3	116
EG005T: Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
EG005T: Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	----	----	----	----
EG005T: Zinc	7440-66-6	5	mg/kg	<5	104 mg/kg	102	88.9	112

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1114903)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----
EG020-SD: Arsenic	7440-38-2	1.0	mg/kg	<1.00	13.1 mg/kg	100	70	130
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	2.76 mg/kg	91.7	70	130
EG020-SD: Chromium	7440-47-3	1.0	mg/kg	<1.0	60.9 mg/kg	93.5	70	130
EG020-SD: Copper	7440-50-8	1.0	mg/kg	<1.0	54.7 mg/kg	97.0	70	130
EG020-SD: Cobalt	7440-48-4	10	mg/kg	<10.0	24.5 mg/kg	96.1	70	130
EG020-SD: Lead	7439-92-1	1.0	mg/kg	<1.0	54.8 mg/kg	88.5	70	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	136 mg/kg	91.8	70	130
EG020-SD: Nickel	7440-02-0	1.0	mg/kg	<1.0	55.2 mg/kg	92.7	70	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	5.6 mg/kg	78.8	70	130
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	34 mg/kg	93.4	70	130
EG020-SD: Zinc	7440-66-6	1.0	mg/kg	<1.0	104 mg/kg	96.3	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	1.4 mg/kg	80.2	67	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114513)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	1.4 mg/kg	76.4	67	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114902)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.090 mg/kg	88.8	74.2	126
EP005: Total Organic Carbon (TOC) (QCLot: 1120253)								
EP005: Total Organic Carbon	----	0.02	%	<0.02	100 %	0.0	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1112948)								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	26 mg/kg	78.9	68.4	128
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1112959)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	109	75.2	116
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	5 mg/kg	101	75.3	113
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	88.0	72.6	117
EP080-SD: BTEX (QCLot: 1112948)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	83.1	67.5	125
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	1 mg/kg	80.5	69	122
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	1 mg/kg	75.2	65.3	126
EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	2 mg/kg	80.7	66.5	124
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	1 mg/kg	80.2	66.7	123
EP090: Organotin Compounds (QCLot: 1112819)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	12.5 µgSn/kg	84.9	24.1	129
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1112950)								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	70.3	36.9	142

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1112950) - continued								
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	51.6	0.5	157
EP130: Chlorfenvinphos (E)	470-90-6	10	µg/kg	<10.0	5 µg/kg	61.2	50.3	137
EP130: Chlorfenvinphos (Z)	470-90-8	10	µg/kg	<10	50 µg/kg	59.7	55.9	152
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	79.3	49	140
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	75.8	28.1	142
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	# 11.8	36.6	172
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	92.3	37.2	148
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	75.0	32.7	153
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	43.6	33.2	150
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	59.7	44	146
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	80.9	3.08	162
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	75.7	10.6	157
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	76.4	38.1	143
EP130: Azinphos Methyl	----	10	µg/kg	<10	50 µg/kg	22.6	8.13	159
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	# 6.3	19.7	176
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	75.4	39.2	145
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	76.0	23.5	152
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	71.4	47.1	141
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	68.3	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1112951)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	90.0	31.7	140
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	111	24.5	150
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	80.8	36.9	139
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	89.3	38.2	137
EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	89.0	42.5	141
EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	67.2	34.8	140
EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	95.2	38	143
EP131A: DDT (total)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	95.3	43.2	134
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	85.4	23.7	139
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	96.2	35.8	138
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	107	7.45	158
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	119	21.6	162
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	66.8	19.3	131
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	97.4	17.9	141
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	136	31	153
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	91.4	34.3	138
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	83.6	18.6	146

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP131A: Organochlorine Pesticides (QCLot: 1112951) - continued								
EP131A: gamma-BHC	58-89-9	0.5	µg/kg	<0.50	5 µg/kg	81.7	30.7	145
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	123	15	157
EP131A: cis-Chlordane	5103-71-9	0.5	µg/kg	<0.50	5 µg/kg	120	22.3	145
EP131A: trans-Chlordane	5103-74-2	0.5	µg/kg	<0.50	5 µg/kg	84.5	42.4	139
EP131A: Total Chlordane (sum)	----	0.5	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1112952)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1016	12974-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	95.8	61.3	121
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1112958)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	91.2	----	----
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	92.5	----	----
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	82.7	----	----
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	85.7	----	----
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	84.1	----	----
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	85.3	----	----
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	81.6	----	----
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	87.7	----	----
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	89.4	----	----
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	80.4	----	----
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	78.8	----	----
EP132B-SD: Benzo(b)fluoranthene	205-99-2	4	µg/kg	<4	25 µg/kg	95.2	----	----
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	95.6	----	----
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	81.8	----	----
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	91.7	----	----
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	73.4	----	----
EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	96.4	----	----
EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	108	----	----
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	104	----	----
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	68.5	----	----
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----

Matrix Spike (MS) Report

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 parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 1114510)							
ES0914365-003	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.7	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	104	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.7	70	130
		EG005T: Selenium	7782-49-2	50 mg/kg	101	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.4	70	130
EG005T: Total Metals by ICP-AES (QCLot: 1114512)							
ES0914450-011	BH1-B 04 1.0-2.0	EG005T: Arsenic	7440-38-2	50 mg/kg	85.5	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.0	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.1	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	96.3	70	130
		EG005T: Selenium	7782-49-2	50 mg/kg	91.4	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	98.8	70	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1114903)							
ES0914365-001	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	91.7	70	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	92.6	70	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	93.5	70	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	88.4	70	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	85.8	70	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	91.0	70	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	91.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114511)							
ES0914365-003	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	93.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114513)							
ES0914450-011	BH1-B 04 1.0-2.0	EG035T: Mercury	7439-97-6	5 mg/kg	81.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1114902)							
ES0914365-001	Anonymous	EG035T-LL: Mercury	7439-97-6	0.50 mg/kg	113	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1112948)							
ES0914450-004	BH1-B 03 0.0-0.5	EP080-SD: C6 - C9 Fraction	----	25 mg/kg	87.8	70	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1112959)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Spike Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 1112959) - continued							
ES0914450-005	BH1-B 03 0.5-1.0	EP071-SD: C10 - C14 Fraction	----	19.75 mg/kg	94.4	70	130
		EP071-SD: C15 - C28 Fraction	----	87.25 mg/kg	83.6	70	130
		EP071-SD: C29 - C36 Fraction	----	60 mg/kg	92.4	70	130
EP080-SD: BTEX (QCLot: 1112948)							
ES0914450-004	BH1-B 03 0.0-0.5	EP080-SD: Benzene	71-43-2	2.5 mg/kg	# 68.4	70	130
		EP080-SD: Toluene	108-88-3	2.5 mg/kg	71.4	70	130
		EP080-SD: Ethylbenzene	100-41-4	2.5 mg/kg	74.2	70	130
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	75.3	70	130
		EP080-SD: ortho-Xylene	95-47-6	2.5 mg/kg	74.5	70	130
EP090: Organotin Compounds (QCLot: 1112819)							
EM0909165-002	Anonymous	EP090: Tributyltin	56573-85-4	12.5 µgSn/kg	47.5	20	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 1112950)							
ES0914450-005	BH1-B 03 0.5-1.0	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	62.5	36.9	142
		EP130: Carbophenothion	786-19-6	50 µg/kg	66.4	0.5	157
		EP130: Chlorfenvinphos (E)	470-90-6	5 µg/kg	74.2	50.3	137
		EP130: Chlorfenvinphos (Z)	470-90-8	50 µg/kg	# 54.6	55.9	152
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	75.7	49	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	62.4	28.1	142
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	55.8	36.6	172
		EP130: Diazinon	333-41-5	50 µg/kg	80.9	37.2	148
		EP130: Dichlorvos	62-73-7	50 µg/kg	76.5	32.7	153
		EP130: Dimethoate	60-51-5	50 µg/kg	72.1	33.2	150
		EP130: Ethion	563-12-2	50 µg/kg	54.5	44	146
		EP130: Fenamiphos	22224-92-6	50 µg/kg	91.6	3.08	162
		EP130: Fenthion	55-38-9	50 µg/kg	63.7	10.6	157
		EP130: Malathion	121-75-5	50 µg/kg	71.0	38.1	143
		EP130: Azinphos Methyl	----	50 µg/kg	57.4	8.13	159
		EP130: Monocrotophos	6923-22-4	50 µg/kg	29.9	19.7	176
		EP130: Parathion	56-38-2	50 µg/kg	64.3	39.2	145
		EP130: Parathion-methyl	298-00-0	50 µg/kg	77.1	23.5	152
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	73.5	47.1	141
		EP130: Prothiofos	34643-46-4	50 µg/kg	43.5	36.1	148
EP131A: Organochlorine Pesticides (QCLot: 1112951)							
ES0914450-005	BH1-B 03 0.5-1.0	EP131A: Aldrin	309-00-2	5 µg/kg	58.5	31.7	140
		EP131A: alpha-BHC	319-84-6	5 µg/kg	60.3	24.5	150
		EP131A: beta-BHC	319-85-7	5 µg/kg	59.8	36.9	139
		EP131A: delta-BHC	319-86-8	5 µg/kg	67.7	38.2	137

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP131A: Organochlorine Pesticides (QCLot: 1112951) - continued							
ES0914450-005	BH1-B 03 0.5-1.0	EP131A: 4.4`-DDD	72-54-8	5 µg/kg	68.7	42.5	141
		EP131A: 4.4`-DDE	72-55-9	5 µg/kg	50.7	34.8	140
		EP131A: 4.4`-DDT	50-29-3	5 µg/kg	78.5	38	143
		EP131A: Dieldrin	60-57-1	5 µg/kg	67.5	43.2	134
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	61.0	23.7	139
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	68.4	35.8	138
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	65.1	7.45	158
		EP131A: Endrin	72-20-8	5 µg/kg	80.4	21.6	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	67.3	19.3	131
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	69.7	17.9	141
		EP131A: Heptachlor	76-44-8	5 µg/kg	90.4	31	153
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	61.9	34.3	138
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	41.5	18.6	146
		EP131A: gamma-BHC	58-89-9	5 µg/kg	52.5	30.7	145
		EP131A: Methoxychlor	72-43-5	5 µg/kg	81.1	15	157
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	87.9	22.3	145
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	62.4	42.4	139
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1112952)							
ES0914450-005	BH1-B 03 0.5-1.0	EP131B: Aroclor 1254	11097-69-1	50 µg/kg	84.7	61.3	121
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1112958)							
ES0914450-005	BH1-B 03 0.5-1.0	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	74.0	70	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	101	70	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	84.7	70	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	88.3	70	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	80.0	70	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	74.3	70	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	89.7	70	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	78.9	70	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	77.4	70	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	82.3	70	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	82.3	70	130
		EP132B-SD: Benzo(b)fluoranthene	205-99-2	25 µg/kg	89.4	70	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	84.2	70	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	78.1	70	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	85.8	70	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	79.4	70	130
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	25 µg/kg	95.0	70	130
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	25 µg/kg	107	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1112958) - continued							
ES0914450-005	BH1-B 03 0.5-1.0	EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	102	70	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	88.8	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0914450**	Page	: 1 of 10
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MR HENRY PARSONS	Contact	: Charlie Pierce
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: hparsons@golder.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 07 3721 5400	Telephone	: +61-2-8784 8555
Facsimile	: +61 07 3721 5401	Facsimile	: +61-2-8784 8500
Project	: 097633052	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Option 1-B-Laird Point Dredge		
C-O-C number	: ----	Date Samples Received	: 23-SEP-2009
Sampler	: LYNDON GORDON	Issue Date	: 06-OCT-2009
Order number	: ----		
		No. of samples received	: 18
Quote number	: BN/354/09 V2	No. of samples analysed	: 18

