



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD

Brisbane River and Moreton Bay

Annual Sediment Characterisation Report 2012

301001-01247 – 00-EN-REP-0003

04 April 2012

Infrastructure & Environment

Level 3, 60 Albert Street

Brisbane QLD 4000

Australia

Telephone: +61 7 3239 7400

Facsimile: +61 7 3221 7791

www.worleyparsons.com

ABN 61 001 279 812

© Copyright 2012 WorleyParsons



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Disclaimer

This report has been prepared on behalf of and for the exclusive use of Port of Brisbane Pty Ltd, and is subject to and issued in accordance with the agreement between Port of Brisbane Pty Ltd and WorleyParsons. WorleyParsons accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying this report without the permission of Port of Brisbane Pty Ltd or WorleyParsons is not permitted.

PROJECT 301001-01247 - BRISBANE RIVER AND MORETON BAY

REV	DESCRIPTION	ORIG	REVIEW	WORLEY- PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
0	Issued for Use	 S Codi King	 V Seto	 E Reid	04-04-12	N/A	



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

EXECUTIVE SUMMARY

INTRODUCTION

Port of Brisbane Pty Ltd (PBPL) proposes to undertake its annual maintenance dredging of the berth areas and access channels within the Brisbane Port Limits during early 2012. Dredging will be undertaken within a number of locations from the Hamilton Reach in the Brisbane River downstream to the entrance channel in northern Moreton Bay.

Options for the disposal of the resultant dredge material include placement within the approved PBPL reclamation area (onshore) and placement to designated material placement areas within Moreton Bay. While all disposal options will be considered, consistent with previous years, PBPL will most likely beneficially reuse the dredge material for reclamation purposes within their future port expansion area.

To inform decisions regarding material placement options, and the management of the dredging and material disposal operations, PBPL has undertaken an assessment of the contaminant status of the material proposed for dredging.

Contaminant testing was undertaken in accordance with an annually implemented Sediment Sampling and Analysis Plan (SAP), which has been developed to comply with the requirements of the *National Assessment Guidelines for Dredging* (NAGD; Commonwealth of Australia, 2009).

OBJECTIVES

The primary objectives of the 2012 SAP study were to undertake sediment sampling and analysis of a range of contaminants from 45 locations within three zones representing the dredge area in accordance with the NAGD, the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (DEH, 1998) and the *Guidelines for Sampling and Analysis for Lowland Acid Sulfate Soils* (ASS) in Queensland (QASSIT, 1998). Three reference locations located upstream of the dredge area, within a fourth zone, were also sampled to provide a comparison of contaminant concentrations to background concentrations.

In accordance with sampling undertaken in 2011, additional sampling was undertaken from four locations within Breakfast Creek to gain a better understanding of potential contaminant sources to the Brisbane River.

METHODOLOGY

Samples were collected using a diver-operated piston corer. At each location a total of between four to six cores were extracted within an area of 1m² to account for contaminant variability within the sediments. Cores were geotechnically logged, homogenised and transferred to sample containers before being sent to a National Association of Testing Authorities (NATA) accredited laboratory for contaminant analysis. Field and laboratory quality control procedures were undertaken in accordance with NAGD requirements.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

Sediments were analysed for metals, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs), benzene toluene ethylbenzene and xylenes (BTEX), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), organotins, nutrients, radionuclides, moisture content, and total organic carbon (TOC). Contaminant concentrations within each zone (Zones 1 to 4), and the total dredge area (Zones 2-4) were assessed through calculation of the 95% upper confidence level (UCL) of the mean for each parameter. 95% UCL concentrations were then compared against three sets of guideline criteria: the NAGD Screening Levels, Environmental Investigation Level (EIL) and Health Investigation Level for residential land use (HIL-A). In addition, sediments were analysed for particle size distribution (PSD), bulk density and acid sulfate soils (ASS). Results of ASS analysis were compared to QASSIT guideline criteria.

RESULTS

A summary of contaminants that exceeded NAGD Screening Levels at each location is provided below:

- Chromium exceeded the Screening Level of 65 mg/kg at location 9-1 in Zone 3
- Lead exceeded the Screening Level of 50 mg/kg at location 2-0 in Zone 1
- Mercury exceeded the Screening Level of 0.15 mg/kg at the following locations:
 - Zone 1: 2-0
 - Zone 2: 4-4, 4-5, 4-9, 8-2, 8-4
 - Zone 3: 9-2
 - Zone 4: 13-5
- Nickel exceeded the Screening Level of 21 mg/kg at the following locations:
 - Zone 1: 2-0, 3-0
 - Zone 2: 4-0, 4-4, 4-5, 4-9, 4-10, 4-13, 5-0, 6-3, 8-1
 - Zone 3: 9-1, 9-4, 10-1, 10-5, 10-6, 10-8, 11-1, 11-3, 11-9
 - Zone 4: 13-3, 13-7, 13-9
- Zinc exceeded the Screening Level of 200 mg/kg at location 2-0 in Zone 1
- Total PCBs (normalised to 1% TOC) exceeded the Screening Level of 23 µg/kg at location 13-1 in Zone 4
- DDD (normalised to 1% TOC) exceeded the Screening Level of 2 µg/kg at the following locations:
 - Zone 1: 2-0
 - Zone 2: 6-3, 7-1, 8-1, 8-3, 8-4



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- Zone 3: 9-2
- DDE (normalised to 1% TOC) exceeded the Screening Level of 2.2 µg/kg at the following locations:
 - Zone 1: 2-0
 - Zone 2: 4-0, 4-4, 4-5, 4-10, 6-2, 6-3, 7-1, 8-3, 8-4
 - Zone 3: 9-2, 9-4, 10-5, 10-8, 11-4, 11-5, 11-9, 11-12, 12-1, 12-2, 12-3, 15-1
 - Zone 4: 13-1, 13-5, 13-9
- Tributyltin (normalised to 1% TOC) exceeded the Screening Level of 9 µgSn/kg at location 4-0 in Zone 2

Chemical analysis of sediments identified a number of contaminants including mercury, nickel, OC pesticides (including trans-chlordane, p,p'-DDD and p,p'-DDE), and TBT that exceeded their respective NAGD Screening Levels at the 95% UCL of the mean within at least one zone of the dredge area (Zones 2-4). In addition, lead, zinc and Total TPHs exceeded respective NAGD Screening Levels in Zone 1. Across the combined dredge area (zones 2-4); nickel (24.8 mg/kg), trans-chlordane (0.5 µg/kg), DDE (2.6 µg/kg) and tributyltin (10 µgSn/kg) exceeded their respective NAGD Screening Levels at the 95% UCL of the mean.

As with previous years there is a general trend for sites within the dredge area (Zones 2-4) to continue a decreasing trend in metals concentrations between sites 4 and 11 with a sharp decline at sites 12, 14 and 15 before a rise again at site 13 (entrance channel).

Assessment of acid sulphate soils identified that the majority of sediments within the Brisbane River have little or no actual acidity, however with the exception of location 9-1 and 14-1 are identified as containing potential acid sulphate soils.

CONCLUSIONS

The results show that none of the zones, including the reference zone, would be considered suitable for sea disposal in accordance with the NAGD Guidelines given that at least one contaminant in each zone exceeded its NAGD Screening Level at the 95% UCL of the mean. Under the NAGD, further testing would be required to determine the potential bioavailability of these contaminants and potential impacts to water quality.

Comparison of the sediment material to the DEH (1998) environmental investigation levels and health investigation (A) levels indicate that the sediment would be suitable for placement on land. The mean and 95% UCL of the mean values for the total dredge area (Zones 2-4) were below investigation levels. Lead and zinc concentrations within Zone 1 exceeded the EIL at the 95% UCL of the mean, however as this is not a dredged area the results obtained for Zone 1 do not impact on the suitability of material for land disposal.

Due to the January 2011 Brisbane floods the overall chemical load to this region would be expected to be higher. This is evident in Zone 1 where chemical concentrations of all metals and total PAHs are



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

higher than previous years which would be expected due to rainwater, stormwater and higher overall inputs into the system especially around the Brisbane CBD. These results are not indicative of a normal wet season for this region and are likely to be higher than the 2011 SAP, which highlighted that metal concentrations in Brisbane are higher than the 4 east coast ports and 1 northwest coast port that were reviewed.

Sampling locations within site 13 (entrance channel) highlight clear site heterogeneity with sediments collected on the northern side of the channel being consistently elevated in concentrations compared to those sites on the southern side. These results could be due to the predominating currents during the floods.

This is the second year that additional samples were collected (within Breakfast Creek) in order to gain a better understanding of potential contaminant sources into the port region. The results show reduced contaminant levels in Breakfast Creek compared to last year. This may potentially be due to the floods at the beginning of the year flushing sediments from the creek. Continued monitoring of Breakfast Creek is recommended as it is considered a potential source of contaminants to the Brisbane River.

RECOMMENDATIONS

OP pesticides have not been detected from any zone since 2002 and BTEX have not been detected within the timeframe of the review (from 2000). It is recommended to reconsider the requirement to monitor these parameters.

The recommendations of the 2011 SAP highlighted PCBs as a contaminant group to reconsider the necessity for continued monitoring. Prior to this 2012 SAP study, PCBs had been undetected since 2003. Given that results of this SAP study have identified PCBs within the dredge area, it is recommended to continue with PCB monitoring in the Brisbane River for 2013, with a review of results (particularly in comparison to results from Breakfast Creek) to identify the continued requirement for this analysis.

The SAP for the PBPL is statistically a complex matrix using a “nested design” (a number of locations within a site, and a number of sites within a zone,) analysed over time and distance. The design is further complicated because of the uneven number of locations and sites being analysed within each zone which makes it unbalanced in terms of comparisons across zones. In addition, many of these locations and sites within each zone are different in their sediment characteristics, which makes it difficult to pool data and compare across zones. It is recommended to present data per site with zone over time as a nested design so the patterns over time are more distinguishable compared to using a box plot, which summarises data within the zone over time and loses the patterns in the data.

Historical data for PBPL work has been collected since 2000 and was conducted in Zones 2-4 with no reference site or Zone 1. We recommend reviewing and evaluating this earlier data to confirm that the analytical results are comparable in methodology to present methods and results. In the last decade laboratory analytical methods and detection limits or LOR have improved considerably and it might be prudent to determine if early data is reliable for inclusion into the PBPL SAP annual sediment characterisation assessment.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.1.1	Sampling and Analysis Plan	1
1.2	Objectives of the Study	2
1.3	Previous Studies	2
1.4	Definitions	4
2	METHODS	5
2.1	Sampling Protocols	5
2.1.1	Sample Collection	11
2.1.2	Sample Processing	11
2.2	Analysis Protocols	12
2.2.1	Laboratory Analysis	12
2.2.2	Data Analysis	16
2.3	Quality Assurance/Quality Control (QA/QC)	17
2.3.1	QA/QC – Field Sampling	17
2.3.2	QA/QC – Laboratory Analysis	18
3	RESULTS	20
3.1	Chemical Results	20
3.1.1	Contaminant Concentrations Exceeding NAGD Screening Levels	20
3.1.2	Contaminant Concentrations Exceeding EIL or HIL (A)	21
3.1.3	Comparison of Results in the Dredge Area to Reference Sites	24
3.1.4	Assessment of Acid Sulfate Soils	27
3.2	Physical Characteristics	30
3.2.1	Zone 1 – Reference Sites	30
3.2.2	Zone 2 – Colmslie to Pinkenba	31
3.2.3	Zone 3 – Port Reaches	32
3.2.4	Zone 4 – Moreton Bay (Entrance Channel)	33



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

3.2.5	Comparison between Zones	34
3.2.6	Bulk Density	35
3.3	Additional Sampling Chemical Results	36
3.3.1	Contaminant Concentrations in Comparison to NAGD Screening Levels at Breakfast Creek 36	
3.3.2	Contaminant Concentrations Exceeding EIL or HIL (A)	38
3.4	Additional Sampling Physical Results.....	38
4	DATA VALIDATION	41
4.1	Laboratory Accuracy and Precision	41
4.1.1	Laboratory Blanks	41
4.1.2	Laboratory Duplicates	41
4.1.3	Surrogate Spikes.....	42
4.1.4	Matrix Spikes.....	42
4.2	Field Split Triplicate, Replicate Triplicate and Inter-Batch Duplicate Analysis	43
4.2.1	Field Split Triplicate Sample Analyses (inter and intra-laboratory comparison) ..	43
4.2.2	Field Triplicate Analyses	43
4.2.3	Inter-laboratory comparison	44
4.2.4	Field Blanks.....	44
4.3	Holding Times	44
5	COMPARISON WITH GUIDELINE CRITERIA.....	45
5.1	Compliance with NAGD Screening Levels	45
5.1.1	Zone 1 – Reference Sites	45
5.1.2	Zone 2 – Colmslie to Pinkenba	45
5.1.3	Zone 3 – Port reaches	45
5.1.4	Zone 4 – Moreton Bay (Entrance Channel)	45
5.1.5	Whole Dredge Area (Zone 2 – Zone 4)	45
5.2	Compliance with EIL and HIL (A) Guidelines	46
6	COMPARISON WITH PREVIOUS SAP DATA	52
6.1	Contaminant Spatial and Temporal Analysis.....	52



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

6.1.1	Arsenic	52
6.1.2	Cadmium.....	52
6.1.3	Chromium.....	53
6.1.4	Copper	53
6.1.5	Lead	53
6.1.6	Mercury	53
6.1.7	Nickel	54
6.1.8	Zinc	54
6.1.9	Tributyltin.....	54
6.1.10	Polycyclic Aromatic Hydrocarbons.....	54
6.2	Patterns in the Distribution of Metal Contaminants	74
6.3	Temporal Comparison of Metals and TBT Exceeding NAGD Screening Levels	77
6.4	Acid Sulfate Soils	78
6.5	Physical Characteristics.....	78
6.6	Comparison of Contaminants with Other Australian Ports	78
6.7	Comparison of Results with Emergency Dredging Results: Brisbane Floods.....	79
7	DISCUSSION AND CONCLUSIONS.....	80
8	RECOMMENDATIONS	82
9	REFERENCES	83

Appendices

APPENDIX 1	MAPS
APPENDIX 2	CORE LOGS
APPENDIX 3	PRIMARY LABORATORY ANALYTICAL REPORT (AAA)
APPENDIX 4	ACID SULFATE SOILS ANALYTICAL REPORT (ENVIROLAB SERVICES)
APPENDIX 5	PARTICLE SIZE ANALYSIS (GOLDER ASSOCIATES)
APPENDIX 6	SECONDARY LABORATORY ANALYTICAL REPORT (ALS)
APPENDIX 7	QUALITY ASSURANCE/ QUALITY CONTROL ANALYSES



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

1 INTRODUCTION

1.1 Background

The Port of Brisbane Pty Ltd (PBPL) is responsible for maintaining minimum channel depths within port limits to allow vessel access to port facilities. The channel depths are declared by the Regional Harbour Master and designated on shipping charts.

PBPL undertakes an annual maintenance dredging program to ensure these minimum depths are maintained. The resultant dredge material is placed within port limits. In early 2012, PBPL again propose to undertake maintenance dredging within the navigational areas of the Brisbane River and Moreton Bay, primarily using the Trailer Suction Hopper Dredge (TSHD) Brisbane. Maintenance dredging works extend from the Hamilton Reach of the Brisbane River downstream to the North-West Channel located in northern Moreton Bay.

PBPL aims to ensure that all dredging activities, including extraction and placement of material, are undertaken in accordance with existing legislation and with minimal environmental harm. A key component of achieving this aim is to undertake a contaminant assessment of the material proposed for dredging prior to commencement of the dredging program. This contaminant testing is undertaken in accordance with a Sediment Sampling and Analysis Plan (SAP), which has been developed to comply with the requirements of the National Assessment Guidelines for Dredging (NAGD; Commonwealth of Australia, 2009). The results are used to inform decisions regarding potential material placement locations, and the management of the dredging and material placement operations.

1.1.1 Sampling and Analysis Plan

The SAP includes assessment of both physical and chemical characteristics of the material to be dredged as well as an assessment of acid sulfate soil potential. Whilst testing of acid sulfate soil potential is undertaken for maintenance works, the presence of acid sulfate soils within material which has recently been eroded or deposited from the system is generally very low.

Sediment testing protocols are undertaken in compliance with the NAGD. Results of analysis are compared against the NAGD Screening Levels as a benchmark for sediment quality.

The SAP includes:

- *'Testing for contamination of sediments by metals, nutrients, hydrocarbons, pesticides, tributyl tin (TBT) and other contaminants to the depth of the proposed dredging;*
- *Comparison of contaminant levels with background levels from similar uncontaminated areas; and*
- *Comparison of contaminant levels with accepted sediment quality criteria.'*



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

1.2 Objectives of the Study

WorleyParsons was commissioned by PBPL to characterise sediments proposed for maintenance dredging in accordance with the SAP and the NAGD. The objectives of this project are to:

- Undertake the sediment sampling and analysis program according to the SAP study methods provided in the project brief;
- Test and analyse sediments for a range of physical and chemical properties (a detailed list of contaminants that have been analysed in accordance to the SAP are provided in Section 2.2.1); and
- Provide a comparison of contaminant concentrations against the NAGD, *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (Department of Environment (DoE), 1998), *Guidelines for Sampling and Analysis for Lowland Acid Sulfate Soils (ASS) in Queensland* (QASSIT, 1998) and previous SAP results.

1.3 Previous Studies

PBPL has undertaken fourteen SAP studies since 1998, which has included the sampling and analysis of sediments from up to 48 locations within the Brisbane River and adjacent entrance channel. Sample dates and the number of sample site locations completed previously are:

- March 1998 (13 locations);
- December 1998 (24 locations);
- December 1999 (35 locations);
- November 2000 (36 locations);
- November 2001 (48 locations);
- November 2002 (48 locations);
- November 2003 (48 locations);
- November 2004 (48 locations);
- January 2006 (48 locations);
- February 2007 (48 locations);
- January 2008 (48 locations);
- February 2009 (48 locations);
- January 2010 (48 locations);
- December 2010 (48 locations); and
- December 2011 (48 locations).



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

Table 1-1 summaries the percentage of sample locations exceeding NODGDM/NAGD contaminant Screening Levels from previous SAP studies for metals and TBT. Historically TBT, nickel and mercury have been the dominant contaminants that have routinely exceeded Screening Levels within port limits.

Table 1-1: Percentage of sample locations exceeding NODGDM and NAGD Screening Levels for metals and TBT 1998 – Dec 2011

SAP Event	No. Locations	Percentage (%) of sample locations exceeding NODGDM/NAGD Screening Levels ¹							
		Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)	Tributyltin (TBT)
Mar-98 ²	13	0	0	0	0	16	39	8	54
Dec-98 ²	24	4	0	0	33	0	33	8	42
Dec-99 ²	35	0	0	0	3	0	83	0	0
Nov-00 ²	36	0	11	9	26	20	43	17	63
Nov-01 ³	45*	0	0	7	31	0	76	7	9
Nov-02 ⁴	45*	0	2	0	16	4	91	0	29
Nov-03 ⁵	45*	0	0	0	18	0	60	0	40
Nov-04 ⁶	45*	0	0	2	4	2	67	4	58
Jan-06 ⁷	45*	0	0	0	7	0	71	0	31
Feb-07 ⁸	45*	0	0	2	13	0	33	2	31
Jan-08 ⁹	45*	2	0	4	15	2	13	0	10
Feb-09 ¹⁰	45*	2	0	4	24	2	53	0	11
Jan-10 ¹¹	45*	0	0	0	20	0	78	0	18
Dec-10 ¹²	45*	0	0	4	9	2	56	0	7
Dec-11	45*	0	1	0	8	1	48	1	2

Notes

¹ Results expressed as percentage of sites containing contaminants above the NODGDM Screening Level criteria. Note: results from Feb-09 onwards are compared against NAGD Screening Levels.

² Source: PBC Environmental Performance Report, 2001

³ Butler & Partners 2002

⁴ Hydrobiology 2003

⁵ Hydrobiology 2004



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

⁶ SKM, 2005

⁷ SKM, 2006

⁸ SKM, 2007

⁹ WorleyParsons, 2008

¹⁰ WorleyParsons, 2009

¹¹ GHD, May 2010

¹² WorleyParsons, 2011

* Although 48 sample locations were tested in the 2001 to 2009 SAPs, 3 of these locations were upstream reference sites (hence not included in the above calculations)

1.4 Definitions

The following definitions have been taken from the NAGD:

Screening Level

Level of a substance in the sediment below which toxic effects on organisms are not expected.

Practical Quantitation Level, PQL

The lowest chemical analysis level that can be reliably achieved within specified limits of precision and accuracy during routine operating conditions and are also referred to as Limit of Reporting (LOR).



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

2 METHODS

The methods implemented during the 2012 Brisbane River and Moreton Bay SAP study were consistent with the project terms of reference issued by PBPL and with the requirements of the NAGD. The following sections provide details of the sampling protocols, sample collection, sample processing and laboratory analysis of the sediment samples.

2.1 Sampling Protocols

The 2012 field sampling program was conducted between 12 December and 16 December 2011. For the purposes of the annual SAP, field sampling was undertaken from a total of 48 locations, 39 within the Brisbane River and 9 within the entrance channel in Moreton Bay. All locations were positioned within four zones and 15 designated sites within the zones. In addition, a further four locations were sampled, three within Breakfast Creek, and one in the Brisbane River upstream of Breakfast Creek. These additional sample locations were added to help assess potential sources of contaminants into the Brisbane River.

Sampling locations were sited using a Garmin Map 76 CSx, which has an accuracy of ± 5 m. Sampling was conducted within 10m of the established location coordinates, with exceptions as follows:

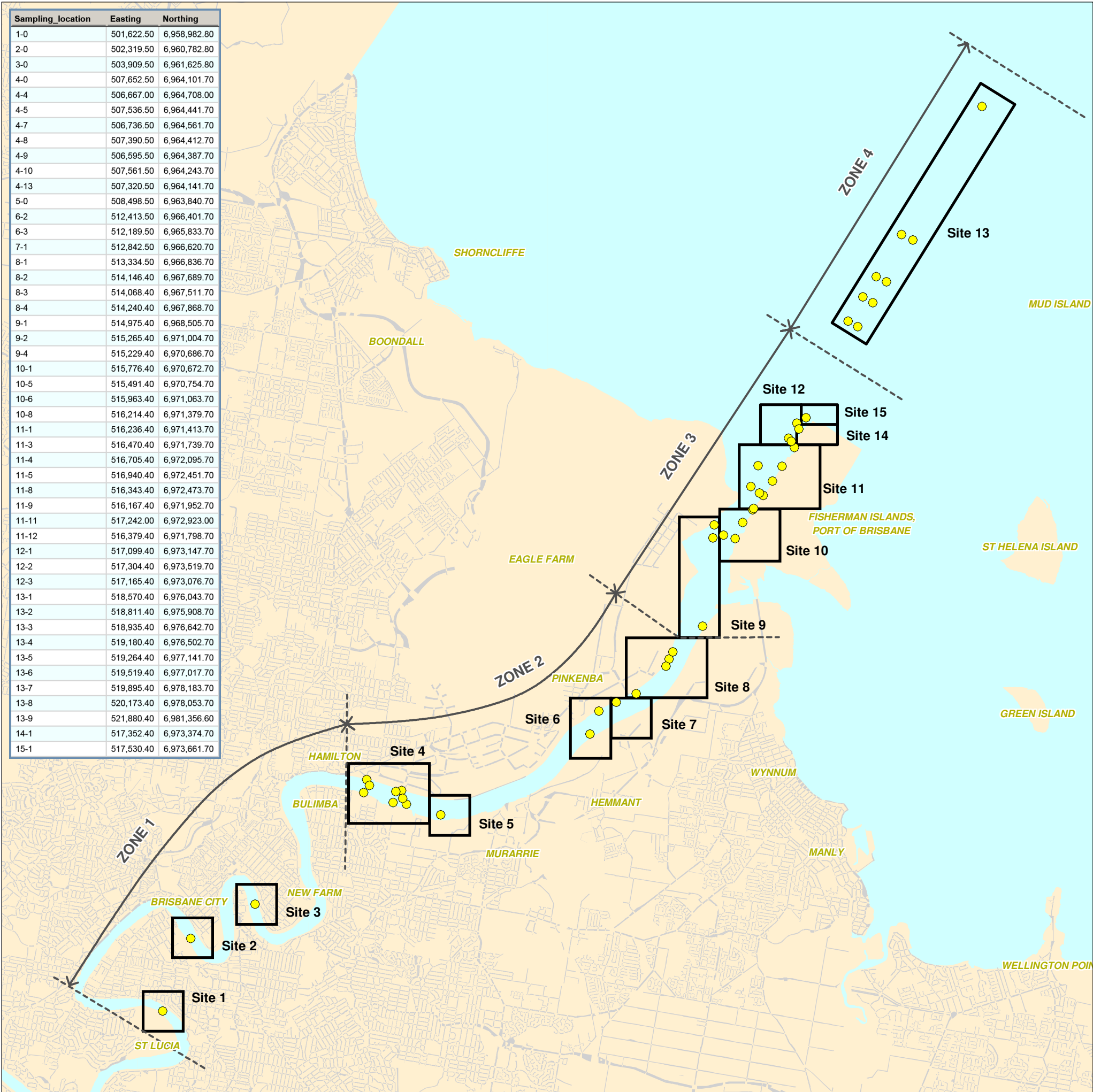
- Site 2-0 was moved closer to the southern riverbank due to strong currents in the middle of the river and diver unable to maintain position on river bed; and
- Site 11-4 was moved approximately 30 m downstream due to ship at berth.

A map showing all sampling locations is provided in Figure 2-1. Table 2-1 provides a list of the GPS coordinates of sampling locations.

Locations have been grouped according to zone and site within zone, which is consistent with previous SAP studies:

- Zone 1 – All up-river reference locations (sites 1-3);
- Zone 2 – All sites between Colmslie and Pinkenba (sites 4 – 8);
- Zone 3 – All sites within Port reaches (sites 9 – 12 and 14-15); and
- Zone 4 – Site within Moreton Bay entrance channel (site 13).

Sampling_location	Easting	Northing
1-0	501,622.50	6,958,982.80
2-0	502,319.50	6,960,782.80
3-0	503,909.50	6,961,625.80
4-0	507,652.50	6,964,101.70
4-4	506,667.00	6,964,708.00
4-5	507,536.50	6,964,441.70
4-7	506,736.50	6,964,561.70
4-8	507,390.50	6,964,412.70
4-9	506,595.50	6,964,387.70
4-10	507,561.50	6,964,243.70
4-13	507,320.50	6,964,141.70
5-0	508,498.50	6,963,840.70
6-2	512,413.50	6,966,401.70
6-3	512,189.50	6,965,833.70
7-1	512,842.50	6,966,620.70
8-1	513,334.50	6,966,836.70
8-2	514,146.40	6,967,689.70
8-3	514,068.40	6,967,511.70
8-4	514,240.40	6,967,868.70
9-1	514,975.40	6,968,505.70
9-2	515,265.40	6,971,004.70
9-4	515,229.40	6,970,686.70
10-1	515,776.40	6,970,672.70
10-5	515,491.40	6,970,754.70
10-6	515,963.40	6,971,063.70
10-8	516,214.40	6,971,379.70
11-1	516,236.40	6,971,413.70
11-3	516,470.40	6,971,739.70
11-4	516,705.40	6,972,095.70
11-5	516,940.40	6,972,451.70
11-8	516,343.40	6,972,473.70
11-9	516,167.40	6,971,952.70
11-11	517,242.00	6,972,923.00
11-12	516,379.40	6,971,798.70
12-1	517,099.40	6,973,147.70
12-2	517,304.40	6,973,519.70
12-3	517,165.40	6,973,076.70
13-1	518,570.40	6,976,043.70
13-2	518,811.40	6,975,908.70
13-3	518,935.40	6,976,642.70
13-4	519,180.40	6,976,502.70
13-5	519,264.40	6,977,141.70
13-6	519,519.40	6,977,017.70
13-7	519,895.40	6,978,183.70
13-8	520,173.40	6,978,053.70
13-9	521,880.40	6,981,356.60
14-1	517,352.40	6,973,374.70
15-1	517,530.40	6,973,661.70



LEGEND

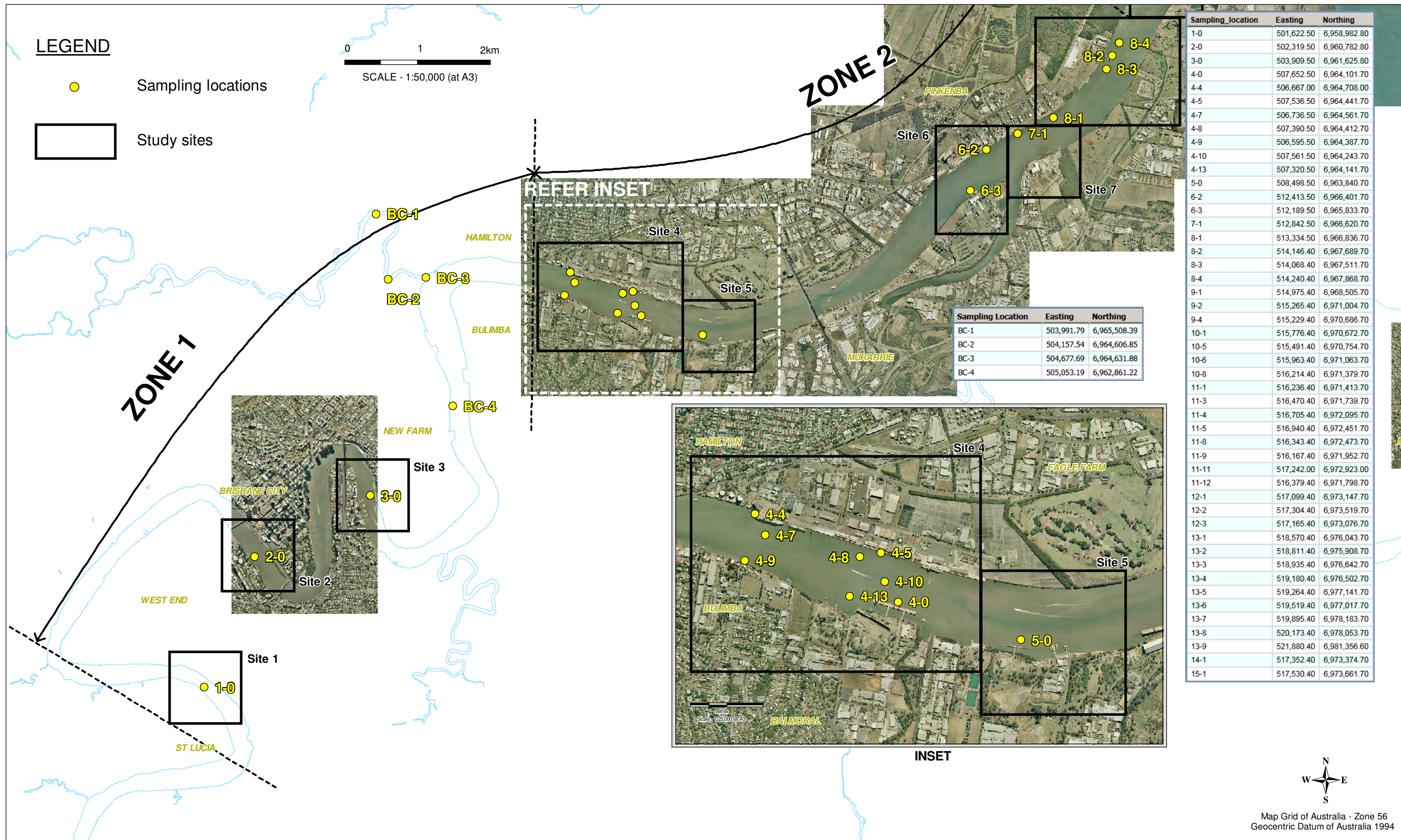
- Sampling locations
- Study sites

This map incorporates data which is:
© Commonwealth of Australia (Geoscience Australia) 2012
The Commonwealth gives no warranty regarding the accuracy, completeness, currency or suitability for any particular purpose.
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

0 2 4km
SCALE - 1:100,000 (at A3)
Map Grid of Australia - Zone 56
Geocentric Datum of Australia 1994



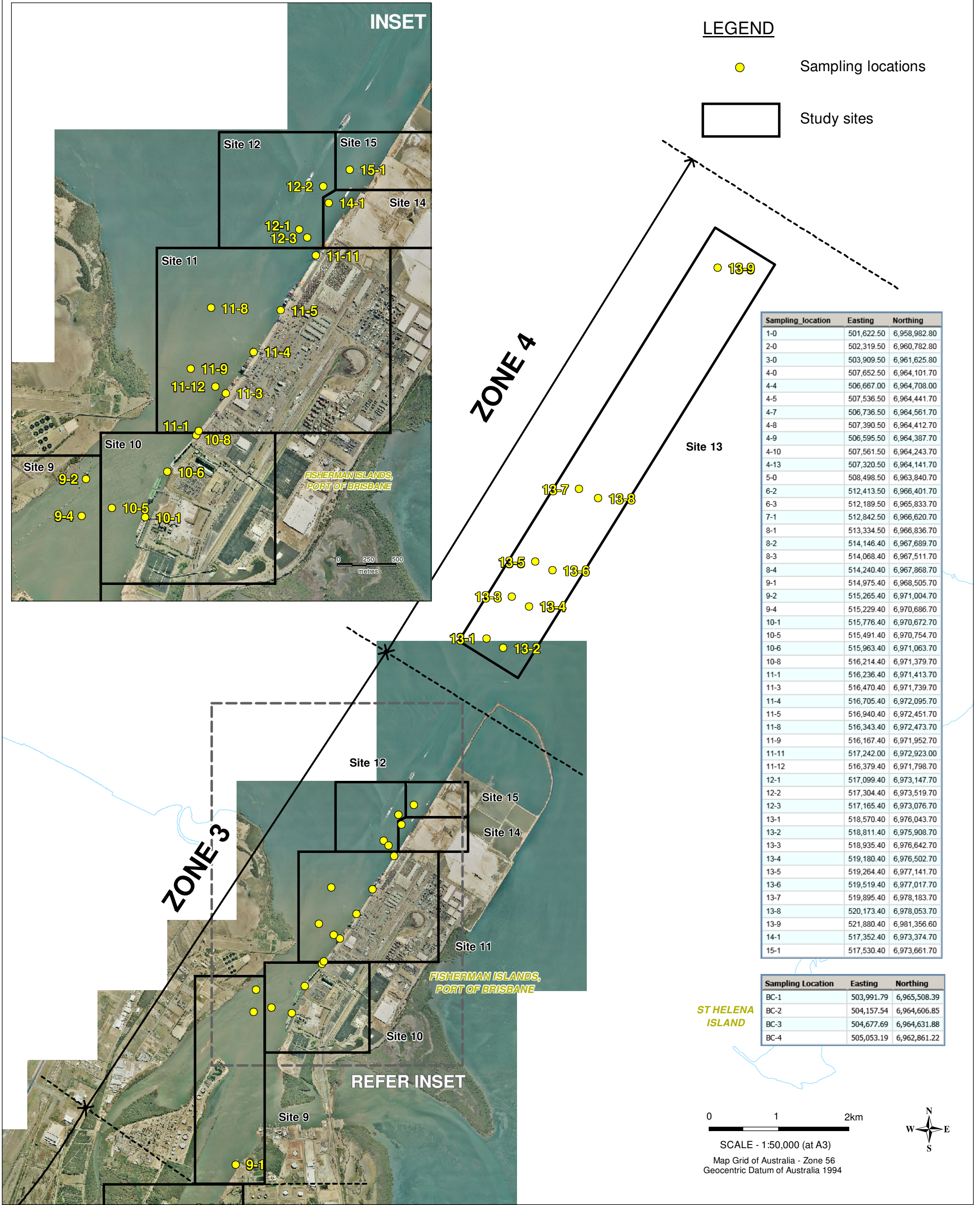
A	02/03/2012	Issued for review	KK	DH		
Rev	Date	Revision Description	DRN	CHK	ENG	APPD
WorleyParsons resources & energy			PORT of BRISBANE Here for the future			
PORT OF BRISBANE PTY LTD						
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012						
Figure 2.1(a)						
Overview of Study Sites and Sampling Locations						
Project No: 301001-01247			Figure: 01247-00-GM-DAL-0021		Rev: A	



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2009. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.
2007 Aerial Photography supplied by Port of Brisbane Corporation

A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	DRN	CHK	ENG	APPD
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			

PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Figure 2.1(b) SAP Sampling Locations (Sites 1-8)		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0022	Rev: A



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

2007 Aerial Photography supplied by Port of Brisbane Corporation

A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			

PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Figure 2.1(c) SAP Sampling Locations (Sites 9 - 15)		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0023	Rev: A



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Table 2-1: Details of sediment sampling locations including: coordinates, date sampled, water depth and analysis performed

Sampling Locations			Location Coordinates		Sample Details							Analyses
Zone	Site	Location	Easting (m)	Northing (m)	Date	Time	Water Depth (m)	Tide Height (MSQ Data 2009)	Top of Core (-m LAT)	Length of Core	No of Cores	
1	1	1-0	501622.5	6958982.8	15-12-11	13:05	11.0	2.371	8.629	0.74	4	Basic + Detailed
1	2	2-0	502319.5	6960782.8	15-12-11	12:10	6.0	2.286	3.714	0.8	4	Basic + Detailed
1	3	3-0	503909.5	6961625.8	15-12-11	11:05	-	2.001	-	0.79	6	Basic + Detailed
2	4	4-0	507652.5	6964101.7	16-12-11	12:00	10.0	2.028	7.972	0.85	4	Basic
2	4	4-4	506672.0	6964709.0	16-12-11	09:50	10.0	1.254	8.746	0.83	1	Basic
2	4	4-5	507536.5	6964441.7	16-12-11	12:30	10.0	2.165	7.835	0.84	4	Basic
2	4	4-7	506736.5	6964561.7	15-12-11	09:30	10.0	1.461	8.539	0.83	4	Basic + Detailed + Bulk Density + Radionuclides
2	4	4-8	507390.5	6964412.7	16-12-11	09:00	12.0	0.909	11.091	0.52	4	Basic + Bulk Density
2	4	4-9	506595.5	6964387.7	16-12-11	10:30	2.0	1.509	0.491	0.82	6	Basic
2	4	4-10	507561.5	6964243.7	16-12-11	08:25	11.0	0.763	10.237	0.78	4	Basic
2	4	4-13	507320.5	6964141.7	16-12-11	10:55	8.0	1.683	6.317	0.92	4	Basic
2	5	5-0	508498.5	6963840.7	16-12-11	11:30	11.0	1.879	9.121	0.86	4	Basic + Detailed + Radionuclides
2	6	6-2	512413.5	6966401.7	14-12-11	14:20	-	1.806	-	0.8	4	Basic + Bulk Density



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Sampling Locations			Location Coordinates		Sample Details							Analyses
Zone	Site	Location	Easting (m)	Northing (m)	Date	Time	Water Depth (m)	Tide Height (MSQ Data 2009)	Top of Core (-m LAT)	Length of Core	No of Cores	
2	6	6-3	512189.5	6965833.7	14-12-11	15:15	13.0	1.388	11.612	0.72	4	Basic + Detailed + Bulk Density + Radionuclides
2	7	7-1	512842.5	6966620.7	14-12-11	13:55	13.0	1.93	11.07	0.78	6	Basic + Detailed + Radionuclides
2	8	8-1	513334.5	6966836.7	14-12-11	13:40	13.0	2.047	10.953	0.86	4	Basic + Detailed + Radionuclides
2	8	8-2	514146.4	6967689.7	14-12-11	13:10	12.0	2.238	9.762	0.53	4	Basic
2	8	8-3	514068.4	6967511.7	14-12-11	12:50	6.5	2.339	4.161	0.78	4	Basic
2	8	8-4	514240.4	6967868.7	14-12-11	12:30	3.1	2.404	0.696	1.0	4	Basic
3	9	9-1	514975.4	6968505.7	14-12-11	12:00	13.0	2.452	10.548	0.1	4	Basic + Detailed
3	9	9-2	515265.4	6971004.7	13-12-11	09:30	12.0	2.24	9.76	0.87	4	Basic
3	9	9-4	515229.4	6970686.7	13-12-11	09:50	8.3	2.354	5.946	0.82	4	Basic + Bulk Density
3	10	10-1	515776.4	6970672.7	13-12-11	-	-	-	-	0.9	4	Basic + Bulk Density
3	10	10-5	515491.4	6970754.7	13-12-11	10:05	16.0	2.454	13.546	0.7	4	Basic
3	10	10-6	515963.4	6971063.7	13-12-11	10:50	16.0	2.558	13.442	0.81	4	Basic + Detailed
3	10	10-8	516214.4	6971379.7	13-12-11	11:55	-	2.466	-	0.62	4	Basic
3	11	11-1	516236.4	6971413.7	13-12-11	12:30	16.0	2.297	13.703	0.33	4	Basic
3	11	11-3	516470.4	6971739.7	13-12-11	14:20	15.0	1.583	13.417	0.29	4	Basic



PORT OF BRISBANE PTY LTD

BRISBANE RIVER AND MORETON BAY

ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Sampling Locations			Location Coordinates		Sample Details							Analyses
Zone	Site	Location	Easting (m)	Northing (m)	Date	Time	Water Depth (m)	Tide Height (MSQ Data 2009)	Top of Core (-m LAT)	Length of Core	No of Cores	
3	11	11-4	516705.4	6972095.7	14-12-11	11:00	-	2.366	-	0.85	4	Basic
3	11	11-5	516940.4	6972451.7	14-12-11	09:50	17.0	1.999	15	0.81	4	Basic
3	11	11-8	516343.4	6972473.7	14-12-11	10:30	2.4	2.244	0.156	0.67	4	Basic + Detailed + Radionuclides
3	11	11-9	516167.4	6971952.7	14-12-11	11:20	16.0	2.429	13.571	1.0	4	Basic + Bulk Density
3	11	11-11	517261.1	6972881.4	14-12-11	09:25	16	1.869	14.131	0.77	6	Basic + Bulk Density
3	11	11-12	516379.4	6971798.7	13-12-11	14:00	16.0	1.715	14.285	0.46	4	Basic
3	12	12-1	517099.4	6973147.7	14-12-11	08:40	16.0	1.521	14.479	0.01	-	Basic + Detailed
3	12	12-2	517304.4	6973519.7	14-12-11	08:00	15.0	1.232	13.768	-	-	Basic + Detailed + Radionuclides
3	12	12-3	517165.4	6973076.7	14-12-11	09:00	16.0	1.661	14.339	0.01	-	Basic
4	13	13-1	518570.4	6976043.7	13-12-11	08:30	8.6	1.841	6.759	0.82	4	Basic + Detailed + Radionuclides
4	13	13-2	518811.4	6975908.7	12-12-11	13:30	8.8	1.697	7.103	0.85	6	Basic
4	13	13-3	518935.4	6976642.7	12-12-11	13:10	9.8	1.855	7.945	0.89	4	Basic
4	13	13-4	519180.4	6976502.7	12-12-11	12:55	9.4	1.924	7.476	0.85	4	Basic
4	13	13-5	519264.4	6977141.7	12-12-11	12:40	8.6	2.017	6.583	0.82	4	Basic
4	13	13-6	519519.4	6977017.7	12-12-11	12:20	12.0	2.146	9.854	0.81	4	Basic



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

Sampling Locations			Location Coordinates		Sample Details							
Zone	Site	Location	Easting (m)	Northing (m)	Date	Time	Water Depth (m)	Tide Height (MSQ Data 2009)	Top of Core (-m LAT)	Length of Core	No of Cores	Analyses
4	13	13-7	519895.4	6978183.7	12-12-11	11:55	9.9	2.293	7.607	0.88	4	Basic + Bulk Density
4	13	13-8	520173.4	6978053.7	12-12-11	11:30	11.0	2.474	8.526	0.64	4	Basic + Bulk Density
4	13	13-9	521880.4	6981356.6	12-12-11	10:50	17.0	2.569	14.431	0.81	4	Basic
3	14	14-1	517352.4	6973374.7	14-12-11	08:20	15.0	1.375	13.625	0.8	1	Basic + Detailed
3	15	15-1	517530.4	6973661.7	13-12-11	13:05	15.0	2.063	12.937	0.58	4	Basic + Detailed
-	-	BC-1	504239	6965473	15-12-11	8:40	2.7	0.98	1.72	0.1	-	Basic + Detailed
-	-	BC-2	504158	6964607	15-12-11	09:20	2.4	1.233	1.167	0.87	4	Basic + Detailed
-	-	BC-3	504678	6964632	15-12-11	09:30	3.6	1.297	2.303	0.85	4	Basic + Detailed
-	-	BC-4	505053	6962861	15-12-11	10:00	7.4	1.494	5.906	0.84	6	Basic + Detailed

Notes: Tide data is sourced from Maritime Safety Queensland.