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**----**	----	----	**25-SEP-2009**	29-SEP-2009	✓
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 0.0-0.5,							
BH1-B 03 - 0.5-1.0,	BH1-B 03 - 1.0-2.25,							
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 0.0-0.2,							
BH1-B 04 - 0.2-0.5,	BH1-B 04 - 0.5-1.0,							
BH1-B 04 - 1.0-2.0,	QC6,							
QC8,	QC9,							
QC10								
EA150: Particle Sizing								
Snap Lock Bag								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**---**	---	----	**29-SEP-2009**	21-MAR-2010	✓
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 0.0-0.5,							
BH1-B 03 - 0.5-1.0,	BH1-B 03 - 1.0-2.25,							
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 0.0-0.2,							
BH1-B 04 - 0.2-0.5,	BH1-B 04 - 0.5-1.0,							
BH1-B 04 - 1.0-2.0,	QC8,							
QC9,	QC10							
EA150: Soil Classification based on Particle Size								
Snap Lock Bag								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**---**	---	----	**29-SEP-2009**	21-MAR-2010	✓
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 0.0-0.5,							
BH1-B 03 - 0.5-1.0,	BH1-B 03 - 1.0-2.25,							
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 0.0-0.2,							
BH1-B 04 - 0.2-0.5,	BH1-B 04 - 0.5-1.0,							
BH1-B 04 - 1.0-2.0,	QC8,							
QC9,	QC10							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**28-SEP-2009**	20-OCT-2009	✓	**29-SEP-2009**	21-MAR-2010	✓
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,							
BH1-B 04 - 0.0-0.2,	BH1-B 04 - 0.2-0.5,							
BH1-B 04 - 0.5-1.0,	QC6,							
QC8,	QC9,							
QC10								
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 1.0-2.25,	**22-SEP-2009**	**28-SEP-2009**	20-OCT-2009	✓	**29-SEP-2009**	21-MAR-2010	✓
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 1.0-2.0							
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**28-SEP-2009**	20-OCT-2009	✓	**29-SEP-2009**	21-MAR-2010	✓
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,							
BH1-B 04 - 0.0-0.2,	BH1-B 04 - 0.2-0.5,							
BH1-B 04 - 0.5-1.0,	QC6,							
QC8,	QC9,							
QC10								
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 1.0-2.25,	**22-SEP-2009**	**28-SEP-2009**	20-OCT-2009	✓	**28-SEP-2009**	20-OCT-2009	✓
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 1.0-2.0							
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**28-SEP-2009**	20-OCT-2009	✓	**29-SEP-2009**	20-OCT-2009	✓
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,							
BH1-B 04 - 0.0-0.2,	BH1-B 04 - 0.2-0.5,							
BH1-B 04 - 0.5-1.0,	QC6,							
QC8,	QC9,							
QC10								
EP005: Total Organic Carbon (TOC)								
Pulp Bag								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**05-OCT-2009**	---	----	**05-OCT-2009**	20-OCT-2009	✓
BH1-B 01 - 0.7-1.6,	BH1-B 03 - 0.0-0.5,							
BH1-B 03 - 0.5-1.0,	BH1-B 03 - 1.0-2.25,							
BH1-B 03 - 2.5-3.6,	BH1-B 04 - 0.0-0.2,							
BH1-B 04 - 0.2-0.5,	BH1-B 04 - 0.5-1.0,							
BH1-B 04 - 1.0-2.0,	QC6,							
QC8,	QC9,							
QC10								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved								
TRIP BLANK,	TRIP SPIKE,	**21-SEP-2009**	**25-SEP-2009**	05-OCT-2009	✓	**28-SEP-2009**	04-NOV-2009	✓
TSC								
Soil Glass Jar - Unpreserved								
TRIP BLANK,	TRIP SPIKE,	**21-SEP-2009**	**25-SEP-2009**	05-OCT-2009	✓	**29-SEP-2009**	05-OCT-2009	✓
TSC								
Soil Glass Jar - Unpreserved								
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**28-SEP-2009**	04-NOV-2009	✓
BH1-B 03 - 1.0-2.25,	BH1-B 03 - 2.5-3.6,							
QC6,	QC8							
Soil Glass Jar - Unpreserved								
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**29-SEP-2009**	06-OCT-2009	✓
BH1-B 03 - 1.0-2.25,	BH1-B 03 - 2.5-3.6,							
QC6,	QC8							
EP080-SD: BTEX								
Soil Glass Jar - Unpreserved								
TRIP BLANK,	TRIP SPIKE,	**21-SEP-2009**	**25-SEP-2009**	05-OCT-2009	✓	**29-SEP-2009**	05-OCT-2009	✓
TSC								
Soil Glass Jar - Unpreserved								
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**29-SEP-2009**	06-OCT-2009	✓
BH1-B 03 - 1.0-2.25,	BH1-B 03 - 2.5-3.6,							
QC6,	QC8							
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved								
BH1-B 01 - 0.0-0.2,	BH1-B 01 - 0.2-0.7,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**29-SEP-2009**	04-NOV-2009	✓
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,							
BH1-B 04 - 0.0-0.2,	BH1-B 04 - 0.2-0.5,							
BH1-B 04 - 0.5-1.0,	QC6,							
QC8,	QC9,							
QC10								
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved								
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**30-SEP-2009**	04-NOV-2009	✓
BH1-B 03 - 1.0-2.25,	BH1-B 03 - 2.5-3.6,							
QC6,	QC8							
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved								
BH1-B 03 - 0.0-0.5,	BH1-B 03 - 0.5-1.0,	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**30-SEP-2009**	04-NOV-2009	✓
BH1-B 03 - 1.0-2.25,	BH1-B 03 - 2.5-3.6,							
QC6,	QC8							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP131B: Polychlorinated Biphenyls (as Aroclors)							
Soil Glass Jar - Unpreserved							
BH1-B 03 - 0.0-0.5, BH1-B 03 - 0.5-1.0, BH1-B 03 - 1.0-2.25, BH1-B 03 - 2.5-3.6, QC6, QC8	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**30-SEP-2009**	04-NOV-2009	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved							
BH1-B 01 - 0.0-0.2, BH1-B 01 - 0.2-0.7, BH1-B 01 - 0.7-1.6, BH1-B 03 - 0.0-0.5, BH1-B 03 - 0.5-1.0, BH1-B 03 - 1.0-2.25, BH1-B 03 - 2.5-3.6, BH1-B 04 - 0.0-0.2, BH1-B 04 - 0.2-0.5, BH1-B 04 - 0.5-1.0, BH1-B 04 - 1.0-2.0, QC6, QC8, QC9, QC10	**22-SEP-2009**	**25-SEP-2009**	06-OCT-2009	✓	**29-SEP-2009**	04-NOV-2009	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	2	14	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	3	30	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	4	34	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	30	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	30	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Organochlorine Pesticides (Ultra-trace)	EP131A	1	6	**16.7**	**5.0**	✓	ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	6	**16.7**	**5.0**	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	14	**7.1**	**5.0**	✓	ALS QCS3 requirement
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	15	**6.7**	**5.0**	✓	ALS QCS3 requirement
PCB's (Ultra-trace)	EP131B	1	6	**16.7**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	30	**6.7**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS (Low Level)	EG035T-LL	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	ALS QCS3 requirement
Total Metals in Sediments by ICPMS	EG020-SD	1	18	**5.6**	**5.0**	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071-SD	1	9	**11.1**	**5.0**	✓	ALS QCS3 requirement
TPH Volatiles/BTEX in Sediments	EP080-SD	1	9	**11.1**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures 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 in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3). LORs per NODG
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Total Organic Carbon	EP005	SOIL	In-house. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
TPH - Semivolatile Fraction	EP071-SD	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
TPH Volatiles/BTEX in Sediments	EP080-SD	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)

Analytical Methods	Method	Matrix	Method Descriptions
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quanitified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (1999) Schedule B(3) (Method 505)
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PCB's (Ultra-trace)	EP131B	SOIL	USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/uECD/uECD) This technique is compliant with NEPM (1999) Schedule B(3) (Method 504)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	8270 GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na2SO4 and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house. 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	ES0914524-002	Anonymous	**Lead**	7439-92-1	54.9 %	0-20%	**RPD exceeds LOR based limits**
Laboratory Control Spike (LCS) Recoveries							
EP130A: Organophosphorus Pesticides (Ultra-trace)	1281438-002	----	**Demeton-S-methyl**	919-86-8	11.8 %	36.6-172%	**Recovery less than lower control limit**
EP130A: Organophosphorus Pesticides (Ultra-trace)	1281438-002	----	**Monocrotophos**	6923-22-4	6.3 %	19.7-176%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
EP080-SD: BTEX	ES0914450-004	BH1-B 03 0.0-0.5	**Benzene**	71-43-2	68.4 %	70-130%	**Recovery less than lower data quality objective**
EP130A: Organophosphorus Pesticides (Ultra-trace)	ES0914450-005	BH1-B 03 0.5-1.0	**Chlorfenvinphos (Z)**	470-90-8	54.6 %	55.9-152%	**Recovery less than lower data quality objective**

- **For all matrices, no Method Blank value outliers occur.**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP130S: Organophosphorus Pesticide Surrogate	ES0914450-005	BH1-B 03 0.5-1.0	**DEF**	78-48-8	41.2 %	51.3-136.9 %	**Recovery less than lower data quality objective**
EP130S: Organophosphorus Pesticide Surrogate	ES0914450-006	BH1-B 03 1.0-2.25	**DEF**	78-48-8	46.1 %	51.3-136.9 %	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

Appendix 5 Secondary Laboratory Reports (AAA)

REPORT OF ANALYSIS

Laboratory Reference: A09/2979

Client: Golder Associates Pty Ltd QLD
611 Coronation Drive
Toowong QLD 4066

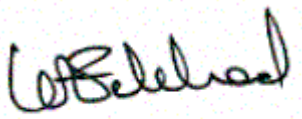
Contact: Ian Wallace

Order No:
Project: 097633052 Laird Point Dredge Study - Option 1-B
Sample Type: Sediment
No. of Samples: 1
Date Received: 24/9/09
Date Completed: 13/10/2009

Laboratory Contact Details:

Client Services Manager: Lilian Wong
Technical Enquiries: Andrew Bradbury
Telephone: +61 7 3268 1228
Fax: +61 7 3268 1238
Email: brisbane@advancedanalytical.com.au
andrew.bradbury@advancedanalytical.com.au

Attached Results Approved By:



Ian Eckhard
Technical Director

Comments:
All samples tested as submitted by client. All attached results have been checked and approved for release.
This is the Final Report and supersedes any reports previously issued with this batch number.
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

NATA Accredited Laboratory
Accreditation No: 15109

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Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

Laboratory Reference:	-	-	**/1**
Client Reference:	-	-	**LV BH1-B 02, 0.0-0.5**
Date Sampled:	-	-	**21/9/09**
Analysis Description	**Method**	**Units**	
Moisture Content			
Moisture Content	04-004	%	22.4
Trace Elements			
Silver	04-001	mg/kg	<0.1
Aluminium	04-001	mg/kg	1,700
Arsenic	04-001	mg/kg	16
Cadmium	04-001	mg/kg	<0.1
Cobalt	04-001	mg/kg	8.2
Copper	04-001	mg/kg	2.3
Chromium	04-001	mg/kg	4.6
Iron	04-001	mg/kg	11,000
Manganese	04-001	mg/kg	1,000
Mercury	04-002	mg/kg	<0.01
Nickel	04-001	mg/kg	3.4
Selenium	04-001	mg/kg	0.84
Antimony	04-001	mg/kg	<0.5
Lead	04-001	mg/kg	1.4
Vanadium	04-001	mg/kg	27
Zinc	04-001	mg/kg	11
BTEX			
Benzene	04-021	mg/kg	<0.20
Toluene	04-021	mg/kg	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20
m+p xylenes	04-021	mg/kg	<0.40
o-xylene	04-021	mg/kg	<0.20
Total BTEX	04-021	mg/kg	<1.2
Surrogate 1 Recovery	04-021	%	89
Surrogate 2 Recovery	04-021	%	73
Surrogate 3 Recovery	04-021	%	86
Date Extracted	04-021	-	25/09/2009
Date Analysed	04-021	-	28/09/2009

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Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**/1** **LV BH1-B 02, 0.0-0.5** **21/9/09**
Total Petroleum Hydrocarbons			
TPH C6-C9	04-021	mg/kg	<10
TPH C10-14	04-020	mg/kg	<10
TPH C15-28	04-020	mg/kg	<50
TPH C29-36	04-020	mg/kg	<50
Surrogate Recovery	04-020	%	90
Date Extracted	04-020	-	28/09/2009
Date Analysed	04-020	-	1/10/2009
Poly Aromatic Hydrocarbons			
Naphthalene	04-022	µg/kg	<5
1-Methylnaphthalene	04-022	µg/kg	<5
2-Methylnaphthalene	04-022	µg/kg	<5
Acenaphthylene	04-022	µg/kg	<5
Acenaphthene	04-022	µg/kg	<5
Fluorene	04-022	µg/kg	<5
Phenanthrene	04-022	µg/kg	<5
Anthracene	04-022	µg/kg	<5
Fluoranthene	04-022	µg/kg	<5
Pyrene	04-022	µg/kg	<5
Benz(a)anthracene	04-022	µg/kg	<5
Chrysene	04-022	µg/kg	<5
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10
Benzo(a)pyrene	04-022	µg/kg	<5
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5
Dibenz(a,h)anthracene	04-022	µg/kg	<5
Benzo(g,h,i)perylene	04-022	µg/kg	<5
Coronene	04-022	µg/kg	<10
Benzo(e)pyrene	04-022	µg/kg	<5
Total PAHs (as above)	04-022	µg/kg	<100
Surrogate 1 Recovery	04-022	%	94
Surrogate 2 Recovery	04-022	%	85
Surrogate 3 Recovery	04-022	%	107
Date Extracted	04-022	-	28/09/2009

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Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**/1** **LV BH1-B 02, 0.0-0.5** **21/9/09**
Date Analysed	04-022	-	30/09/2009
Organochlorine Pesticides			
Aldrin	04-023	µg/kg	<1.0
alpha-BHC	04-023	µg/kg	<1.0
beta-BHC	04-023	µg/kg	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0
delta-BHC	04-023	µg/kg	<1.0
cis-Chlordane	04-023	µg/kg	<1.0
trans-Chlordane	04-023	µg/kg	<1.0
p,p'-DDD	04-023	µg/kg	<1.0
p,p'-DDE	04-023	µg/kg	<1.0
p,p'-DDT	04-023	µg/kg	<1.0
Dieldrin	04-023	µg/kg	<1.0
alpha-Endosulfan	04-023	µg/kg	<1.0
beta-Endosulfan	04-023	µg/kg	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0
Endrin	04-023	µg/kg	<1.0
Endrin ketone	04-023	µg/kg	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0
Heptachlor	04-023	µg/kg	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0
Methoxychlor	04-023	µg/kg	<1.0
Surrogate Recovery	04-023	%	102
Date Extracted	04-023	-	28/09/2009
Date Analysed	04-023	-	30/09/2009
Organophosphate Pesticides			
Dichlorvos	04-024	µg/kg	<20
Demeton-S-methyl	04-024	µg/kg	<20
Dimethoate	04-024	µg/kg	<20
Diazinon	04-024	µg/kg	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20
Parathion-methyl	04-024	µg/kg	<20

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Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**/1** **LV BH1-B 02, 0.0-0.5** **21/9/09**
Pirimiphos-methyl	04-024	µg/kg	<20
Fenitrothion	04-024	µg/kg	<20
Malathion	04-024	µg/kg	<20
Chlorpyrifos	04-024	µg/kg	<20
Fenthion	04-024	µg/kg	<20
Parathion	04-024	µg/kg	<20
Chlorfenvinphos	04-024	µg/kg	<20
Bromophos-ethyl	04-024	µg/kg	<20
Methidathion	04-024	µg/kg	<20
Fenamiphos	04-024	µg/kg	<20
Prothiofos	04-024	µg/kg	<20
Ethion	04-024	µg/kg	<20
Carbophenothion	04-024	µg/kg	<20
Phosalone	04-024	µg/kg	<20
Azinphos-methyl	04-024	µg/kg	<20
Surrogate Recovery	04-024	%	117
Date Extracted	04-024	-	28/09/2009
Date Analysed	04-024	-	30/09/2009
Polychlorinated Biphenyls			
Mono-PCB congeners	04-029	µg/kg	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0
Hexa-PCB congeners	04-029	µg/kg	<5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0
Octa-PCB congeners	04-029	µg/kg	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0
Total PCB congeners	04-029	µg/kg	<5.0
Surrogate 1 Recovery	04-029	%	103
Surrogate 2 Recovery	04-029	%	102
Date Extracted	04-029	-	28/09/2009

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Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**/1** **LV BH1-B 02, 0.0-0.5** **21/9/09**
Date Analysed	04-029	-	30/09/2009
Organotins			
Monobutyl tin	04-026	µgSn/kg	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50
Surrogate 1 Recovery	04-026	%	104
Date Extracted	04-026	-	30/09/2009
Date Analysed	04-026	-	30/09/2009
Subcontract Analysis			
Particle Size Distribution	SUB		See comments
Total Organic Carbon	SUB	%	0.32

Method	Method Description
04-004	Moisture by gravimetric, %
04-001	Metals by ICP-OES, mg/kg
04-002	Mercury by CVAAS, mg/kg
04-021	TPH C6-9 & BTEX by P&T GCMS, mg/kg
04-020	TPH by GC-FID, mg/kg
04-022	Low level PAHs & Phenols by GCMS, µg/kg
04-023	Low level OC Pesticides by GCMS, µg/kg
04-024	OP Pesticides by GCMS, µg/kg
04-029	PCBS (as congeners) by GCMS, µg/kg
04-026	Organotins by GCMS, µgSn/kg
SUB	Subcontracted Analyses

Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required

Solid sample results are reported on a dry weight basis.

Total Organic Carbon (TOC) analysis was subcontracted to Ecowise Environmental Pty Ltd (NATA Number 992); reference Ecowise Job Name: XADVAN_78913.

PSD analysis was subcontracted to Golder Associates (NATA Number 1446); see attached Golder report number R8262.

- Spike recovery for A09/2979/01 could not be accurately determined for Al, Fe & Mn due to a significant background of analyte concentration.