Tide heights and water depth (LAT) for Sites 1-3 and BC have been calculated from tide data collected from the MSQ Port Office Station.

Tide heights and water depth (LAT) for sites 4-8 and location 9-1 have been calculated based on tide data collected from MSQ Station at Gateway Bridge

Tide heights and water depth (LAT) for sites 9 (ex. 9-1) – 15 have been calculated based on tide data collected from MSQ Brisbane Bar Station.

Datum: UTM WGS84



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

2.1.1 Sample Collection

Samples were collected using a diver-operated stainless steel piston corer, 60 mm in diameter. At each sampling location, a shot line was deployed from the bow of the sampling vessel to the river/sea bed. Once the piston corer was attached and lowered to the river/sea bed, a diver was then deployed to operate the corer and obtain a sediment sample to a depth of 1 m. Once a sediment core had been collected the piston corer was retrieved to the surface and extruded manually either into plastic tubing for later geotechnical core logging or directly into a stainless steel mixing bowl for sample processing. At each location, between four to six cores (including one representative core retained for core-logging) were extracted within an area of 1 m² to account for contaminant variability within the sediments.

Diving operations were undertaken by Dermody Diving and Marine Services Pty Ltd.

2.1.2 Sample Processing

Once each set of cores had been collected, sample material designated for chemical analysis was homogenised in a large stainless steel bowl using powderless gloved hands. Samples were then placed in sample containers with zero headspace and stored in chilled eskies before being consigned under chain-of-custody documentation to the analytical laboratories, Advanced Analytical Australia (AAA) and Australian Laboratory Services (ALS). Following receipt at the laboratories, samples were stored under refrigerated conditions prior to analysis. The jars for chemical analyses were either solvent rinsed (organics) or acid rinsed glass jars (metals) with Teflon lined lids, provided by the analytical laboratories.

At each location a site description sheet was completed. The following information was collected:

- Name of client;
- Sampling date;
- General location of sample collection;
- Sampling location number and sample identifiers assigned;
- Name of the sample collector;
- Type of sampler used;
- Weather conditions at the time of sampling;
- Sea state at time of sampling;
- General comments (e.g. wind speed, level of shipping traffic etc);
- GPS location (easting and northing);
- Time of sampling;



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- Water depth at each sampling location (based on surface deployed tape measure); and
- Photograph of each sediment sample.

Cores extruded into plastic socks for descriptive logging remained on-board the sampling vessel until the end of each day. Cores were then transferred to the Port of Brisbane Operations Base for logging. A sediment log of each core was recorded on a field data sheet, providing a description of the composition of each sample, including the following information:

- Colour;
- Field texture;
- Observed sand grain size;
- Plasticity;
- Moisture content of sample (e.g. wet, moist, dry);
- % stones;
- Presence of shell/shell grit; and
- Odour (e.g. Marine, sulphurous).

2.2 Analysis Protocols

2.2.1 Laboratory Analysis

Sediment analysis was completed by two NATA accredited laboratories:

- Advanced Analytical Australia (AAA); and
- Australian Laboratory Services (ALS).

Advanced Analytical Australia provided primary laboratory services while ALS provided secondary laboratory services on QA/QC samples. The primary laboratory (AAA) did not perform all analyses and sub-contracted Envirolab to conduct acid sulfate soils (ASS), Golder Associates to conduct particle size and bulk density analysis, respectively, and Queensland Health to conduct radionuclides.

Table 2-2 provides a summary of the contaminant analysis completed for each sediment sample collected. Contaminant analysis was determined based on the project brief supplied by PBPL. All sites were analysed for a basic suite of parameters including:

- Particle size distribution (sieve and hydrometer analysis);
- Moisture content;
- Total Organic Carbon (TOC);
- Total Petroleum Hydrocarbons (TPH);



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Trace Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Total Phosphorus;
- Total Nitrogen (Nitrite and Nitrate as N, Total Kjeldahl Nitrogen as N);
- Organotins; and
- Organochlorine (OC) and Organophosphorous (OP) pesticides.

In addition, at selected locations a more detailed suite of parameters were analysed and they included:

- Total Polychlorinated biphenyls (PCBs);
- 21 priority pollutant Polycyclic Aromatic Hydrocarbons (PAHs);
- Sum Total of PAHs; and
- Acid Sulfate Soils (ASS).

Bulk density testing at ten sites and radionuclides at eight sites were also completed as specified by PBPL.

Table 2-2: Contaminant analyses undertaken at each sampling location

	Basic									Detailed			Bulk Density	Radionuclides
	PSD	TOC	TPH/BTEX	Metals	Total P	Total N	Organotins	OC	OP	PCB	PAH	ASS		
1-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
2-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
3-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
4-0	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4-4	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4-5	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4-7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4-8	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
4-9	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4-10	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4-13	✓	✓	✓	✓	✓	✓	✓	✓	✓					
5-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
6-2	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
6-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

	Basic									Detailed			Bulk Density	Radionuclides
	PSD	TOC	TPH/BTEX	Metals	Total P	Total N	Organotins	OC	OP	PCB	PAH	ASS		
7-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
8-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
8-2	✓	✓	✓	✓	✓	✓	✓	✓	✓					
8-3	✓	✓	✓	✓	✓	✓	✓	✓	✓					
8-4	✓	✓	✓	✓	✓	✓	✓	✓	✓					
9-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
9-2	✓	✓	✓	✓	✓	✓	✓	✓	✓					
9-4	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
10-1	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
10-5	✓	✓	✓	✓	✓	✓	✓	✓	✓					
10-6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
10-8	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11-1	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11-3	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11-4	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11-5	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11-8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
11-9	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
11-11	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
11-12	✓	✓	✓	✓	✓	✓	✓	✓	✓					
12-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
12-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
12-3	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
13-2	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-3	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-4	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-5	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-6	✓	✓	✓	✓	✓	✓	✓	✓	✓					
13-7	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
13-8	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	
13-9	✓	✓	✓	✓	✓	✓	✓	✓	✓					
14-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
15-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BC-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BC-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

	Basic									Detailed			Bulk Density	Radionuclides
	PSD	TOC	TPH/BTEX	Metals	Total P	Total N	Organotins	OC	OP	PCB	PAH	ASS		
BC-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BC-4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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 and are commonly referred to as PQLs. The PQLs reported in Table 2-3 were applicable to the analyses and comply with the Practical Quantitation Limits (PQLs) required under Appendix A, Table 1 of the NAGD.

Table 2-3: Laboratory PQLs for analyses

Analyte	PQLs
Moisture content	0.1%
Total organic carbon	0.01%
Particle size	0.002 mm diameter
Trace metals	0.1 mg/kg (Hg 0.01 mg/kg, As 0.4mg/kg, Zn & Pb 0.5mg/kg)
PAHs (individual)	5 -10 µg/kg
Total PAHs	100 µg/kg
Organotins	0.5 µgSn/kg
Nutrients	0.1 – 20 mg/kg
TPH	10-50 mg/kg
BTEX	0.2 mg/kg
Total PCBs	5 µg/kg
OC Pesticides	1 µg/kg
OP Pesticides	20µg/kg



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

2.2.2 Data Analysis

2.2.2.1 CONTAMINANTS

Contaminant levels for sediments are compared against the following guidelines:

- Screening Level concentrations listed in Appendix A Table 2 of the NAGD (Commonwealth of Australia, 2009) to assess whether the material is suitable for unconfined placement at sea or if further testing is required (eg elutriate, bioavailability and/or direct toxicity assessment).
- Environmental Investigation Level (EIL) and Health Investigation Level for residential land use (HIL-A) listed in the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (DEH, 1998) to assess the 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 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 LOR were not normalised to 1% TOC in 95% UCL calculations, but left at half the LOR.

The methods used to calculate the 95% UCLs were based on those required in Appendix A of the NAGD (P38, Comparison of Data to Screening Levels). Normality of datasets was determined using Shapiro-Wilks test and quantile-quantile plots in ProUCL Version 4 (4.00.05) 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 jackknife analysis as recommended in the NAGD. Similarly, datasets that were neither normal nor log-normally distributed were analysed using non-parametric jackknife analysis.

Outcomes regarding the tests are presented in each of the zone/dredge area tables 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.

Temporal and spatial analysis of contaminant results was also undertaken. Data collected during previous SAP investigations has been collated and compared against results obtained during the 2012 sampling program. Temporal and spatial data has been analysed using summary statistical methodology and presented graphically as a series of GIS maps and box plots.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

2.2.2.2 ACID SULFATE SOILS

The *Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines* (Dear et al. 2002) provides action criteria for when ASS is disturbed at a site and should be managed (refer Table 2-4). To account for a soil's natural ability to resist pH change (buffering capacity), generally influenced by clay content, the action criteria have been grouped into the following three broad soil texture categories: coarse; medium; and fine.

Table 2-4: Soil management guidelines for acid sulphate soil action criteria

Type of material		Action criteria if 1 to 1000 tonnes of material is disturbed		Action criteria if more than 1000 tonnes of material is disturbed	
Texture range (McDonald et al. 1990)	Approx. clay content (%)	Existing + Potential Acidity		Existing + Potential Acidity	
		Equivalent sulphur (%S) (oven-dry basis)	Equivalent acidity (mol H+/tonne) (oven-dry basis)	Equivalent sulphur (%S) (oven-dry basis)	Equivalent acidity (mol H+/tonne) (oven-dry basis)
Coarse texture - Sands to loamy sands	<5	0.03	18	0.03	18
Medium texture - Sandy loams to light clays	5 - 40	0.06	36	0.03	18
Fine texture - Medium to heavy clays and silty clays	>40	0.1	62	0.03	18

(Dear et al. 2002)

Action criteria for disturbances greater than 1,000 tonnes have been selected as the appropriate criteria based on the maintenance works that are likely to occur.

2.3 Quality Assurance/Quality Control (QA/QC)

2.3.1 QA/QC – Field Sampling

The following procedures were undertaken during sampling:

- Using suitably qualified environmental staff and support personnel experienced in diver deployed piston corer sediment sampling, field supervision and sediment logging;
- Decontaminating all sampling equipment, including mixing bowls etc. between samples via a decontamination procedure involving washing with ambient sea water and a laboratory grade detergent (Decon 90), and successive rinsing with deionised water;
- Storing samples in appropriately cleaned, pre-treated and labelled sample containers that were provided by the analytical laboratory;



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- Keeping samples cool in eskies containing bags of ice immediately after sampling, stored at 1°C in a mobile refrigerator until being transported to the laboratory in eskies containing ice-packs;
- Transportation of samples to the laboratories under chain of custody documentation; and
- Blind labelling all field QC (split and replicate samples) samples with identification that did not relate to sampling location names so the laboratory analyses these samples “blind”.

2.3.2 QA/QC – Laboratory Analysis

Quality assurance/ quality control (QA/QC) procedures for contaminant assessment were used from sampling through to completion of laboratory analysis, including:

- Chain of custody (COC) documentation;
- Field and intra-laboratory QC protocols; and
- Inter-laboratory analyses.

Material submitted for testing included additional samples for quality control (QC) purposes in accordance with the project brief and NAGD requirements. Additional QC samples included:

- Sediment homogeneity – a ‘replicate triplicate’ sample (i.e. Three separate samples taken within 1 m³);
- Inter and intra-laboratory comparisons – a ‘split triplicate’ sample – two samples sent to the ‘primary laboratory’ (intra-laboratory) and a third sent to a secondary (‘check’) laboratory (inter-laboratory);
- Inter-batch duplicate- one sample split into two and submitted to the laboratory in two different batches to test for precision.

Table 2-5 provides a summary of the field QC samples obtained in accordance with the project brief and NAGD requirements and included; one inter-batch duplicate, six samples to test for site homogeneity and three field replicate triplicate.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Table 2-5: Summary of QC analyses undertaken during 2011 SAP study

Site	Sediment Homogeneity	Field Split Triplicate	Inter-batch Duplicate	Sample Analyses Suite Type
3-0	X			Detailed
4-9	X			Basic
6-2		X		Basic
7-1	X			Detailed + Radionuclides
8-1		X		Detailed + Radionuclides
8-3			X	Basic
11-8		X		Detailed + Radionuclides
11-11	X			Basic
13-2	X			Basic
BC-4	X			Detailed

Laboratory QC procedures were conducted in accordance with the requirements of Appendix F of the NAGD. These requirements included analysis of laboratory blanks, certified reference materials, replicates 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, matrix spikes and matrix duplicate samples. Field data validation included calculation of relative standard deviation (RSD) for field split triplicates and site homogeneity with comparisons against laboratory and NAGD criteria.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

3 RESULTS

3.1 Chemical Results

Laboratory results obtained during the 2012 SAP study are summarised in Table 3-1. Primary laboratory analytical reports are provided in Appendix 3. Results are compared against the Screening Levels listed in Appendix A, Table 2 of the NAGD (Commonwealth of Australia, 2009) and EIL and HIL (A) guidelines listed in Appendix 9 (DEH, 1998).

3.1.1 Contaminant Concentrations Exceeding NAGD Screening Levels

Contaminants exceeding NAGD Screening Levels are described below and presented spatially in maps in Appendix 1.

3.1.1.1 METALS

- Chromium concentration at one location Zone 3 (9-1; 100 mg/kg) exceeded the NAGD Screening Level (80 mg/kg);
- Lead concentrations were below NAGD Screening Level (50 mg/kg) with one exception in Zone 1 (2-0; 360 mg/kg);
- Eight of the 48 samples (17%) had mercury concentrations that were greater than the NAGD Screening Level of 0.15 mg/kg. Exceedances occurred at one location in Zone 1 (2-0), five locations in Zone 2 (4-4, 4-5, 4-9, 8-2 and 8-4), one location in Zone 3 (9-2) and one location in Zone 4 (9-2);
- Twenty three (23) of the 48 samples (47%) had nickel levels that were greater than the NAGD Screening Level (21 mg/kg). Exceedances occurred at two locations in Zone 1 (2-0 and 3-0), nine locations in Zone 2 (4-0, 4-4, 4-5, 4-9, 4-10, 4-13, 5-0, 6-3 and 8-1), nine locations in Zone 3 (9-1, 9-4, 10-1, 10-5, 10-6, 10-8, 11-1, 11-3 and 11-9), and three locations in Zone 4 (13-3, 13-7 and 13-9);
- Zinc concentration at one location Zone 1 (2-0) exceeded the NAGD Screening Level (200 mg/kg).

3.1.1.2 ORGANOTINS

- Tributyltin concentrations (normalised to 1% TOC) exceeded the NAGD Screening Level of 9 µgSn/kg at three locations in Zone 2 (4-0, 6-2, and 7-1).



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

3.1.1.3 BTEX

- All benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations were below PQLs (0.2-0.4 mg/kg) at all locations.

3.1.1.4 POLYCYCLIC AROMATIC HYDROCARBONS

- Total PAHs (normalised to 1% TOC) were below the Screening Level of 10,000 µg/kg at all locations.

3.1.1.5 TOTAL PETROLEUM HYDROCARBONS

- Total TPHs (normalised to 1% TOC) were below the Screening Level of 550 µg/kg at all locations.

3.1.1.6 ORGANOCHLORINE PESTICIDES

- Seven (7) of the 48 samples (15%) had p,p'-DDD concentrations (normalised to 1% TOC) that were greater than the NAGD Screening Level of 2 µg/kg. Exceedances occurred at one location in Zone 1 (2-0), five locations in Zone 2 (6-3, 7-1, 8-1, 8-3 and 8-4) and one location in Zone 3 (9-2);
- Twenty five (25) of the 48 samples (52%) had p,p'-DDE concentrations (normalised to 1% TOC) that were greater than the NAGD Screening Level of 2.2 µg/kg. Exceedances occurred at one location in Zone 1 (2-0), nine locations in Zone 2 (4-0, 4-4, 4-5, 4-10, 6-2, 6-3, 7-1, 8-3 and 8-4), 12 locations in Zone 3 (9-2, 9-4, 10-5, 10-8, 11-4, 11-5, 11-9, 11-12, 12-1, 12-2, 12-3 and 15-1), and three locations in Zone 4 (13-1, 13-5 and 13-9).

3.1.1.7 POLYCHLORINATED BIPHENYLS

- Polychlorinated biphenyls (PCB) concentrations (normalised to 1% TOC) exceeded the NAGD Screening Level of 23 µg/kg at one location in Zone 4 (13-1).

3.1.1.8 ORGANOPHOSPHORUS PESTICIDES, AND RADIONUCLIDES

- OP Pesticides were below PQLs (20 µg/kg) at all locations;
- Sum of gross alpha and gross beta radionuclides were below PQLs (<195 mBq/g) at all locations

3.1.2 Contaminant Concentrations Exceeding EIL or HIL (A)

The following parameters reported concentrations exceeding EIL guidelines indicated in DEH (1998) and included:

- Chromium concentrations were greater than the EIL of 50 µg/kg at one location, Zone 3 (9-1);



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- Copper concentrations were greater than EIL of 60 µg/kg at two locations, Zone 2 (4-0 and 4-5);
- Lead concentrations were greater than the EIL of 300 µg/kg at one location, Zone 1 (2-0);
- Nickel concentrations were greater than the EIL of 60 µg/kg at one location, Zone 3 (9-1); and
- Zinc concentrations were greater than the EIL of 200 µg/kg at one location, Zone 1 (2-0).

The following parameters reported concentrations equal to or exceeding HIL (A) guideline values and included:

- Chromium concentration at site Zone 3 (9-1) was equivalent to the HIL (A) guideline value of 100 µg/kg; and
- Lead concentration at site Zone 1 (2-0) exceeded the HIL (A) guideline value of 300 µg/kg.

Table 3-1: Summary of laboratory results (Primary laboratory)																										
							Zone 3																			
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	9-1	9-2	9-4	10-1	10-5	10-6	10-8	11-1	11-3	11-4	11-5	11-8	11-9	11-11	11-12	12-1	12-2	12-3	14-1	15-1
Date sampled							14/12/11	13/12/11	13/12/11	13/12/11	13/12/11	13/12/11	13/12/11	13/12/11	12/12/11	14/12/11	14/12/11	14/12/11	14/12/11	14/12/11	13/12/11	14/12/11	14/12/11	14/12/11	14/12/11	13/12/11
Moisture Content	%	0.1	0.1				33.6	49.8	55.5	46.1	44.2	46.7	48.5	40.4	38.6	36.9	44.1	37.7	51.4	20	47	57.6	50.2	44.3	21.2	44.9
Total Organic Carbon	%	0.01	0.1				0.12	1.1	1.3	1.5	1.5	1.5	1.5	0.97	0.97	0.96	0.71	0.5	1.5	0.04	1.1	1.8	1.3	1.1	0.08	0.75
Metals																										
Arsenic	mg/kg	0.4	1	20	100	20	1.3	8.2	7.2	7.3	6	7.3	7.1	7.8	8.7	5.5	6.5	7	8.2	16	16	16	17	14	1.5	6.4
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	0.49	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	mg/kg	0.1	1	50	100	80	100	47	40	39	34	35	38	38	38	30	39	34	38	39	39	41	40	45	5.3	31
Copper	mg/kg	0.1	1	60	1,000	65	40	32	30	30	25	27	30	25	24	20	23	16	31	5.3	4.7	5.4	4.7	6	1.9	18
Lead	mg/kg	0.5	1	300	300	50	1.3	19	15	16	13	14	16	7.7	7.4	11	13	5.6	15	1.4	1.3	1.4	1.1	1.4	1.3	9.7
Mercury	mg/kg	0.01	0.01	1	15	0.15	<0.01	0.24	0.1	0.12	0.09	0.09	0.12	0.04	0.04	0.09	0.08	0.04	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
Nickel	mg/kg	0.1	1	60	600	21	110	19	23	24	22	21	24	21	21	17	19	18	22	13	13	14	13	16	2.6	17
Zinc	mg/kg	0.5	1	200	7,000	200	51	95	90	86	68	75	81	50	50	89	69	42	79	7.6	6.5	7.6	6.7	8.7	8.1	57
BTEX																										
Benzene	mg/kg	0.2	0.2	1			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<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	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethyl Benzene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m+p xylenes	mg/kg	0.4	0.2				<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
o-xylene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total BTEX	mg/kg	1.2	0.2				<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Total Petroleum Hydrocarbons																										
TPH C6-C9	mg/kg	10	100				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10-14	mg/kg	10	100				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Normalised to 1% TOC																										
TPH C15-28	mg/kg	50	100				<50	110	63	79	51	60	53	<50	<50	<50	<50	<50	55	<50	<50	58	55	<50	<50	<50
Normalised to 1% TOC								100.0	48.5	52.7	34.0	40.0	35.4						36.7			32.3	42.3			
TPH C29-36	mg/kg	50	100				<50	100	73	91	65	64	64	<50	<50	<50	<50	<50	65	<50	<50	89	71	<50	<50	<50
Normalised to 1% TOC								90.9	56.1	60.6	43.4	42.7	42.7						43.4			49.5	54.6			
Total TPH (Sum of)	mg/kg						<120	210	136	170	116	124	117	<120	<120	<120	<120	<120	120	<120	<120	147	126	<120	<120	<120
Normalised to 1% TOC						550		190.9	104.6	113.3	77.3	82.7	78.0						80.0			81.7	96.9			
Polycyclic Aromatic Hydrocarbons																										
Naphthalene	µg/kg	5	5				<5					9						<5				7	5		<5	<5
Normalised to 1% TOC												6.0										3.9	3.8			
1-Methylnaphthalene	µg/kg	5					<5					5						<5				<5	<5		<5	<5
Normalised to 1% TOC												3.3														
2-Methylnaphthalene	µg/kg	5	5				<5					6						<5				6	<5		<5	<5
Normalised to 1% TOC												4.0										3.3				
Acenaphthylene	µg/kg	5	5				<5					7						<5				14	12		<5	<5
Normalised to 1% TOC												4.7										7.8	9.2			
Acenaphthene	µg/kg	5	5				<5					9						<5				10	7		<5	<5
Normalised to 1% TOC												6.0										5.6	5.4			
Fluorene	µg/kg	5	5				<5					10						<5				10	8		<5	<5
Normalised to 1% TOC												6.7										5.6	6.2			
Phenanthrene	µg/kg	5	5				<5					50						<5				40	40		<5	<5
Normalised to 1% TOC												33.3										22.2	30.8			
Anthracene	µg/kg	5	5				<5					20						<5				20	20		<5	<5
Normalised to 1% TOC												13.3										11.1	15.4			
Fluoranthene	µg/kg	5	5				<5					200						7				200	100		9	20
Normalised to 1% TOC												133.3						14.0				111.1	76.9		45.0	26.7

							Zone 3																			
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	9-1	9-2	9-4	10-1	10-5	10-6	10-8	11-1	11-3	11-4	11-5	11-8	11-9	11-11	11-12	12-1	12-2	12-3	14-1	15-1
Pyrene	µg/kg	5	5				<5					150						10				180	140		9	23
Normalised to 1% TOC												100.0						20.0				100.0	107.7		45.0	30.7
Benz(a)anthracene	µg/kg	5					<5					60						5				80	50		<5	9
Normalised to 1% TOC												40.0						10.0				44.5	38.5			12.0
Chrysene	µg/kg	5	5				<5					60						7				80	60		<5	10
Normalised to 1% TOC												40.0						14.0				44.5	46.2			13.3
Benzo(b)&(k)fluoranthene	µg/kg	10					<10					100						20				200	100		<10	30
Normalised to 1% TOC												60.0						40.0				111.1	76.9			40.0
Benzo(a)pyrene	µg/kg	5	5				<5					73						8				97	88		<5	13
Normalised to 1% TOC												48.7						16.0				53.9	67.7			17.3
Indeno(1,2,3-cd)pyrene	µg/kg	5	5				<5					50						<5				80	80		<5	10
Normalised to 1% TOC												33.3										44.5	67.7			13.3
Dibenz(a,h)anthracene	µg/kg	5	5				<5					10						<5				10	14		<5	<5
Normalised to 1% TOC												6.7										5.6	10.8			
Benzo(g,h,i)perylene	µg/kg	5					<5					40						5				100	100		<5	10
Normalised to 1% TOC												26.7						10.0				55.6	76.9			13.3
Coronene	µg/kg	10	5				<10					<10						<10				23	20		<10	<10
Normalised to 1% TOC																						12.8	15.4			
Benzo(e)pyrene	µg/kg	5	5				<5					52						7				74	62		<5	12
Normalised to 1% TOC												34.7						14.0				41.1	47.7			16.0
Perylene	µg/kg	5	5				<5					200						90				300	200		10	60
Normalised to 1% TOC												133.3						180.0				166.7	153.8		50.0	80.0
Total PAHs (as above)	µg/kg	100	100				<100					1100						160				1550	1220		<100	200
Normalised to 1% TOC							10,000					733.3						320.0				861.1	938.5			266.7
PCBs																										
Mono-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Di-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Tri-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Tetra-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Penta-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Normalised to 1% TOC																										
Hexa-PCB congeners	µg/kg	5					<5					<5						<5				5	<5		<5	<5
Normalised to 1% TOC																						2.8				
Hepta-PCB congeners	µg/kg	5					<5					<5						<5				15	<5		<5	<5
Normalised to 1% TOC																						8.3				
Octa-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Nona-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Deca-PCB congeners	µg/kg	5					<5					<5						<5				<5	<5		<5	<5
Total PCB congeners	µg/kg	5		1,000	10,000		<5					<5						<5				20	<5		<5	<5
Normalised to 1% TOC						23																11.1				

							Zone 3																			
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	9-1	9-2	9-4	10-1	10-5	10-6	10-8	11-1	11-3	11-4	11-5	11-8	11-9	11-11	11-12	12-1	12-2	12-3	14-1	15-1
Organochlorine Pesticides																										
Aldrin	µg/kg	1	1	200	10,000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
alpha-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
beta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
delta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
trans-Chlordane	µg/kg	1	1		50,000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Normalised to 1% TOC						0.5																				
p,p'-DDD	µg/kg	1	1				<1	17	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	
Normalised to 1% TOC						2		15.5	1.5										1.4							
p,p'-DDE	µg/kg	1	1				<1	10	3	<1	4	3	5	<1	<1	3	2	<1	4	<1	3	10	5	3	<1	2
Normalised to 1% TOC						2.2		9.1	2.3		2.7	2.0	3.4			3.1	2.8		2.7		2.7	5.6	3.8	2.7		2.7
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Dieldrin	µg/kg	1	1	200	10,000	280	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
alpha-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
beta-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Endosulfan Sulphate	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Endrin	µg/kg	1	1			10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Endrin ketone	µg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Endrin aldehyde	µg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Heptachlor	µg/kg	1	1		10,000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Heptachlor epoxide	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Hexachlorobenzene	µg/kg	1	1				<1	<1	<1	<1	<1	<1	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Normalised to 1% TOC													4.0													
Methoxychlor	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Oxychlordane	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Organophosphorus Pesticides																										
Dichlorvos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Demeton-S-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Dimethoate	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Diazinon	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Chlorpyrifos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Parathion-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Pirimiphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Fenitrothion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Malathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Chlorpyrifos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Fenthion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Parathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Chlorfenvinphos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Bromophos-ethyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Methidathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Fenamiphos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Prothiofos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Ethion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Carbophenothion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Phosalone	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
Azinphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	

							Zone 3																			
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	9-1	9-2	9-4	10-1	10-5	10-6	10-8	11-1	11-3	11-4	11-5	11-8	11-9	11-11	11-12	12-1	12-2	12-3	14-1	15-1
Organotins																										
Monobutyl tin	µgSn/kg	0.5	1				<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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibutyl tin	µgSn/kg	0.5	1				<0.5	0.9	0.9	0.7	1	0.9	1.5	<0.5	<0.5	0.6	1.1	<0.5	0.9	<0.5	1	1.5	1.3	0.9	<0.5	0.5
Normalised to 1% TOC								0.8	0.7	0.5	0.7	0.6	1.0			0.6	1.6		0.6		0.9	0.8	1.0	0.8		0.7
Tributyl tin	µgSn/kg	0.5	1				<0.5	<0.5	0.8	0.7	1.2	1.7	2.1	<0.5	<0.5	0.9	1.2	<0.5	1.1	<0.5	1	1.5	2	0.8	<0.5	<0.5
Normalised to 1% TOC						9			0.6	0.5	0.8	1.1	1.4			0.9	1.7		0.7		0.9	0.8	1.5	0.7		
Nutrients																										
Phosphorus	mg/kg	1	0.1	2,000			240	660	700	700	710	650	800	540	450	500	520	400	690	300	280	270	260	230	93	460
Total Nitrogen	mg/kg	20	0.1				220	990	1260	890	950	940	1170	730	590	690	640	330	1070	22	690	970	920	820	84	560
Total Kjeldahl Nitrogen	mg/kg	20	0.1				220	990	1260	890	950	940	1170	730	590	690	640	330	1070	22	690	970	920	820	84	560
Nitrate as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1
Radionuclides																										
Gross alpha	mBq/g	1																								
Gross beta	mBq/g	1																								
Sum of gross alpa and gross beta	mBq/g	2				3500																				

Legend

Note

When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD)

PQL

Practical Quantitation Limit

Sample Sites

Sample location numbers

50

Value exceeds NAGD Screening Level

50

Value exceeds DEH (1998) EIL

Normalised to 1% TOC

Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

The DEH (1998) EIL for Dieldrin and Aldrin is based on the sum of the concentrations reported for the two analytes

Table 3-1: Summary of laboratory results (Primary laboratory)

							Zone 1			Zone 2															
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	1-0	2-0	3-0	4-0	4-4	4-5	4-7	4-8	4-9	4-10	4-13	5-0	6-2	6-3	7-1	8-1	8-2	8-3	8-4
Date sampled							15/12/11	15/12/11	15/12/11	16/12/11	16/12/11	16/12/11	16/12/11	16/12/11	16/12/11	16/12/11	16/12/11	16/12/11	14/12/11	14/12/11	14/12/11	14/12/11	14/12/11	14/12/11	14/12/11
Moisture Content	%	0.1	0.1				31	50.4	49	51.6	50.9	50.3	56.7	45.5	51.2	57.1	59.9	61.3	41.7	47.3	40.6	56.1	47.6	56.2	47.9
Total Organic Carbon	%	0.01	0.1				0.52	1.4	1.5	1.5	1	1.5	1.8	2.3	1.6	1.9	1.7	1.8	0.74	1.5	0.95	1.4	2	1.3	1.1
Metals																									
Arsenic	mg/kg	0.4	1	20	100	20	4.2	9.12	5.36	8.44	7.51	7.24	6.93	7.64	8.22	5.35	7.41	8.67	5.7	7.4	5.3	7.8	7.2	7.1	7.2
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	0.32	<0.1	0.139	<0.1	0.213	<0.1	<0.1	0.385	<0.1	<0.1	<0.1	0.13	0.11	<0.1	<0.1	<0.1	0.16	0.34
Chromium	mg/kg	0.1	1	50	100	80	31.9	40.8	37.4	43.2	39.3	45	36.2	36.9	36.7	37.3	43.1	40.2	37	37	29	44	33	43	43
Copper	mg/kg	0.1	1	60	1,000	65	16.5	48	17.8	62.7	38.5	60.3	38.6	49.7	40.9	29.4	46.8	44.9	23	30	21	36	27	30	30
Lead	mg/kg	0.5	1	300	300	50	5.17	360	6.22	38.2	24.6	28.3	27.1	22.4	34.4	15.7	26	27.4	11	16	11	17	18	18	18
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.032	0.428	0.038	0.14	0.15	0.184	0.115	0.134	0.556	0.083	0.124	0.127	0.07	0.11	0.07	0.13	0.15	0.14	0.27
Nickel	mg/kg	0.1	1	60	600	21	20.3	21.4	21.6	22.2	21.3	22.4	19.5	19.1	22.1	26.5	22.4	21.5	20	23	15	21	19	20	19
Zinc	mg/kg	0.5	1	200	7,000	200	45.4	220	52.5	169	131	142	143	127	131	100	143	143	70	85	64	98	82	88	86
BTEX																									
Benzene	mg/kg	0.2	0.2	1			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethyl Benzene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m+p xylenes	mg/kg	0.4	0.2				<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
o-xylene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total BTEX	mg/kg	1.2	0.2				<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Total Petroleum Hydrocarbons																									
TPH C6-C9	mg/kg	10	100				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10-14	mg/kg	10	100				<10	21	<10	<10	<10	<10	<10	<10	18	<10	<20	20	<10	<10	<10	<10	12	<10	<10
Normalised to 1% TOC								15.0							11.3			11.1					6.0		
TPH C15-28	mg/kg	50	100				<50	362	<50	87	72	99	97	91	384	92	125	127	<50	52	<50	56	100	67	58
Normalised to 1% TOC								258.6		58.0	72.0	66.0	53.9	39.5	240.0	48.4	73.5	70.6		54.7		40.0	50.0	51.5	52.7
TPH C29-36	mg/kg	50	100				<50	264	<50	97	100	119	127	102	254	136	134	135	<50	70	<50	67	120	72	63
Normalised to 1% TOC								188.6		64.7	100.0	79.4	70.6	44.3	158.8	71.6	79.4	75.0		73.7		47.9	60.0	55.4	57.2
Total TPH (Sum of)	mg/kg						<120	647	<120	184	172	218	224	193	656	228	259	282	<120	122	<120	123	232	139	121
Normalised to 1% TOC						550		462.1		122.7	172.0	145.3	124.4	124.4	410.0	120.0	152.4	156.7		81.3		87.9	116.0	106.9	110.0
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	µg/kg	5	5				<5	56	<5				11					8		7	<5	<5			
Normalised to 1% TOC								40.0					6.1					4.4		4.7					
1-Methylnaphthalene	µg/kg	5					<5	86	<5				7					6		<5	<5	<5			
Normalised to 1% TOC								61.4					3.9					3.3							
2-Methylnaphthalene	µg/kg	5	5				<5	170	<5				9					6		<5	<5	<5			
Normalised to 1% TOC								121.4					5.0					0.7							
Acenaphthylene	µg/kg	5	5				<5	92	<5				15					8		10	<5	<5			
Normalised to 1% TOC								65.7					8.3					0.3		6.7					
Acenaphthene	µg/kg	5	5				<5	48	<5				7					<5		7	<5	<5			
Normalised to 1% TOC								34.3					3.9							4.7					
Fluorene	µg/kg	5	5				<5	60	<5				13					7		9	<5	<5			
Normalised to 1% TOC								42.9					7.2					3.9		6.0					
Phenanthrene	µg/kg	5	5				<5	242	<5				98					38		70	20	20			
Normalised to 1% TOC								172.9					54.4					21.1		46.7	21.1	14.3			
Anthracene	µg/kg	5	5				<5	103	<5				28					12		20	8	8			
Normalised to 1% TOC								73.6					15.6					6.7		13.3	8.4	5.7			
Fluoranthene	µg/kg	5	5				<5	789	<5				316					117		300	90	80			
Normalised to 1% TOC								563.6					175.6					65.0		200.0	94.7	57.1			

							Zone 1			Zone 2															
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	1-0	2-0	3-0	4-0	4-4	4-5	4-7	4-8	4-9	4-10	4-13	5-0	6-2	6-3	7-1	8-1	8-2	8-3	8-4
Pyrene	µg/kg	5	5				<5	986	<5				268					109		250	84	78			
Normalised to 1% TOC								704.3					148.9					60.6		166.7	88.4	55.7			
Benz(a)anthracene	µg/kg	5					<5	414	<5				164					59		100	30	30			
Normalised to 1% TOC								295.7					91.1					32.8		66.7	31.6	21.4			
Chrysene	µg/kg	5	5				<5	349	<5				140					54		100	100	40			
Normalised to 1% TOC								249.3					77.8					30.0		66.7	105.3	28.6			
Benzo(b)&(k)fluoranthene	µg/kg	10					<10	927	<10				272					128		200	100	90			
Normalised to 1% TOC								662.1					151.1					71.1		133.3	105.3	64.3			
Benzo(a)pyrene	µg/kg	5	5				<5	522	<5				151					63		110	40	44			
Normalised to 1% TOC								372.9					83.9					35.0		73.3	42.1	31.4			
Indeno(1,2,3-cd)pyrene	µg/kg	5	5				<5	451	<5				135					61		80	30	30			
Normalised to 1% TOC								322.1					75.0					33.9		53.3	31.6	21.4			
Dibenz(a,h)anthracene	µg/kg	5	5				<5	72	<5				13					6		12	7	8			
Normalised to 1% TOC								51.4					7.2					3.3		8.0	7.4	5.7			
Benzo(g,h,i)perylene	µg/kg	5					<5	483	<5				148					64		90	30	30			
Normalised to 1% TOC								345.0					82.2					35.6		60.0	31.6	21.4			
Coronene	µg/kg	10	5				<10	152	<10				53					27		12	<10	<10			
Normalised to 1% TOC								108.6					29.4					15.0		8.0	5.0				
Benzo(e)pyrene	µg/kg	5	5				<5	364	<5				120					59		77	40	38			
Normalised to 1% TOC								260.0					66.7					32.8		51.3	42.1	27.1			
Perylene	µg/kg	5	5				365	987	905				586					243		300	90	300			
Normalised to 1% TOC							701.9	705.0	603.3				325.6					135.0		200.0	94.7	214.3			
Total PAHs (as above)	µg/kg	100	100				365	6990	905				2554					1075		1740	690	770			
Normalised to 1% TOC						10,000	701.9	4,992.9	603.3	2,099.4	6,298.1		1,418.9					597.2		1,160.0	726.3	550.0			
PCBs																									
Mono-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Di-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Tri-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Tetra-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Penta-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Normalised to 1% TOC																									
Hexa-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Normalised to 1% TOC																									
Hepta-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Normalised to 1% TOC																									
Octa-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Nona-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Deca-PCB congeners	µg/kg	5					<5	<5	<5				<5					<5		<5	<5	<5			
Total PCB congeners	µg/kg	5		1,000	10,000		<5	<5	<5				<5					<5		<5	<5	<5			
Normalised to 1% TOC						23																			
Organochlorine Pesticides																									
Aldrin	µg/kg	1	1	200	10,000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
alpha-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
beta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
delta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-Chlordane	µg/kg	1	1		50,000		<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Normalised to 1% TOC						0.5								0.4											

							Zone 1			Zone 2															
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	1-0	2-0	3-0	4-0	4-4	4-5	4-7	4-8	4-9	4-10	4-13	5-0	6-2	6-3	7-1	8-1	8-2	8-3	8-4
p,p'-DDD	µg/kg	1	1				<1	69	<1	<1	<1	2	1	1	<1	1	1	2	<1	3	4	3	<1	3	3
Normalised to 1% TOC						2		49.3				1.3	0.6	0.4		0.5	0.6	1.2		2.0	4.2	2.1		2.3	2.7
p,p'-DDE	µg/kg	1	1				<1	28	<1	4	3	4	3	3	<1	5	3	3	2	4	3	3	4	4	4
Normalised to 1% TOC						2.2		20.0		2.7	3.0	2.7	1.7	1.3		2.6	1.8	1.7	2.7	2.7	3.2	2.1	2.0	3.1	3.6
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dieldrin	µg/kg	1	1	200	10,000	280	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
alpha-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
beta-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endosulfan Sulphate	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin	µg/kg	1	1			10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin ketone	µg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin aldehyde	µg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Heptachlor	µg/kg	1	1		10,000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Heptachlor epoxide	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Normalised to 1% TOC																									
Methoxychlor	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Oxychlordan	µg/kg	1	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Organophosphorus Pesticides																									
Dichlorvos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Demeton-S-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Dimethoate	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Diazinon	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Parathion-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Pirimiphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenitrothion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Malathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenthion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Parathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorfenvinphos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Bromophos-ethyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Methidathion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenamiphos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Prothiofos	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ethion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Carbophenothion	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Phosalone	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Azinphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Organotins																									
Monobutyl tin	µgSn/kg	0.5	1				<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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibutyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	20.5	1.8	3.9	<0.5	2.4	<0.5	1	<0.5	<0.5	2.2	1.3	1.5	2.7	1.1	2.4	3.2
Normalised to 1% TOC										13.7	1.8	2.6		1.0		0.5			3.0	0.9	1.6	1.9	0.6	1.8	2.9
Tributyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	227	1	1.8	<0.5	9.9	0.9	1.2	4.5	<0.5	6.4	1.4	2.5	1.7	4.5	0.8	0.5
Normalised to 1% TOC						9	0.25	0.25	0.25	151.3	1.0	1.2		4.3	0.6	0.6	2.6		8.6	0.9	2.6	1.2	2.3	0.6	0.5

							Zone 1			Zone 2															
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	1-0	2-0	3-0	4-0	4-4	4-5	4-7	4-8	4-9	4-10	4-13	5-0	6-2	6-3	7-1	8-1	8-2	8-3	8-4
Nutrients																									
Phosphorus	mg/kg	1	0.1	2,000			411	636	500	832	755	930	801	751	560	854	830	822	850	790	470	700	730	610	670
Total Nitrogen	mg/kg	20	0.1				340	810	1120	1170	800	1070	1270	1190	950	1510	1440	1470	440	1150	530	1170	1000	1110	770
Total Kjeldahl Nitrogen	mg/kg	20	0.1				340	810	1120	1170	800	1070	1270	1190	950	1510	1440	1470	440	1150	530	1170	1000	1110	770
Nitrate as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Radionuclides																									
Gross alpha	mBq/g	1											<60					<60							
Gross beta	mBq/g	1											<135					<135							
Sum of gross alpa and gross beta	mBq/g	2				3500																			

Legend

Note	When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD)
PQL	Practical Quantitation Limit
Sample Sites	Sample location numbers
50	Value exceeds NAGD Screening Level
50	Value exceeds DEH (1998) EIL
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%
The DEH (1998) EIL for Dieldrin and Aldrin is based on the sum of the concentrations reported for the two analytes	

Table 3-1: Summary of laboratory results (Primary laboratory)

							Zone 4								
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9
Date sampled							13/12/11	12/12/11	12/12/11	12/12/11	12/12/11	12/12/11	12/12/11	12/12/11	12/12/11
Moisture Content	%	0.1	0.1				45	44.4	46.9	44.8	49.4	46.4	49.9	49.4	56.9
Total Organic Carbon	%	0.01	0.1				1.3	0.73	0.89	0.68	1.1	0.96	0.84	1.1	1.2
Metals															
Arsenic	mg/kg	0.4	1	20	100	20	14	13	9.4	8.7	8.2	8.6	9.1	9.5	8.1
Cadmium	mg/kg	0.1	0.1	3	20	1.5	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	<0.1	<0.1	<0.1
Chromium	mg/kg	0.1	1	50	100	80	43	44	39	37	45	41	40	41	45
Copper	mg/kg	0.1	1	60	1,000	65	5.9	5.9	18	13	24	17	16	17	22
Lead	mg/kg	0.5	1	300	300	50	1.3	1.4	12	7.3	15	9.5	6.6	9.4	13
Mercury	mg/kg	0.01	0.01	1	15	0.15	<0.01	<0.01	0.03	0.02	0.16	0.08	0.03	0.07	0.1
Nickel	mg/kg	0.1	1	60	600	21	15	15	22	18	20	19	21	20	22
Zinc	mg/kg	0.5	1	200	7,000	200	7.9	8.5	52	40	75	54	47	56	65
BTEX															
Benzene	mg/kg	0.2	0.2	1			<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	<0.2	<0.2
Ethyl Benzene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m+p xylenes	mg/kg	0.4	0.2				<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
o-xylene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total BTEX	mg/kg	1.2	0.2				<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Total Petroleum Hydrocarbons															
TPH C6-C9	mg/kg	10	100				<10	<10	<10	<10	<10	<10	<10	<10	<10
TPH C10-14	mg/kg	10	100				<10	<10	<10	<10	<10	<10	<10	<10	<10
Normalised to 1% TOC															
TPH C15-28	mg/kg	50	100				56	<50	<50	<50	<50	<50	<50	<50	<50
Normalised to 1% TOC							43.1								
TPH C29-36	mg/kg	50	100				<50	<50	<50	<50	<50	<50	<50	<50	<50
Normalised to 1% TOC							99.1								
Total TPH (Sum of)	mg/kg						56	<120	<120	<120	<120	<120	<120	<120	<120
Normalised to 1% TOC						550	76.7								

[illegible]

[illegible]

							Zone 4								
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9
<i>alpha</i> -Endosulfan	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
<i>beta</i> -Endosulfan	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endosulfan Sulphate	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin	µg/kg	1	1			10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin ketone	µg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Endrin aldehyde	µg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Heptachlor	µg/kg	1	1		10,000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Heptachlor epoxide	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
<i>Normalised to 1% TOC</i>															
Methoxychlor	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Oxychlordan	µg/kg	1	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Organophosphorus Pesticides															
Dichlorvos	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Demeton-S-methyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Dimethoate	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Diazinon	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos-methyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Parathion-methyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Pirimiphos-methyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenitrothion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Malathion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorpyrifos	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenthion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Parathion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Chlorfenvinphos	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Bromophos-ethyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Methidathion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Fenamiphos	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Prothiofos	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ethion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Carbophenothion	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Phosalone	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Azinphos-methyl	µg/kg	20				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

							Zone 4								
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9
Organotins															
Monobutyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibutyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Normalised to 1% TOC															
Tributyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Normalised to 1% TOC						9									
Nutrients															
Phosphorus	mg/kg	1	0.1	2,000			230	240	440	380	540	500	450	480	510
Total Nitrogen	mg/kg	20	0.1				840	530	610	540	810	730	750	790	1180
Total Kjeldahl Nitrogen	mg/kg	20	0.1				840	530	610	540	810	730	750	790	1180
Nitrate as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Radionuclides															
Gross alpha	mBq/g	1													
Gross beta	mBq/g	1													
Sum of gross alpa and gross beta	mBq/g	2				3500									

Legend

Note	When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD)
PQL	Practical Quantitation Limit
Sample Sites	Sample location numbers
50	Value exceeds NAGD Screening Level
50	Value exceeds DEH (1998) EIL
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%
The DEH (1998) EIL for Dieldrin and Aldrin is based on the sum of the concentrations reported for the two analytes	



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

3.1.3 Comparison of Results in the Dredge Area to Reference Sites

3.1.3.1 APPROACH

Comparison of dredge data (Zone 2-4) against reference data (Zone 1) was undertaken for metals, PAH and TBT concentrations by adopting the 80th percentile of the reference data. Data from zones 2-4 are graphed, with the median concentration of each zone compared against the 80th percentile from Zone 1 (red control line in graphs presented in Figure 3-1 and Figure 3-2). This approach follows that described in the ANZECC/ARMCANZ (2000) for comparing data between impact and reference locations. Adoption of the 80th percentile of the Zone 1 (reference site) data allows scope for natural variation within sediments throughout the river.

3.1.3.2 RESULTS

Graphs are provided in Figure 3-1 and Figure 3-2, and summarized in Table 3-2. Key results include the following:

- Median arsenic and chromium concentrations in Zones 2, 3 and 4 were elevated above Zone 1 reference data;
- Median cadmium and lead concentrations in Zones 2 - 4 were below Zone 1 reference data;
- Median copper concentrations were above Zone 1 reference data in Zone 2 and 3 only;
- Median nickel were above Zone 1 reference data in Zones 2 - 4, with Zone 3 shows high intra-site variability;
- Median mercury concentrations were equal to Zone 1 reference data in Zone 2 only. The other two zones were below Zone 1;
- Median zinc concentrations were elevated above Zone 1 reference data in Zone 2 only;
- Total PAH median concentrations were below Zone 1 reference data across Zones 2 - 4; and
- Median TBT concentrations were above Zone 1 reference data in Zones 2 and 3. No TBT was detected in Zone 4; data represent LOR.

It should be noted that there were considerable textural differences in sediments between the upstream reference locations (Zone 1) and those from the areas to be dredged (Zones 2-4), as described in Section 3.2.5. Zone 1 is an inner city urban site it is used as a “non-dredged” reference site for chemical comparison to show the annual accumulation and source inputs into the Brisbane River. Furthermore, previous SAP studies have established a strong relationship between the clay content and contaminant concentrations moving from Zone 1 to Zone 4 (particularly for metal contaminants) (SKM, 2005).



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

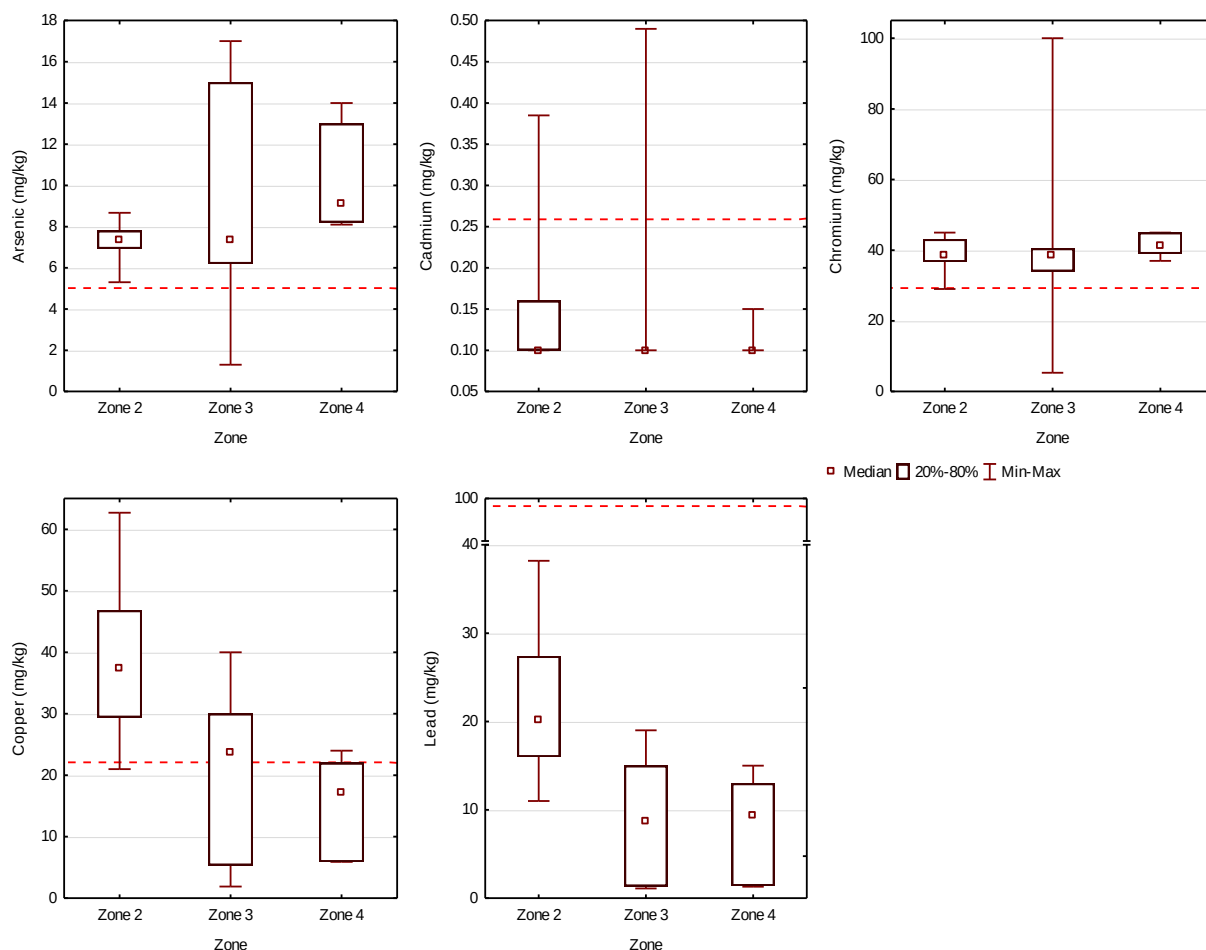


Figure 3-1: Comparison of arsenic, cadmium, chromium, copper and lead concentrations from dredge zones 2 – 4 against the 80th percentile of the reference site data (zone 1 – red control line)



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

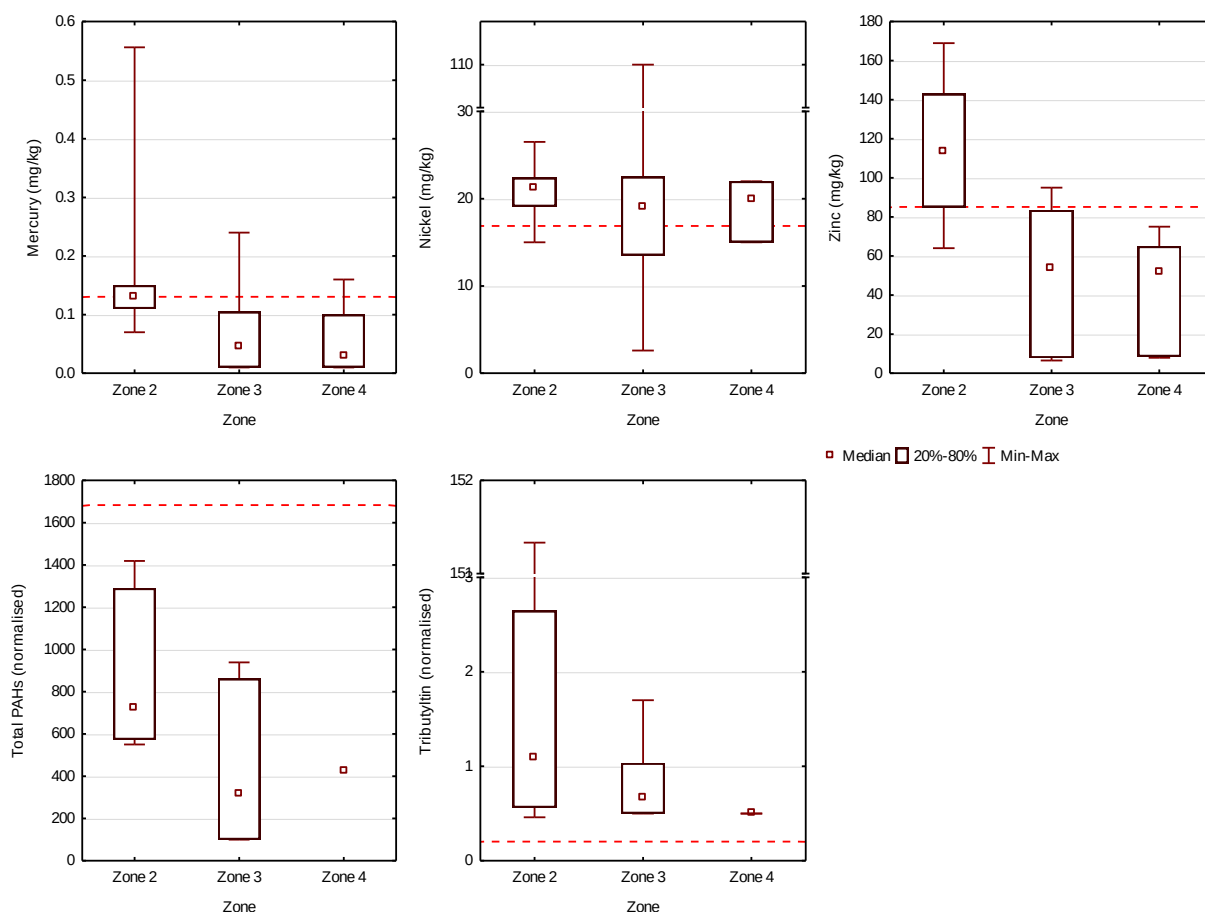


Figure 3-2: Comparison of mercury, nickel, zinc, total PAHs and TBT concentrations from dredge zones 2 – 4 against the 80th percentile of the reference site data (zone 1 – red control line)



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Table 3-2: Summary results comparing the median concentrations of parameters from each dredge zone against the 80th percentile established from the Zone 1, non-dredged area.

Parameter	Zone 1 (80 th Percentile)	Zone 2 (Median)	Zone 3 (Median)	Zone 4 (Median)
Arsenic (mg/kg)	5	7.3	7.3	9.1
Cadmium (mg/kg)	0.26	0.1	0.1	0.1
Chromium (mg/kg)	30	38.3	38.5	41
Copper (mg/kg)	22	37.2	23.5	17
Lead (mg/kg)	99	20.2	8.7	9.4
Mercury (mg/kg)	0.13	0.132	0.045	0.03
Nickel (mg/kg)	17	21	19	20
Zinc (mg/kg)	85	114	54	52
Total PAHs (µg/kg)	1680	726	320	423
TBT (µgSn/kg)	0.2	1.1	0.7	0.5

Legend: Orange highlighting = above reference, Grey highlighting = below reference

3.1.4 Assessment of Acid Sulfate Soils

The presence of potential acid sulfate soils (PASS) was assessed at all locations undergoing detailed analysis using the chromium suite of analysis. The chromium suite, along with the Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS) suite, is the acid sulfate soil assessment recommended by Ahern *et al* (2003) and the most recent guidelines, *Queensland Acid Sulfate Soil Technical Manual – Soil Management Guideline* (Dear *et al*, 2002). The results of the chromium suite testing are provided in Table 3-3 and the analytical laboratory reports are provided in Appendix 4.

3.1.4.1 ACTUAL ACIDITY

Actual acidity is assessed by the measurement of Titratable Actual Acidity (TAA). The determination of pH potassium chloride (pH_{KCl}) is a means of estimating the actual soil acidity which is used to calculate TAA. TAA at all sample locations was less than the laboratory detection level of 5 mole H⁺/t, which is also less than the QASSIT guideline of 18 mole H⁺/t. This indicates all samples have very little or no actual acidity.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

3.1.4.2 POTENTIAL ACIDITY

Potential acidity is assessed through the measurement of Chromium Reducible Sulfur (S_{CR}). Most samples tested for ASS, with the exception of two locations (9-1 and 14-1) had S_{CR} values greater than the QASSIT guideline of 0.03%. This identifies 88% of sample locations as PASS.



Table 3-3: Results of chromium suite acid sulphate soils tests

Sample	Units	PQL	QASSIT Action Criteria	1-0	2-0	3-0	4-7	5-0	6-3	7-1	8-1	9-1	10-6	11-8	12-1	12-2	13-1	14-1	15-1
pH Measurements																			
pH _{KCl}	pH units			6.6	8.2	7.1	8.2	8.4	8.3	8.3	8.1	7.4	8.4	8.6	7.8	7.8	8.3	9.4	8.5
Potential Acidity																			
Chromium Reducible Sulfur	%w/w	0.005	0.03	0.21	0.53	0.52	0.48	0.23	0.24	0.23	0.39	<0.005	0.27	0.3	0.23	0.22	0.29	0.03	0.25
α-Chromium Reducible Sulfur	moles H ⁺ /t	3	18	130	330	320	300	150	150	150	240	<3	170	190	140	140	180	18	160
Actual Acidity																			
s-TAA pH 6.5	%w/w S	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	5	18	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

3.2 Physical Characteristics

Physical characteristics of sediment samples were documented either on board the sampling vessel or at the Port of Brisbane Operations Base from a representative core collected at each site. In addition, sediment samples were collected from each site and analysed for particle size distribution (PSD). Bulk density analysis was also completed at 10 sample locations. PSD and bulk density analysis was completed by Golder Associates (sub-contracted from AAA). Field core log descriptions are provided in Appendix 2. Analytical laboratory reports for PSD and bulk density analyses are provided in Appendix 5.

In the following sections, PSD data are presented for Zones 1 – 4 with a graphical presentation of PSD results for each location and a table providing a statistically descriptive summary of the data across all locations.

3.2.1 Zone 1 – Reference Sites

Sediments within Zone 1 were dominated by clay fractions, which had a mean percentage fraction of (37%). The remainder of the material consists of sand (35%) and clay (28%). There was a very small amount of gravel detected < 1% (Table 3-4).

Within Zone 1, the three sites had different PSD. Locations 1 and 2 had similar PSD dominated by sand, then silt and clay with little or no gravel. In contrast, location 3 was dominated by clay (51%), silt (43%) and sand (6%) with no gravel (Figure 3-3).

Table 3-4: Summary statistics for Zone 1 particle size distribution

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Number of Samples	3	3	3	3
Mean (%)	0	35	28	37
Standard Deviation (%)	0	22	11	11
Minimum (%)	0	6	17	24
Maximum (%)	1	58	43	51



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

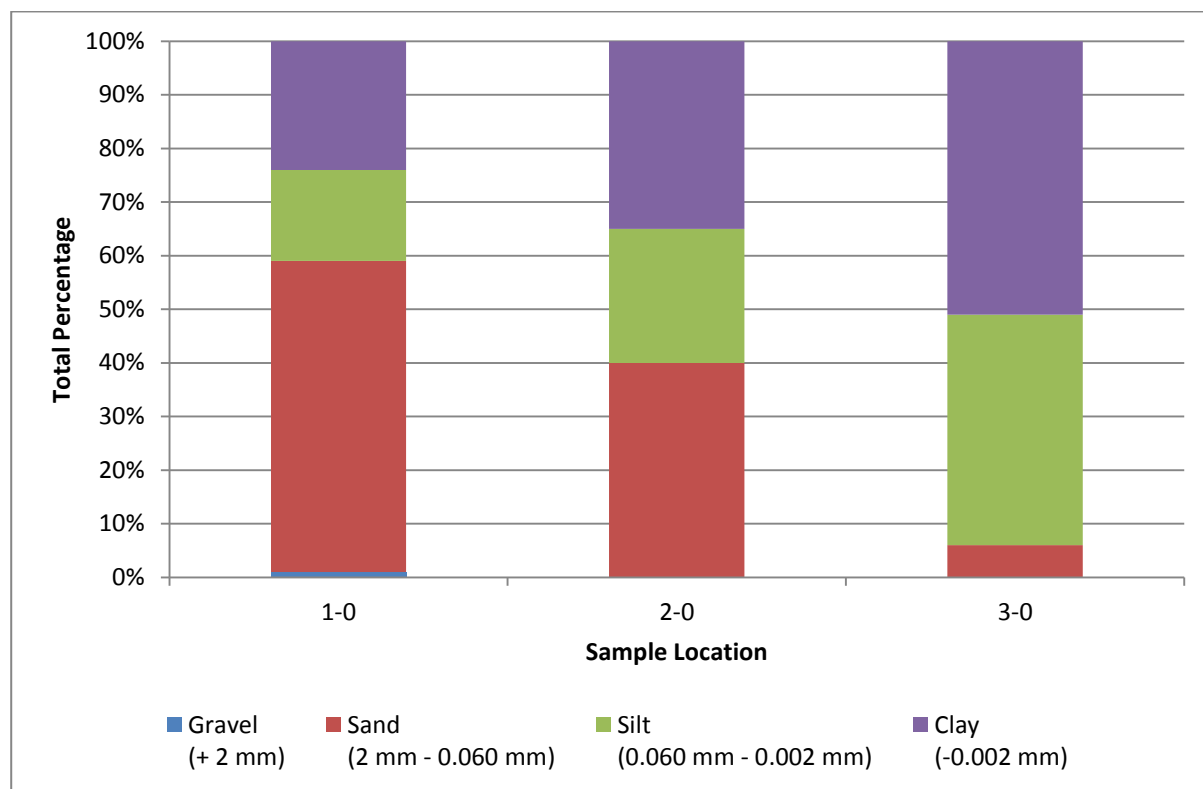


Figure 3-3: Particle size distribution at sample locations within Zone 1

3.2.2 Zone 2 – Colmslie to Pinkenba

The dominant PSD within Zone 2 was clay (42%) followed by silt (34%) and sand (23%) with only 1% gravel (Table 3-5).

Each location within Zone 2 is similar in PSD, consisting predominantly of clay, followed by silt then sand. Locations 4-13 and 5-0 PSD were dominated mainly by clay and silt with minimal sand compared to the other locations. Several sites showed no gravel content including locations 4-0, 4-10, 4-13, 5-0, 6-2, 8-2, 8-3 and 8-4 (Figure 3-4).

Table 3-5: Summary statistics for Zone 2 particle size distribution

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Number of Samples	16	16	16	16
Mean (%)	1	23	34	42
Standard Deviation (%)	2	13	5	13
Minimum (%)	0	3	26	22
Maximum (%)	6	51	46	60



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

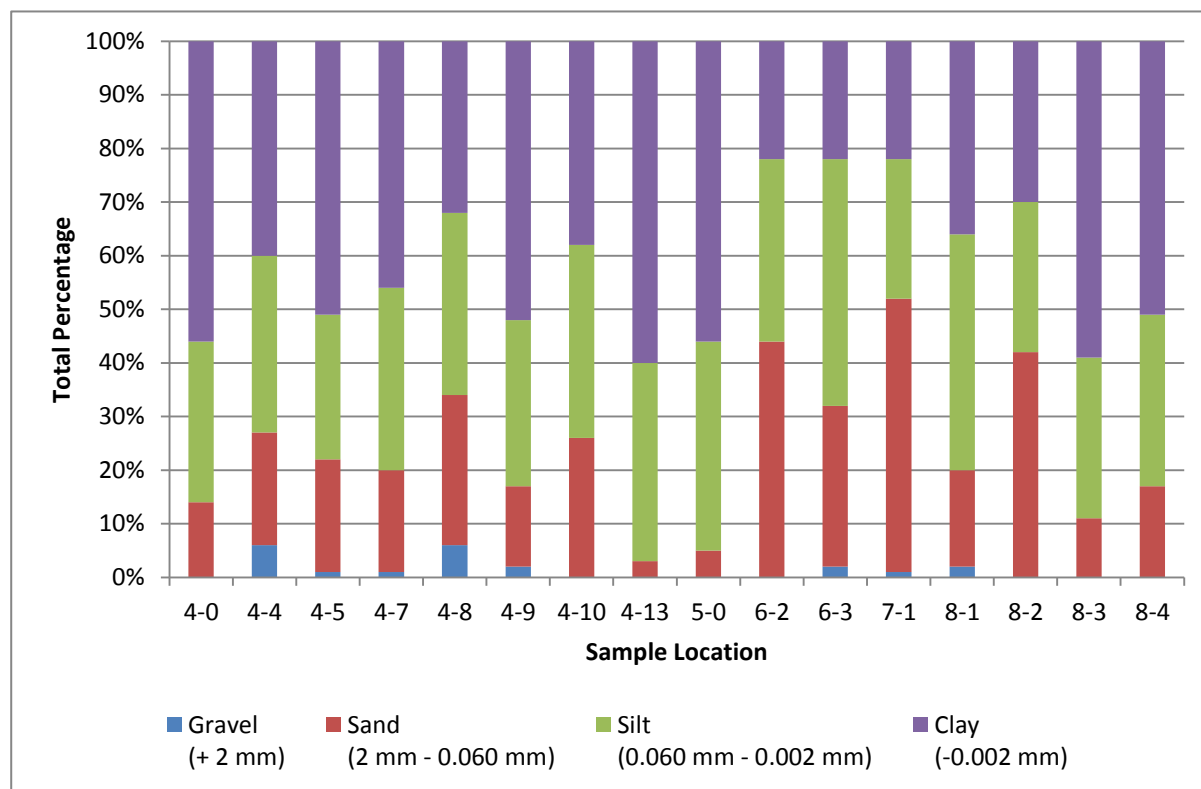


Figure 3-4: Particle size distribution at locations within Zone 2

3.2.3 Zone 3 – Port Reaches

The dominant PSD within Zone 3 was sand (38%) followed by silt (34%) and clay (27%) with only 2% gravel (Table 3-6).

The majority of sites located in Zone 3 had relatively similar PSD consisting predominantly of clay, silt and sand. Exceptions were locations 9-1, 11-11 and 14-1 which were dominated sand. Several sites showed no gravel content including 9-2, 10-5, 10-6, 11-3, 11-11, 12-1, 12-2, 12-3 and 14-1 (Figure 3-5).



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Table 3-6: Summary statistics for Zone 3 particle size distribution

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Number of Samples	20	20	20	20
Mean (%)	2	38	34	27
Standard Deviation (%)	3	21	12	11
Minimum (%)	0	7	6	4
Maximum (%)	11	90	46	46

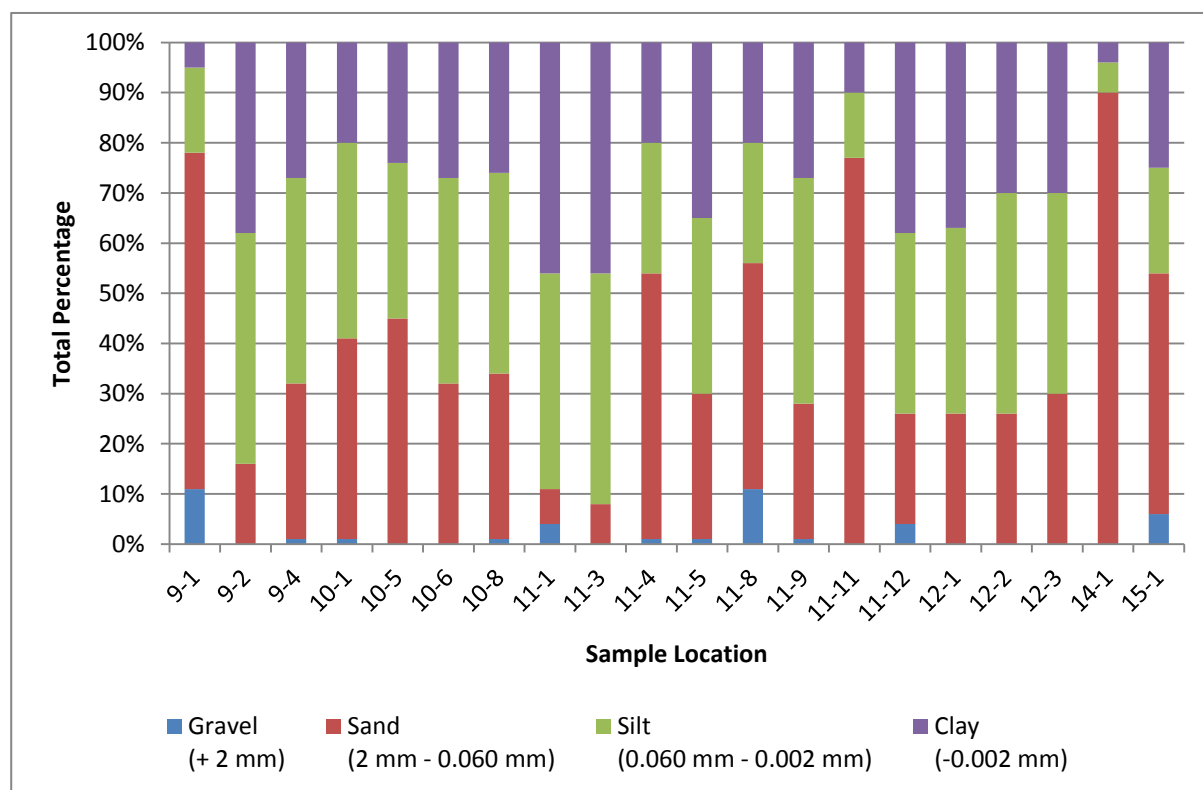


Figure 3-5: Particle size distribution at locations within Zone 3

3.2.4 Zone 4 – Moreton Bay (Entrance Channel)

The dominant PSD within Zone 4 was clay (49%) followed by silt (32%) and sand (18%) with only 1% gravel (Table 3-7).

The PSD pattern for Zone 4 generally follows a similar pattern to that which has been identified in previous years (WorleyParsons 2011; GHD 2010). Sediments increase in silt and clay content with



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

distance from the mouth of the river (Figure 3-6). The exceptions are locations 13-3 and 13-4 which have a similar sand content to the 13-9, the most seaward sampling location.

Table 3-7: Summary statistics for Zone 4 particle size distribution

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Number of Samples	9	9	9	9
Mean (%)	1	18	32	49
Standard Deviation (%)	1	9	6	9
Minimum (%)	0	8	23	38
Maximum (%)	3	34	42	69

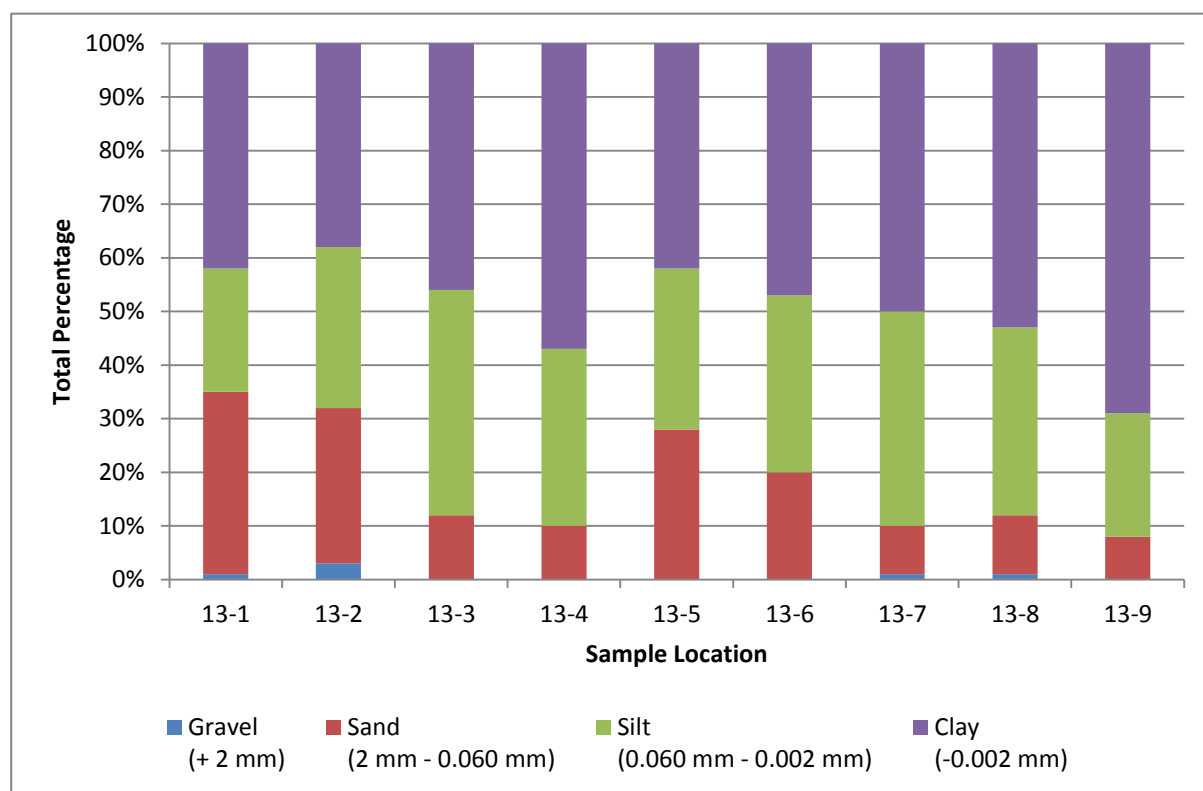


Figure 3-6: Particle size distribution at locations within Zone 4

3.2.5 Comparison between Zones

Table 3-8 and Figure 3-7 show the mean percentage of particle size distribution of sediments within Zones 1–4. In general, each zone has relatively comparative particle distribution. Silt and gravel are relatively consistent across each zone ranging from 28 to 34% and 0 to 2%, respectively. Difference



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

in PSD across the zones was related to clay and sand content. Zone 2 (23%) and zone 4 (18%) had decreased sand content compared to zones 1 (35%) and 3 (38%), corresponding to an increase in clay content.