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Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank
Moisture Content	%	N/T

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Silver	mg/kg	<0.1	A09/2979-1	<0.1 || <0.1	[NA]	N/T
Aluminium	mg/kg	<5	A09/2979-1	1700 || 1600 || RPD: 6	[NA]	N/T
Arsenic	mg/kg	<0.4	A09/2979-1	16 || 16 || RPD: 0	[NA]	N/T
Cadmium	mg/kg	<0.1	A09/2979-1	<0.1 || <0.1	[NA]	N/T
Cobalt	mg/kg	<0.5	A09/2979-1	8.2 || 7.9 || RPD: 4	[NA]	N/T
Copper	mg/kg	<0.1	A09/2979-1	2.3 || 2.4 || RPD: 4	[NA]	N/T
Chromium	mg/kg	<0.1	A09/2979-1	4.6 || 4.4 || RPD: 4	[NA]	N/T
Iron	mg/kg	<5	A09/2979-1	11000 || 10000 || RPD: 10	[NA]	N/T
Manganese	mg/kg	<0.5	A09/2979-1	1000 || 1000 || RPD: 0	[NA]	N/T
Mercury	mg/kg	<0.01	A09/2979-1	<0.01 || <0.01	[NA]	99%
Nickel	mg/kg	<0.1	A09/2979-1	3.4 || 3.3 || RPD: 3	[NA]	N/T
Selenium	mg/kg	<0.5	A09/2979-1	0.84 || 1.1 || RPD: 27	[NA]	N/T
Antimony	mg/kg	<0.5	A09/2979-1	<0.5 || <0.5	[NA]	N/T
Lead	mg/kg	<0.5	A09/2979-1	1.4 || 1.4 || RPD: 0	[NA]	N/T
Vanadium	mg/kg	<0.1	A09/2979-1	27 || 26 || RPD: 4	[NA]	N/T
Zinc	mg/kg	<0.5	A09/2979-1	11 || 11 || RPD: 0	[NA]	N/T

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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	[NT]	[NT]	External	68%
Toluene	mg/kg	<0.20	[NT]	[NT]	External	63%
Ethyl Benzene	mg/kg	<0.20	[NT]	[NT]	External	67%
m+p xylenes	mg/kg	<0.40	[NT]	[NT]	External	73%
o-xylene	mg/kg	<0.20	[NT]	[NT]	External	83%
Total BTEX	mg/kg	<1.2	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	98	[NT]	[NT]	External	68%
Surrogate 2 Recovery	%	81	[NT]	[NT]	External	58%
Surrogate 3 Recovery	%	98	[NT]	[NT]	External	67%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPH C6-C9	mg/kg	<10	[NT]	[NT]	External	64%
TPH C10-14	mg/kg	<10	[NT]	[NT]	External	98%
TPH C15-28	mg/kg	<50	[NT]	[NT]	External	114%
TPH C29-36	mg/kg	<50	[NT]	[NT]	External	95%
Surrogate Recovery	%	100	[NT]	[NT]	External	90%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	[NT]	[NT]	External	94%
1-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	98%
2-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	External	97%
Acenaphthylene	µg/kg	<5	[NT]	[NT]	External	97%
Acenaphthene	µg/kg	<5	[NT]	[NT]	External	101%
Fluorene	µg/kg	<5	[NT]	[NT]	External	102%
Phenanthrene	µg/kg	<5	[NT]	[NT]	External	104%
Anthracene	µg/kg	<5	[NT]	[NT]	External	89%
Fluoranthene	µg/kg	<5	[NT]	[NT]	External	118%
Pyrene	µg/kg	<5	[NT]	[NT]	External	113%
Benz(a)anthracene	µg/kg	<5	[NT]	[NT]	External	110%
Chrysene	µg/kg	<5	[NT]	[NT]	External	106%
Benzo(b)&(k)fluoranthene	µg/kg	<10	[NT]	[NT]	External	102%
Benzo(a)pyrene	µg/kg	<5	[NT]	[NT]	External	96%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	[NT]	[NT]	External	106%
Dibenz(a,h)anthracene	µg/kg	<5	[NT]	[NT]	External	89%
Benzo(g,h,i)perylene	µg/kg	<5	[NT]	[NT]	External	101%
Coronene	µg/kg	<10	[NT]	[NT]	External	107%
Benzo(e)pyrene	µg/kg	<5	[NT]	[NT]	External	96%
Total PAHs (as above)	µg/kg	<100	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	102	[NT]	[NT]	External	98%
Surrogate 2 Recovery	%	87	[NT]	[NT]	External	89%
Surrogate 3 Recovery	%	116	[NT]	[NT]	External	102%

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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	[NT]	[NT]	External	100%
alpha-BHC	µg/kg	<1.0	[NT]	[NT]	External	107%
beta-BHC	µg/kg	<1.0	[NT]	[NT]	External	112%
gamma-BHC (Lindane)	µg/kg	<1.0	[NT]	[NT]	External	104%
delta-BHC	µg/kg	<1.0	[NT]	[NT]	External	102%
cis-Chlordane	µg/kg	<1.0	[NT]	[NT]	External	96%
trans-Chlordane	µg/kg	<1.0	[NT]	[NT]	External	104%
p,p'-DDD	µg/kg	<1.0	[NT]	[NT]	External	99%
p,p'-DDE	µg/kg	<1.0	[NT]	[NT]	External	98%
p,p'-DDT	µg/kg	<1.0	[NT]	[NT]	External	101%
Dieldrin	µg/kg	<1.0	[NT]	[NT]	External	98%
alpha-Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	96%
beta-Endosulfan	µg/kg	<1.0	[NT]	[NT]	External	110%
Endosulfan Sulphate	µg/kg	<1.0	[NT]	[NT]	External	103%
Endrin	µg/kg	<1.0	[NT]	[NT]	External	108%
Endrin ketone	µg/kg	<1.0	[NT]	[NT]	External	103%
Endrin aldehyde	µg/kg	<1.0	[NT]	[NT]	External	81%
Heptachlor	µg/kg	<1.0	[NT]	[NT]	External	104%
Heptachlor epoxide	µg/kg	<1.0	[NT]	[NT]	External	98%
Hexachlorobenzene	µg/kg	<1.0	[NT]	[NT]	External	99%
Methoxychlor	µg/kg	<1.0	[NT]	[NT]	External	94%
Surrogate Recovery	%	110	[NT]	[NT]	External	94%

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TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	[NT]	[NT]	External	103%
Demeton-S-methyl	µg/kg	<20	[NT]	[NT]	External	120%
Dimethoate	µg/kg	<20	[NT]	[NT]	External	121%
Diazinon	µg/kg	<20	[NT]	[NT]	External	95%
Chlorpyrifos-methyl	µg/kg	<20	[NT]	[NT]	External	109%
Parathion-methyl	µg/kg	<20	[NT]	[NT]	External	108%
Pirimiphos-methyl	µg/kg	<20	[NT]	[NT]	External	109%
Fenitrothion	µg/kg	<20	[NT]	[NT]	External	101%
Malathion	µg/kg	<20	[NT]	[NT]	External	128%
Chlorpyrifos	µg/kg	<20	[NT]	[NT]	External	109%
Fenthion	µg/kg	<20	[NT]	[NT]	External	105%
Parathion	µg/kg	<20	[NT]	[NT]	External	101%
Chlorfenvinphos	µg/kg	<20	[NT]	[NT]	External	137%
Bromophos-ethyl	µg/kg	<20	[NT]	[NT]	External	105%
Methidathion	µg/kg	<20	[NT]	[NT]	External	117%
Fenamiphos	µg/kg	<20	[NT]	[NT]	External	103%
Prothiofos	µg/kg	<20	[NT]	[NT]	External	103%
Ethion	µg/kg	<20	[NT]	[NT]	External	118%
Carbophenothion	µg/kg	<20	[NT]	[NT]	External	113%
Phosalone	µg/kg	<20	[NT]	[NT]	External	108%
Azinphos-methyl	µg/kg	<20	[NT]	[NT]	External	116%
Surrogate Recovery	%	92	[NT]	[NT]	External	114%

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www.advancedanalytical.com.au

Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	101%
Di-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	104%
Tri-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	97%
Tetra-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	96%
Penta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	94%
Hexa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	96%
Hepta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	93%
Octa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	96%
Nona-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	95%
Deca-PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	94%
Total PCB congeners	µg/kg	<5.0	[NT]	[NT]	External	N/A
Surrogate 1 Recovery	%	107	[NT]	[NT]	External	105%
Surrogate 2 Recovery	%	107	[NT]	[NT]	External	103%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Monobutyl tin	µgSn/kg	<0.50	A09/2979-1	<0.50 || <0.50	A09/2979-1	53%
Dibutyl tin	µgSn/kg	<0.50	A09/2979-1	<0.50 || <0.50	A09/2979-1	83%
Tributyl tin	µgSn/kg	<0.50	A09/2979-1	<0.50 || <0.50	A09/2979-1	87%
Surrogate 1 Recovery	%	110	A09/2979-1	104 || 108 || RPD: 4	A09/2979-1	103%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Silver	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	108%
Aluminium	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	#
Arsenic	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	111%
Cadmium	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	107%
Cobalt	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	93%
Copper	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	106%
Chromium	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	101%
Iron	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	#
Manganese	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	#
Mercury	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	N/T
Nickel	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	94%
Selenium	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	107%
Antimony	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	106%
Lead	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	92%
Vanadium	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	103%
Zinc	mg/kg	[NT]	[NT]	[NT]	A09/2979-1	95%

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Batch Number: A09/2979

Project Reference: 097633052 Laird Point Dredge Study - Option 1-B

Comments:

RPD = Relative Percent Deviation
[NT] = Not Tested
[N/A] = Not Applicable
'#' = Spike recovery data could not be calculated due to high levels of contaminants

Acceptable replicate reproducibility limit or RPD:	Results < 10 times LOR: no limits
	Results >10 times LOR: 0% - 50%
Acceptable matrix spike & LCS recovery limits:	Trace elements 70-130%
	Organic analyses 50-150%
	SVOC & speciated phenols 10-140%
	Surrogates 10-140%

When levels outside these limits are obtained, an investigation into the cause of the deviation is performed before the batch is accepted or rejected, and results are released.