Table 3-8: Mean percentage particle size distribution for each zone

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Zone 1	0	35	28	37
Zone 2	1	23	34	42
Zone 3	2	38	34	27
Zone 4	1	18	32	49

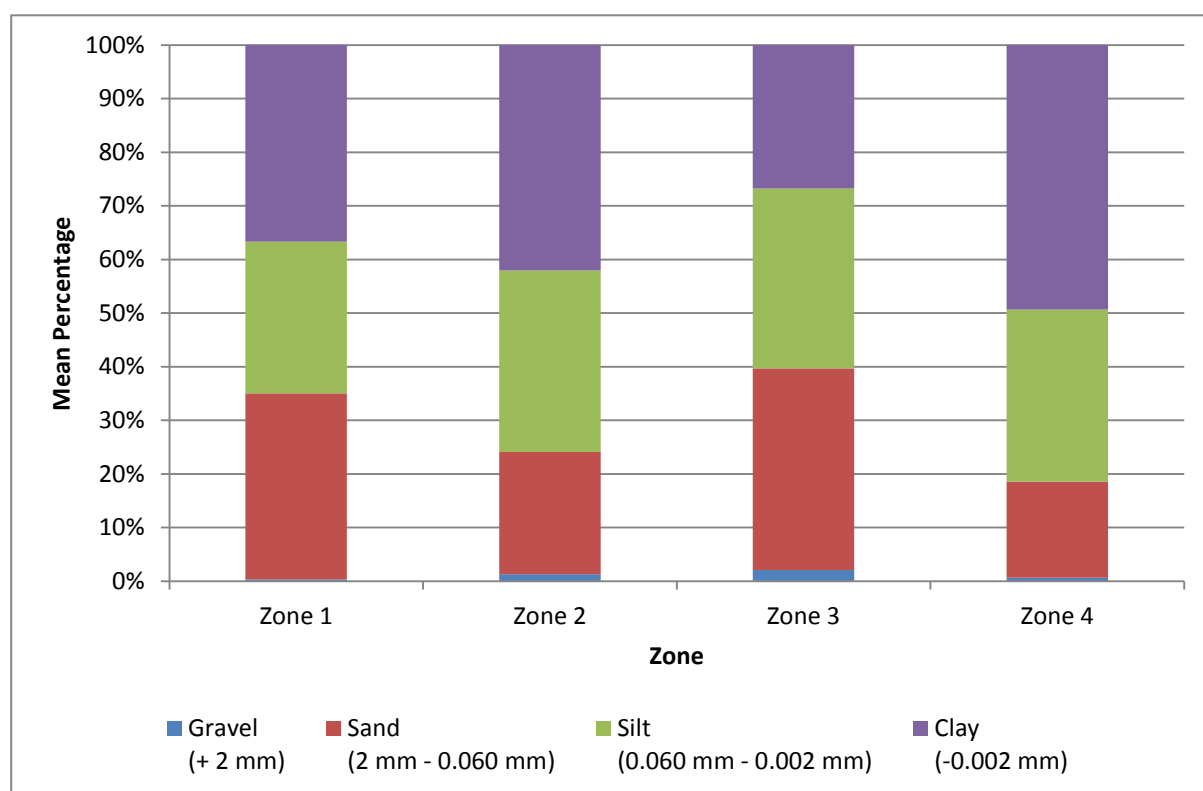


Figure 3-7: Mean percentage of particle size distribution of sediments within zones 1 – 4.

3.2.6 Bulk Density

PBPL requested that samples from ten selected locations across Zones 2 to 4 be analysed for bulk density and reported for consideration by dredge operators. Results for bulk density analyses are presented in Table 3-9.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Table 3-9: Bulk density at ten locations across Zones 2 - 4

Sample Location	Wet Sediment Density (t/m ³)	Zone
4-7	1.403	2
4-8	1.318	2
6-2	1.526	2
6-3	1.343	2
9-4	1.342	3
10-1	1.394	3
11-9	1.356	3
11-11	1.754	3
13-7	1.431	4
13-8	1.42	4

3.3 Additional Sampling Chemical Results

Samples taken from additional locations in Breakfast Creek were analysed for the basic and detailed suite of analysis. Laboratory results for these sampling locations are summarised in Table 3-11 and represented spatially in maps provided in Appendix 1. Primary laboratory analytical reports are provided in Appendix 3. Results are compared against the Screening Levels listed in Appendix A Table 2 of the NAGD (Commonwealth of Australia, 2009) and EIL and HIL(A) concentrations in DEH (1998).

3.3.1 Contaminant Concentrations in Comparison to NAGD Screening Levels at Breakfast Creek

3.3.1.1 METALS

- All metals were detected above their respective PQLs at all sites with one exception. Cadmium was below PQL at BC-3.
- Lead concentrations at BC-2 exceeded the NAGD Screening Level of 50 mg/kg.
- Three of the four sites had mercury concentrations that were greater than the NAGD Screening Level of 0.15 mg/kg; BC-2, BC-3 and BC-4.
- Two of the four sites had nickel levels that were greater than the NAGD Screening Level of 21 mg/kg; BC-2 and BC-4.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

- Zinc concentration at BC-2 exceeded the NAGD Screening Level (200 mg/kg).

3.3.1.2 ORGANOTINS

- Tributyltin concentrations were below the PQL at all locations.

3.3.1.3 BTEX

- All BTEX concentrations were below PQLs (0.2-0.4 mg/kg) at all locations.

3.3.1.4 POLYCYCLIC AROMATIC HYDROCARBONS

- Total PAHs (normalised to 1% TOC) where detected, were below the Screening Level of 10,000 µg/kg at all locations.

3.3.1.5 TOTAL PETROLEUM HYDROCARBONS

- Total TPH (normalised to 1% TOC) where detected, were below the Screening Level of 550 µg/kg at all locations.

3.3.1.6 ORGANOCHLORINE PESTICIDES

- Trans-chlordane (normalised to 1% TOC) at one location (BC-1) exceeded the NAGD Screening Level of 0.5 µg/kg.
- *p,p'*-DDD (normalised to 1% TOC) at one location (BC-1) was equivalent to the NAGD Screening Level of 2 µg/kg.
- *p,p'*-DDE concentrations (normalised to 1% TOC) at three locations (BC-2, BC-3 and BC-4) exceeded the NAGD Screening Level of 2.2 µg/kg.

3.3.1.7 POLYCHLORINATED BIPHENYLS

- Total polychlorinated biphenyls (PCB) concentrations (normalised to 1% TOC) were all below NAGD Screening Level of 23 µg/kg.

3.3.1.8 ORGANOPHOSPHORUS PESTICIDES SAND RADIONUCLIDES

- OP Pesticides were below PQLs (20 µg/kg) at all locations.
- Sum of gross alpha and gross beta radionuclides were below PQLs (<195 mBq/g) at all locations



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

3.3.2 Contaminant Concentrations Exceeding EIL or HIL (A)

The following chemicals had concentrations that exceeded EIL guidelines indicated in the DEH (1998):

- Copper was greater than EIL of 60 µg/kg at one location (BC-2); and
- Zinc was greater than the EIL of 200 µg/kg at one location (BC-2).

None of the chemicals analysed exceeded HIL (A) guideline values.

3.4 Additional Sampling Physical Results

Table 3-10 shows that sediments within Breakfast Creek contain relatively even portions of sand (27%), silt (28%) and clay (32%). Figure 3-8 shows the mean percentage of particle size distribution of sediments within BC1 to BC 4. Figure 3-8 clearly demonstrates that the composition of BC-1 is different compared to the other three locations. BC-1 was dominated by sand (58%) and gravel (24%) with lower portions of clay (12%) and silt (8%). Sites BC2 –BC4 have similar PSD patterns dominated by clay and silt with smaller proportion of sand.

Table 3-10: Summary statistics for Breakfast Creek particle size distribution

	Gravel (+ 2 mm)	Sand (2 mm - 0.060 mm)	Silt (0.060 mm - 0.002 mm)	Clay (-0.002 mm)
Number of Samples	4	4	4	4
Mean (%)	7	24	27	42
Standard Deviation (%)	10	19	12	18
Minimum (%)	0	9	8	12
Maximum (%)	24	56	39	58



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

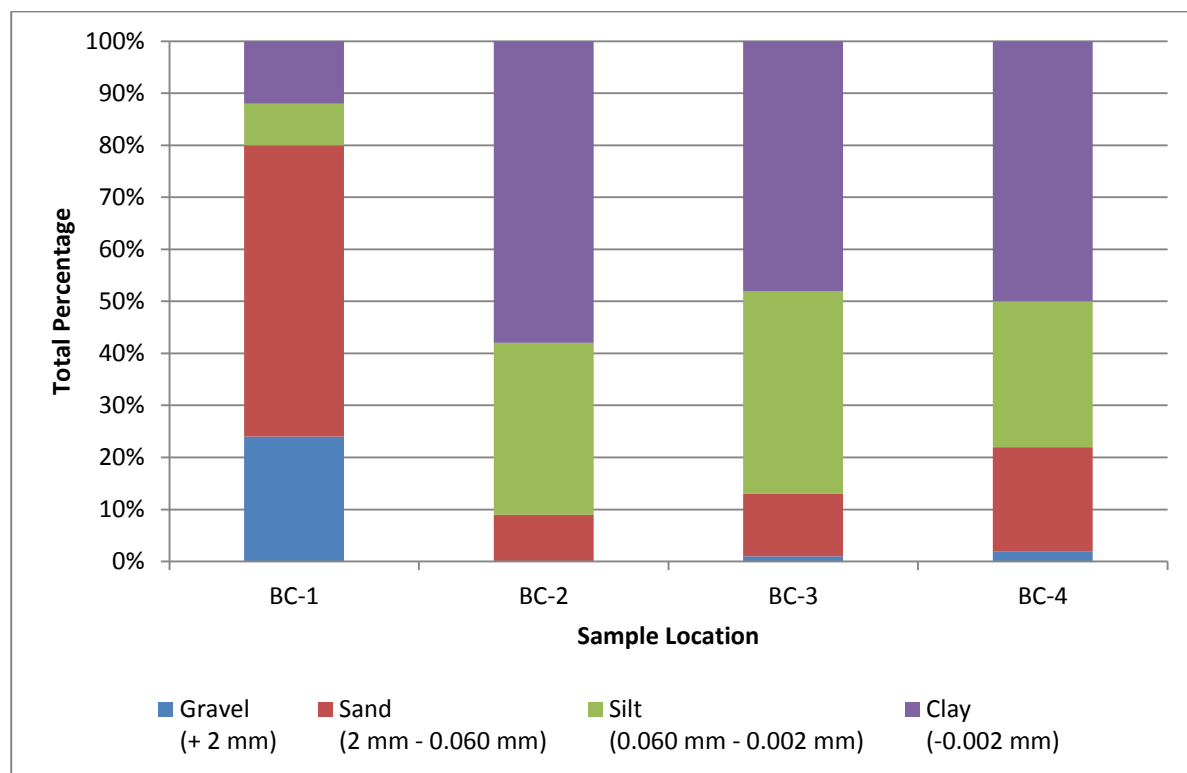


Figure 3-8: Particle size distribution for sediments within Breakfast Creek

Table 3-11: Summary of laboratory results for additional sampling locations at Breakfast Creek

Breakfast Creek													
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BC - 1	BC - 2	BC - 3	BC - 4	Mean/ Geomean	Standard Deviation	Normal (N) Log-Normal (L) Neither (X)
Date sampled							15/12/11	15/12/11	15/12/11	15/12/11			
Moisture Content	%	0.1	0.1				35	58	59.4	54.9	51.8	11.4	65.2 N
Total Organic Carbon	%	0.01	0.1				1.5	2.2	2.1	1.8	1.9	0.3	2.3 N
Metals													
Arsenic	mg/kg	0.4	1	20	100	20	10.3	9.27	8.1	6.83	8.6	1.5	10.4 N
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.154	0.285	<0.1	0.27	0.2	0.1	0.3 N
Chromium	mg/kg	0.1	1	50	100	80	23.2	48.2	42	43.5	39.2	11.0	52.2 N
Copper	mg/kg	0.1	1	60	1,000	65	29.9	64	50.7	42.6	46.8	14.3	63.6 N
Lead	mg/kg	0.5	1	300	300	50	47.2	99.2	36	35.7	54.5	30.3	90.1 N
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.074	0.25	0.174	0.181	0.2	0.1	0.3 N
Nickel	mg/kg	0.1	1	60	600	21	12.6	24.4	20.5	25.7	20.8	5.9	27.7 N
Zinc	mg/kg	0.5	1	200	7,000	200	168	202	171	154	173.8	20.2	197.6 N
BTEX													
Benzene	mg/kg	0.2	0.2	1			<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 -
Ethyl Benzene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2 -
m+p xylenes	mg/kg	0.4	0.2				<0.4	<0.4	<0.4	<0.4	<0.4	-	<0.4 -
o-xylene	mg/kg	0.2	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2 -
Total BTEX	mg/kg	1.2	0.2				<1.2	<1.2	<1.2	<1.2	<1.2	-	<1.2 -
Total Petroleum Hydrocarbons													
TPH C6-C9	mg/kg	10	100				<10	<10	<10	<10	<10	-	<10 -
TPH C10-14	mg/kg	10	100				37	<10	17	12			
Normalised to 1% TOC							24.7		8.1	6.7	11.1	9.1	21.8 N
TPH C15-28	mg/kg	50	100				245	118	137	120			
Normalised to 1% TOC							163.4	53.6	65.2	66.7	87.2	51.1	147.4 N
TPH C29-36	mg/kg	50	100				292	140	138	115			
Normalised to 1% TOC							194.7	63.6	65.7	63.9	97.0	65.2	173.6 N
Total TPH (Sum of)	mg/kg						574	258	292	247			
Normalised to 1% TOC						550	382.7	117.3	139.0	137.2	194.1	126.1	342.5 N
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/kg	5	5				<5	15	16	21			
Normalised to 1% TOC								12.8	13.9	19.2	12.1	7.0	20.3 N
1-Methylnaphthalene	µg/kg	5					<5	7	7	12			
Normalised to 1% TOC								3.2	3.3	6.7	3.9	1.9	6.1 N
2-Methylnaphthalene	µg/kg	5	5				<5	12	10	18			
Normalised to 1% TOC								5.5	4.8	10.0	5.7	3.1	9.4 N
Acenaphthylene	µg/kg	5	5				9	18	25	15			
Normalised to 1% TOC							6.0	8.2	11.9	8.3	8.6	2.4	11.5 N
Acenaphthene	µg/kg	5	5				<5	5	9	10			
Normalised to 1% TOC								2.3	4.3	5.6	3.7	1.6	5.5 N
Fluorene	µg/kg	5	5				<5	9	14	18			
Normalised to 1% TOC								4.1	6.7	10.0	5.8	3.3	9.7 N
Phenanthrene	µg/kg	5	5				35	53	109	65			
Normalised to 1% TOC							23.3	24.1	51.9	36.1	33.9	13.4	49.6 N
Anthracene	µg/kg	5	5				14	21	36	21			
Normalised to 1% TOC							9.3	9.5	17.1	11.7	11.9	3.6	16.2 N
Fluoranthene	µg/kg	5	5				166	201	390	172			
Normalised to 1% TOC							110.7	91.4	185.7	95.6	120.8	44.1	172.7 N
Pyrene	µg/kg	5	5				145	202	361	182			
Normalised to 1% TOC							96.7	91.8	171.9	101.1	115.4	37.9	159.9 N
Benz(a)anthracene	µg/kg	5					77	134	201	82			
Normalised to 1% TOC							51.3	60.9	95.7	45.6	63.4	22.5	89.8 N
Chrysene	µg/kg	5	5				65	104	158	75			
Normalised to 1% TOC							43.3	47.3	75.2	41.7	51.9	15.8	70.4 N
Benzo(b)&(k)fluoranthene	µg/kg	10					173	262	342	167			
Normalised to 1% TOC							115.3	119.1	162.9	92.8	122.5	29.3	157.00 N
Benzo(a)pyrene	µg/kg	5	5				97	144	190	80			
Normalised to 1% TOC							64.7	65.5	90.5	44.4	66.3	18.9	88.4 N
Indeno(1,2,3-cd)pyrene	µg/kg	5	5				97	145	176	74			
Normalised to 1% TOC							64.7	65.9	83.8	41.1	63.9	17.5	84.5 N
Dibenz(a,h)anthracene	µg/kg	5	5				8	14	17	7			
Normalised to 1% TOC							5.3	6.4	8.1	3.9	5.9	1.8	8.0 N
Benzo(g,h,i)perylene	µg/kg	5					93	160	192	84			
Normalised to 1% TOC							62.0	72.7	91.4	46.7	68.2	18.8	90.3 N
Coronene	µg/kg	10	5				23	36	38	19			
Normalised to 1% TOC							1.5	2.2	2.1	1.8	1.9	0.3	2.3 N
Benzo(e)pyrene	µg/kg	5	5				69	113	145	74			
Normalised to 1% TOC							46.0	51.4	69.0	41.1	51.9	12.2	66.2 N
Perylene	µg/kg	5	5				56	136	510	1779			
Normalised to 1% TOC							37.3	61.8	242.9	988.3	332.6	446.7	858.2 N
Total PAHs (as above)	µg/kg	100	100				1127	1791	2946	2900			
Normalised to 1% TOC						10,000	751.3	814.1	1,402.9	1,611.1	1,144.8	427.5	1,647.9 N

Breakfast Creek														
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BC - 1	BC - 2	BC - 3	BC - 4	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
PCBs														
Mono-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Di-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Tri-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Tetra-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Penta-PCB congeners	µg/kg	5					<5	5	<5	<5				
Normalised to 1% TOC								2.3			2.4	0.1	2.6	N
Hexa-PCB congeners	µg/kg	5					<5	7	5	5				
Normalised to 1% TOC								3.2	2.4	2.8	2.7	0.4	3.1	N
Hepta-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Octa-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Nona-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Deca-PCB congeners	µg/kg	5					<5	<5	<5	<5	<5	-	<5	-
Total PCB congeners	µg/kg	5		1,000	10,000		<5	12	5	5				
Normalised to 1% TOC						23		5.5	2.4	2.8	3.3	1.5	5.0	N
Organochlorine Pesticides														
Aldrin	µg/kg	1	1	200	10,000		<1	<1	<1	<1	<1	-	<1	-
alpha-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
beta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	<1	<1	<1	<1	-	<1	-
delta-BHC	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	<1	<1	<1	<1	-	<1	-
trans-Chlordane	µg/kg	1	1		50,000		2	1	<1	<1				
Normalised to 1% TOC						0.5	1.3	0.5			0.7	0.4	1.2	N
p,p'-DDD	µg/kg	1	1				3	2	1	2				
Normalised to 1% TOC						2	2.0	0.9	0.5	1.1	1.1	0.6	1.9	N
p,p'-DDE	µg/kg	1	1				3	7	5	9				
Normalised to 1% TOC						2.2	2.0	3.2	2.4	5.0	3.1	1.3	4.7	N
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	<1	<1	<1	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	<1	<1	<1	<1	-	<1	-
alpha-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
beta-Endosulfan	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	<1	<1	<1	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	<1	<1	<1	<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	<1	<1	<1	<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	<1	<1	<1	<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Normalised to 1% TOC														
Methoxychlor	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	<1	<1	<1	<1	-	<1	-
Organophosphorus Pesticides														
Dichlorvos	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Demeton-S-methyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Dimethoate	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Diazinon	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Chlorpyrifos-methyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Parathion-methyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Pirimiphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Fenitrothion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Malathion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Chlorpyrifos	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Fenthion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Parathion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Chlorfenvinphos	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Bromophos-ethyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Methidathion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Fenamiphos	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Prothiofos	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Ethion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Carbophenothion	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Phosalone	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Azinphos-methyl	µg/kg	20					<20	<20	<20	<20	<20	-	<20	-
Organotins														
Monobutyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-
Dibutyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-
Tributyl tin	µgSn/kg	0.5	1				<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-

Breakfast Creek														
	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	BC - 1	BC - 2	BC - 3	BC - 4	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Nutrients														
Phosphorus	mg/kg	1	0.1	2,000			450	817	896	969	783.0	230.5	1052.2	N
Total Nitrogen	mg/kg	20	0.1				540	1280	1380	1230	1107.5	383.4	1558.7	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				540	1280	1380	1230	1107.5	383.4	1558.7	N
Nitrate as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<1	-	<1	-
Nitrite as N	mg/kg	0.1	0.1				<0.1	<0.1	<0.1	<0.1	<1	-	<1	-

Legend

Note	When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD)
PQL	Practical Quantitation Limit
Sample Sites	Sample location numbers
50	Value exceeds NAGD Screening Level
50	Value exceeds DEH (1998) EIL
Normalised to 1% TOC	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

The DEH (1998) EIL for Dieldrin and Aldrin is based on the sum of the concentrations reported for the two analytes



4 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 (AAA) and secondary laboratory (ALS) incorporated a range of QA/QC methods to ensure accuracy and precision of data. These are detailed further below. Laboratory QA/QC reports are included in Appendix 3 (AAA) and Appendix 6 (ALS).

4.1.1 Laboratory Blanks

Laboratory blanks or method blanks are artificial samples, usually distilled water, introduced to a chemical analyser to observe the response of the instrument to a sample that does not contain the material being measured. Blanks can also detect any contamination occurring during laboratory processing of the sample. An assessment of laboratory blank samples reported by AAA 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

Laboratory duplicates refers to an intra-laboratory split sample randomly selected from the sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity. The precision of analysis performed by the laboratory is determined by the calculation of the relative percentage difference (RPD). The RPD is calculated as follows: $\text{RPD} = \frac{(A2-B2)/((A2+B2)/2)}{100} \times 100$, where cell A2 contains the chemical concentration for A and cell B2 contains the second chemical concentration for B. The NAGD recommends that laboratory duplicate samples should be within an RPD of $\pm 35\%$. Review of laboratory QC results identifies that a number of PAHs, where detected, were outside of this criterion. In addition, TPH C10-C14, trans chlordane, DDE and DDD each exceeded this criterion on a singular basis.

While the NAGD states that the RPD should be within $\pm 35\%$, AAA prefers to use a sliding scale to account for greater analytical uncertainty for contaminant concentrations nearer to the LOR. The laboratory RPDs have been assessed using the following protocol:

- Results <10 times LOR: no limits; and
- Results > 10 times LOR: 0% - 50%

Using these criteria, the majority of PAHs were outside of these limits on at least one occasion. When levels outside these limits are obtained, an investigation into the cause of the deviation is performed by the laboratory before the batch is accepted or rejected, and results are released.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

Investigations were conducted and the laboratory accepted the results for release. All other contaminants complied with this criterion.

4.1.3 Surrogate Spikes

Surrogate spikes are compounds similar in composition to the target analyte that will behave in a similar manner to the target compounds throughout preparation and analysis, will not interfere with the target analysis and do not occur in the environment. Samples are spiked with the surrogate material and a calculation of the percentage recovery of the returned concentration is performed. The percentage 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 for organic compounds. NAGD states that recovery limits of 75% - 125% are generally acceptable.

For the analysis, BTEX were consistently outside of the set NAGD recovery limits. Organotins, OPPs and PCBs were also outside of NAGD recovery limits for some locations.

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. As such, AAA has developed recovery limits for different contaminants. Refer to Appendix 3 for the relevant dynamic recovery limits applied by AAA. Based on these limits, there are no surrogate spikes that fall outside of AAA's criteria.

Matrix interference occurs when samples contain certain properties such as high moisture content, high salinity and/or contain substances such as plant sterols, waxes, lipids or other organic matter that can inhibit the full extrusion of a contaminant during laboratory surrogate extraction.

4.1.4 Matrix Spikes

To verify that the physical properties or characteristics of the matrix do not interfere with the analytical result, a known concentration of the chemical of interest is mixed into a sample of the required matrix. The matrix spike is then prepared and analysed according to the analytical method, and results are compared with an analysis of the parent sample (the original sample with no added spike). Samples collected from the field are sub-sampled from the original sample and spiked with a known contaminant concentration. If there is no matrix interference, the result of the matrix spike should be equivalent to the result of the parent sample plus the amount of chemical added to the matrix spike sample:

$$\% \text{ Recovery} = \frac{\text{Matrix spike sample result} - \text{Parent (unspiked) sample result}}{\text{Spike Amount}} \times 100$$

Matrix spikes measure the analytical methodology's performance on a specific matrix type.

NAGD recommends that:



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

"Recovery Rates (for matrix spiked samples) should be within the limits specified for the analysis method (typically 75-125%)".

Matrix spike recoveries show that a number of OCP, OPP, BTEX, PAH and TPH species were outside of the NAGD criteria. The majority however, were within the guidelines set by AAA. AAA report that when levels are outside of these limits, an investigation into the cause of the deviation is performed before the batch is accepted or rejected and results released.

Consequently, reported contaminant concentrations by the laboratory are potentially lower than actual contaminant concentrations found within sediment samples. Given that these analytical groups were typically not detected or were well below Screening Levels, these matrix spike recovery exceedances are not of significant concern.

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

Appendix 7 provides a summary of RPDs and Relative Standard Deviations (RSDs) of field split triplicate, field replicate triplicate and inter-batch duplicate analyses. Results for the various analyses are discussed below.

4.2.1 Field Split Triplicate Sample Analyses (inter and intra-laboratory comparison)

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. These QC samples identify variation associated with sub-sample handling and repeatability of laboratory analyses. Chemical concentrations are compared between the split samples through calculation of the Relative Standard Deviation (RSD). Three field split triplicates were collected from the following locations: 6-2, 8-1, and 11-8.

The NAGD states that RSDs for field split samples should be within $\pm 50\%$. For location 6-2, TOC, arsenic, copper, lead, zinc, total nitrogen, total Kjeldahl nitrogen and phosphorus exceeded the NAGD criteria. For location 8-1, copper, lead, zinc, tributyltin and phosphorus exceeded the NAGD criteria. For location 11-8, lead and zinc were the only two parameters that exceeded the NAGD criteria.

These results highlight that there was site heterogeneity issues for field split samples. Most results were near the limit of detection so the impact on the data was minimal. Arrangement have been made with the laboratories to address these QA/QC issues at the time of analyses so results in future should be within the NAGD limits of within $\pm 50\%$.

4.2.2 Field Triplicate Analyses

Six field triplicate samples (i.e. three separate samples collected in the field at a given sampling location) were collected from site locations 3-0, 4-9, 7-1, 11-11, 13-2, and BC-4 and tested for



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

sediment homogeneity. Chemical results were compared through calculation of the 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 $\pm 50\%$, although they may not always do so where the sediments are very inhomogeneous or greatly differing in grain size”.

Site locations 3-0, 4-9, 13-2 and BC-4 demonstrated good sediment homogeneity as no parameters, where detected, exceeded the NAGD criteria of $> 50\%$ RSDs. Location 7-1 had copper, lead, zinc, *p,p'*-DDD, *p,p'*-DDE, dibutyltin, tributyltin, 12 of the 21 individual PAHs, and total PAHs with % RSD exceeding the NAGD criteria of $> 50\%$. Location 11-11 had TOC, chromium, nickel, total nitrogen, and total Kjeldahl nitrogen with %RSD that exceeded the NAGD criteria of $> 50\%$.

4.2.3 Inter-laboratory comparison

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 between sample batches. Contaminant concentrations are compared between the two split samples through calculation of the 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 $\pm 50\%$. One inter-batch duplicate sample was taken from location 8-3. All contaminants analysed were compliant with the NAGD criteria.

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

4.2.4 Field Blanks

A field blank is a container of water, quality assured to be free of any of the substances - organic, inorganic or both - that are to be tested for in the real samples. The container is taken into the field and exposed to the atmosphere of the site for a period of time. Three field blanks for BTEX were collected in the field and sent to the primary laboratory for BTEX analysis. BTEX concentrations were below detection limits, so no cross-contamination is likely to have occurred during in-field sample processing.

4.3 Holding Times

Samples were kept chilled whilst in the field (using eskies and bags of ice), during storage (using a mobile refrigerator at 2°C) and during delivery, and stored under refrigeration at the laboratories. All sample analyses were undertaken within required holding times by the primary laboratory (AAA) and the secondary laboratory (ALS).



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

5 COMPARISON WITH GUIDELINE CRITERIA

Compliance against NAGD Screening levels, and DEH EIL and HIL-A concentrations has been assessed for Zones 1 - 4 as well as an assessment of the whole dredge area (Zones 2 - 4). Locations within Zone 1 have not been included in the assessment of the whole dredge area as these represent reference conditions and would not be dredged.

The following sections provide a summary description and tables of mean and 95% Upper Confident Limit (UCL). Contaminants that were detected in the 2012 SAP study are assessed. Nutrients, moisture content and TOC were excluded from this comparison as they are not classified as contaminants under the NAGD.

5.1 Compliance with NAGD Screening Levels

5.1.1 Zone 1 – Reference Sites

The 95% UCL of the mean for lead (469 mg/kg), mercury (0.5 mg/kg), nickel (22 mg/kg), Total TPH (587 mg/kg), *p,p'*-DDD (64 µg/kg) and *p,p'*-DDE (26 µg/kg) were above their respective NAGD Screening Level (Table 5-1). All other contaminants were below respective NAGD Screening Levels.

5.1.2 Zone 2 – Colmslie to Pinkenba

The 95% UCL of the mean for mercury (0.2 mg/kg), nickel (22 mg/kg), trans-chlordane (0.5 µg/kg), *p,p'*-DDE (2.7 µg/kg), and TBT (27.6 µgSn/kg) were above their respective NAGD Screening Levels (Table 5-2). All other contaminants were below respective NAGD Screening Levels.

5.1.3 Zone 3 – Port reaches

The 95% UCL of the mean for nickel (30.7 mg/kg), *p,p'*-DDD (2.6 µg/kg), and *p,p'*-DDE (3.3 µg/kg) were above their respective NAGD Screening Levels (Table 5-3). All other contaminants were below respective NAGD Screening Levels.

5.1.4 Zone 4 – Moreton Bay (Entrance Channel)

The 95% UCL of the mean for *p,p'*-DDE (2.2 µg/kg) was above the NAGD Screening Level (Table 5-4). All other contaminants were below respective NAGD Screening Levels.

5.1.5 Whole Dredge Area (Zone 2 – Zone 4)

The 95% UCL concentrations calculated for each parameter for the total dredge area (Zones 2-4) were generally below respective NAGD Screening Levels with the exception of nickel (24.8 mg/kg), trans-chlordane (0.5 µg/kg), *p,p'*-DDE (2.6 µg/kg) and TBT (10 µgSn/kg) (Table 5-5).



5.2 Compliance with EIL and HIL (A) Guidelines

The 95% UCL for lead in Zone 1 (468 mg/kg) was the only contaminant that exceeded the EIL guidelines. The guideline for lead is 300 mg/kg (Table 5-5). No contaminants exceeded the EIL or HIL (A) guideline values (DEH, 1998) at the 95% UCL of the mean for the whole dredge area (zone 2-4).

Table 5-1: Comparison of 95% UCL concentrations with NAGD Screening Levels and DEH Investigation Levels for contaminants in the reference area (Zone 1)

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Moisture Content	%	0.1	0.1				43.5	10.8	61.7	N
Total Organic Carbon	%	0.01	0.1				1.1	0.5	2.0	N
Metals										
Arsenic	mg/kg	0.4	1	20	100	20	6.2	2.6	10.6	N
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.1	0.2	0.4	N
Chromium	mg/kg	0.1	1	50	100	80	36.7	4.5	44.3	N
Copper	mg/kg	0.1	1	60	1,000	65	27.4	17.8	57.5	N
Lead	mg/kg	0.5	1	300	300	50	123.8	204.6	468.7	N
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.2	0.2	0.5	N
Nickel	mg/kg	0.1	1	60	600	21	21.1	0.7	22.3	N
Zinc	mg/kg	0.5	1	200	7,000	200	106.0	98.8	272.6	N
Total Petroleum Hydrocarbons										
TPH C6-C9	mg/kg	10	100				<10	-	<10	-
TPH C10-14	mg/kg	10	100							
Normalised to 1% TOC							8.3	5.8	18.1	N
TPH C15-28	mg/kg	50	100							
Normalised to 1% TOC							102.9	134.9	330.2	N
TPH C29-36	mg/kg	50	100							
Normalised to 1% TOC							79.5	94.4	238.7	N
Total TPH (Sum of)	mg/kg									
Normalised to 1% TOC						550	190.7	235.1	587.1	N
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/kg	5	5							
Normalised to 1% TOC							15.0	21.7	51.5	N
1-Methylnaphthalene	µg/kg	5								
Normalised to 1% TOC							22.1	34.0	79.5	N
2-Methylnaphthalene	µg/kg	5	5							
Normalised to 1% TOC							42.1	68.7	157.9	N
Acenaphthylene	µg/kg	5	5							
Normalised to 1% TOC							23.6	36.5	85.1	N
Acenaphthene	µg/kg	5	5							
Normalised to 1% TOC							13.1	18.4	44.0	N
Fluorene	µg/kg	5	5							
Normalised to 1% TOC							16.0	23.3	55.2	N
Phenanthrene	µg/kg	5	5							
Normalised to 1% TOC							59.3	98.4	225.1	N
Anthracene	µg/kg	5	5							
Normalised to 1% TOC							26.2	41.0	95.4	N
Fluoranthene	µg/kg	5	5							
Normalised to 1% TOC							189.5	323.9	735.6	N
Pyrene	µg/kg	5	5							
Normalised to 1% TOC							236.4	405.2	919.5	N
Benz(a)anthracene	µg/kg	5								
Normalised to 1% TOC							100.2	169.3	385.6	N
Chrysene	µg/kg	5	5							
Normalised to 1% TOC							84.8	142.5	325.0	N
Benzo(b)&(k)fluoranthene	µg/kg	10								
Normalised to 1% TOC							224.0	379.4	863.7	N
Benzo(a)pyrene	µg/kg	5	5							
Normalised to 1% TOC							126.0	213.8	486.4	N
Indeno(1,2,3-cd)pyrene	µg/kg	5	5							
Normalised to 1% TOC							109.0	184.6	420.2	N
Dibenz(a,h)anthracene	µg/kg	5	5							
Normalised to 1% TOC							18.8	28.3	66.4	N
Benzo(g,h,i)perylene	µg/kg	5								
Normalised to 1% TOC							116.7	197.7	450.0	N
Coronene	µg/kg	10	5							
Normalised to 1% TOC							39.5	59.8	140.3	N

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Benzo(e)pyrene	µg/kg	5	5							
<i>Normalised to 1% TOC</i>							88.3	148.7	339.0	N
Perylene	µg/kg	5	5							
<i>Normalised to 1% TOC</i>							670.0	57.8	767.6	N
Total PAHs (as above)	µg/kg	100	100							
<i>Normalised to 1% TOC</i>						10,000	2,099.4	2,506.3	6,324.7	N
Organochlorine Pesticides										
Aldrin	µg/kg	1	1	200	10,000		<1	-	<1	-
<i>alpha</i> -BHC	µg/kg	1	1				<1	-	<1	-
<i>beta</i> -BHC	µg/kg	1	1				<1	-	<1	-
<i>gamma</i> -BHC (Lindane)	µg/kg	1	1			0.32	<1	-	<1	-
<i>delta</i> -BHC	µg/kg	1	1				<1	-	<1	-
<i>cis</i> -Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
<i>trans</i> -Chlordane	µg/kg	1	1		50,000		<1	-	<1	-
<i>p,p'</i> -DDD	µg/kg	1	1							
<i>Normalised to 1% TOC</i>						2	16.80	28.17	64.20	N
<i>p,p'</i> -DDE	µg/kg	1	1							
<i>Normalised to 1% TOC</i>						2.2	7.00	11.26	26.00	N
<i>p,p'</i> -DDT	µg/kg	1	1	200	200,000	1.6	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	-	<1	-
<i>alpha</i> -Endosulfan	µg/kg	1	1				<1	-	<1	-
<i>beta</i> -Endosulfan	µg/kg	1	1				<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1				<1	-	<1	-
Methoxychlor	µg/kg	1	1				<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	-	<1	-
Nutrients										
Phosphorus	mg/kg	1	0.1	2,000			515.7	113.32	706.7	N
Total Nitrogen	mg/kg	20	0.1				756.7	392.73	1418.7	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				756.7	392.73	1418.7	N
Nitrate as N	mg/kg	0.1	0.1				<0.1	-	<0.1	-
Nitrite as N	mg/kg	0.1	0.1				<0.1	-	<0.1	-
Radionuclides										
Gross alpha	Bq/g	1								
Gross beta	Bq/g	1								
Sum of gross alpha and gross beta	Bq/g	2								

Legend

Note	When calculating averages and 95%UCLs, values below limit of reporting for individual sample results were set to half the detection levels (consistent with the NAGD)
	Data analysis has been undertaken assuming a normal distribution. There are too few samples to test for normality or undertake non-parametric analysis.
PQL	Practical Quantitation Limit
50	Value exceeds NAGD Screening Level
50	Value exceeds DEH (1998) EIL
<i>Normalised to 1% TOC</i>	Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

Table 5-2: Comparison of 95% UCL concentrations with NAGD Screening Levels and DEH Investigation Levels for contaminants in the Colmslie to Pinkenba area (Zone 2)

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Moisture Content	%	0.1	0.1				51.4	6.2	54.1	N
Total Organic Carbon	%	0.01	0.1				1.5	0.4	1.7	N
Metals										
Arsenic	mg/kg	0.4	1	20	100	20	7.2	1.0	7.6	N
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.1	0.1	0.2	X
Chromium	mg/kg	0.1	1	50	100	80	39.0	4.4	40.9	N
Copper	mg/kg	0.1	1	60	1,000	65	38.1	12.3	43.5	N
Lead	mg/kg	0.5	1	300	300	50	22.1	7.9	25.5	N
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.2	0.1	0.2	X
Nickel	mg/kg	0.1	1	60	600	21	20.9	2.5	22.0	N
Zinc	mg/kg	0.5	1	200	7,000	200	112.6	31.9	126.6	N
Total Petroleum Hydrocarbons										
TPH C6-C9	mg/kg	10	100				<10	-	<10	-
TPH C10-14	mg/kg	10	100							
Normalised to 1% TOC							6.2	2.3	7.2	X
TPH C15-28	mg/kg	50	100							
Normalised to 1% TOC							63.8	49.2	85.4	X
TPH C29-36	mg/kg	50	100							
Normalised to 1% TOC							61.8	31.2	81.7	L
Total TPH (Sum of)	mg/kg									
Normalised to 1% TOC						550	120.4	80.3	169.5	L
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/kg	5	5							
Normalised to 1% TOC							4.0	1.6	5.5	N
1-Methylnaphthalene	µg/kg	5								
Normalised to 1% TOC							2.9	0.6	3.6	N
2-Methylnaphthalene	µg/kg	5	5							
Normalised to 1% TOC							2.6	1.5	4.1	N
Acenaphthylene	µg/kg	5	5							
Normalised to 1% TOC							4.1	3.3	7.2	N
Acenaphthene	µg/kg	5	5							
Normalised to 1% TOC							3.2	1.0	4.2	N
Fluorene	µg/kg	5	5							
Normalised to 1% TOC							4.4	2.1	6.5	N
Phenanthrene	µg/kg	5	5							
Normalised to 1% TOC							31.5	17.8	48.5	N
Anthracene	µg/kg	5	5							
Normalised to 1% TOC							9.9	4.3	14.0	N
Fluoranthene	µg/kg	5	5							
Normalised to 1% TOC							118.5	65.4	180.8	N
Pyrene	µg/kg	5	5							
Normalised to 1% TOC							104.0	51.0	152.7	N
Benz(a)anthracene	µg/kg	5								
Normalised to 1% TOC							48.7	29.2	76.6	N
Chrysene	µg/kg	5	5							
Normalised to 1% TOC							61.7	32.7	92.9	N
Benzo(b)&(k)fluoranthene	µg/kg	10								
Normalised to 1% TOC							105.0	37.9	141.1	N
Benzo(a)pyrene	µg/kg	5	5							
Normalised to 1% TOC							53.2	23.9	75.9	N
Indeno(1,2,3-cd)pyrene	µg/kg	5	5							
Normalised to 1% TOC							43.1	21.3	63.3	N
Dibenz(a,h)anthracene	µg/kg	5	5							
Normalised to 1% TOC							6.3	1.9	8.1	N
Benzo(g,h,i)perylene	µg/kg	5								
Normalised to 1% TOC							46.2	24.6	69.7	N
Coronene	µg/kg	10	5							
Normalised to 1% TOC							12.5	10.3	22.3	N
Benzo(e)pyrene	µg/kg	5	5							
Normalised to 1% TOC							44.0	15.7	58.9	N
Perylene	µg/kg	5	5							
Normalised to 1% TOC							193.9	88.2	278.0	N
Total PAHs (as above)	µg/kg	100	100							
Normalised to 1% TOC						10,000	890.5	381.0	1,254.0	N

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Organochlorine Pesticides										
Aldrin	µg/kg	1	1	200	10,000		<1	-	<1	-
alpha-BHC	µg/kg	1	1				<1	-	<1	-
beta-BHC	µg/kg	1	1				<1	-	<1	-
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	-	<1	-
delta-BHC	µg/kg	1	1				<1	-	<1	-
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
trans-Chlordane	µg/kg	1	1		50,000					
Normalised to 1% TOC						0.5	0.5	0.0	0.5	X
p,p'-DDD	µg/kg	1	1							
Normalised to 1% TOC						2	1.3	1.1	1.8	X
p,p'-DDE	µg/kg	1	1							
Normalised to 1% TOC						2.2	2.3	0.8	2.7	N
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	-	<1	-
alpha-Endosulfan	µg/kg	1	1				<1	-	<1	-
beta-Endosulfan	µg/kg	1	1				<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1				<1	-	<1	-
Methoxychlor	µg/kg	1	1				<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	-	<1	-
Organotins										
Monobutyl tin	µgSn/kg	0.5	1				<0.5	-	<0.5	-
Dibutyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC							1.1	3.2	3.5	L
Tributyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC						9	11.2	37.4	27.6	X
Nutrients										
Phosphorus	mg/kg	1	0.1	2,000			747.2	120.8	800.1	N
Total Nitrogen	mg/kg	20	0.1				1,065	310.2	1,201	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				1,065	310.2	1,201	N
Nitrate as N	mg/kg	0.1	0.1				<0.1	-	<0.1	-
Nitrite as N	mg/kg	0.1	0.1				<0.1	-	<0.1	-
Radionuclides										
Gross alpha	Bq/g	1								
Gross beta	Bq/g	1								
Sum of gross alpa and gross beta	Bq/g	2								

Legend

Note When calculating averages and 95%UCLs, values below limit of reporting for individual sample results were set to half the detection levels (consistent with the NAGD)

PQL Practical Quantitation Limit

50 Value exceeds NAGD Screening Level

50 Value exceeds DEH (1998) EIL

Normalised to 1% TOC Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

Table 5-3: Comparison of 95% UCL concentrations with NAGD Screening Levels and DEH Investigation Levels for contaminants in the Port Reaches (Zone 3)

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Moisture Content	%	0.1	0.1				42.9	9.7	46.7	N
Total Organic Carbon	%	0.01	0.1				1.0	0.5	1.2	N
Metals										
Arsenic	mg/kg	0.4	1	20	100	20	8.8	4.6	10.5	X
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.1	0.1	0.1	X
Chromium	mg/kg	0.1	1	50	100	80	39.5	16.5	45.9	X
Copper	mg/kg	0.1	1	60	1,000	65	20.0	11.5	24.4	N
Lead	mg/kg	0.5	1	300	300	50	8.6	6.3	11.0	X
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.1	0.1	0.1	X
Nickel	mg/kg	0.1	1	60	600	21	22.5	21.2	30.7	X
Zinc	mg/kg	0.5	1	200	7,000	200	51.4	32.8	64.1	X
Total Petroleum Hydrocarbons										
TPH C6-C9	mg/kg	10	100				<10	-	<10	-
TPH C10-14	mg/kg	10	100				<10	-	<10	-
TPH C15-28	mg/kg	50	100							
Normalised to 1% TOC							34.9	17.6	41.7	X
TPH C29-36	mg/kg	50	100							
Normalised to 1% TOC							38.0	17.8	44.8	X
Total TPH (Sum of)	mg/kg									
Normalised to 1% TOC						550	78.3	31.3	90.4	X
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/kg	5	5							
Normalised to 1% TOC							3.4	1.3	4.4	X
1-Methylnaphthalene	µg/kg	5								
Normalised to 1% TOC							2.6	0.3	2.9	X
2-Methylnaphthalene	µg/kg	5	5							
Normalised to 1% TOC							2.8	0.6	3.3	X
Acenaphthylene	µg/kg	5	5							
Normalised to 1% TOC							4.5	2.9	6.6	X
Acenaphthene	µg/kg	5	5							
Normalised to 1% TOC							3.9	1.7	5.1	X
Fluorene	µg/kg	5	5							
Normalised to 1% TOC							4.1	2.0	5.5	X
Phenanthrene	µg/kg	5	5							
Normalised to 1% TOC							13.8	14.4	24.4	X
Anthracene	µg/kg	5	5							
Normalised to 1% TOC							7.1	5.9	11.5	X
Fluoranthene	µg/kg	5	5							
Normalised to 1% TOC							58.5	50.0	95.3	N
Pyrene	µg/kg	5	5							
Normalised to 1% TOC							58.0	43.7	90.1	N
Benz(a)anthracene	µg/kg	5								
Normalised to 1% TOC							21.4	18.7	35.2	N
Chrysene	µg/kg	5	5							
Normalised to 1% TOC							23.4	19.6	37.7	N
Benzo(b)&(k)fluoranthene	µg/kg	10								
Normalised to 1% TOC							55.5	36.3	85.4	N
Benzo(a)pyrene	µg/kg	5	5							
Normalised to 1% TOC							29.8	26.5	49.3	N
Indeno(1,2,3-cd)pyrene	µg/kg	5	5							
Normalised to 1% TOC							23.8	25.5	42.5	N
Dibenz(a,h)anthracene	µg/kg	5	5							
Normalised to 1% TOC							4.7	3.2	7.1	X
Benzo(g,h,i)perylene	µg/kg	5								
Normalised to 1% TOC							26.8	28.8	48.0	N
Coronene	µg/kg	10	5							
Normalised to 1% TOC							7.6	5.0	10.9	X
Benzo(e)pyrene	µg/kg	5	5							
Normalised to 1% TOC							22.6	18.5	36.2	N
Perylene	µg/kg	5	5							
Normalised to 1% TOC							109.5	66.6	158.4	N
Total PAHs (as above)	µg/kg	100	100							
Normalised to 1% TOC						10,000	459.9	378.1	737.6	N

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
PCBs										
Mono-PCB congeners	µg/kg	5					<5	-	<5	-
Di-PCB congeners	µg/kg	5					<5	-	<5	-
Tri-PCB congeners	µg/kg	5					<5	-	<5	-
Tetra-PCB congeners	µg/kg	5					<5	-	<5	-
Penta-PCB congeners	µg/kg	5					<5	-	<5	-
Hexa-PCB congeners	µg/kg	5								
Normalised to 1% TOC							2.5	0.1	2.6	X
Hepta-PCB congeners	µg/kg	5								
Normalised to 1% TOC							3.3	2.2	5.0	X
Octa-PCB congeners	µg/kg	5					<5	-	<5	-
Nona-PCB congeners	µg/kg	5					<5	-	<5	-
Deca-PCB congeners	µg/kg	5					<5	-	<5	-
Total PCB congeners	µg/kg	5		1,000	10,000					
Normalised to 1% TOC						23	3.7	3.3	6.1	X
Organochlorine Pesticides										
Aldrin	µg/kg	1	1	200	10,000		<1	-	<1	-
alpha-BHC	µg/kg	1	1				<1	-	<1	-
beta-BHC	µg/kg	1	1				<1	-	<1	-
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	-	<1	-
delta-BHC	µg/kg	1	1				<1	-	<1	-
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
trans-Chlordane	µg/kg	1	1		50,000		<1	-	<1	-
p,p'-DDD	µg/kg	1	1							
Normalised to 1% TOC						2	1.4	3.4	2.6	X
p,p'-DDE	µg/kg	1	1							
Normalised to 1% TOC						2.2	2.5	2.1	3.3	X
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	-	<1	-
alpha-Endosulfan	µg/kg	1	1				<1	-	<1	-
beta-Endosulfan	µg/kg	1	1				<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1							
Normalised to 1% TOC							0.7	0.8	1.0	X
Methoxychlor	µg/kg	1	1				<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	-	<1	-
Organotins										
Monobutyl tin	µgSn/kg	0.5	1				<0.5	-	<0.5	-
Dibutyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC							0.6	0.3	0.8	X
Tributyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC						9	0.7	0.5	0.9	X
Nutrients										
Phosphorus	mg/kg	1	0.1	2,000			472.7	205.8	552.2	N
Total Nitrogen	mg/kg	20	0.1				726.8	346.1	860.6	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				726.8	346.1	860.1	N
Nitrate as N	mg/kg	0.1	0.1				<0.1	-	<0.1	-
Nitrite as N	mg/kg	0.1	0.1				0.06	0.06	0.08	X
Radionuclides										
Gross alpha	Bq/g	1								
Gross beta	Bq/g	1								
Sum of gross alpa and gross beta	Bq/g	2								

Legend

Note When calculating averages and 95%UCLs, values below limit of reporting for individual sample results were set to half the detection levels (consistent with the NAGD)

PQL Practical Quantitation Limit

50 Value exceeds NAGD Screening Level

50 Value exceeds DEH (1998) EIL

Normalised to 1% TOC Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

Table 5-4: Comparison of 95% UCL concentrations with NAGD Screening Levels and DEH Investigation Levels for contaminants in Moreton Bay (Entrance Channel) (Zone 4)

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Moisture Content	%	0.1	0.1				48.1	3.9	50.6	N
Total Organic Carbon	%	0.01	0.1				1.0	0.2	1.1	N
Metals										
Arsenic	mg/kg	0.4	1	20	100	20	9.8	2.1	11.2	X
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.1	0.0	0.1	X
Chromium	mg/kg	0.1	1	50	100	80	41.7	2.8	43.4	N
Copper	mg/kg	0.1	1	60	1,000	65	15.4	6.3	19.3	N
Lead	mg/kg	0.5	1	300	300	50	8.4	4.8	11.4	N
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.1	0.1	0.1	N
Nickel	mg/kg	0.1	1	60	600	21	19.1	2.7	20.8	N
Zinc	mg/kg	0.5	1	200	7,000	200	45.0	23.2	59.4	N
Total Petroleum Hydrocarbons										
TPH C6-C9	mg/kg	10	100				<10	-	<10	-
TPH C10-14	mg/kg	10	100				<10	-	<10	-
TPH C15-28	mg/kg	50	100							
Normalised to 1% TOC							27.0	6.0	30.7	X
TPH C29-36	mg/kg	50	100							
Normalised to 1% TOC							33.2	24.7	48.5	X
Total TPH (Sum of)	mg/kg									
Normalised to 1% TOC						550	61.9	5.6	65.3	X
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/kg	5	5							
Normalised to 1% TOC							3.0	-	3.0	-
1-Methylnaphthalene	µg/kg	5					<5	-	<5	-
2-Methylnaphthalene	µg/kg	5	5				<5	-	<5	-
Normalised to 1% TOC										
Acenaphthylene	µg/kg	5	5							
Normalised to 1% TOC							5.4	-	5.4	-
Acenaphthene	µg/kg	5	5				<5	-	<5	-
Fluorene	µg/kg	5	5				<5	-	<5	-
Phenanthrene	µg/kg	5	5							
Normalised to 1% TOC							7.7	-	7.7	-
Anthracene	µg/kg	5	5							
Normalised to 1% TOC							6.9	-	6.9	-
Fluoranthene	µg/kg	5	5							
Normalised to 1% TOC							46.2	-	46.2	-
Pyrene	µg/kg	5	5							
Normalised to 1% TOC							51.5	-	51.5	-
Benz(a)anthracene	µg/kg	5								
Normalised to 1% TOC							30.8	-	30.8	-
Chrysene	µg/kg	5	5							
Normalised to 1% TOC							30.8	-	30.8	-
Benzo(b)&(k)fluoranthene	µg/kg	10								
Normalised to 1% TOC							69.2	-	69.2	-
Benzo(a)pyrene	µg/kg	5	5							
Normalised to 1% TOC							40.8	-	40.8	-
Indeno(1,2,3-cd)pyrene	µg/kg	5	5							
Normalised to 1% TOC							30.8	-	30.8	-
Dibenz(a,h)anthracene	µg/kg	5	5							
Normalised to 1% TOC							8.5	-	8.5	-
Benzo(g,h,i)perylene	µg/kg	5								
Normalised to 1% TOC							38.5	-	38.5	-
Coronene	µg/kg	10	5				<10	-	<10	-
Benzo(e)pyrene	µg/kg	5	5							
Normalised to 1% TOC							28.5	-	28.5	-
Perylene	µg/kg	5	5							
Normalised to 1% TOC							23.1	-	23.1	-
Total PAHs (as above)	µg/kg	100	100							
Normalised to 1% TOC						10,000	423.1	-	423.1	-

Organochlorine Pesticides										
Aldrin	µg/kg	1	1	200	10,000		<1	-	<1	-
alpha-BHC	µg/kg	1	1				<1	-	<1	-
beta-BHC	µg/kg	1	1				<1	-	<1	-
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	-	<1	-
delta-BHC	µg/kg	1	1				<1	-	<1	-
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
trans-Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
p,p'-DDD	µg/kg	1	1							
Normalised to 1% TOC						2	0.7	0.4	0.9	X
p,p'-DDE	µg/kg	1	1							
Normalised to 1% TOC						2.2	1.5	1.4	2.2	N
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	-	<1	-
alpha-Endosulfan	µg/kg	1	1				<1	-	<1	-
beta-Endosulfan	µg/kg	1	1				<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1				<1	-	<1	-
Methoxychlor	µg/kg	1	1				<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	-	<1	-
Nutrients										
Phosphorus	mg/kg	1	0.1	2,000			418.9	114	489.5	N
Total Nitrogen	mg/kg	20	0.1				753.3	197	875.5	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				753.3	197	875.5	N
Nitrate as N	mg/kg	0.1	0.1				0.06	0.02	0.07	X
Nitrite as N	mg/kg	0.1	0.1				0.06	0.02	0.07	X
Radionuclides										
Gross alpha	Bq/g	1								
Gross beta	Bq/g	1								
Sum of gross alpha and gross beta	Bq/g	2								

Legend

Note When calculating averages and 95%UCLs, values below limit of reporting for individual sample results were set to half the detection levels (consistent with the NAGD)

PQL Practical Quantitation Limit

50 Value exceeds NAGD Screening Level

50 Value exceeds DEH (1998) EIL

Normalised to 1% TOC Normalised to 1% TOC, over the range of TOC from 0.2 to 10%

Table 5-5: Comparison of 95% UCL concentrations with NAGD Screening Levels and DEH Investigation Levels for contaminants in the whole dredge area (Zone 2 – Zone 4)

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Moisture Content	%	0.1	0.1				47.0	8.4	49.1	X
Total Organic Carbon	%	0.01	0.1				1.2	0.5	1.3	N
Metals										
Arsenic	mg/kg	0.4	1	20	100	20	8.4	3.4	9.3	X
Cadmium	mg/kg	0.1	0.1	3	20	1.5	0.1	0.1	0.1	X
Chromium	mg/kg	0.1	1	50	100	80	39.8	11.3	42.6	X
Copper	mg/kg	0.1	1	60	1,000	65	25.5	14.4	29.1	N
Lead	mg/kg	0.5	1	300	300	50	13.3	9.2	15.7	X
Mercury	mg/kg	0.01	0.01	1	15	0.15	0.1	0.1	0.1	L
Nickel	mg/kg	0.1	1	60	600	21	21.2	14.1	24.8	X
Zinc	mg/kg	0.5	1	200	7,000	200	71.9	43.0	82.7	X
Total Petroleum Hydrocarbons										
TPH C6-C9	mg/kg	10	100				<10	-	<10	-
TPH C10-14	mg/kg	10	100							
Normalised to 1% TOC							5.4	1.5	5.8	X
TPH C15-28	mg/kg	50	100							
Normalised to 1% TOC							43.6	34.7	52.3	X
TPH C29-36	mg/kg	50	100							
Normalised to 1% TOC							47.7	28.6	54.8	X
Total TPH (Sum of)	mg/kg									
Normalised to 1% TOC						550	94.9	59.5	109.8	X
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/kg	5	5							
Normalised to 1% TOC							3.6	1.4	4.3	X
1-Methylnaphthalene	µg/kg	5								
Normalised to 1% TOC							2.7	0.5	3.0	X
2-Methylnaphthalene	µg/kg	5	5							
Normalised to 1% TOC							2.7	1.0	3.2	X
Acenaphthylene	µg/kg	5	5							
Normalised to 1% TOC							4.4	2.8	5.8	N
Acenaphthene	µg/kg	5	5							
Normalised to 1% TOC							3.5	1.4	4.2	X
Fluorene	µg/kg	5	5							
Normalised to 1% TOC							4.1	1.9	5.0	X
Phenanthrene	µg/kg	5	5							
Normalised to 1% TOC							20.1	17.3	28.7	N
Anthracene	µg/kg	5	5							
Normalised to 1% TOC							8.2	5.1	10.7	N
Fluoranthene	µg/kg	5	5							
Normalised to 1% TOC							85.8	60.1	115.5	N
Pyrene	µg/kg	5	5							
Normalised to 1% TOC							80.4	49.0	104.6	N
Benz(a)anthracene	µg/kg	5								
Normalised to 1% TOC							32.6	25.3	45.2	N
Chrysene	µg/kg	5	5							
Normalised to 1% TOC							38.6	30.2	53.5	N
Benzo(b)&(k)fluoranthene	µg/kg	10								
Normalised to 1% TOC							71.7	44.7	93.8	N
Benzo(a)pyrene	µg/kg	5	5							
Normalised to 1% TOC							39.6	25.9	52.5	N

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Indeno(1,2,3-cd)pyrene	µg/kg	5	5							
Normalised to 1% TOC							31.7	23.8	43.5	N
Dibenz(a,h)anthracene	µg/kg	5	5							
Normalised to 1% TOC							5.9	2.7	7.3	N
Benzo(g,h,i)perylene	µg/kg	5								
Normalised to 1% TOC							35.1	26.6	48.3	N
Coronene	µg/kg	10	5							
Normalised to 1% TOC							10.6	7.9	15.2	X
Benzo(e)pyrene	µg/kg	5	5							
Normalised to 1% TOC							31.3	19.1	40.7	N
Perylene	µg/kg	5	5							
Normalised to 1% TOC							141.1	83.9	182.6	N
Total PAHs (as above)	µg/kg	100	100							
Normalised to 1% TOC						10,000	622.7	410.5	825.6	N
PCBs										
Mono-PCB congeners	µg/kg	5					<5	-	<5	-
Di-PCB congeners	µg/kg	5					<5	-	<5	-
Tri-PCB congeners	µg/kg	5					<5	-	<5	-
Tetra-PCB congeners	µg/kg	5					<5	-	<5	-
Penta-PCB congeners	µg/kg	5					<5	-	<5	-
Hexa-PCB congeners	µg/kg	5								
Normalised to 1% TOC							3.9	4.8	6.4	X
Hepta-PCB congeners	µg/kg	5								
Normalised to 1% TOC							4.2	4.6	6.4	X
Octa-PCB congeners	µg/kg	5					<5	-	<5	-
Nona-PCB congeners	µg/kg	5					<5	-	<5	-
Deca-PCB congeners	µg/kg	5					<5	-	<5	-
Total PCB congeners	µg/kg	5		1,000	10,000					
Normalised to 1% TOC						23	5.9	9.9	10.7	X
Organochlorine Pesticides										
Aldrin	µg/kg	1	1	200	10,000		<1	-	<1	-
alpha-BHC	µg/kg	1	1				<1	-	<1	-
beta-BHC	µg/kg	1	1				<1	-	<1	-
gamma-BHC (Lindane)	µg/kg	1	1			0.32	<1	-	<1	-
delta-BHC	µg/kg	1	1				<1	-	<1	-
cis-Chlordane	µg/kg	1	1		50,000	0.5	<1	-	<1	-
trans-Chlordane	µg/kg	1	1		50,000					
Normalised to 1% TOC						0.5	0.5	0.0	0.5	X
p,p'-DDD	µg/kg	1	1							
Normalised to 1% TOC						2	1.2	2.3	1.8	X
p,p'-DDE	µg/kg	1	1							
Normalised to 1% TOC						2.2	2.2	1.6	2.6	X
p,p'-DDT	µg/kg	1	1	200	200,000	1.6	<1	-	<1	-
Dieldrin	µg/kg	1	1	200	10,000	280	<1	-	<1	-
alpha-Endosulfan	µg/kg	1	1				<1	-	<1	-
beta-Endosulfan	µg/kg	1	1				<1	-	<1	-
Endosulfan Sulphate	µg/kg	1	1				<1	-	<1	-
Endrin	µg/kg	1	1			10	<1	-	<1	-
Endrin ketone	µg/kg	1					<1	-	<1	-
Endrin aldehyde	µg/kg	1					<1	-	<1	-
Heptachlor	µg/kg	1	1		10,000		<1	-	<1	-
Heptachlor epoxide	µg/kg	1	1				<1	-	<1	-
Hexachlorobenzene	µg/kg	1	1							
Normalised to 1% TOC							0.6	0.5	0.7	X
Methoxychlor	µg/kg	1	1				<1	-	<1	-
Oxychlordane	µg/kg	1	1				<1	-	<1	-
Organotins										
Monobutyl tin	µgSn/kg	0.5	1				<1	-	<1	-
Dibutyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC							1.1	2.1	1.6	X
Tributyl tin	µgSn/kg	0.5	1							
Normalised to 1% TOC						9	4.3	22.5	10.0	X

	Units	PQL	NAGD PQL	DEH (1998) EIL	DEH (1998) HIL-A	NAGD Screening Level	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-Normal (L) Neither (X)
Nutrients										
Phosphorus	mg/kg	1	0.1	2,000			559.5	214.3	613.2	N
Total Nitrogen	mg/kg	20	0.1				852.4	342.3	938.1	N
Total Kjeldahl Nitrogen	mg/kg	20	0.1				852.4	342.3	938.1	N
Nitrate as N	mg/kg	0.1	0.1				0.05	0.01	0.05	X
Nitrite as N	mg/kg	0.1	0.1				0.06	0.04	0.07	X
Radionuclides										
Gross alpha	Bq/g	1								
Gross beta	Bq/g	1								
Sum of gross alpa and gross beta	Bq/g	2								

Legend

Note When calculating averages and 95%UCLs, values below limit of reporting for individual sample results were set to half the detection levels (consistent with the NAGD)

PQL Practical Quantitation Limit

50 Value exceeds NAGD Screening Level

50 Value exceeds DEH (1998) EIL

Normalised to 1% TOC Normalised to 1% TOC, over the range of TOC from 0.2 to 10%



6 COMPARISON WITH PREVIOUS SAP DATA

This section provides a series of spatial and temporal analysis graphs utilizing the PBPL data set collated between 1998 and December 2011. NAGD Screening Levels are provided for additional reference. Results for the 2012 SAP are identified in the graphs to indicate current relative condition. Key metals, TBT and total PAHs have been presented. Other parameters have not been presented due to their low number of results above LOR.

Statistical analysis of the data has been completed using a one-way analysis of variance (ANOVA). One-way ANOVA assumes that the data come from populations that are Gaussian (normally distributed) and have equal variances. Homogeneity tests test this assumption. If the assumption is true then site comparisons can be made without further manipulation of the data. If the assumption is false, then the data needs to be transformed to make it more normality distributed before comparisons can be made.

Spatial graphs present zone, site and location data for each parameter. Temporal graphs present data from each dredge zone against each year sampled for each parameter.

6.1 Contaminant Spatial and Temporal Analysis

6.1.1 Arsenic

Median arsenic concentrations continue to remain below the NAGD Screening Level. Results of the December 2011 survey generally follow the median concentrations reported from previous investigations. The exceptions are locations 11-11, 11-12, 12-1, 12-2 and 12-3 which show December 2011 results have noticeably higher concentrations compared to the median of historical data (Figure 6-1).

Based on the historical dataset which demonstrates homogeneity (transformation of data was not required), arsenic concentrations from Zone 1 are significantly lower than Zones 2, 3 and 4 (Zone 1 < Zone 4 < Zone 2 = Zone 3 ($F_{(3, 339)} = 34.513$, $p = 0.0000$). There is high variability in arsenic numbers for Zone 1 in Dec 2011 and Dec 2010, which mask any significant zone differences. However, when the combined effects, Zone and Year are assessed together, there is a significant difference $F_{(43, 339)} = 1.757$, $p = 0.000002$.

6.1.2 Cadmium

Median cadmium concentrations across all locations remain less the NAGD Screening Level (Figure 6-3). Results from this SAP are consistent with median concentrations reported from previous years with one exception, location 6-2, which reported a lower concentration compared to previous years.

Based on the historical dataset which demonstrates homogeneity (transformation of data was not required) cadmium seems to be higher in Zone 2 after Feb 2007. However in that year the variability for Zone 2 is so high, it is higher than differences between zones for all years. Before Feb 2007



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

cadmium seems to be elevated in Zone 3. This site had elevated levels in both 2008 and 2009, exceeding the NAGD Screening Level of 1.5 mg/kg. There is no significant difference in cadmium concentrations between each dredge zone over time due to the high variability. Cadmium concentrations have generally been consistent over previous studies, except for 2008 which shows an elevation in concentrations across all dredge zones (Figure 6-4).

6.1.3 Chromium

December 2011 SAP data are generally consistent with previous studies, except for location 9-1 (100 mg/kg) which exceeded the NAGD Screening Level and has a noticeably elevated chromium concentration compared to the median of historical data (Figure 6-5).

Based on the historical dataset which demonstrates homogeneity so transformation of data was not required, chromium concentrations from Zone 1 are significantly lower than Zones 2, 3 and 4 (Zone 1 < Zone 3 = Zone 4 < Zone 2 ($F_{(3, 484)} = 38.829$, $p = 0.0000$)).

6.1.4 Copper

All median copper values are below the NAGD Screening Levels (65 mg/kg), except for location 6-2 (66 mg/kg). Results of sampling in December 2011 generally follow trends of the median concentrations reported from previous years. Notable exceptions are location 2-0 (48 mg/kg) which recorded a higher concentration and 6-2 (23 mg/kg) which recorded a lower concentration compared to historical data.

Based on the historical dataset, copper concentrations within Zone 2 are significantly higher than those within all other zones (Zone 2 > Zone 3 = Zone 4 > Zone 1 ($F_{(3, 484)} = 102.72$, $p = 0.0000$)). Copper concentrations appear to decrease as you move towards the mouth of the Brisbane River (Figure 6-8).

6.1.5 Lead

Except for location 2-0, which recorded a lead concentration 50 times greater than the median, all 2011 SAP data are consistent with previous studies (Figure 6-9).

Based on the historical dataset, lead concentrations are significantly higher in Zone 2 than all other zones (Zone 2 > Zone 3 = Zone 4 > Zone 1 ($F_{(3, 484)} = 69.499$, $p = 0.0000$)). There are no temporal trends evident in lead concentrations (Figure 6-10).

6.1.6 Mercury

Eight locations had mercury concentrations that were greater than the NAGD Screening Level of 0.15 mg/kg during this SAP study. Seven of the eight locations are also above the median of historical data for their respective sampling locations. Mercury concentration appears to be greater and more variable in Zones 2 and 3 (Figure 6-11).



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

Based on the historical dataset, mercury concentrations are significantly higher in Zone 2 than all other zones (Zone 2 > Zone 3 = Zone 4 > Zone 1 ($F_{(3, 484)}=52.016$, $p=0.0000$)). There are no clear temporal trends in mercury concentrations (Figure 6-12).

6.1.7 Nickel

Results of sampling in December 2011 are generally consistent with historical data. However, location 9-1 recorded a concentration four times greater than the median for that sample location. The mean nickel concentration at sites 1, 2, 3, 9 and 15 were higher than the median of historical data. From these relative elevations, only concentrations in Zone 1 were noticeably higher compared to historical data. All other results are consistent with the median concentrations of the previous studies (Figure 6-13).

Based on the historical dataset, Zone 2 has significantly higher median nickel concentrations than all other sites (Zone 2 > Zone 3 = Zone 4 > Zone 1 ($F_{(3, 484)}=17.002$, $p=.00000$)). There are no temporal trends in nickel concentrations (Figure 6-14).

6.1.8 Zinc

Zinc concentrations from the December 2011 survey are generally lower compared to previous years, particularly across sites 6 to 14 (Figure 6-15). Site 2 however, recorded a much higher concentration, exceeding the NAGD Screening Level, and was much higher in comparison to historical data.

Based on the historical dataset, Zone 2 had significantly higher median zinc concentrations compared to all other sites (Zone 2 > Zone 3 = Zone 1 > Zone 4 ($F_{(3, 484)}=116.97$, $p=0.0000$)). There are no temporal trends in zinc concentrations (Figure 6-16).

6.1.9 Tributyltin

Results of this survey show that locations 4-10, 4-13, 6-2, and 9-1 have lower TBT concentrations compared to the median of historical data. In comparison, location 4-0 recorded a higher concentration compared to the historical median. Overall zone 2 appears to have a slightly elevated TBT concentration compared to other zones, both historically and from the current SAP survey results.

The temporal trends for TBT concentrations show that Zone 2 and 3 are consistently higher than Zone 1 and 4.

6.1.10 Polycyclic Aromatic Hydrocarbons

Total PAHs (normalised to 1% TOC), where detected, were consistently higher across sampling locations, sites and zones in December 2011 compared to historical data (Figure 6-18). However all results remain below the NAGD Screening Level of 10,000 µg/kg.

Temporal trends of total PAHs (normalised to 1% TOC) show a consistent pattern over time.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

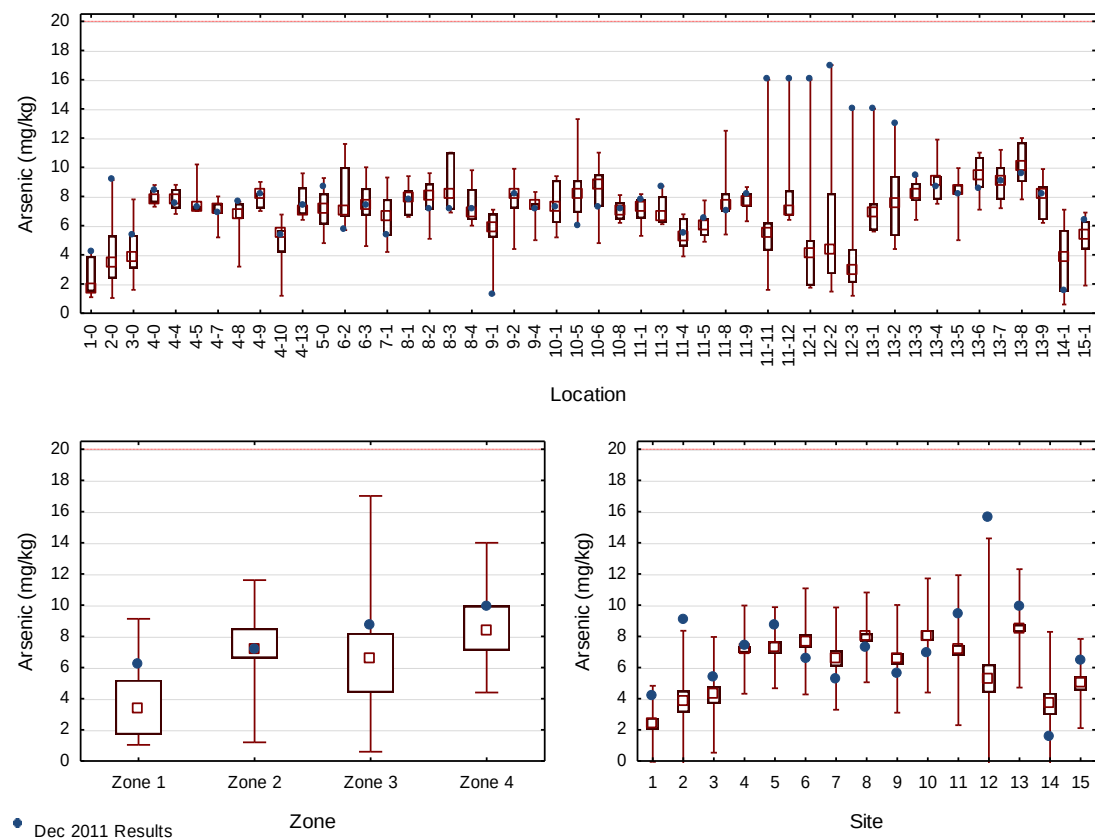


Figure 6-1: Spatial presentation of arsenic (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

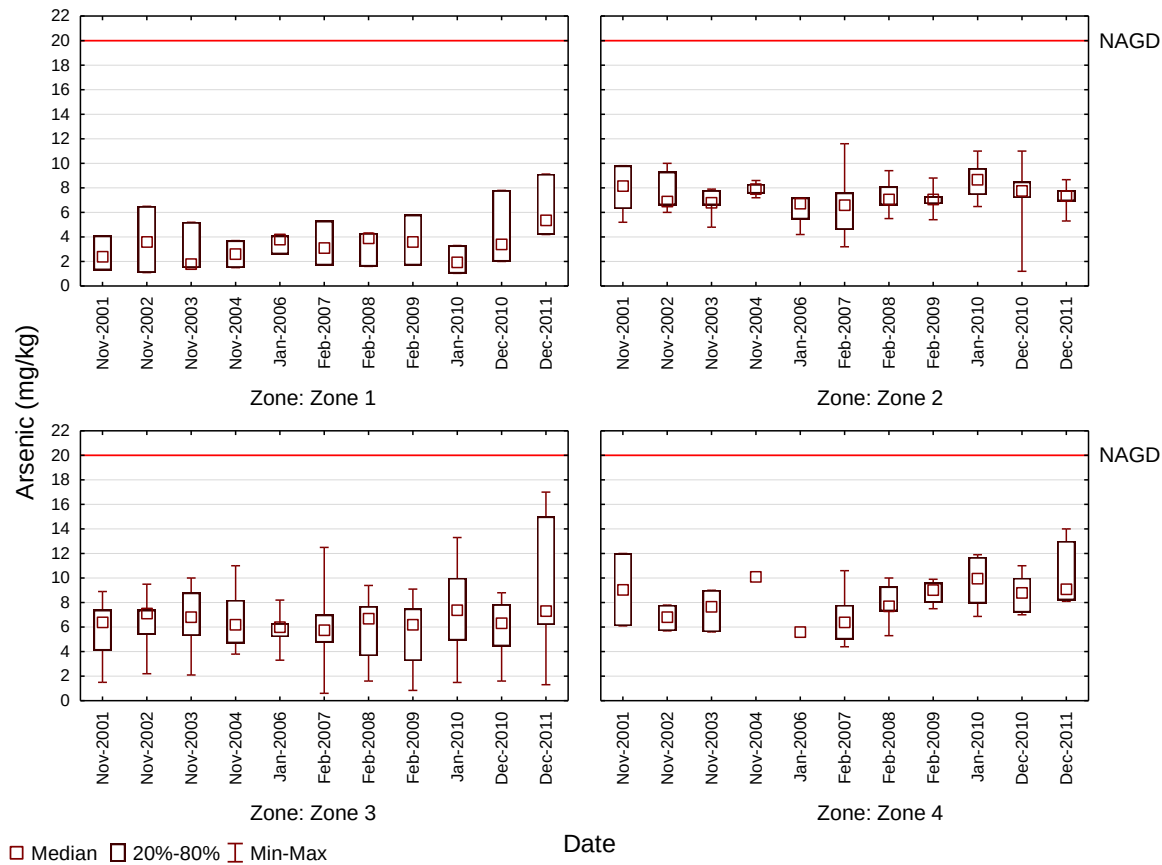


Figure 6-2: Temporal presentation of arsenic (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

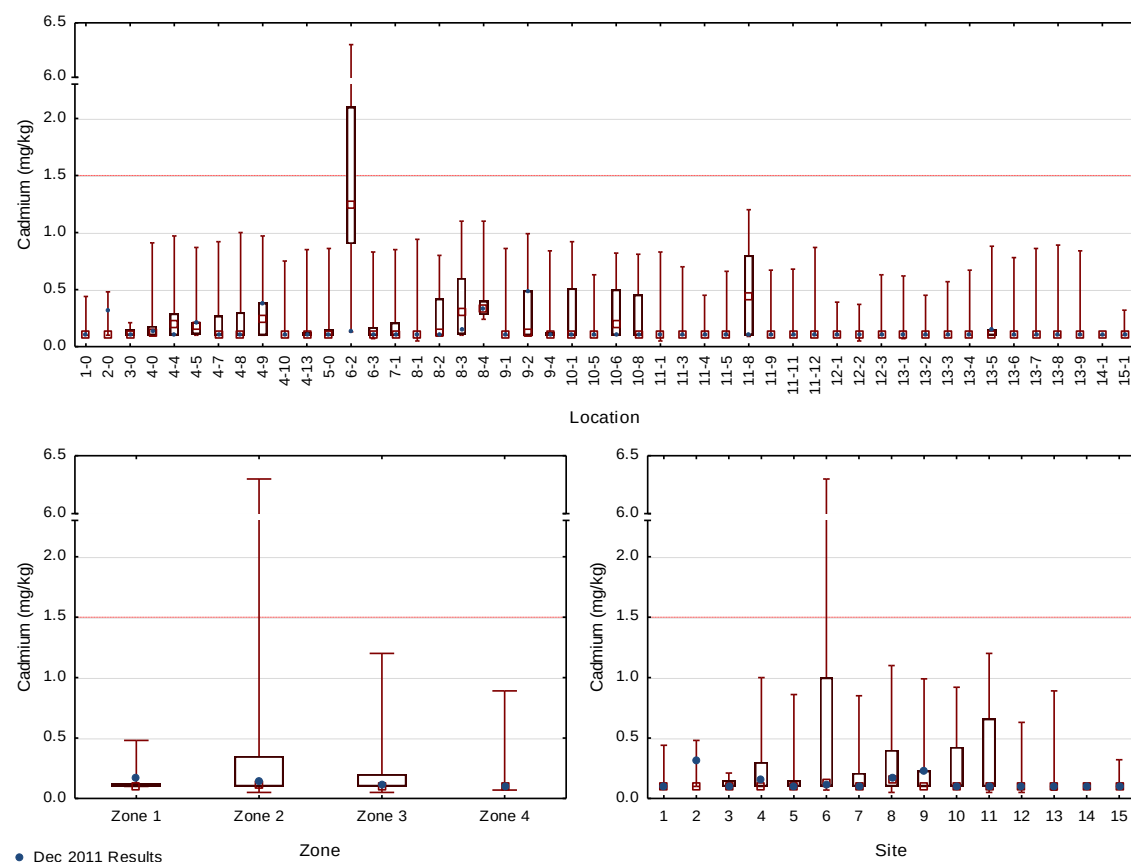


Figure 6-3: Spatial presentation of cadmium (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