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Appendix 6 Bulk Density and Settling Rates Laboratory Reports

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(Bisbane Laboratory)

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TOOWONG QLD 4066
(PO Box 1734, MILTON BC QLD 4064)
Telephone: (61-7) 3721 5400
Facsimile: (61-7) 3721 5401
http://www.golder.com

Client:	Worley Parsons	Sampled By:	Golder
Project:	Laird Point Dredging Study	Job No:	097633052
Location:	Dredge Foortprint - Option 1B Re-sampled		

Bulk Density Results

Sample Location	Depth of core sub-sample	Volume - Calculated by Direct Measurement[2, 3] (cc)	*insitu* Volume - Estimated from Field data [1] (cc)	Wet Sample Weight (g)	Moisture (%)	Bulk Density (t/m^3)	Dry Density (t/m^3)
HOLOCENE							
Coarse Texture							
BH1-B 02	1.1-1.2m	365	550	554	22.0	1.01 - 1.52	0.79 - 1.18
BH1-B 02	3.0-3.1m	415	550	606	20.3	1.10 - 1.46	0.88 - 1.16
BH1-B 08	0.6-0.7m	671	537	884	22.9	1.32 - 1.65	1.02 - 1.27
BH1-B 08	3.5-3.6m	861	537	1064	21.9	1.24 - 1.98	0.97 - 1.55
BH1-B 09	1.0-1.1m	-[3]	567	776	24.6	1.37	1.03
BH1-B 09	2.5-2.6m	-	567	838	22.2	1.48	1.15
BH1-B 10	1.0-1.1m	-	454	552	26.4	1.22	0.89
BH1-B 10	2.5-2.6m	-	454	907	19.0	2.00	1.62
BH1-B 10	4.5-4.6m	-	385	1016	21.4	2.24	1.76
BH1-B 11	1.1-1.2m	-	477	881	26.2	1.85	1.36
BH1-B 11	4.1-4.2m	711	477	994	21.0	1.40 - 2.08	1.10 - 1.65
BH1-B 17	0.1-0.2m	299	385	630	28.4	1.64 - 2.11	1.17 - 1.51
Averages					**23.0**	**1.60 - 1.63**	**1.23 - 1.26**
Fine Texture							
BH1-B 01	0.2-0.3m	398	385	819	30.6	2.06 - 2.13	1.43 - 1.48
BH1-B 12	0.6-0.7m	332	385	630	45.9	1.64 - 1.90	0.89 - 1.03
BH1-B 18	0.5-0.6m	362	420	634	41.5	1.51 - 1.75	0.88 - 1.02
BH1-B 18	2.55-2.65m	362	420	632	40.4	1.51 - 1.74	0.90 - 1.04
BH1-B 19	0.1-0.2m	256	458	420	39.4	0.92 - 1.64	0.56 - 0.99
Averages					**39.5**	**1.54 - 1.82**	**0.94 - 1.10**

Test Procedure:

The length of the recovered sediment core was measured and reported and compared to the coring length recorded in the field and an estimate of the % core shrinkage or swell was made (ie. to allow correction of a measured sub-sample). A measured (approx. 100mm) sub-sample of core was collected from each horizon (Holocene or Pleistocene). An estimated*insitu* volume was calculated based on the recovered sub-sample length and casing internal diameter (70mm). Each sub-sample was also measured directly for length and diameter and a volume calculated based on these measurements. Volumes from both measurement methods were corrected for core shrinkage or swelling. Each sub-sample was weighed and moisture content determined. The following formula were used to determine a 'range' for bulk density based on the two methods described:

1. Volume of core sub-sample (cc) = (π (70mm/2)^2 x length) / 1,000 —- corrected for length shrink/swell
2. Volume of core sub-sample (cc) = (π (measured dia/2)^2 x measured length) / 1,000 — corrected for length shrink/swell

   % Moisture = dry weight of solids / wet weight of solids * 100

   Bulk Density (t/m^3) = wet wt soil / volume

   Dry Density (t/m^3) = wet wt soil * ((100-% moisture)/100) / corrected volume
3. In some instances, the core sub-sample lost integrity and, therefore, volume could only be estimated

Prepared By: IMW Checked By: HP

Golder Associates

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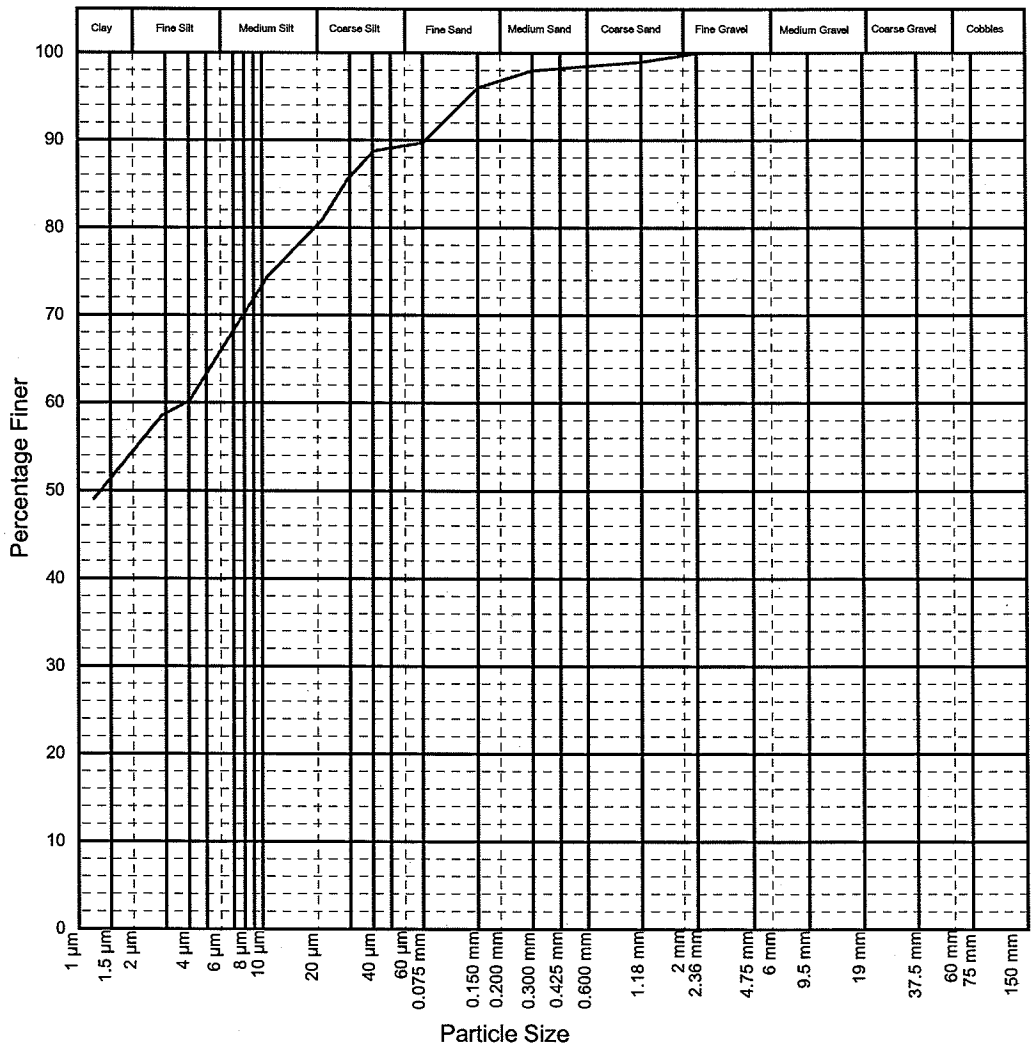
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Worley Parsons (Resources & Energy)	Report No. :	R8263
Address :	80 Albert Street, Brisbane	Job No. :	097633052
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940369
Sample ID :	BH1-B 18 (1.5 - 1.9m)	Senders No. :	
		Date Received :	25/09/2009
		Sampled By :	Golder

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.9
1.18	99.0
0.600	98.5
0.425	98.2
0.300	97.9
0.150	96.0
0.075	89.7
Particle Size (Microns)	Percent Passing
41.0	88.8
29.4	85.6
21.2	80.8
10.8	74.5
7.8	69.7
5.6	64.9
4.0	60.1
2.9	58.6
1.2	49.0

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CH) Silty CLAY, grey		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NW		Checked by : JA	

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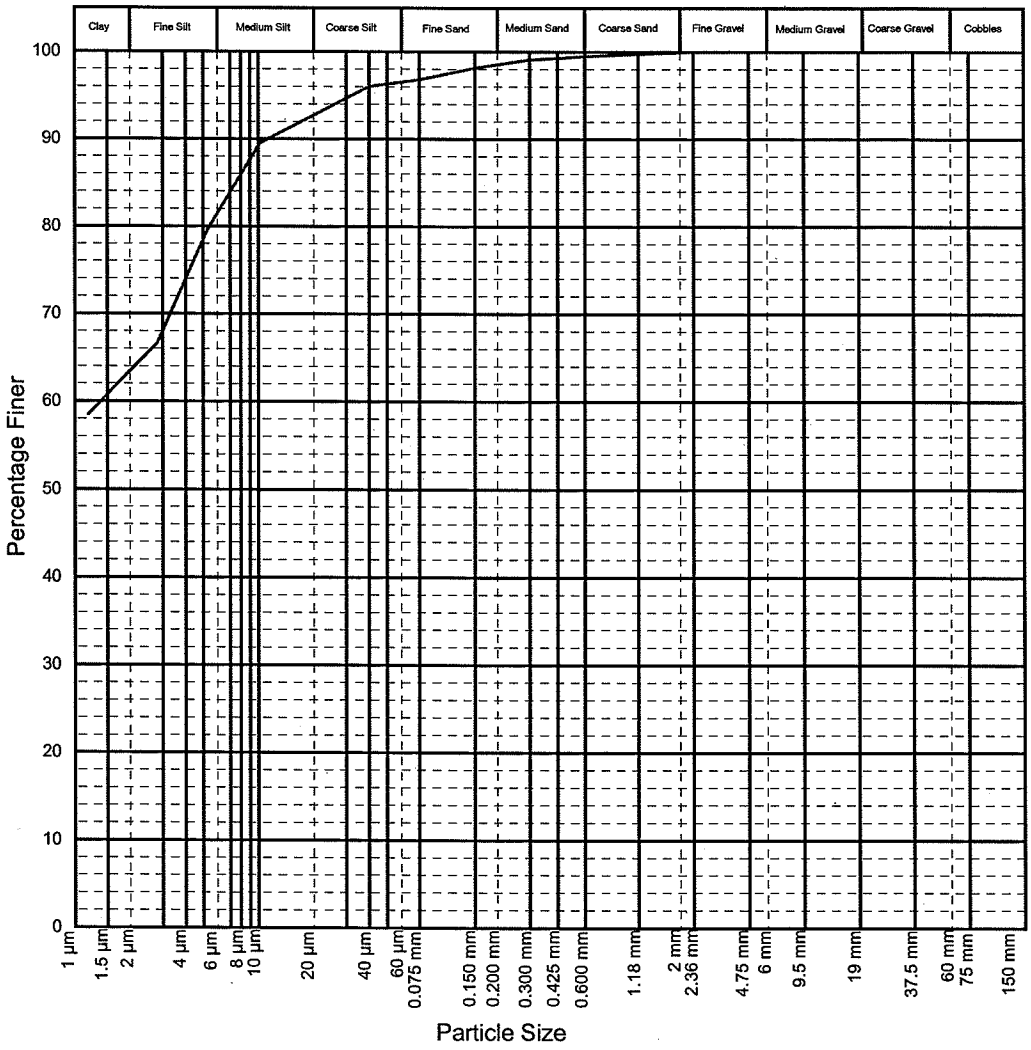
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Worley Parsons (Resources & Energy)	Report No. :	R8263
Address :	80 Albert Street, Brisbane	Job No. :	097633052
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940370
Sample ID :	BH1-B 12 (1.0 - 1.5m)	Senders No. :	
		Date Received :	25/09/2009
		Sampled By :	Golder