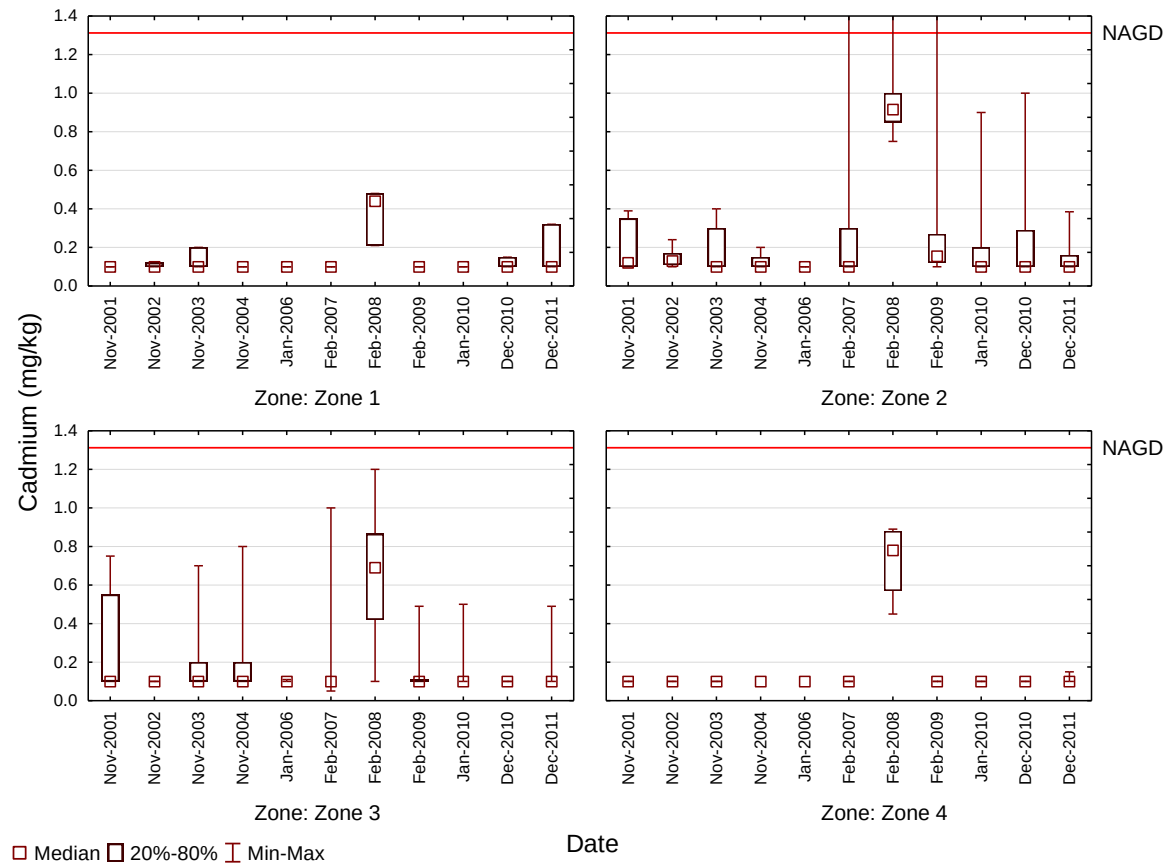


Figure 6-4: Temporal presentation of cadmium (mg/kg) within zones



PORT OF BRISBANE PTY LTD

BRISBANE RIVER AND MORETON BAY

ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

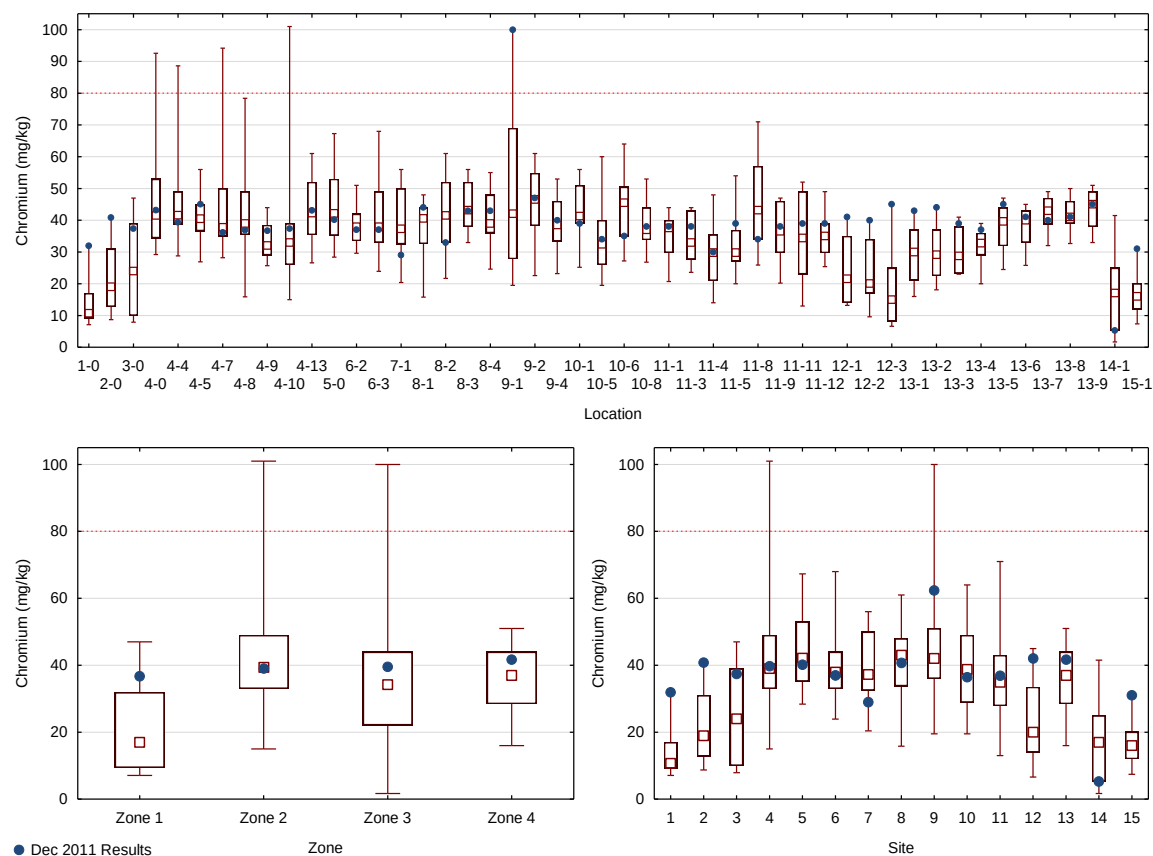


Figure 6-5: Spatial presentation of chromium (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

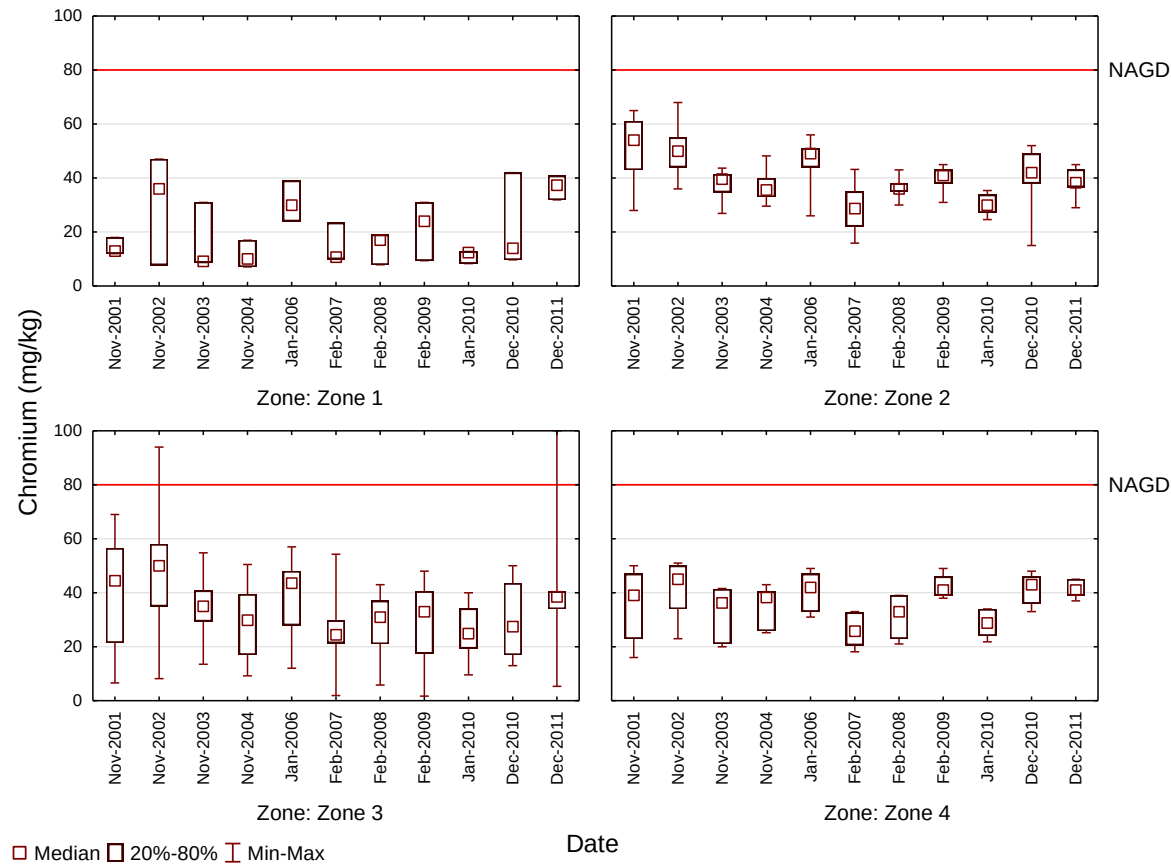


Figure 6-6: Temporal presentation of chromium (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

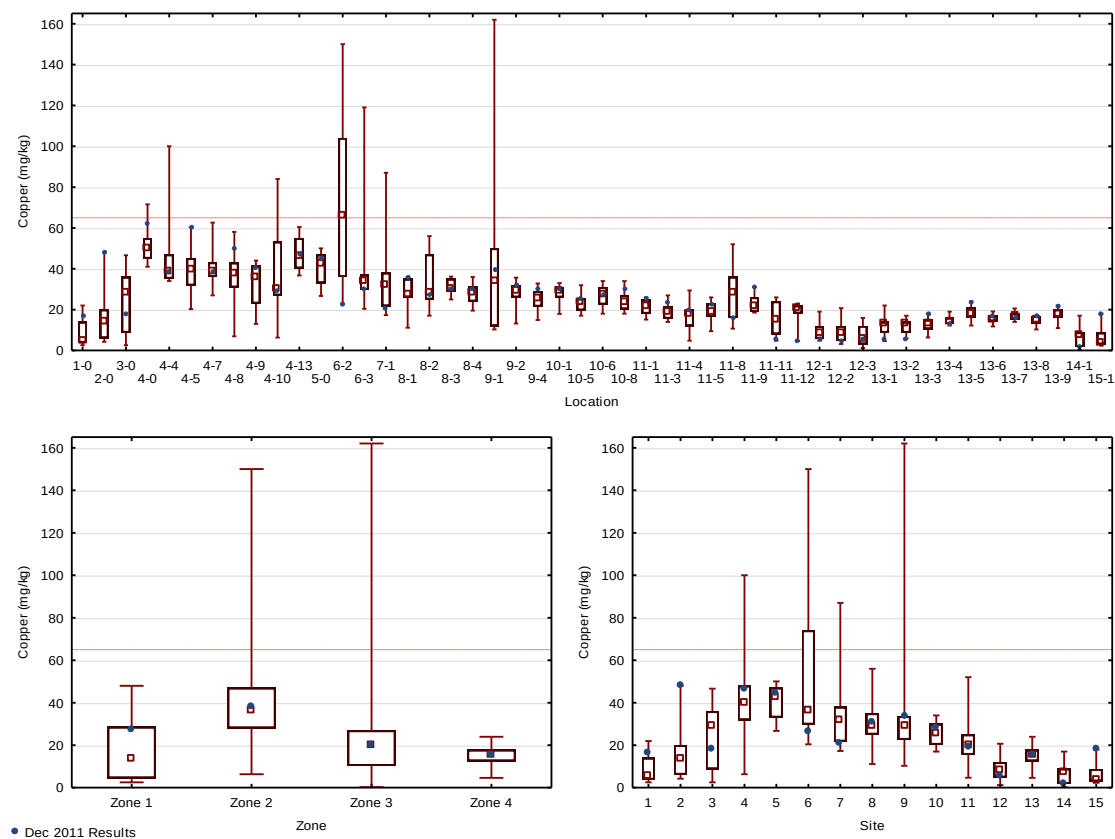


Figure 6-7: Spatial presentation of copper (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

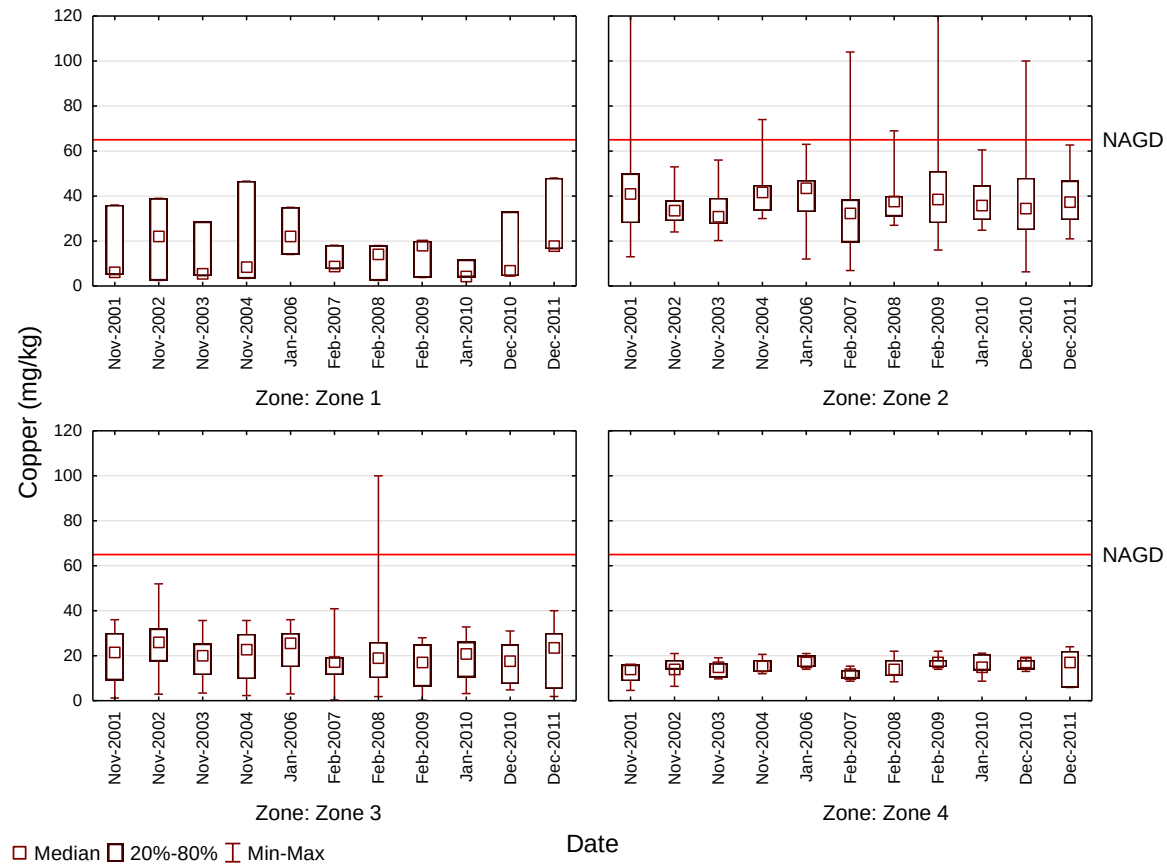


Figure 6-8 Temporal presentation of copper (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

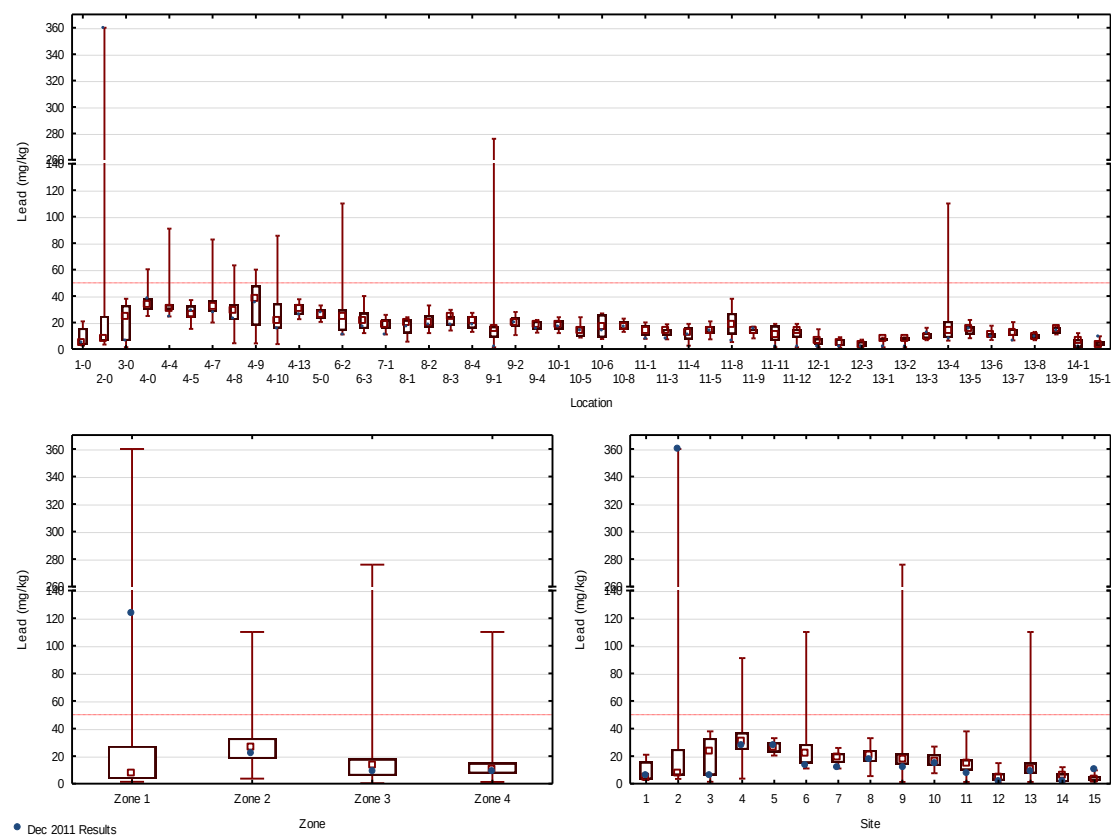


Figure 6-9: Spatial presentation of lead (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

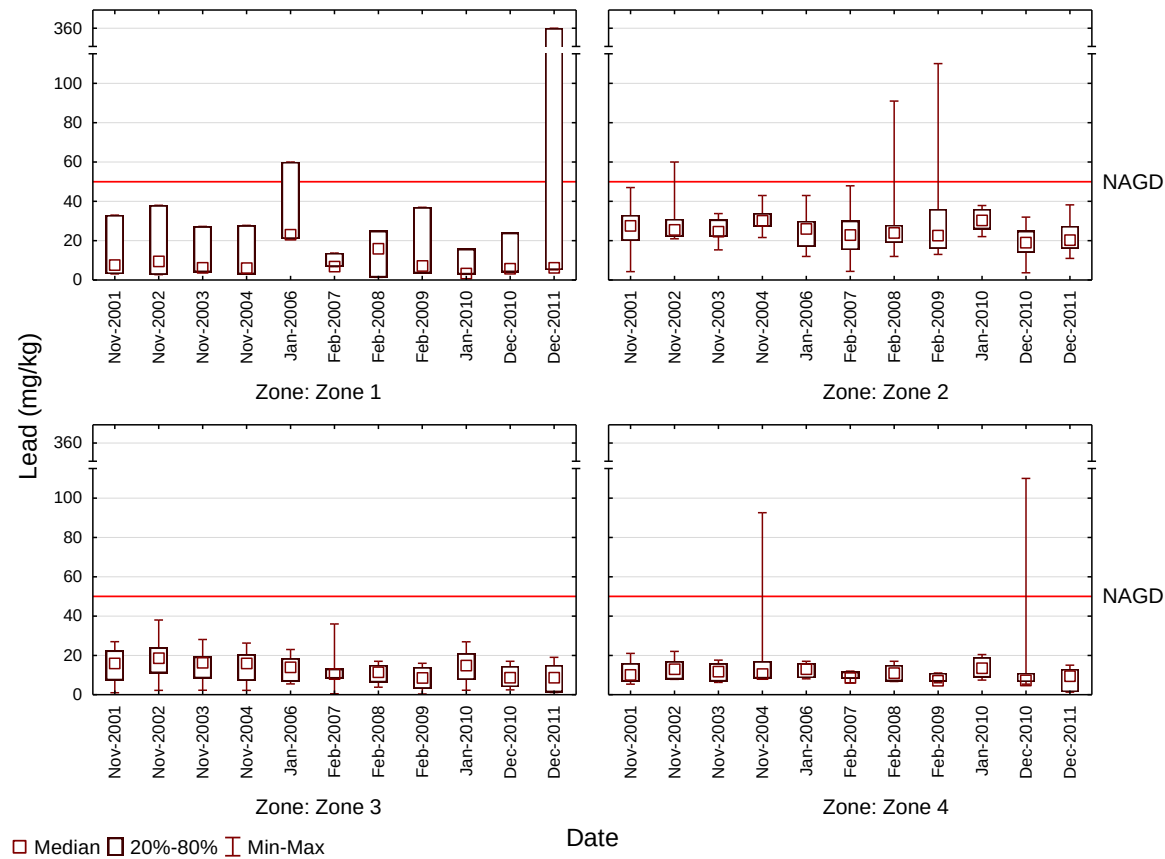


Figure 6-10: Temporal presentation of lead (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

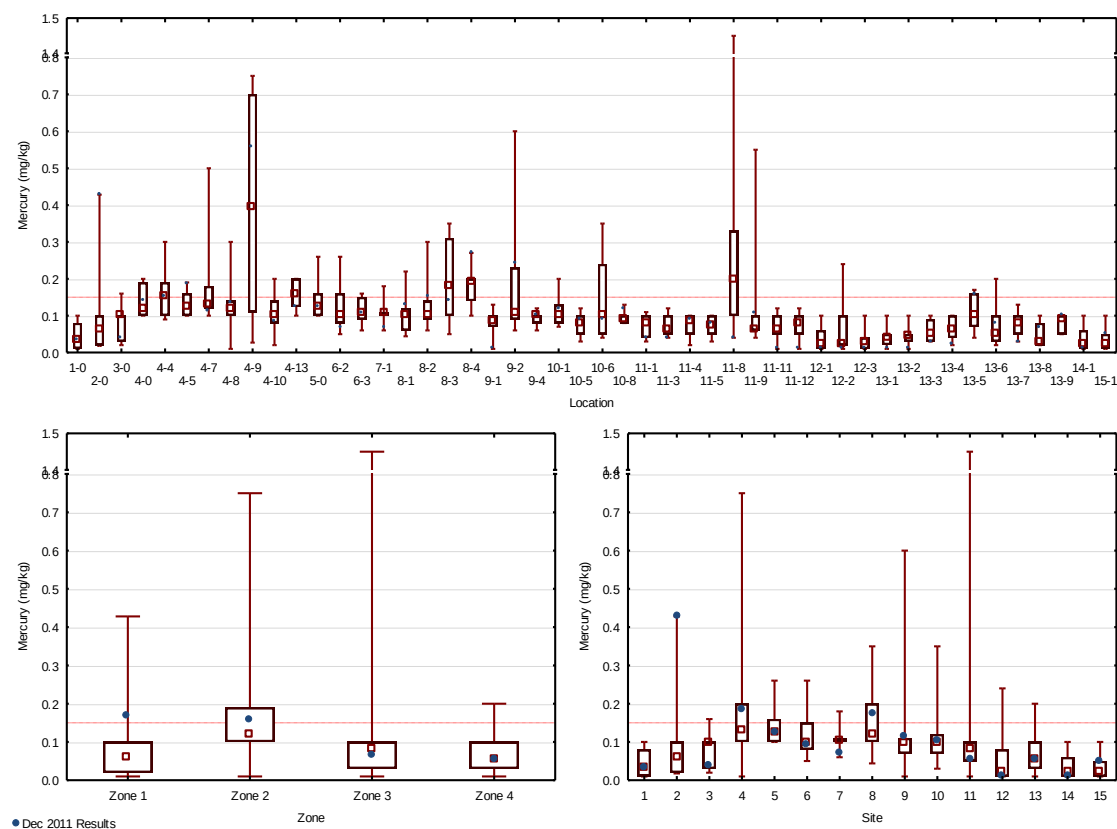


Figure 6-11 Spatial presentation of mercury (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

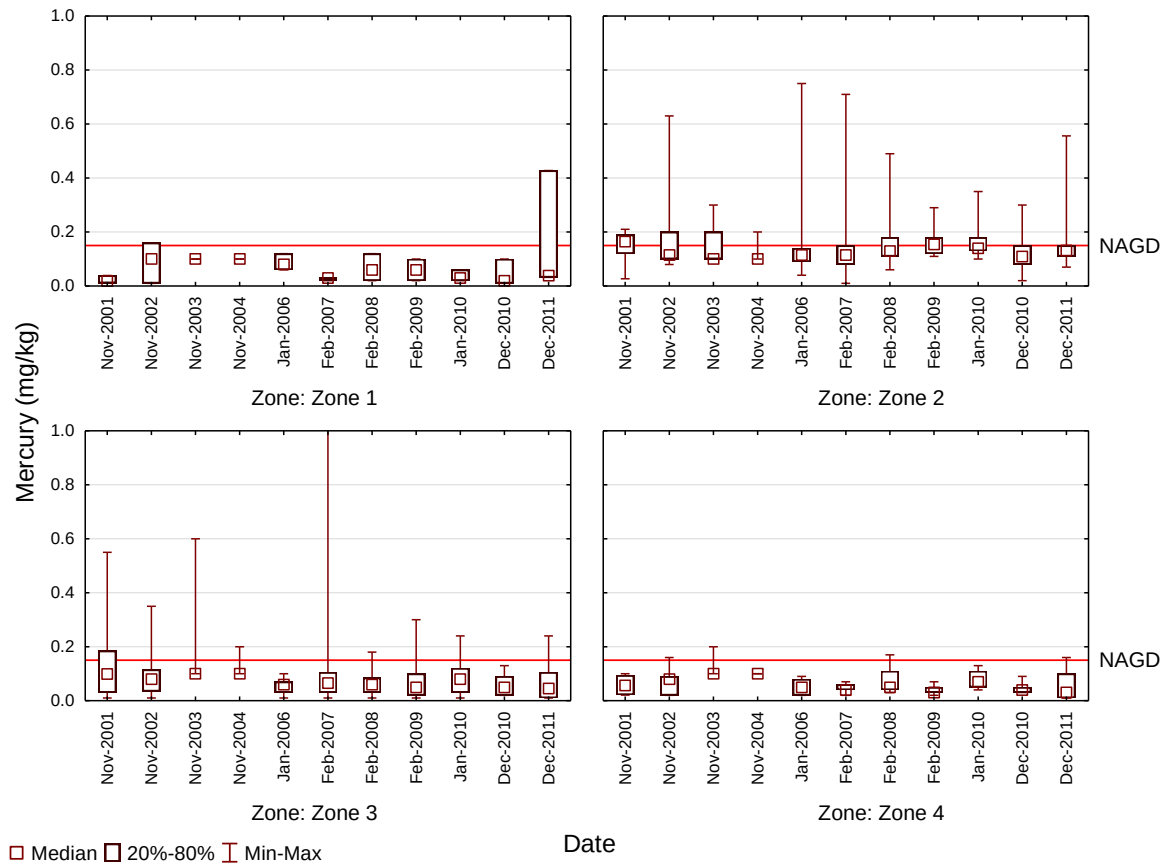


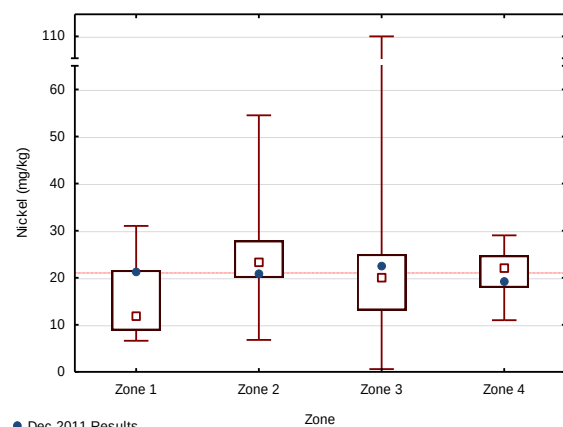
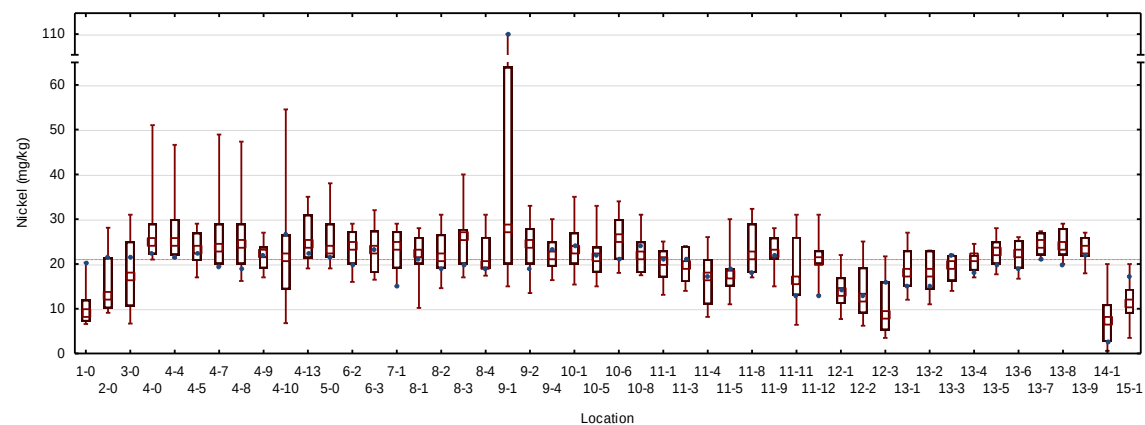
Figure 6-12: Temporal presentation of mercury (mg/kg) within zones



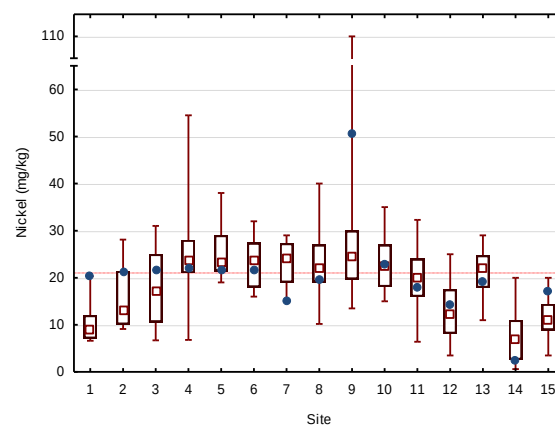
PORT OF BRISBANE PTY LTD

BRISBANE RIVER AND MORETON BAY

ANNUAL SEDIMENT CHARACTERISATION REPORT 2012



● Dec 2011 Results





WorleyParsons

resources & energy

EcoNomics

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Figure 6-13: Spatial presentation of nickel (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD

BRISBANE RIVER AND MORETON BAY

ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

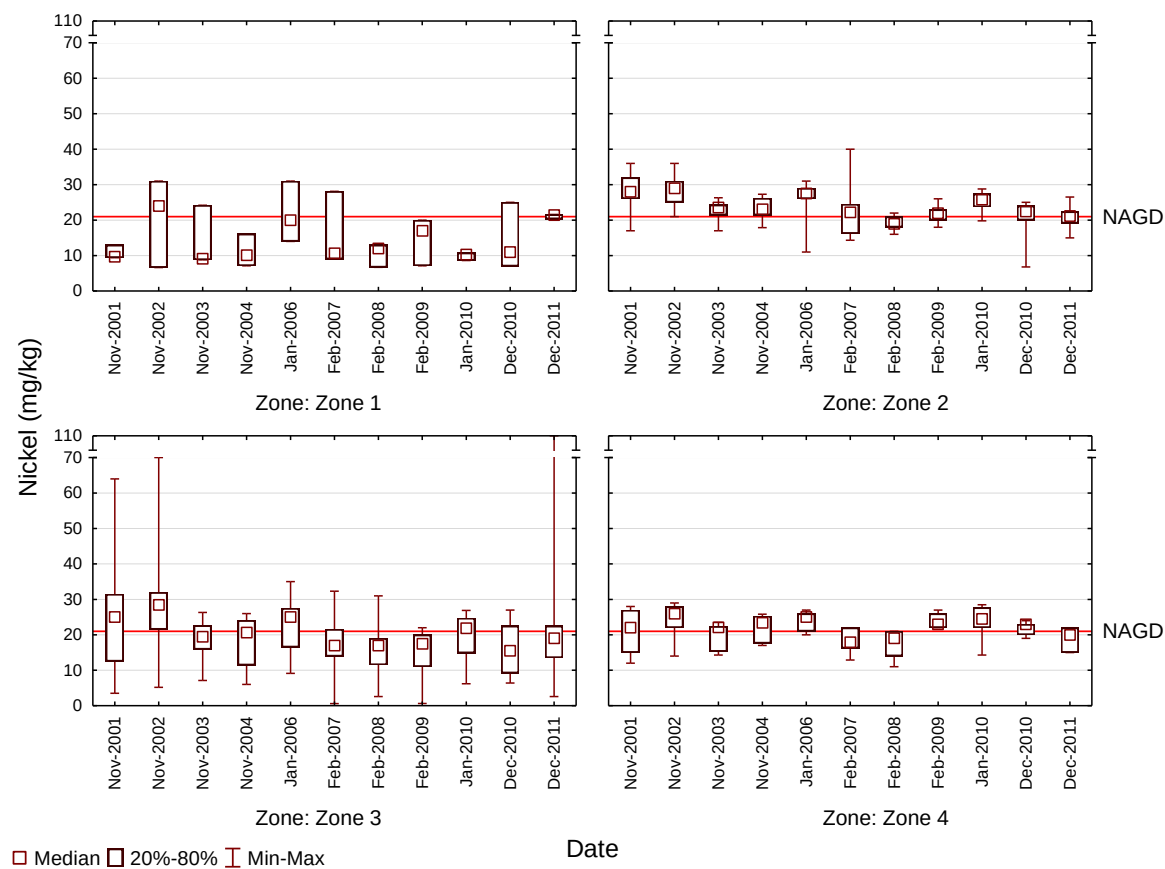


Figure 6-14: Temporal presentation of nickel (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

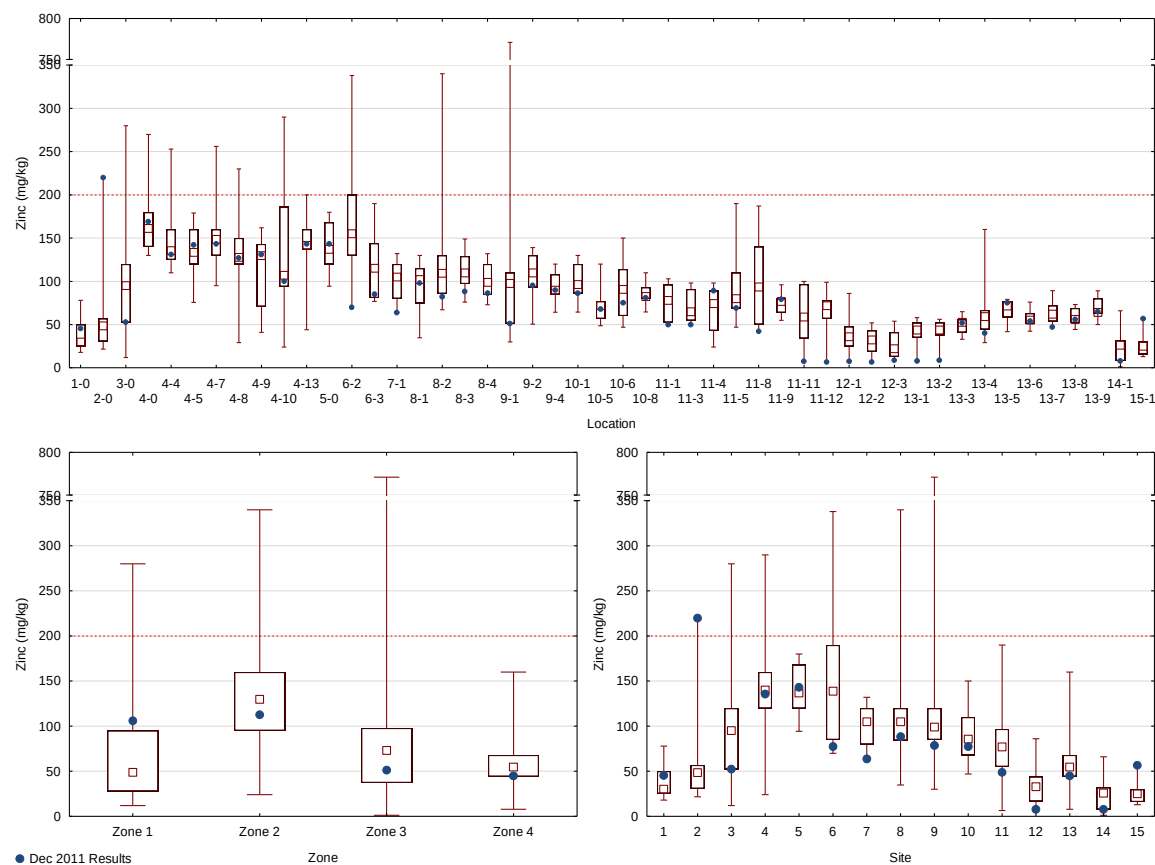


Figure 6-15: Spatial presentation of zinc (mg/kg) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