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.7
0.600	99.5
0.425	99.3
0.300	99.1
0.150	98.2
0.075	96.8
Particle Size (Microns)	Percent Passing
40.1	96.0
28.6	94.4
20.4	92.8
10.2	89.5
7.4	84.6
5.3	79.7
3.9	73.2
2.8	66.7
1.2	58.5



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CH) Silty CLAY, brown		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MK		Checked by : JA	

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ENVIRONMENTAL SETTLING TEST

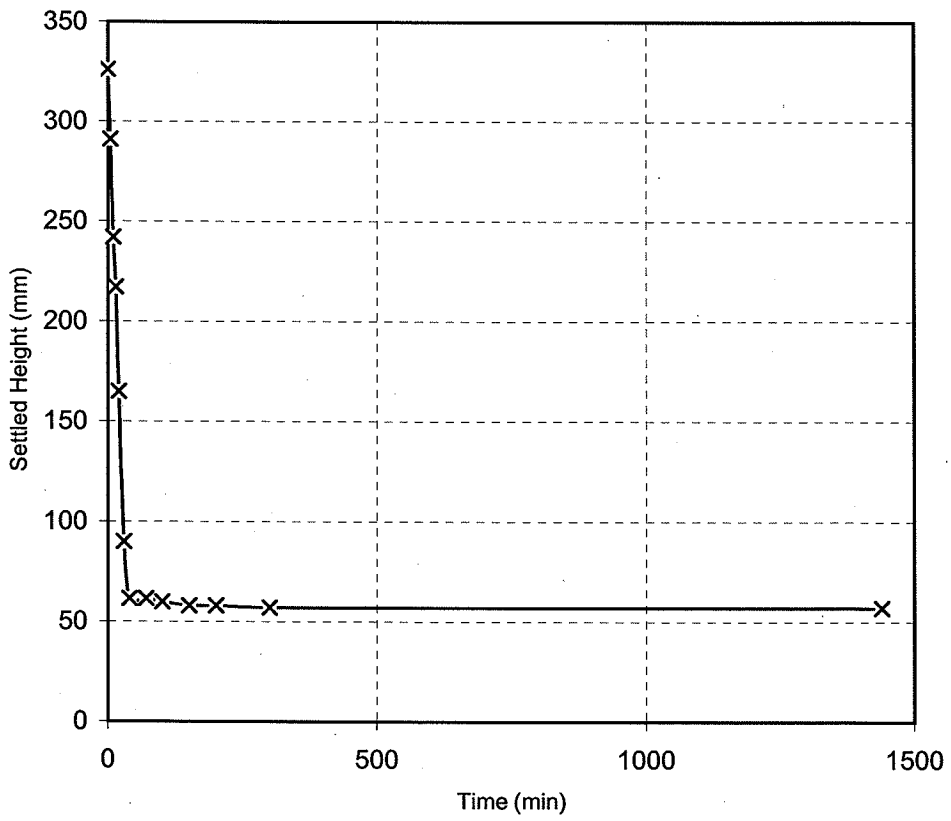
Client :	Worley Parsons (Resources & Energy)	Job No. :	097633052/130
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940369
Sample ID. :	BH1-B 18 (1.5 - 1.9m)	Date Received:	25/09/2009
		Sampled By :	Golder

TEST CONDITIONS

Weight of solids (g)	90	Volume of Slurry (ml)	935
Starting weight (g)	990	Final Volume (ml)	155
Starting Slurry Density (%)	10	Final Pulp Weight (g)	210

TEST RESULTS

Time (min)	Height (mm)
0	326
5	291
10	242
15	217
20	165
30	90
40	62
70	62
100	60
150	58
200	58
300	57
1440	57



SETTLING RATES

Underflow Density (g/cm³)	1.355
Underflow % Solids	43

Settlement (%)	Settling Height (mm)	Settling Rate (mm/min)
50	192	7.91
90	84	7.57

Remarks :	Clear settling interface after 5 minutes.
Material Description :	(CH) Silty CLAY, grey
Test Procedure :	
Prepared by MK	Checked by JA

Golder Associates

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ENVIRONMENTAL SETTLING TEST

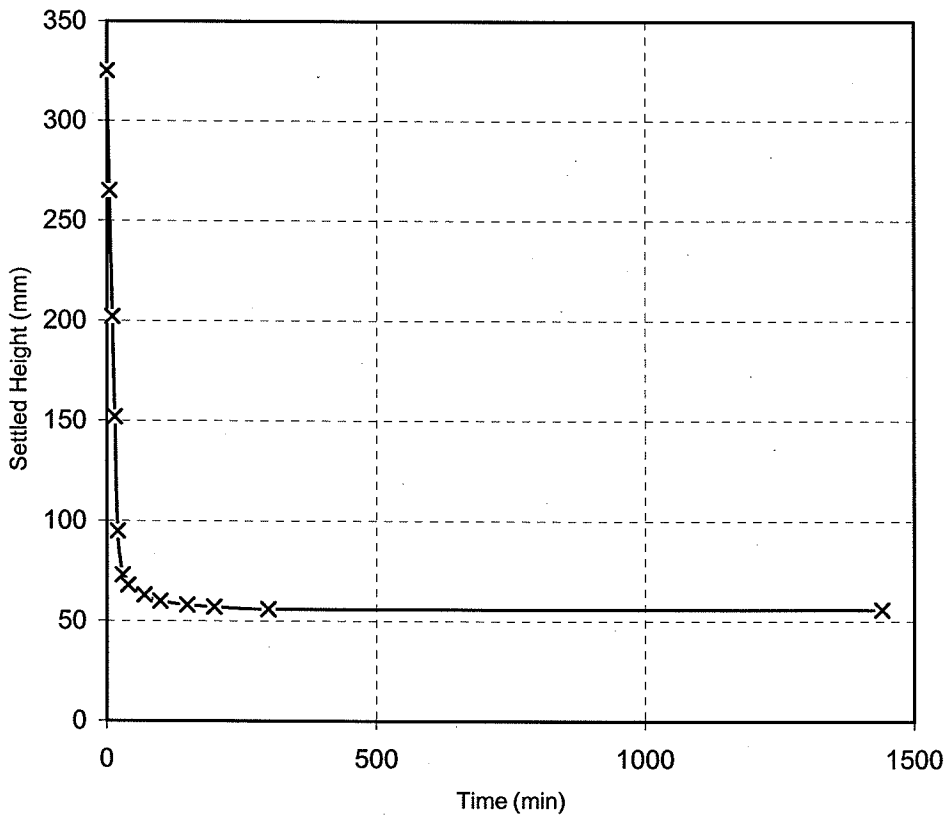
Client :	Worley Parsons (Resources & Energy)	Job No. :	097633052/130
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940370
Sample ID. :	BH1-B 12 (1.0 - 1.5m)	Date Received:	25/09/2009
		Sampled By :	Golder

TEST CONDITIONS

Weight of solids (g)	90	Volume of Slurry (ml)	940
Starting weight (g)	990	Final Volume (ml)	150
Starting Slurry Density (%)	10	Final Pulp Weight (g)	200

TEST RESULTS

Time (min)	Height (mm)
0	325
5	265
10	202
15	152
20	95
30	73
40	68
70	63
100	60
150	58
200	57
300	56
1440	56



SETTLING RATES

Underflow Density (g/cm³)	1.333
Underflow % Solids	45

Settlement (%)	Settling Height (mm)	Settling Rate (mm/min)
50	191	12.23
90	83	9.68

Remarks :	Clear settling interface after 5 minutes.
Material Description :	(CH) Silty CLAY, brown
Test Procedure :	
Prepared by NF	Checked by JA

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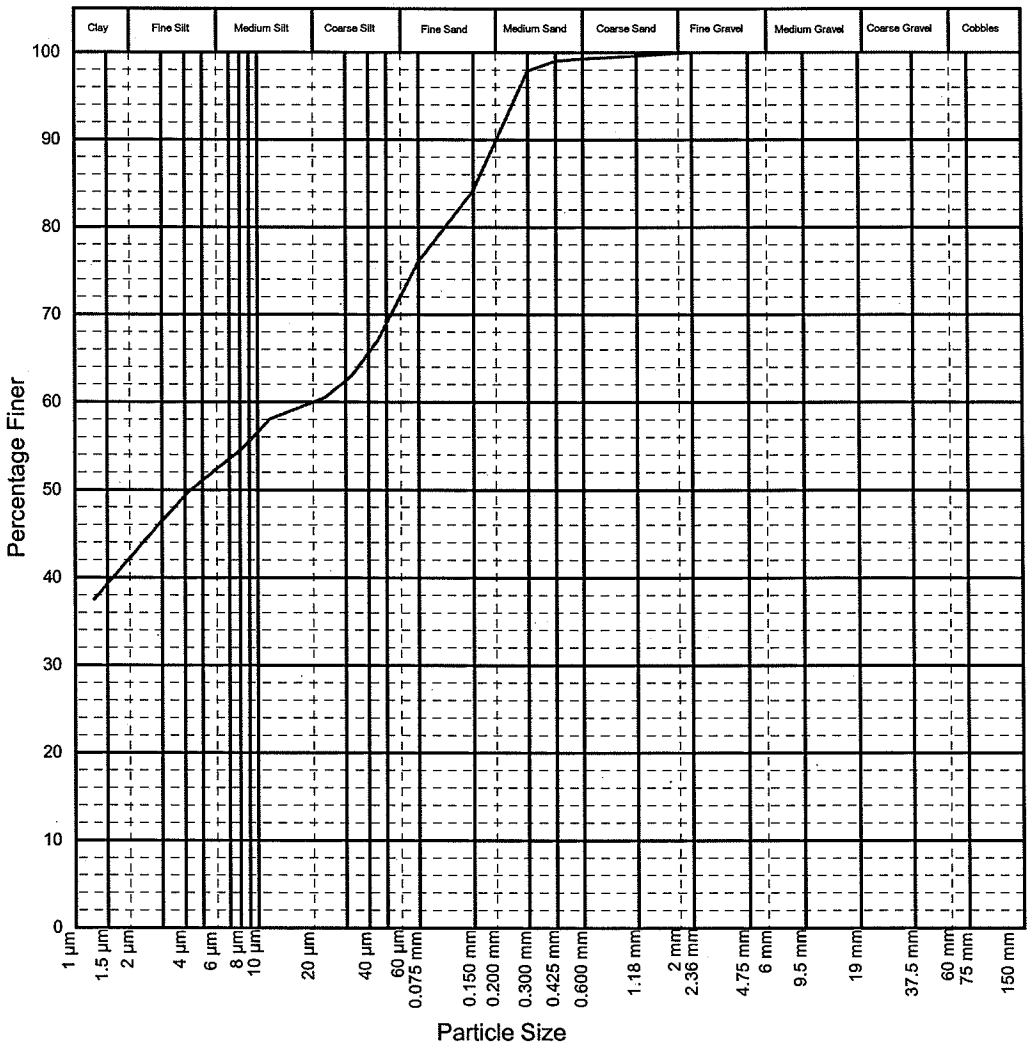
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Worley Parsons (Resources & Energy)	Report No. :	R8289
Address :	80 Albert Street, Brisbane	Job No. :	097633052/330
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940578
Sample ID :	BH1-B03 (3.0 - 3.6m)	Senders No. :	
		Date Received :	4/10/2009
		Sampled By :	Golder

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	100.0
1.18	99.6
0.600	99.3
0.425	99.0
0.300	97.9
0.150	84.2
0.075	76.1
Particle Size (Microns)	**Percent Passing**
45.2	67.1
32.4	63.0
23.1	60.5
11.6	58.0
8.3	54.7
5.9	52.3
4.2	49.8
3.0	46.5
1.3	37.5

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CH) Silty CLAY, pale brown, with some sand		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NK		Checked by :	

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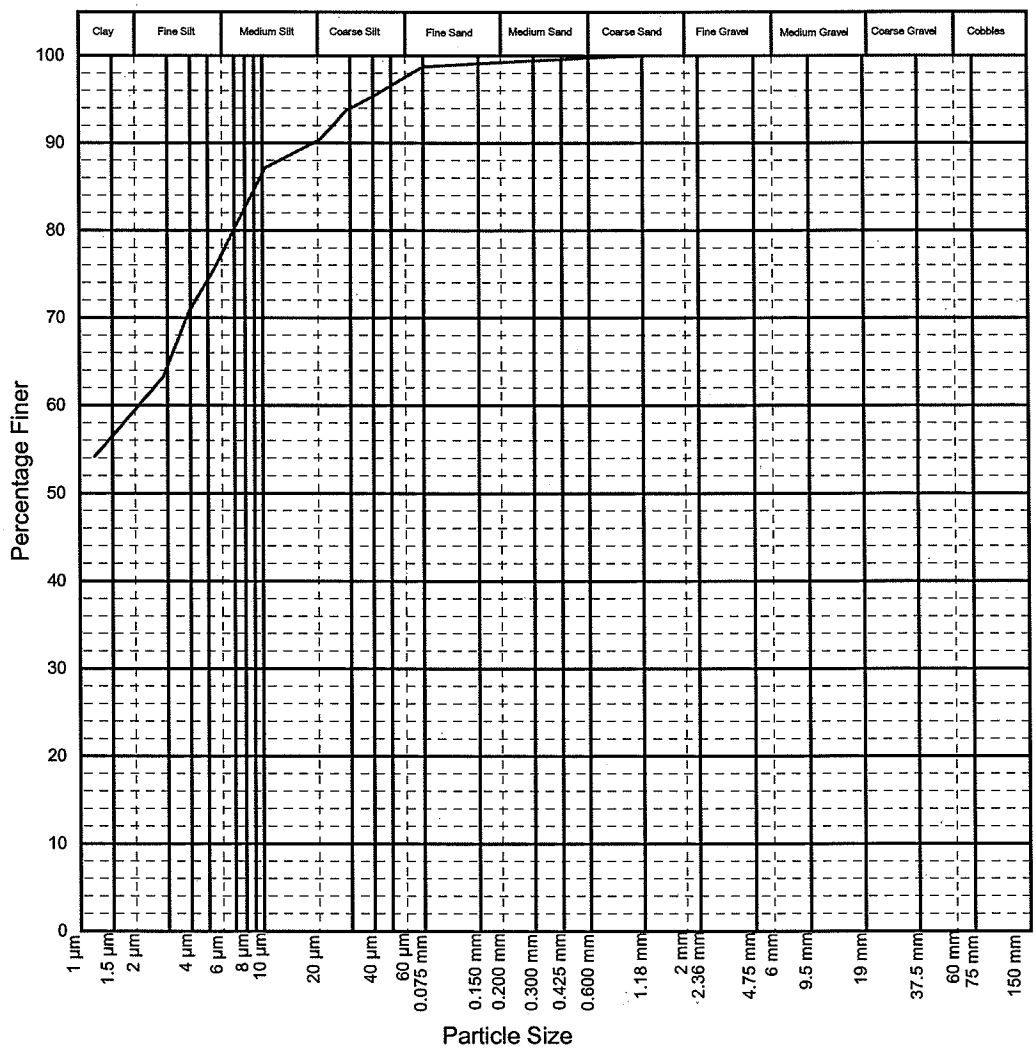
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Worley Parsons (Resources & Energy)	Report No. :	R8289
Address :	80 Albert Street, Brisbane	Job No. :	097633052/330
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940579
Sample ID :	BH1-B04 (1.6 - 2.0m)	Senders No. :	
		Date Received :	4/10/2009
		Sampled By :	Golder

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	
2.36	
1.18	100.0
0.600	99.7
0.425	99.6
0.300	99.4
0.150	99.1
0.075	98.7

Particle Size (Microns)	Percent Passing
40.4	95.4
28.8	93.7
20.7	90.4
10.3	87.1
7.5	81.4
5.4	75.6
3.9	70.6
2.9	63.2
1.2	54.1

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CH) Silty CLAY, grey		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : MF		Checked by : MF	

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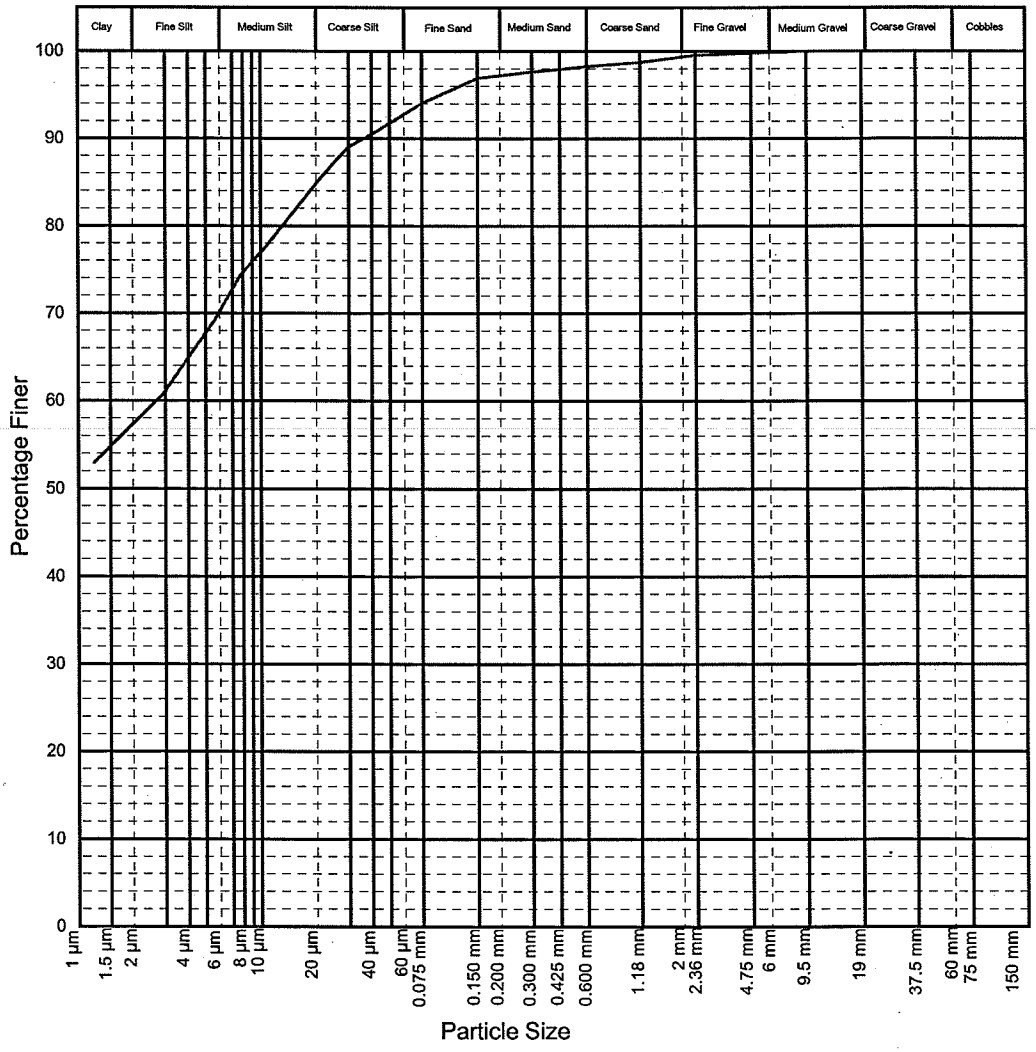
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Worley Parsons (Resources & Energy)	Report No. :	R8289
Address :	80 Albert Street, Brisbane	Job No. :	097633052/330
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940580
Sample ID :	BH1-B05 (3.0 - 3.3m)	Senders No. :	
		Date Received :	4/10/2009
		Sampled By :	Golder

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	100.0
4.75	99.8
2.36	99.5
1.18	98.7
0.600	98.2
0.425	97.9
0.300	97.6
0.150	96.9
0.075	94.0

Particle Size (Microns)	Percent Passing
41.9	90.7
29.8	89.0
21.4	85.6
10.9	77.8
7.8	74.4
5.6	69.2
4.0	65.0
2.9	60.7
1.2	52.9

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CH) Silty CLAY, dark grey		
Test Procedure :	AS 1289 3.6.2, 3.6.3 (up to 24 hours)		
Prepared by : NF		Checked by :	

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Golder Form No. R08 Hydrometer
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www.golder.com.au