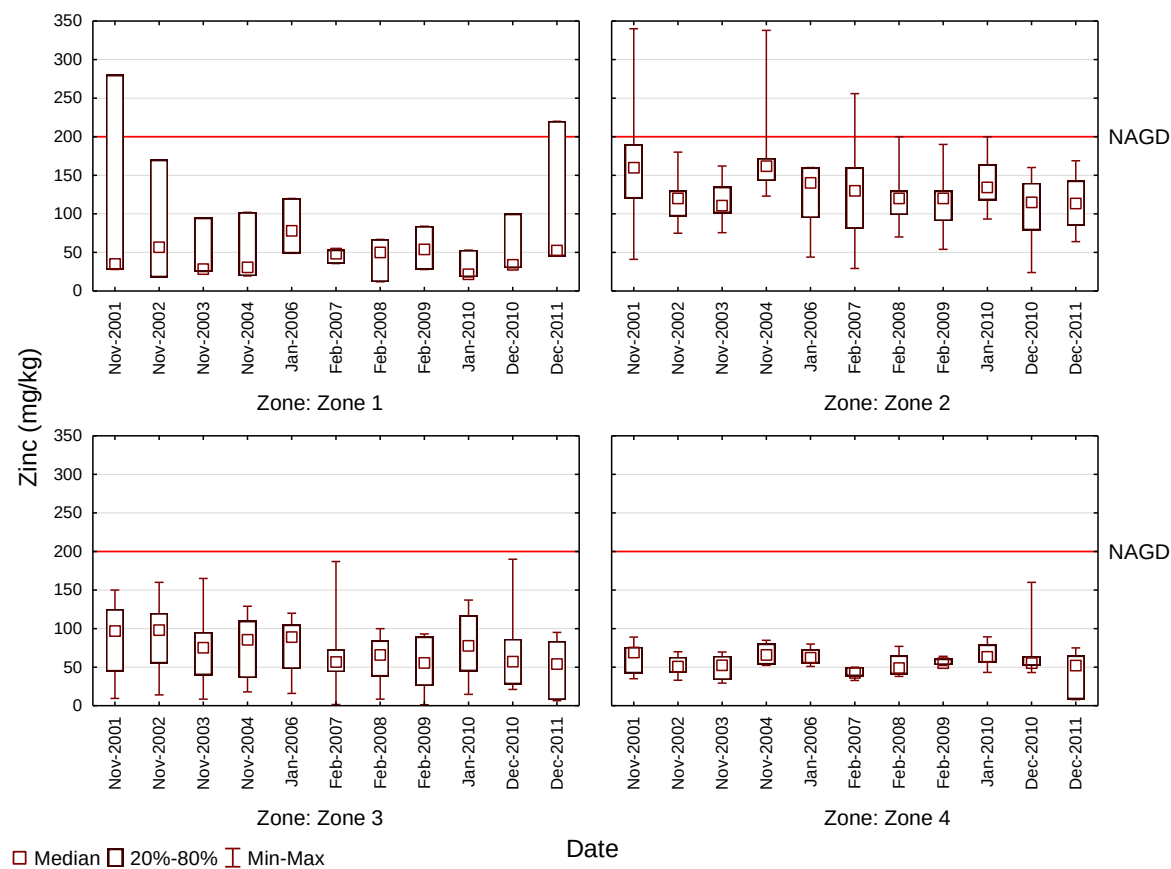


Figure 6-16: Temporal presentation of zinc (mg/kg) within zones



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

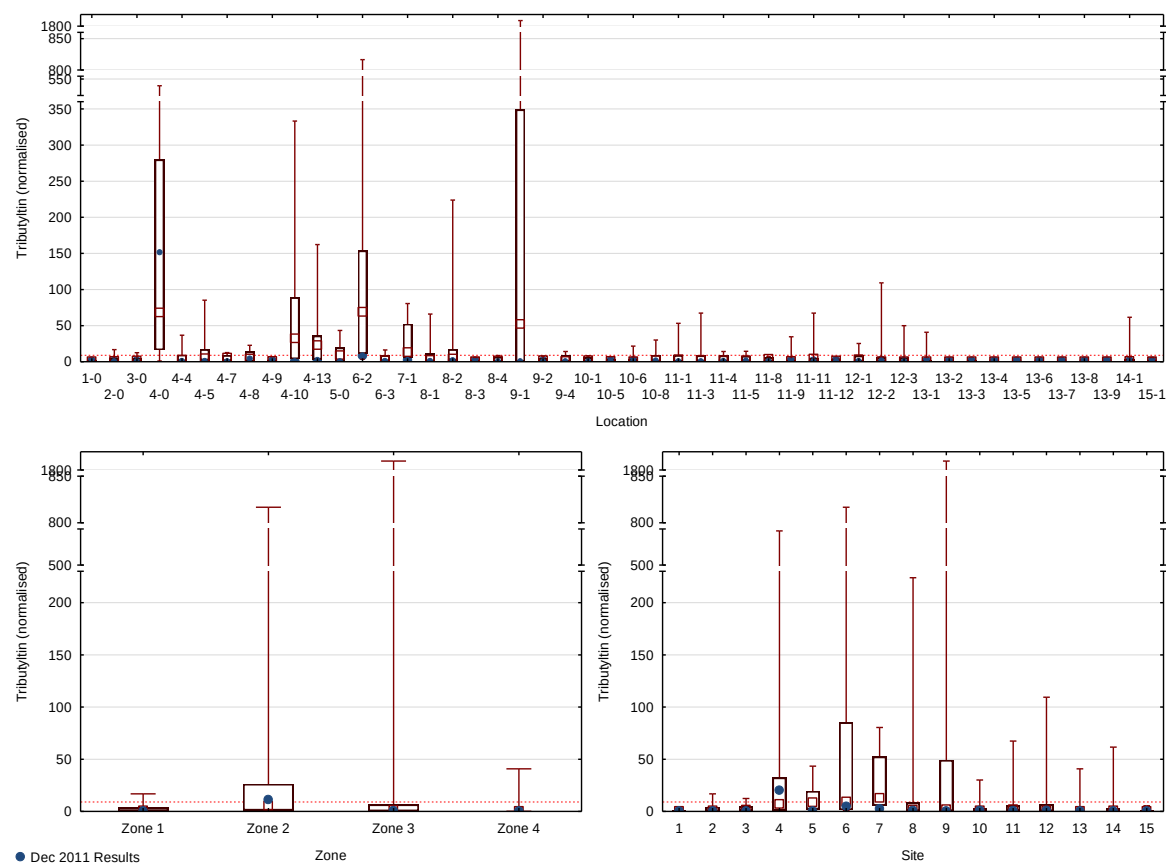


Figure 6-17: Spatial presentation of tributyltin ($\mu\text{gSn/kg}$) by location, zone and site



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

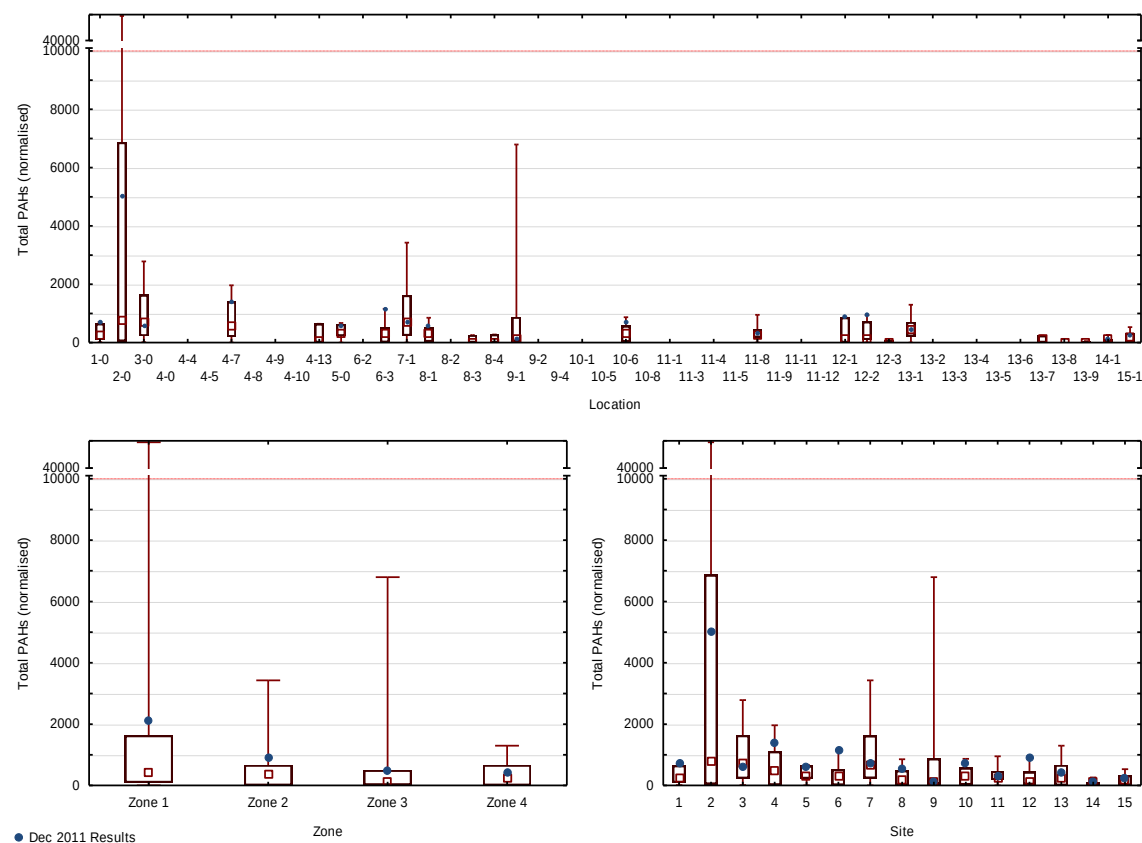


Figure 6-18: Spatial presentation of total PAHs (normalised to 1% TOC) ($\mu\text{g/kg}$) by location, zone and site



6.2 Patterns in the Distribution of Metal Contaminants

Metals concentrations across the dredge area study sites (sites 4 – 15) for the past fourteen years are presented in Figure 6-19 and Figure 6-20. Patterns in the distribution of metals concentrations follow two distinct patterns. Copper, zinc and lead all show a trend in decreasing concentration from site 4 through to site 15 (from the upper reaches of the dredge area to the port), with a rise in concentrations at site 13 (the entrance channel). Arsenic, chromium, mercury and nickel follow a second trend in which metals concentrations are relatively consistent between sites 4 to 11 and then decrease from sites 12 to 15 followed by clear increase in concentrations at site 13.



PORT OF BRISBANE PTY LTD

BRISBANE RIVER AND MORETON BAY

ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

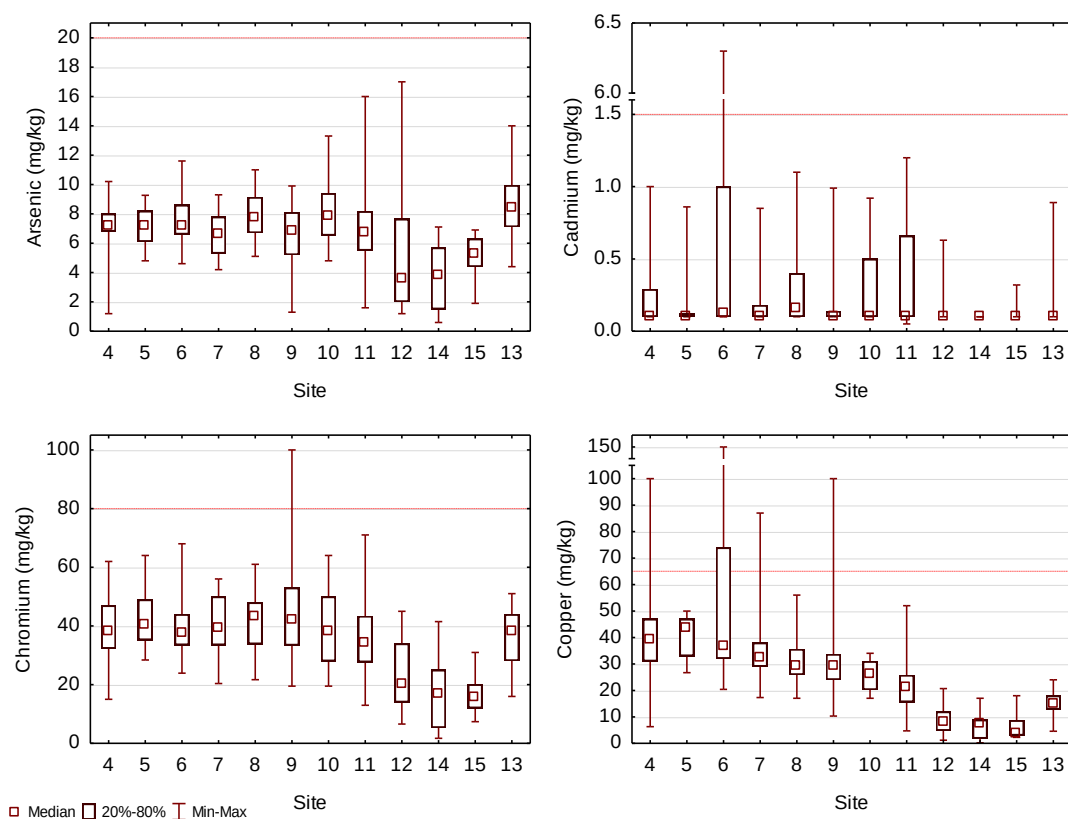


Figure 6-19: Spatial distribution of arsenic, cadmium, chromium and copper (1998-2012). NAGD Screening Levels are represented by red control line



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

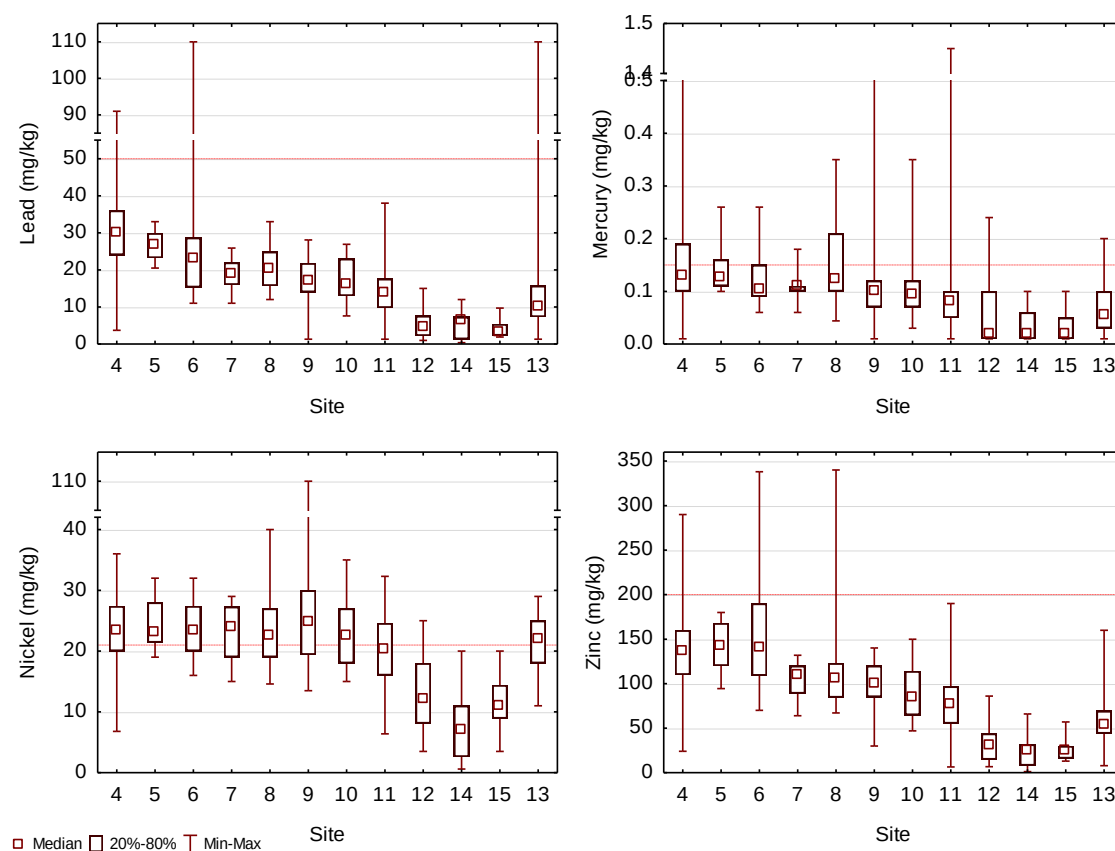


Figure 6-20: Spatial distribution of lead, mercury, nickel and zinc (1998 – 2012). NAGD Screening Levels are represented by red control line



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

6.3 Temporal Comparison of Metals and TBT Exceeding NAGD Screening Levels

Table 6-1 presents the percentage of locations exceeding the NODGDM and NAGD Screening Levels for each year of the SAP study program (1998 – Dec 2011). In comparison with previous sampling events, the Dec 2011 percentage of compliance for metals and TBT compared to NAGD Screening Levels are within the range recorded from previous years. The percentage of non-compliance for mercury is lower than for the previous four years. The percentage of non-compliance for TBT is the lowest it has been during the history of sediment sampling in this region.

Table 6-1: Percentage of sample locations exceeding NODGDM and NAGD Screening Levels for metal and TBT 1998 – Dec 2011

SAP Event	No. Locations	Percentage (%) of sample locations exceeding NODGDM/NAGD Screening Levels ¹							
		Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)	Tributyltin (TBT)
Mar-98 ²	13	0	0	0	0	16	39	8	54
Dec-98 ²	24	4	0	0	33	0	33	8	42
Dec-99 ²	35	0	0	0	3	0	83	0	0
Nov-00 ²	36	0	11	9	26	20	43	17	63
Nov-01 ³	45*	0	0	7	31	0	76	7	9
Nov-02 ⁴	45*	0	2	0	16	4	91	0	29
Nov-03 ⁵	45*	0	0	0	18	0	60	0	40
Nov-04 ⁶	45*	0	0	2	4	2	67	4	58
Jan-06 ⁷	45*	0	0	0	7	0	71	0	31
Feb-07 ⁸	45*	0	0	2	13	0	33	2	31
Jan-08 ⁹	45*	2	0	4	15	2	13	0	10
Feb-09 ¹⁰	45*	2	0	4	24	2	53	0	11
Jan-10 ¹¹	45*	0	0	0	20	0	78	0	18
Dec-10 ¹²	45*	0	0	4	9	2	56	0	7
Dec-11	45*	0	1	0	8	1	48	1	1



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

¹ Results expressed as percentage of sites containing contaminants above the NODGDM Screening Level criteria. Note: results from Feb-09 onwards are compared against NAGD Screening Levels.

² Source: PBC Environmental Performance Report, 2001

³ Butler & Partners 2002

⁴ Hydrobiology 2003

⁵ Hydrobiology 2004

⁶ SKM, 2005

⁷ SKM, 2006

⁸ SKM, 2007

⁹ WorleyParsons, 2008

¹⁰ WorleyParsons, 2009

¹¹ GHD, May 2010

¹² WorleyParsons, 2011

* Although 48 sample locations were tested in the 2001 to 2009 SAPs, 3 of these locations were upstream reference sites (hence not included in the above calculations)

6.4 Acid Sulfate Soils

Acid sulfate soils analysis results indicate that soils are generally consistent with previous sampling events which identified soils that are considered to be PASS. Although buffering capacity was not analysed on these sediments, previous results of this material from each of the dredge zones (2 – 4) has indicated that these sediments have sufficient acid neutralizing capacity to buffer any acid potentially generated through onshore disposal.

6.5 Physical Characteristics

The PSD of sediments within each zone recorded during the December 2011 SAP are comparable to previous SAP surveys. However, individual locations within each zone can vary from year to year.

The largest shift in PSD was in Zone 1 where the percentage of gravel dropped from ~ 18% to <1 % and percentage of sand dropped from ~60% to 35%. Zones 2 to 4 showed very similar proportion of fractions compared to 2010 data, with little change.

6.6 Comparison of Contaminants with Other Australian Ports

In the 2011 SAP, a literature review was undertaken on contaminant data from five Australian ports including Cairns (WorleyParsons, 2010), Abbott Point (GHD, 2009a), Weipa (SKM, 2009), Gladstone (GHD, 2009b), and Port Hedland (BHP Billiton, 2009) and the results were compared to the results from the 2011 SAP.

The main outcomes of this review were the following:

- Metals in the Brisbane River in December 2010 generally have elevated concentrations compared to those in other ports around Australia. The metalloid, arsenic, was detected at higher concentrations in Cairns and Gladstone;
- Where analysed, the concentration for the Sum Total of PAHs was generally higher at the Port of Brisbane than other ports;



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

- TBT concentrations within individual ports can vary greatly. Overall, TBT concentrations at the Port of Brisbane are comparable to those of other ports, where detected; and
- The OC pesticides trans-chlordane, *p,p'*-DDD, *p,p'*-DDE were detected only in the Port of Brisbane. Where analysed, no other ports have detected these contaminants.

Each of these outcomes is current for the 2012 SAP data.

6.7 Comparison of Results with Emergency Dredging Results: Brisbane Floods

In early January 2011, the Brisbane River was inundated with flood waters and subsequent high deposition of sediments, which required emergency dredging within the Port of Brisbane to maintain channel depths. PBPL requested approval from the Department of Environment and Resource Management (DERM) to dispose of emergency dredging material at the Mud Island Dredge Material Placement Area (MIDMPA) located within the Moreton Bay Marine Park. Subsequent emergency sediment sampling was undertaken for the full suite of chemicals as outlined in Table 1, Appendix A of the NAGD. In addition, DERM requested that further analyses (i.e., elutriate and dilute acid extraction (DAE) be conducted for nickel and mercury to determine bioavailability of contaminants and potential impacts of water quality for material being disposed of at the MIDMPA. The sediment samples were collected at 15 sites in total, 12 sampling locations were based on the zoning utilised in the annual SAP (Zones 2-4). Three locations were within the MIDMPA and were randomly selected for background assessment prior to dredging material deposition.

Sampling locations 1-3 were located in Zone 2, locations 4-8 in Zone 3 and locations 9-12 in Zone 4 however these locations don't correspond directly to sampling sites utilized for the annual SAP. A comparison of contaminants within each zone has been made to the results of the 2012 SAP. For Zone 2, most contaminants were lower than the results reported for the 2012 SAP. The exceptions were lead, nickel, PAHs, and ammonia which were consistently higher at Site 2 with lead and nickel exceeding NAGD Screening Levels. In Zone 3, most contaminants were lower than the results reported in the 2012 SAP with the exception of nickel, individual and total PAHs, and *p,p'*-DDT. Lead (3 of 4), mercury (2 of 4), and *p,p'*-DDT (1 of 4) exceeded their NAGD Screening Levels. For Zone 4, most contaminants were lower than the results reported in the 2012 SAP with the exception of nickel, individual and total PAHs, and *p,p'*-DDT. Both nickel and total PAHs were two times higher on average at most sites in Zone 4.

Overall the results from the January 2011 sampling suggest that most sediment concentrations in the Brisbane River for each Zone (1-4) are below levels recorded in the 2012 SAP with the exception of nickel, individual and total PAHs, and *p,p'*-DDT. This may be due to continued settling of suspended sediments from the water column over a period of time post flooding as the river returned to normal flow conditions.



PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

7 DISCUSSION AND CONCLUSIONS

Chemical analysis of sediments requiring maintenance dredging by PBPL in early 2012 identified a number of contaminants that exceeded NAGD Screening Levels across the dredge area. Mercury, nickel, OC pesticides including trans-chlordane, *p,p'*-DDD and *p,p'*-DDE, and TBT exceeded their respective NAGD Screening Levels at the 95% UCL of the mean within at least one zone of the dredge area (Zones 2-4). In addition, lead, zinc and Total TPHs exceeded respective NAGD Screening Levels in Zone 1. However as sediments within this zone are not dredged, these results do not impact on the suitability of the material for sea disposal.

If PBPL were to seek approval for placement of the maintenance material at the Mud Island Dredge Material Placement Area, further contaminant analysis would be required in accordance with the sediment assessment framework of the NAGD. Under this framework, elutriate, dilute acid extraction and/or porewater analysis may be required to estimate bioavailability of contaminants and potential water quality impacts. This would be required for those contaminants that exceeded the 95% UCL of the mean over the whole dredge area (Zones 2-4) and would include nickel, trans-chlordane, *p,p'*-DDE and TBT.

Comparison of the sediment material to the DEH (1998) environmental investigation levels and health investigation (A) levels indicate that the sediment would be suitable for placement on land. The mean and 95% UCL of the mean values for the total dredge area (Zones 2-4) were below investigation levels. Lead and zinc concentrations within Zone 1 exceeded the EIL at the 95% UCL of the mean, however as this is not a dredged area the results obtained for Zone 1 do not impact on the suitability of material for land disposal.

Results of ASS analysis indicate that there are no management requirements for ASS if dredge material is to be placed on land.

As with previous years there is a general trend for sites within the dredge area (Zones 2-4) to continue a decreasing trend in metals concentrations between sites 4 and 11 with a sharp decline at sites 12, 14 and 15 before a rise again at site 13 (entrance channel). Sampling locations within site 13 (entrance channel) highlight clear site heterogeneity with sediments collected on the northern side of the channel being consistently elevated in concentrations compared to those sites on the southern side. These results could be due to the predominating currents during the floods.

Due to the Brisbane floods the overall chemical load into the Brisbane River region would be expected to be higher due to increased sediment loads. This is evident in Zone 1 where chemical concentrations of all metals and total PAHs are higher than previous years. These results are consistent with higher rainwater, stormwater and higher sediment loads into the system especially around the Brisbane CBD. Additional sampling was conducted, for the second year, in order to gain a better understanding of potential contaminant sources into the Port of Brisbane region. The additional sample locations included three sampling locations within Breakfast Creek and one upstream of Breakfast Creek at Teneriffe. The results show reduced contaminant levels in Breakfast Creek compared to last year. Sediments in Breakfast Creek were likely to be flushed downstream due to



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

extreme flood waters and diluted with cleaner sediments from upstream. Continued monitoring of Breakfast Creek is recommended as it is considered a potential source of contaminants to the Brisbane River.

Data validation for field and laboratory samples was conducted with results showing some poor surrogate spike recoveries for BTEX, and OPPs. These results may be due to matrix interference that 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 contaminant extraction. Consequently, reported contaminant concentrations by the laboratory are potentially lower than actual contaminant concentrations found within sediment samples.

All three of the split triplicate analyses had chemicals that exceeded the NAGD criteria of 50%. The main concern with these results is that the primary laboratory had % RSD for duplicate values that were > 100%. However, all values detected were below NAGD Screening Levels and therefore do not change the chemical suitability for ocean or land disposal.

Three of the six locations for site homogeneity were well below the NAGD criteria of 50%. The other three sites did show RSDs > 50% for TOC, chromium, copper, lead, nickel, zinc, *p,p'*-DDD, *p,p'*-DDE, 12 of the 21 individual PAHs, and total PAHs, total nitrogen, and total Kjeldahl nitrogen with some RSDs > 100%. Zones 2 and 3 have a history of site and sediment heterogeneity and therefore, the results may potentially be considered an over estimate of concentration. Since most metals, total PAHs and OC pesticides were well below the NAGD Screening Level these results do not significantly impact on the conclusions of the study.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

8 RECOMMENDATIONS

As discussed in the 2011 SAP recommendations, OP pesticides have not been detected from any zone since 2002 and BTEX have not been detected within the timeframe of the review (from 2000). It was recommended that continued assessment of these parameters be reconsidered. It is again recommended to reconsider the requirement to monitor these parameters.

The recommendations in 2011 similarly highlighted PCBs as a contaminant group to reconsider the necessity for continued monitoring. Prior to this 2012 SAP study, PCBs had been undetected since 2003. The 2011 SAP undertook additional sampling in Breakfast Creek which detected a number of PCBs, with totals exceeding the NAGD Screening Level. Levels within Breakfast Creek for the 2012 survey have decreased compared to 2011, however PCBs are now recorded within dredge areas (Zone 3 and Zone 4) where they have not been detected since 2003. Given that PCBs remain undetected from Zone 1, these results highlight that Breakfast Creek is a potential contaminant source to the Brisbane River and the downstream sediments so monitoring these sites for all analytes should be continued. It is also recommended to continue with PCB monitoring in the Brisbane River for 2013, with a review of results (particularly with reference to results from Breakfast Creek) to identify the continued requirement for this.

The SAP for the PBPL is statistically a complex matrix using a “nested design” (a number of locations within a site, and a number of sites within a zone,) analysed over time and distance. The design is further complicated because of the uneven number of locations and sites being analysed within each zone which makes it unbalanced in terms of comparisons across zones. In addition, many of these locations and sites within each zone are different in their sediment characteristics, which makes it difficult to pool data and compare across zones. It is recommended to present data per site with zone over time as a nested design so the patterns over time are more distinguishable compared to using a box plot, which summarises data within the zone over time and loses the patterns in the data.

Historical data for PBPL work has been collected since 2000 and was conducted in Zones 2-4 with no reference site or Zone 1. We recommend reviewing and evaluating this earlier data to confirm that the analytical results are comparable in methodology to present methods and results. In the last decade laboratory analytical methods and detection limits or LOR have improved considerably and it might be prudent to determine if early data is reliable for inclusion into the PBPL SAP annual sediment characterisation assessment.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

9 REFERENCES

BHP Billiton (2009) *RGP6 Port Facilities Nelson Point Dredging Sampling and Analysis Plan Implementation Report for Land Disposal*. April 2009.

Butler & Partners (2002) *Sediment Sampling and Analysis Plan: Brisbane River and Outer Bar Moreton Bay, November 2001*. Prepared by Butler & Partners Pty Ltd for the Port of Brisbane Corporation, April 2002.

Commonwealth of Australia (2002) *National Ocean Disposal Guidelines for Dredged Material*. Commonwealth of Australia, Canberra, May 2002.

Commonwealth of Australia (2009) *National Assessment Guidelines for Dredging*. Commonwealth of Australia, Canberra, March 2009.

Dear, S.E., Moore, N.G., Dobos, S.K. Watling, K.M. and Ahern, C.R. (2002) *Soil Management Guidelines*. In *Queensland Acid Sulfate Soil Technical Manual*. Department of Natural Resources and mines, Indooroopilly, Queensland, Australia.

DEH (1998). *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland*. May 1998. Department of Environment and Heritage (now EPA): Brisbane.

GHD (2009a) *Report for Proposed Multi Cargo Facility, Abbot Point – Preliminary Sediment Quality Assessment*. Prepared by GHD for North Queensland Bulk Ports. July 2009.

GHD (2009b) *Report for Western Basin Dredging and Disposal Project – Sediment Quality Assessment*. Prepared by GHD for Gladstone Ports Corporation. October 2009.

GHD (2010). *Report for Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay*. Prepared by GHD for the Port of Brisbane Corporation, May 2010.

Hydrobiology (2003). *Sediment Sampling and Analysis Plan (SAP) in the Brisbane River and Outer Bar (November 2002)*. Prepared by Hydrobiology Pty Ltd for the Port of Brisbane Corporation, February 2003.

Hydrobiology (2004). *Sediment Sampling and Analysis Plan (SAP) in the Brisbane River and Outer Bar (November 2003)*. Prepared by Hydrobiology Pty Ltd for the Port of Brisbane Corporation, May 2004.

Maunsell McIntyre (2000). *Sediment Sampling and Analysis Plan (SAP) in the Brisbane River and Outer Bar (November 2000)*. Prepared by Maunsell McIntyre Pty Ltd for the Port of Brisbane Corporation, June 2001.

QASSIT (1998) *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland*. Queensland Acid Sulfate Soils Investigation Team (QASSIT), Department of Natural Resources and Mines (now Department of Natural Resources and Water). DNRQ980124.



**PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012**

SKM (2005). *Sediment Sampling and Analysis Plan for the Brisbane River and Outer Bar, November 2004*. Prepared by Sinclair Knight Merz for the Port of Brisbane Corporation, 2005.

SKM (2006). *Sediment Sampling and Analysis Plan for the Brisbane River and Outer Bar, January 2006*. Prepared by Sinclair Knight Merz for the Port of Brisbane Corporation, July 2006.

SKM (2007) *Sediment Sampling and Analysis Plan (SAP) for Brisbane River and Moreton Bay, 2007*. Prepared by Sinclair Knight Merz for the Port of Brisbane Corporation, July 2007.

SKM (2009) *Port of Weipa Long Term Management Plan – Long Term Environment Plan for Dredging and Dumping Activities*. Prepared by Sinclair Knight Merz for Ports Corporation of Queensland. August 2009.

US EPA (2006). *Data Quality Assessment: Statistical Methods for Practitioners*. Unites States Environmental Protection Agency. February 2006. EPA/240/B-06.003.

WorleyParsons (2008). *Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay*. Prepared by WorleyParsons for the Port of Brisbane Corporation. May 2008.

WorleyParsons (2009). *Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay, February 2009*. Prepared by WorleyParsons for the Port of Brisbane Corporation. June 2009.

WorleyParsons (2010) *Cairns Port Long Term Management Plan – Dredging and Dredge Spoil Management*. Prepared by WorleyParsons for Far North Queensland Ports Corporation. May 2010.

WorleyParsons (2011) *Brisbane River and Moreton Bay Annual Sediment Characterisation Report 2011*. Prepared by WorleyParsons for Port of Brisbane Pty Ltd. May 2011.



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

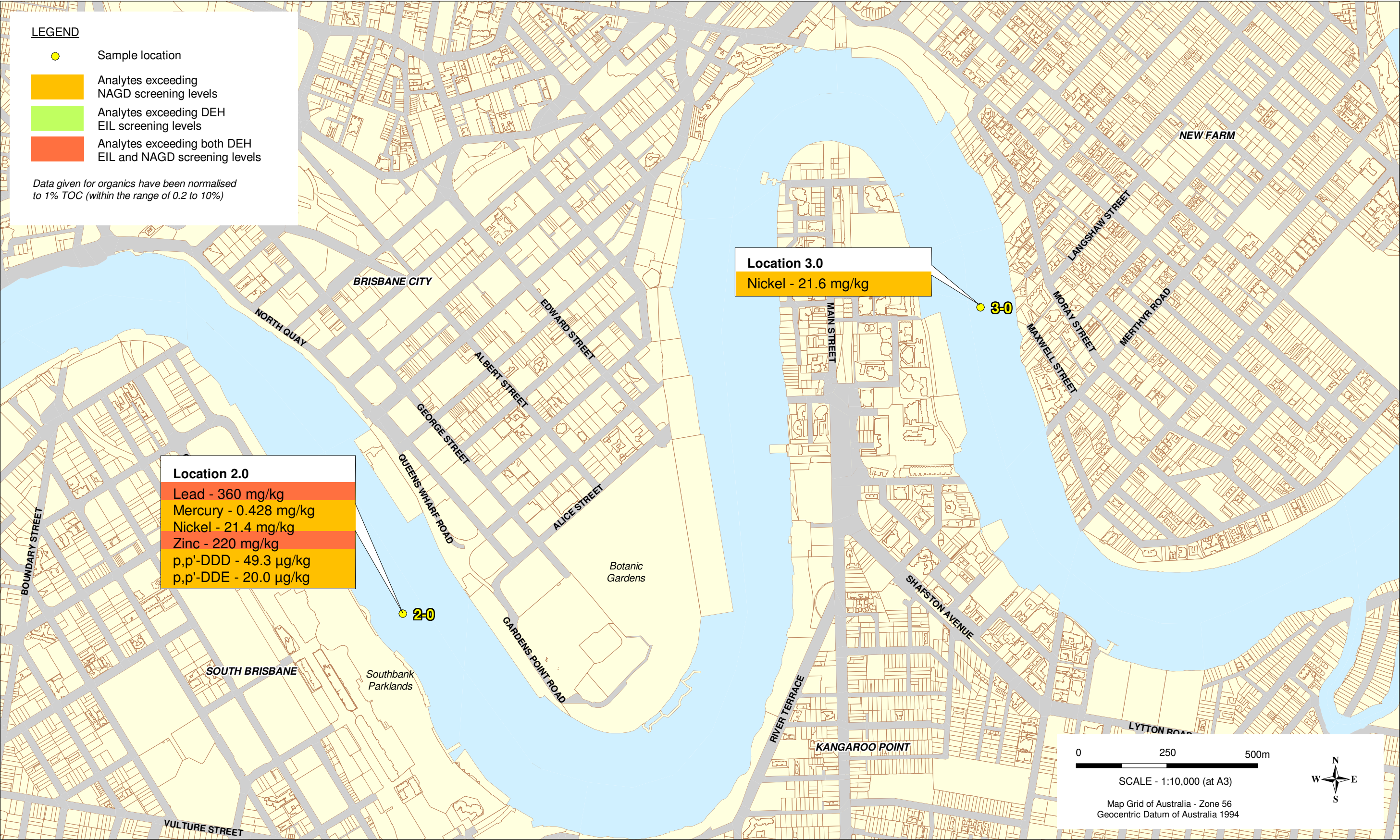
Appendix 1 Maps



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012.
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			

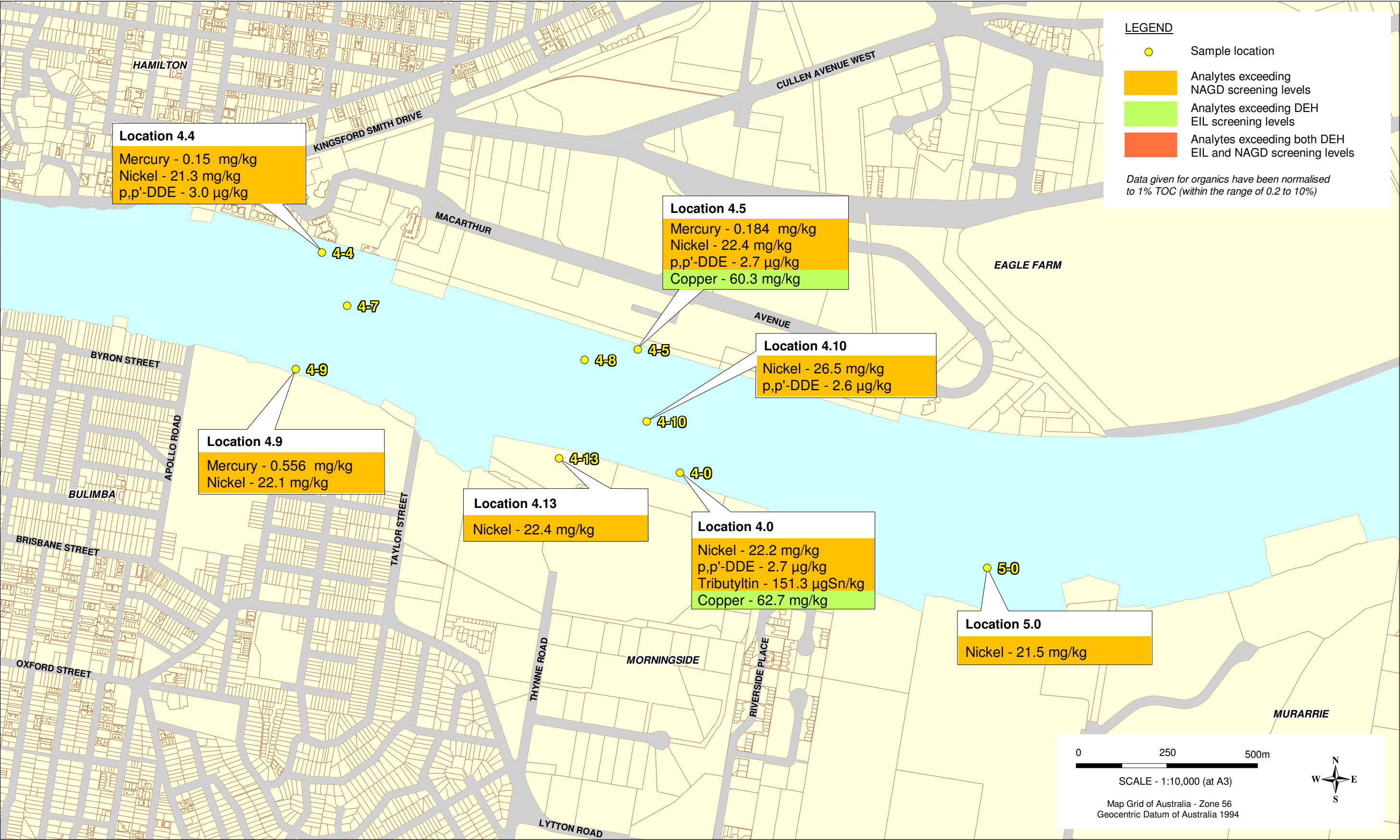
PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Sample Location 1 Summary Comparison with NAGD		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0013	Rev: A