ENVIRONMENTAL SETTLING TEST

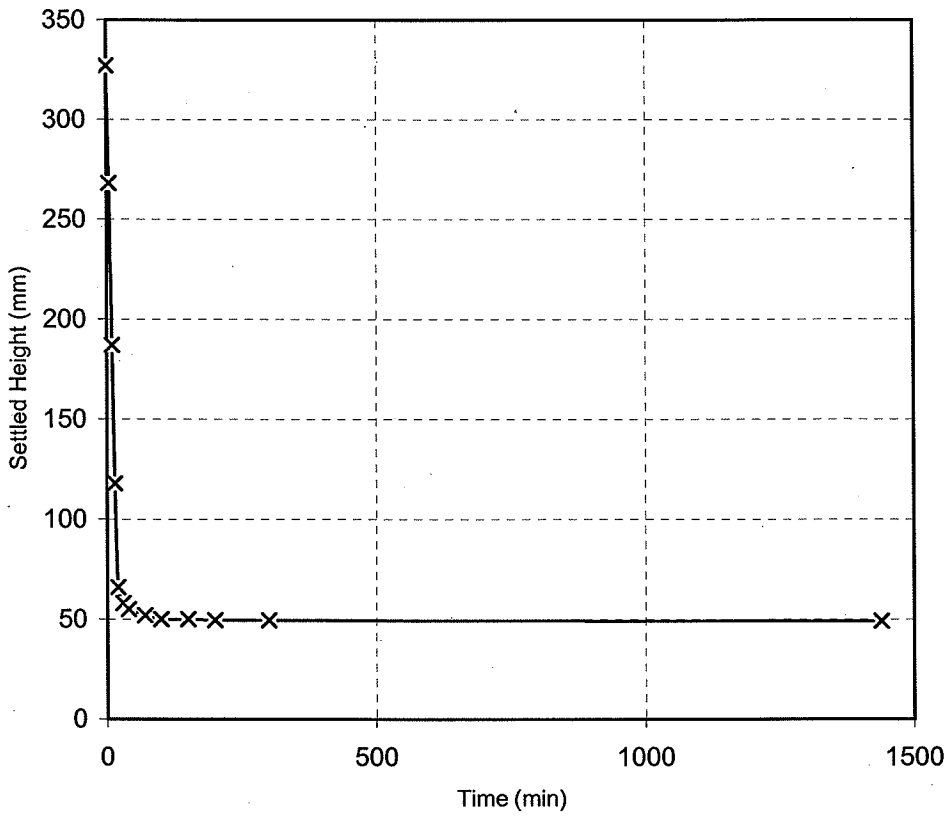
Client :	Worley Parsons (Resources & Energy)	Job No. :	097633052/130
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940578
Sample ID. :	BH1-B03 (3.0 - 3.6m)	Date Received:	4/10/2009
		Sampled By :	Golder

TEST CONDITIONS

Weight of solids (g)	90	Volume of Slurry (ml)	931
Starting weight (g)	990	Final Volume (ml)	132
Starting Slurry Density (%)	10	Final Pulp Weight (g)	191

TEST RESULTS

Time (min)	Height (mm)
0	327
5	268
10	187
15	118
20	66
30	58
40	55
70	52
100	50
150	50
200	50
300	50
1440	49



SETTLING RATES

Underflow Density (g/cm³)	1.447
Underflow % Solids	47

Settlement (%)	Settling Height (mm)	Settling Rate (mm/min)
50	188	13.90
90	77	13.17

Remarks : Clear settling interface after 5 minutes.
Material Description : (CH) Silty CLAY, pale brown, with some sand
Test Procedure :
Prepared by NF Checked by

Golder Associates

MANSFIELD
LABORATORY

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ENVIRONMENTAL SETTLING TEST

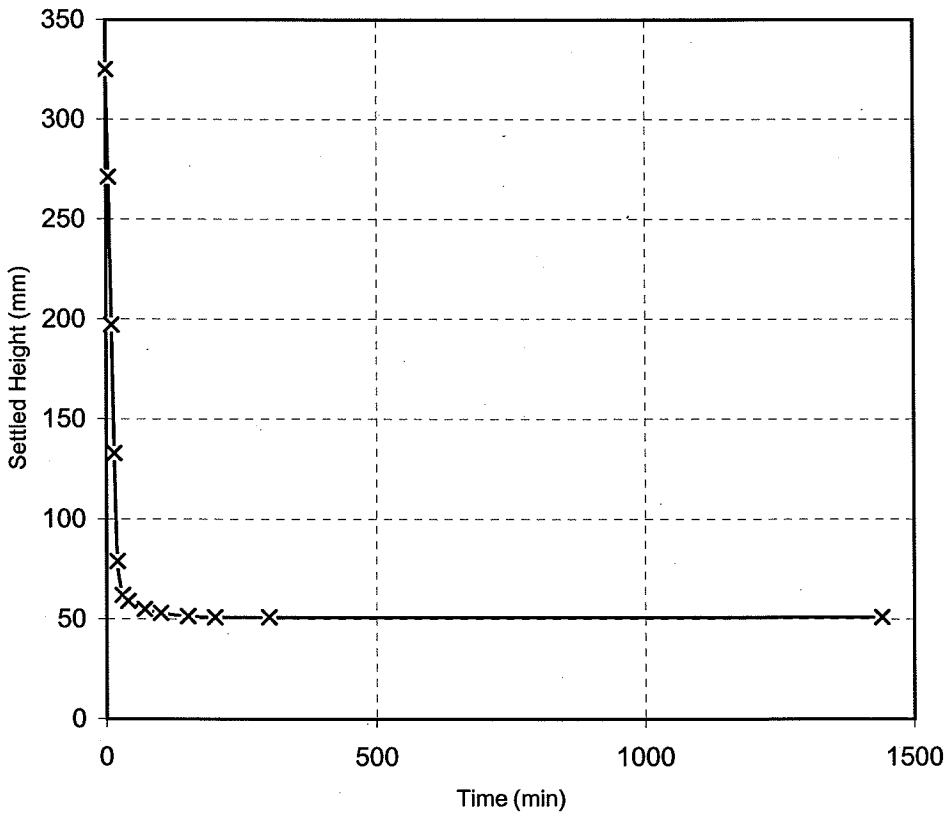
Client :	Worley Parsons (Resources & Energy)	Job No. :	097633052/130
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940579
Sample ID. :	BH1-B04 (1.6 - 2.0m)	Date Received:	4/10/2009
		Sampled By :	Golder

TEST CONDITIONS

Weight of solids (g)	90	Volume of Slurry (ml)	932
Starting weight (g)	990	Final Volume (ml)	140
Starting Slurry Density (%)	10	Final Pulp Weight (g)	198

TEST RESULTS

Time (min)	Height (mm)
0	325
5	271
10	197
15	133
20	79
30	62
40	59
70	55
100	53
150	52
200	51
300	51
1440	51



SETTLING RATES

Underflow Density (g/cm³)	1.414
Underflow % Solids	45

Settlement (%)	Settling Height (mm)	Settling Rate (mm/min)
50	188	12.45
90	78	12.33

Remarks :	Clear settling interface after 5 minutes.
Material Description :	(CH) Silty CLAY, grey
Test Procedure :	
Prepared by NF	Checked by

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ENVIRONMENTAL SETTLING TEST

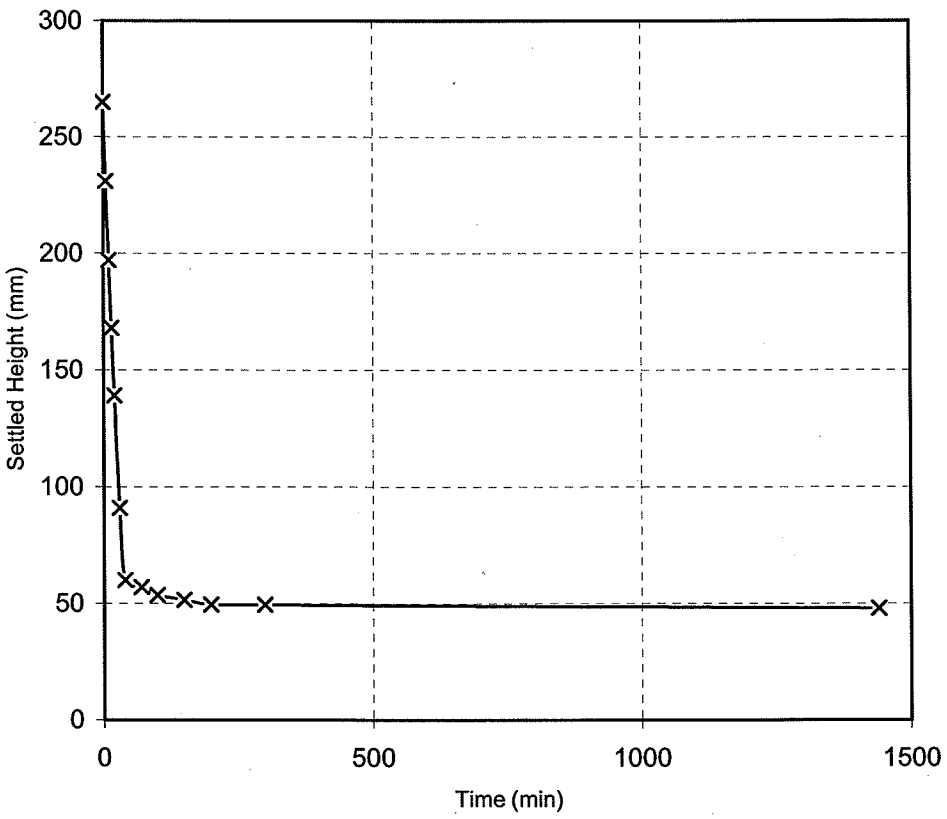
Client :	Worley Parsons (Resources & Energy)	Job No. :	097633052/130
Project :	Laird Point Dredge Study Option 1-B	Reg'n No. :	0940580
Sample ID. :	BH1-B05 (3.0 - 3.3m)	Date Received:	4/10/2009
		Sampled By :	Golder

TEST CONDITIONS

Weight of solids (g)	80	Volume of Slurry (ml)	800
Starting weight (g)	880	Final Volume (ml)	145
Starting Slurry Density (%)	10	Final Pulp Weight (g)	225

TEST RESULTS

Time (min)	Height (mm)
0	265
5	231
10	197
15	168
20	139
30	91
40	60
70	57
100	54
150	52
200	50
300	50
1440	48



SETTLING RATES

Underflow Density (g/cm³)	1.552
Underflow % Solids	36

Settlement (%)	Settling Height (mm)	Settling Rate (mm/min)
50	157	6.78
90	70	5.14

Remarks :	Clear settling interface after 5 minutes.
Material Description :	(CH) Silty CLAY, dark grey
Test Procedure :	
Prepared by	Checked by