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			

PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Sample Locations 2 and 3 Summary Comparison with NAGD		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0014	Rev: A



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

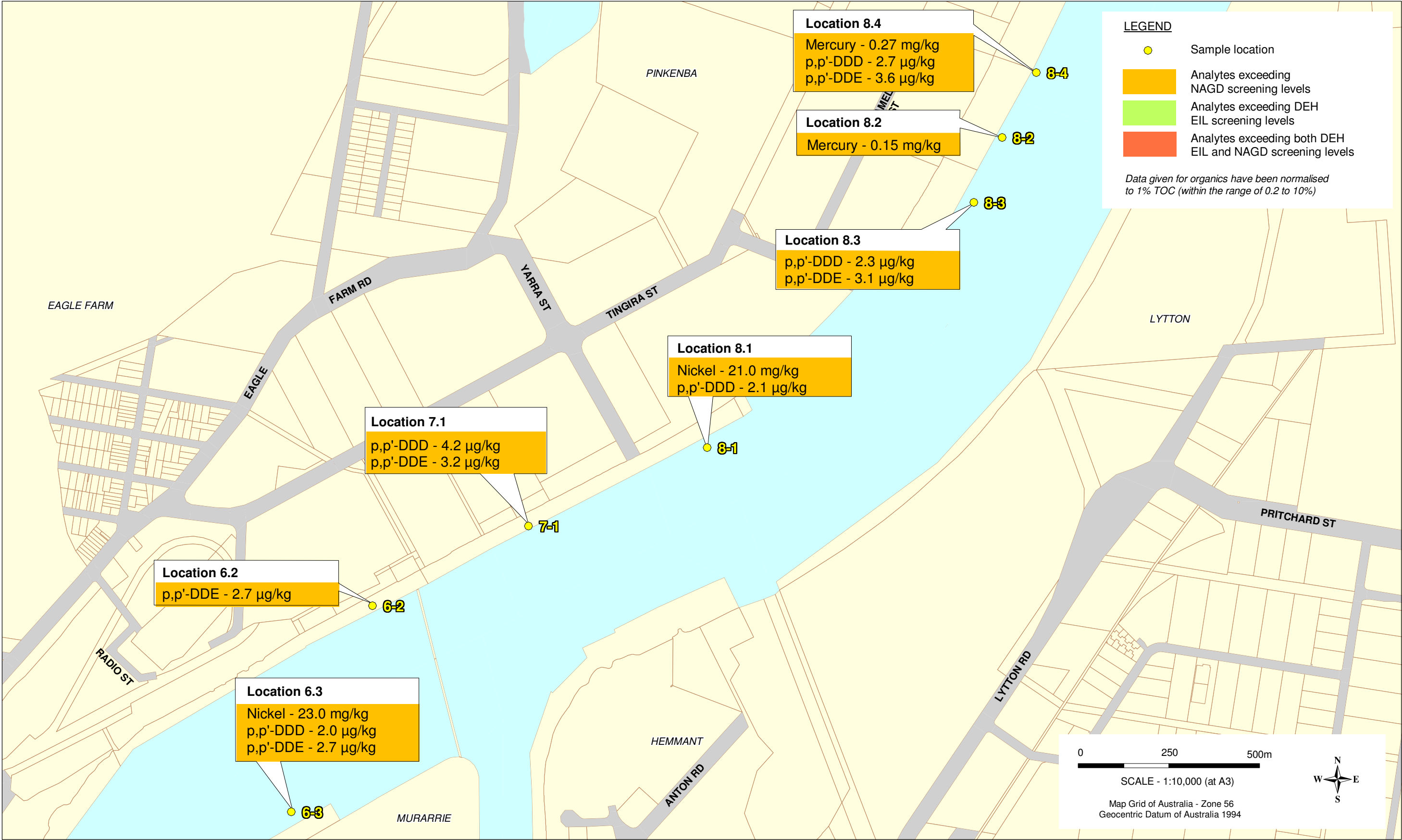
A	02/03/2012	Issued for review	KK	DH	VS			PORT OF BRISBANE PTY LTD			
Rev	Date	Revision Description	ORIG	CHK	ENG	QA	APPD	SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012			
 WorleyParsons resources & energy								Sample Locations 4 and 5 Summary Comparison with NAGD			
								Project No: 301001-01247		Figure: 01247-00-GM-DAL-0015	Rev: A



WorleyParsons
resources & energy



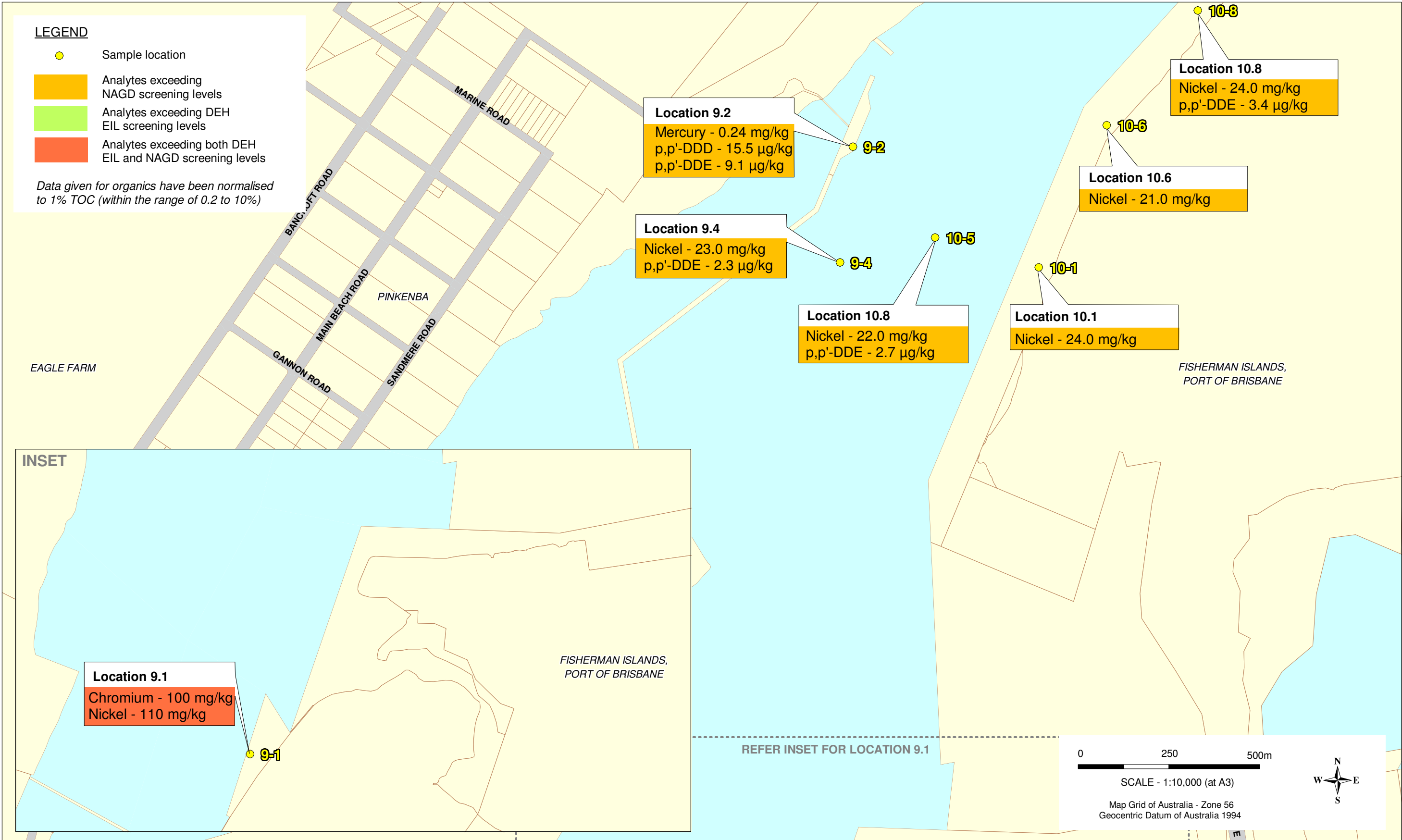
K:\POB\301001-01247\GIS\Maps\01247-00-GM-DAL-0015A(Sites_4_5_2012).wor



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

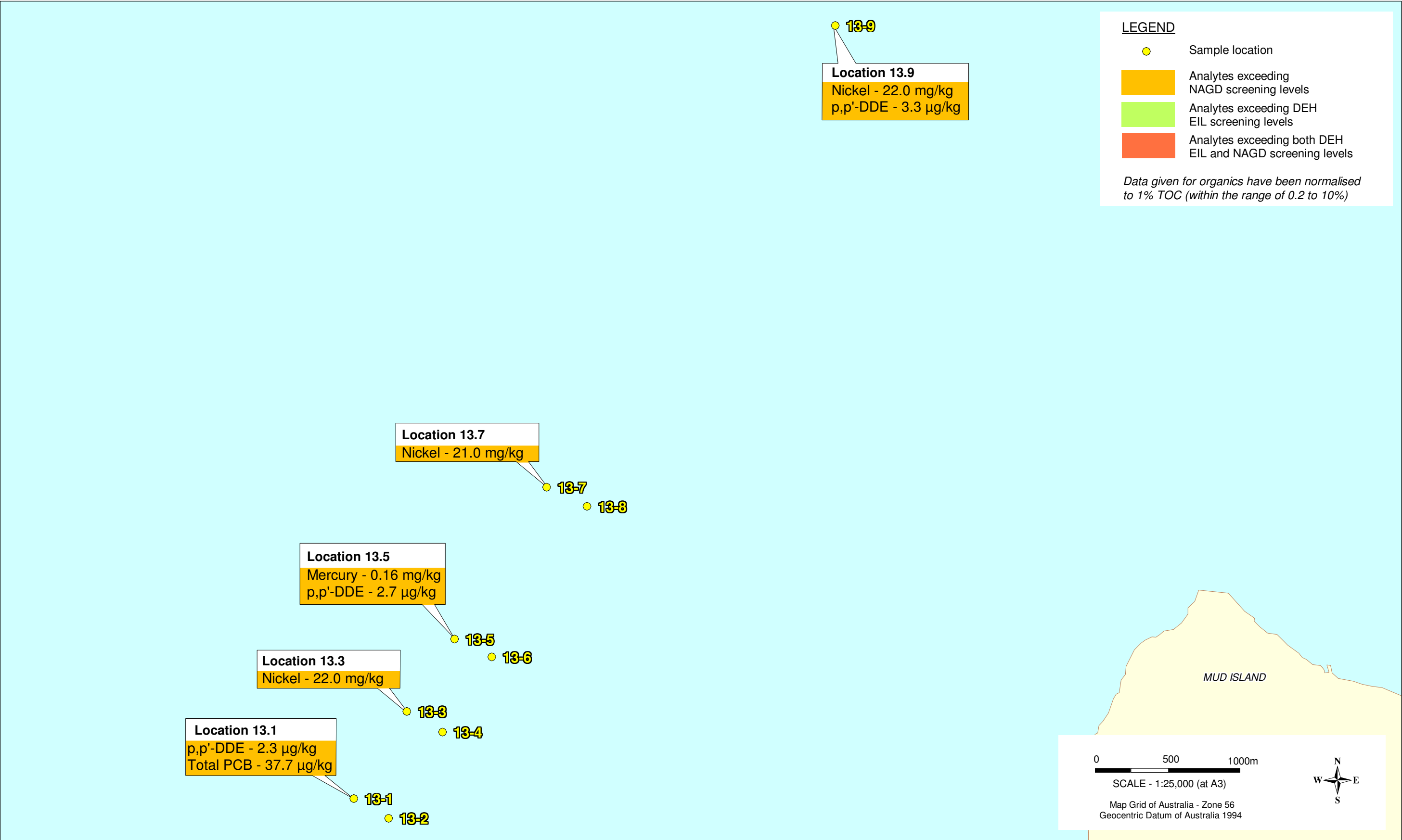
A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
WorleyParsons resources & energy			PORT of BRISBANE Here for the future			

PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Sample Locations 6, 7 and 8 Summary Comparison with NAGD		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0016	Rev: A



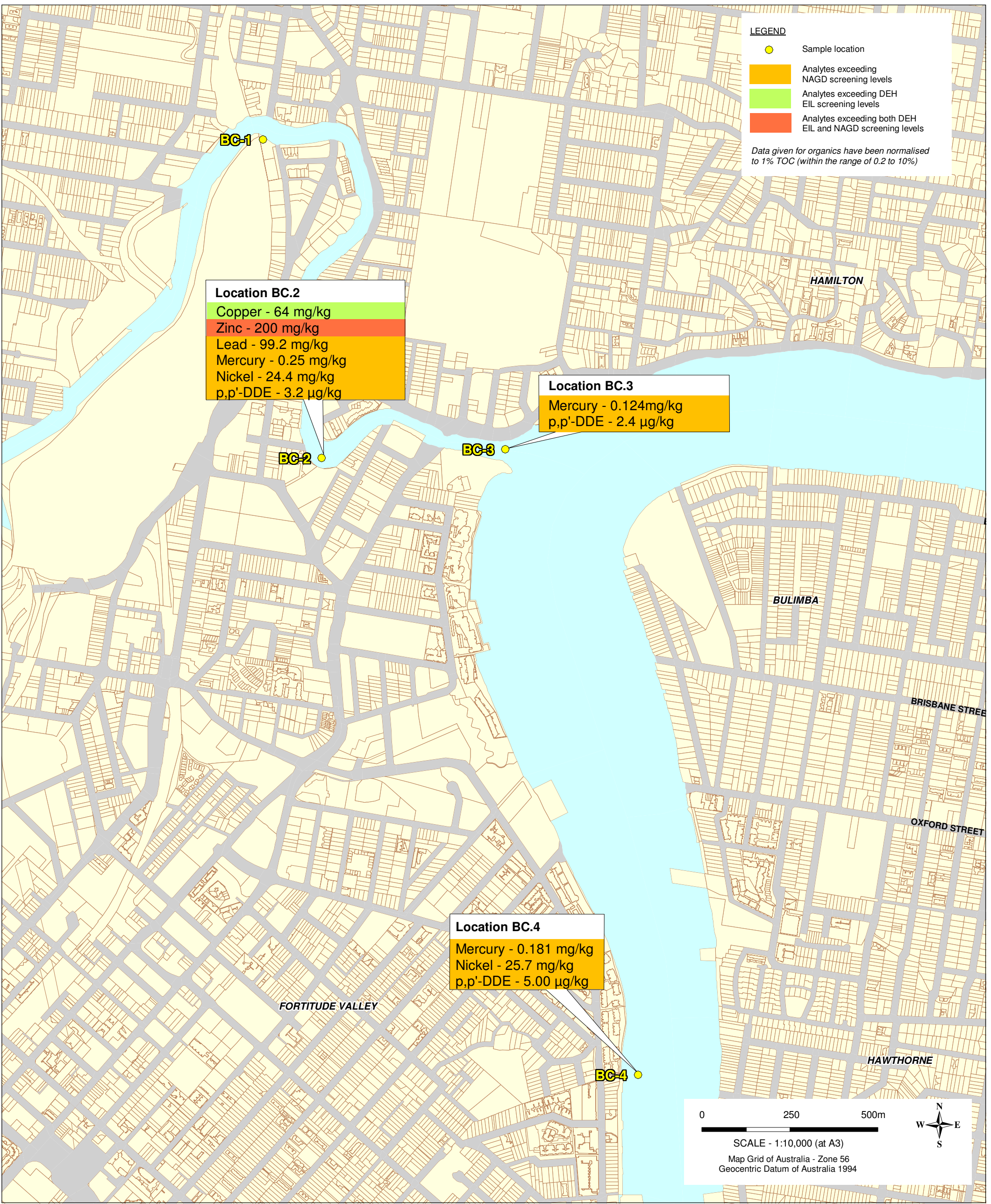
This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

A	02/03/2012	Issued for review	KK	DH	VS		PORT OF BRISBANE PTY LTD		
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD	SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			Sample Locations 9 and 10 Summary Comparison with NAGD			
						Project No: 301001-01247		Figure: 01247-00-GM-DAL-0017	Rev: A



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

A	02/03/2012	Issued for review	KK	DH	VS		PORT OF BRISBANE PTY LTD		
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD	SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
 WorleyParsons resources & energy						Sample Location 13			
						Summary Comparison with NAGD			
			Project No: 301001-01247			Figure: 01247-00-GM-DAL-0019			
						Rev: A			



This map incorporates data which is:
© The State of Queensland (Department of Environment and Resource Management) 2012
Based on or contains data provided by the State of Queensland (Department of Environment and Resource Management) 2012.
In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.
© WorleyParsons Services Pty Ltd
While every care is taken to ensure the accuracy of this data, WorleyParsons makes no representations or warranties about particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred its accuracy, reliability, completeness or suitability for any as a result of the data being inaccurate or incomplete in any way and for any reason.

A	02/03/2012	Issued for review	KK	DH	VS	
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 WorleyParsons resources & energy			 PORT of BRISBANE Here for the future			

PORT OF BRISBANE PTY LTD		
SEDIMENT SAMPLING AND ANALYSIS PLAN FOR BRISBANE RIVER AND MORETON BAY 2012		
Breakfast Creek Sample Locations Summary Comparison with NAGD		
Project No: 301001-01247	Figure: 01247-00-GM-DAL-0020	Rev: A



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 2 Core Logs

General Location of Sampling	University of Queensland	Type of Core Sampler	Piston
Site Number	1-0	Depth Retained	0.74m
Date/Sample Time	15 December 2011; 01:05pm	Weather Conditions	Calm seas, 15 knots wind
Water Depth at Site	11m	General Information	

PSD (%)

Gravel (1)	Sand (58)	Silt (17)	Clay (24)
------------	-----------	-----------	-----------



Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.48	Grey	Clay	Low	Firm	Nil	High	Nil	Nil	Nil
0.48 – 0.6	Grey	Sandy Silt	High	Very Weak	Fine	Nil	Nil	Nil shell 20% organics	Nil
0.6 – 0.74	Grey	Silty Clay	Moderate	Firm	Fine	Moderate	Nil	Nil shell 20% organics	Nil

General Location of Sampling	Southbank	Type of Core Sampler	Piston						
Site Number	2-0	Depth Retained	0.8m						
Date/Sample Time	15 December 2011; 12:10pm	Weather Conditions	Calm seas, 10 knots wind						
Water Depth at Site	6m	General Information	Current too strong for diver to maintain position on river bed, moved closer to the southern riverbank to minimise effect of current.						
PSD (%)									
Gravel (0)	Sand (40)	Silt (17)	Clay (24)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.09	Grey	Sandy Silt	High	Loose	Fine	Nil	Nil	Nil	Nil
0.09 – 0.66	Dark Grey	Sandy Silty Clay	Moderate	Weak to Firm	Fine	Nil to High	Nil	Nil	Marine
0.66 – 0.79	Black	Silty Clay	Low	Weak	Nil	High	Nil	Nil	Marine

General Location of Sampling	Storey Bridge	Type of Core Sampler	Piston						
Site Number	3-0	Depth Retained	0.79m						
Date/Sample Time	15 December 2011; 11:05am	Weather Conditions	Calm seas; 5 knots wind						
Water Depth at Site	NA	General Information							
PSD (%)									
Gravel (0)		Sand (6)	Silt (43)	Clay (51)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.58	Grey	Silty Clay	Moderate	Weak	Nil	Moderate	Nil	Nil	Nil
0.58 – 0.79	Grey	Silty Clay	Moderate	Very Weak	Nil	Low	Nil	Nil	Nil

General Location of Sampling	Cairns Cross Dock	Type of Core Sampler	Piston						
Site Number	4-0	Depth Retained	0.85m						
Date/Sample Time	16 December 2011; 12:00pm	Weather Conditions	Calm seas; 15 knots wind						
Water Depth at Site	10m	General Information							
PSD (%)									
Gravel (0)	Sand (14)	Silt (30)	Clay (56)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.05	Brown	Clay	Dry	Very Firm	Nil	High	Nil	Nil	Nil
0.05 – 0.85	Dark Grey	Silty Clay	Moderate	Weak	Trace, fine	Low	Nil	Trace	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	4-4	Depth Retained	0.83m						
Date/Sample Time	16 December 2011; 09:50am	Weather Conditions	Calm seas; 12 knots wind						
Water Depth at Site	10m	General Information	1 core only – abandoned site due to strong currents, unable to hold anchor						
PSD (%)									
Gravel (6)		Sand (21)	Silt (33)	Clay (40)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.83	Dark Grey	Silty Clay	Low	Weak	Nil	Low	Nil	Nil	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	4-5	Depth Retained	0.84m						
Date/Sample Time	16 December 2011; 12:30pm	Weather Conditions	Calm seas; 8 knots wind						
Water Depth at Site	10m	General Information							
PSD (%)									
Gravel (1)		Sand (21)	Silt (27)	Clay (51)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.84	Grey	Silty Clay	Moderate	Weak	Trace, fine	Moderate	Nil	Trace shell 5% organics	Marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	4-7	Depth Retained	0.83m						
Date/Sample Time	16 December 2011; 09:30am	Weather Conditions	Calm seas, 10 knots wind						
Water Depth at Site	10m	General Information							
PSD (%)									
Gravel (1)	Sand (19)	Silt (34)	Clay (46)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.14	Brown	Silty Gravel	High	Loose	Coarse	Nil	70% <2mm	Trace	Marine
0.14 – 0.83	Grey	Silty Clay	Moderate	Weak	Nil	Low	Nil	Nil	Marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	4-8	Depth Retained	0.52m						
Date/Sample Time	16 December 2011; 09:00am	Weather Conditions	Calm seas, 8 knots wind						
Water Depth at Site	12m	General Information							
PSD (%)									
Gravel (6)	Sand (28)	Silt (34)	Clay (32)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.52	Brown/ Grey	Silty Gravel with silty clay lumps	Low	Loose	Coarse	Nil	90% <5mm	5% <10mm	Nil

General Location of Sampling	Army Barracks	Type of Core Sampler	Piston						
Site Number	4-9	Depth Retained							
Date/Sample Time	16 December 2011; 10:30am	Weather Conditions	Calm seas, 12 knots wind						
Water Depth at Site	2m	General Information							
PSD (%)									
Gravel (2)		Sand (15)	Silt (31)	Clay (52)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.33	Grey	Silt	High	Very Weak	Nil	Low	Nil	Trace	Nil
0.33 – 0.82	Grey	Silt	Moderate	Weak	Trace, fine	Moderate	Nil	5% shell 10% organics	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	4-10	Depth Retained	0.78m						
Date/Sample Time	16 December 2011; 08:25am	Weather Conditions	Calm seas, 8 knots wind						
Water Depth at Site	11m	General Information							
PSD (%)									
Gravel (0)	Sand (26)	Silt (36)	Clay (38)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.23	Dark Grey	Silty Sand	High	Loose	Fine	Nil	Nil	5% <2mm shell Trace organics	Marine
0.23 – 0.78	Dark Grey	Silty Clay	Moderate	Weak	Nil	Moderate	Nil	Nil shell Trace organics	Sulphur

General Location of Sampling	Cairns Cross Dock	Type of Core Sampler	Piston						
Site Number	4-13	Depth Retained	0.92						
Date/Sample Time	16 December 2011; 10:55am	Weather Conditions	Calm seas, 12 knots wind						
Water Depth at Site	8m	General Information							
PSD (%)									
Gravel (0)		Sand (3)	Silt (37)	Clay (60)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.06	Brown	Silt	High	Very Weak	Nil	Nil	Nil	Nil	Nil
0.06 – 0.92	Grey	Silty Clay	Moderate	Weak	Nil	Low	Nil	Nil	Nil

General Location of Sampling	Colmslie	Type of Core Sampler	Piston
Site Number	5-0	Depth Retained	0.86m
Date/Sample Time	16 December 2011; 11:30am	Weather Conditions	Calm seas, 10 knots wind
Water Depth at Site	11m	General Information	

PSD (%)

Gravel (0)	Sand (5)	Silt (39)	Clay (56)
------------	----------	-----------	-----------



Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.2	Brown	Silty Clay	High	Loose	Nil	Nil	Nil	Nil	Marine
0.2 – 0.86	Grey	Silty Clay	Moderate	Very Weak	Nil	Low	Nil	Nil	Marine

General Location of Sampling									
Site Number		6-2							
Date/Sample Time		14 December 2011; 02:20pm							
Water Depth at Site		NA							
Type of Core Sampler		Piston							
Depth Retained		0.8m							
Weather Conditions		Moderate seas, 18 knots wind							
General Information									
PSD (%)									
Gravel (0)	Sand (44)	Silt (34)	Clay (22)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.8	Grey	Silty Clay	Moderate	Weak	Fine	Moderate	Nil	5% <5mm	Nil

General Location of Sampling	Incitec	Type of Core Sampler	Piston						
Site Number	6-3	Depth Retained	0.72m						
Date/Sample Time	14 December 2011; 03:15pm	Weather Conditions	Calm seas, 18 knots wind						
Water Depth at Site	13m	General Information							
PSD (%)									
Gravel (2)	Sand (30)	Silt (46)	Clay (22)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.54	Brown/ Grey	Silt	Moderate	Weak	Fine	Low	Nil	Nil	Marine
0.54 – 0.72	Grey	Silty Clay	Low	Weak	Nil	Moderate	Nil	Nil shell 10% organics	Marine

General Location of Sampling	Shell	Type of Core Sampler	Piston						
Site Number	7-1	Depth Retained	0.78m						
Date/Sample Time	14 December 2011; 01:55pm	Weather Conditions	Calm seas, 15 knots wind						
Water Depth at Site	13m	General Information							
PSD (%)									
Gravel (1)	Sand (51)	Silt (26)	Clay (22)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.78	Dark Grey	Sandy Silt	Moderate	Weak	Fine	Low	Nil	Trace shell Trace organics	Marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	8-1	Depth Retained	0.86m						
Date/Sample Time	14 December 2011; 01:40pm	Weather Conditions	Moderate seas, 20 knots wind						
Water Depth at Site	13m	General Information							
PSD (%)									
Gravel (2)		Sand (18)	Silt (44)	Clay (22)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.86	Dark Grey	Silty Clay	Moderate	Weak	Nil	Moderate	Nil	Nil	Faint marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	8-2	Depth Retained	0.53m						
Date/Sample Time	14 December 2011; 01:10pm	Weather Conditions	Calm seas, 15 knots wind						
Water Depth at Site	12m	General Information							
PSD (%)									
Gravel (0)	Sand (42)	Silt (28)	Clay (30)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.53	Grey	Silty Clay	Moderate	Very Weak	Trace, fine	Low	Nil	Nil shell Trace organics	Faint marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	8-3	Depth Retained	0.78m						
Date/Sample Time	14 December 2011; 12:50pm	Weather Conditions	Calm to moderate seas, 10 knots wind						
Water Depth at Site	6.5m	General Information							
PSD (%)									
Gravel (0)		Sand (11)	Silt (30)	Clay (59)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.41	Brown/ Grey	Silt	High	Very Weak	Nil	Low	Nil	Nil	Marine
0.41 – 0.78	Grey	Silty Clay	Moderate	Weak	Nil	Low	Nil	Nil	Marine

General Location of Sampling	Cement Australia	Type of Core Sampler	Piston	
Site Number	8-4	Depth Retained		
Date/Sample Time	14 December 2011; 12:30pm	Weather Conditions	Calm seas, 10 knots wind	
Water Depth at Site	3.1m	General Information		
PSD (%)				
Gravel (0)		Sand (17)	Silt (32)	Clay (51)



Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.85	Grey	Silty Clay	Moderate	Weak	Trace	Low	Nil	Nil	Marine

General Location of Sampling											
Site Number										9-1	
Date/Sample Time										14 December 2011; 12:00pm	
Water Depth at Site										13m	
Type of Core Sampler										Piston	
Depth Retained										Surface	
Weather Conditions										Calm seas, 8 knots wind	
General Information										Refusal at <10cm on hard clay – Sample collected in zip lock bags.	
PSD (%)											
Gravel (11)	Sand (67)	Silt (17)	Clay (5)								
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour		
Surface	Mottle of orange, grey, red and brown	Clay	Low	Very Firm	Nil	Nil	5%	20%	Nil		

General Location of Sampling	BP			Type of Core Sampler			Piston				
Site Number	9-2			Depth Retained			0.82m				
Date/Sample Time	13 December 2011; 09:30am			Weather Conditions			Calm seas, 5 knots wind				
Water Depth at Site	12m			General Information							
PSD (%)											
Gravel (0)			Sand (16)			Silt (46)			Clay (38)		
											
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour		
0.0 – 0.82	Grey	Silt	Moderate	Weak	Trace, fine	Low	Nil	Nil	Nil		

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	9-4	Depth Retained	0.82m						
Date/Sample Time	13 December 2011; 09:50am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	8.3m	General Information							
PSD (%)									
Gravel (1)		Sand (31)	Silt (41)	Clay (27)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.82	Grey	Silt	Moderate	Weak	Trace, fine	Low	Nil	Nil	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	10-1	Depth Retained	0.9m						
Date/Sample Time		Weather Conditions							
Water Depth at Site		General Information							
PSD (%)									
Gravel (1)		Sand (40)			Silt (39)			Clay (20)	
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.9	Brown/ Grey	Silt	High	Very Weak	Fine	Nil	Nil	Trace <2mm	Marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	10-5	Depth Retained	0.70m						
Date/Sample Time	13 December 2011; 10:05am	Weather Conditions	Calm seas, 8 knots wind						
Water Depth at Site	16m	General Information							
PSD (%)									
Gravel (0)		Sand (45)	Silt (31)	Clay (24)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.06	Brown Grey	Silt	High	Loose	Fine	Nil	Nil	5% <2mm	Marine
0.06 – 0.19	Grey	Silty Clay	Low	Firm	Fine	High	Trace	Trace	Nil
0.19 – 0.47	Light Grey	Silt	Moderate	Very Weak	Fine	Nil	Nil	5% <3mm	Faint marine
0.47 – 0.70	Light Grey	Clay	Low	Firm	Trace, fine	High	Nil	Nil	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	10-6	Depth Retained	0.81m						
Date/Sample Time	13 December 2011; 10:50am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	16m	General Information							
PSD (%)									
Gravel (0)		Sand (32)	Silt (41)	Clay (27)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.35	Brown/ Grey	Silt	High	Loose	Fine	Nil	Nil	Nil	Marine
0.35 – 0.57	Brown/ Grey	Silty Clay	Moderate	Firm	Fine	High	Nil	Nil	Faint marine
0.57 – 0.81	Grey	Clay	Low	Very Firm	Nil	High	Nil	Trace <3mm	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	10-8	Depth Retained	0.62m						
Date/Sample Time	13 December 2011; 11:55am	Weather Conditions	Calm seas, 10 knots wind						
Water Depth at Site	NA	General Information							
PSD (%)									
Gravel (1)	Sand (33)	Silt (40)	Clay (26)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.42	Grey	Silt	High	Very Weak	Fine	Nil	Nil	Nil	Faint marine
0.42 – 0.62	Dark Grey	Silty Sand	High	Very Weak	Fine	Nil	Nil	20% <2mm	Faint marine

General Location of Sampling	Fisherman's Island 1	Type of Core Sampler	Piston						
Site Number	11-1	Depth Retained	0.33m						
Date/Sample Time	13 December 2011; 12:30pm	Weather Conditions	Calm to moderate seas, 10 knots wind						
Water Depth at Site	16m	General Information	Refusal at 0.3m						
PSD (%)									
Gravel (4)	Sand (7)	Silt (43)	Clay (46)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.05	Brown	Silt	Moderate	Very Weak	Fine	Nil	Nil	Nil	Faint marine
0.05 – 0.33	Light Grey	Clay	Low	Very Firm	Nil	High	Nil	Trace <10mm	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	11-3	Depth Retained	0.29m						
Date/Sample Time	13 December 2011; 02:20pm	Weather Conditions	Calm seas, 12 knots wind						
Water Depth at Site	15m	General Information	Refusal at 0.3m						
PSD (%)									
Gravel (0)	Sand (8)	Silt (46)	Clay (46)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 -0.1	Grey	Silty Clay	Moderate	Firm	Nil	High	Nil	Nil	Nil
0.1 – 0.29	Grey	Clay	Low	Very Firm	Nil	High	Nil	Trace <2mm	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	11-4	Depth Retained	0.85m						
Date/Sample Time	14 December 2011; 11:00am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	NA	General Information	Moved site downstream due to ship at berth						
PSD (%)									
Gravel (1)		Sand (53)	Silt (26)	Clay (20)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0..0 – 0.85	Dark Grey	Silt	High	Very Weak	Fine	Low	Nil	Trace	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	11-5	Depth Retained	0.81m						
Date/Sample Time	14 December 2011; 09:50am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	17m	General Information							
PSD (%)									
Gravel (1)	Sand (29)	Silt (35)	Clay (35)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.13	Brown/ Grey	Silt	High	Very Weak	Fine	Nil	Nil	Nil shell Trace organics	Nil
0.13 – 0.81	Dark Grey	Silty Clay	Low	Weak	Nil	Moderate	Nil	Nil	Nil

General Location of Sampling	Mouth of River	Type of Core Sampler	Piston						
Site Number	11-8	Depth Retained	0.67m						
Date/Sample Time	14 December 2011; 10:30am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	2.4m	General Information							
PSD (%)									
Gravel (11)	Sand (45)	Silt (24)	Clay (20)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.67	Grey	Silty Clay	High	Weak	Fine	Low	Nil	40% <30mm	Nil

General Location of Sampling									
Site Number		11-9							
Date/Sample Time		14 December 2011; 11:20am							
Water Depth at Site		16m							
Type of Core Sampler		Piston							
Depth Retained		1m							
Weather Conditions		Calm seas, 5 knots wind							
General Information									
PSD (%)									
Gravel (1)	Sand (27)	Silt (45)	Clay (27)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 1.0	Light Grey	Silt	Moderate	Weak	Fine	Low	Nil	Trace	Marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	11-11	Depth Retained	0.77m						
Date/Sample Time	14 December 2011; 09:25am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	16m	General Information							
PSD (%)									
Gravel (0)		Sand (77)	Silt (13)	Clay (10)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.3	Grey	Silt	High	Weak	Fine	Low	Nil	Nil	Nil
0.3 – 0.77	Red/ Brown	Sand	Low	Loose	Fine	Nil	Nil	Nil	Nil

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	11-12	Depth Retained	0.46m						
Date/Sample Time	13 December 2011; 02:00pm	Weather Conditions	Calm seas, 12 knots wind						
Water Depth at Site	16m	General Information	Refusal at 0.4m						
PSD (%)									
Gravel (4)	Sand (22)	Silt (36)	Clay (38)						
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.28	Brown/ Grey	Silt	Moderate	Weak	Fine	Low	Nil	Trace <2mm	Marine
0.28 – 0.46	Grey	Clay	Low	Very Firm	Nil	High	Nil	Trace <2mm	Nil

General Location of Sampling									
Site Number		12-1							
Date/Sample Time		14 December 2011; 08:40am							
Water Depth at Site		16m							
Type of Core Sampler		Piston							
Depth Retained		Surface							
Weather Conditions		Calm seas, 5 knots wind							
General Information		Refusal at 10cm – Sample collected in zip lock bags. Strong current on river bed.							
PSD (%)									
Gravel (0)	Sand (26)	Silt (37)	Clay (37)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
Surface	Brown/ Grey	Silt	High	Very Weak	Fine	Low	Nil	Trace shell 20% Organics	Sulphurous

General Location of Sampling									
Site Number		12-2							
Date/Sample Time		14 December 2011; 08:00am							
Water Depth at Site		15m							
Type of Core Sampler		Piston							
Depth Retained		Surface							
Weather Conditions		Calm seas, 5 knots wind							
General Information		Current on river bed too strong to get a core – sample collected in zip lock bags.							
PSD (%)				Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
Gravel (0)	Sand (26)	Silt (37)	Clay (37)						
Strata Change (m)	Colour	Field Texture	Moist.						
Surface	Dark Grey	Silt	High	Very Weak	Fine	Low	Nil	Trace	Marine

General Location of Sampling		Mouth of River							
Site Number		12-3							
Date/Sample Time		14 December 2011; 09:00am							
Water Depth at Site		16m							
Type of Core Sampler		Piston							
Depth Retained		Surface							
Weather Conditions		Calm seas, 5 knots wind							
General Information		Refusal at 10cm – sample collected in zip lock bags							
PSD (%)									
Gravel (0)	Sand (30)	Silt (40)	Clay (30)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.05	Dark Grey	Silt with brown clay lumps	High	Weak	Fine	Low	Nil	Trace shell 10% organics	Marine
0.05 – 0.08	Red/ Brown	Clay	High	Firm	Nil	High	Nil	Nil	Nil

General Location of Sampling	Entrance Channel	Type of Core Sampler	Piston						
Site Number	13-1	Depth Retained	0.82m						
Date/Sample Time	13 December 2011; 08:30am	Weather Conditions	Calm seas, 2 knots wind						
Water Depth at Site	8.6m	General Information							
PSD (%)									
Gravel (1)		Sand (34)	Silt (23)	Clay (42)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.25	Grey	Sandy Silt	High	Loose	Fine	Nil	Nil	Nil	Faint marine
0.25 – 0.82	Grey	Silt	Moderate	Very weak	Trace, fine	Low	Nil	Trace <2mm	Faint marine

General Location of Sampling	Entrance Channel		Type of Core Sampler		Piston				
Site Number	13-2		Depth Retained		0.85m				
Date/Sample Time	12 December 2011; 01:30pm		Weather Conditions		Moderate seas, 15 knots wind				
Water Depth at Site	8.8m		General Information						
PSD (%)									
Gravel (3)		Sand (29)		Silt (30)		Clay (38)			
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.85	Grey	Sandy Silt	Moderate	Weak	Fine	Moderate	Nil	10% <10mm	Marine

General Location of Sampling	Entrance Channel		Type of Core Sampler		Piston				
Site Number	13-3		Depth Retained		0.89m				
Date/Sample Time	12 December 2011; 01:10pm		Weather Conditions		Moderate seas, 10 knots wind				
Water Depth at Site	9.8m		General Information						
PSD (%)									
Gravel (0)		Sand (12)		Silt (42)		Clay (46)			
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.28	Grey with brown & green mottle	Silt with clay lumps	High	Very Weak to Very Firm	Fine	Low to high	Nil	Trace <2mm	Nil
0.28 – 0.89	Grey	Silt	Moderate	Weak	Trace, fine	Low	Nil	Trace <2mm	Nil

General Location of Sampling	Entrance Channel		Type of Core Sampler			Piston			
Site Number	13-4		Depth Retained			0.85m			
Date/Sample Time	12 December 2011; 12:55pm		Weather Conditions			Moderate seas, 10 knots wind			
Water Depth at Site	9.4m		General Information						
PSD (%)									
Gravel (0)		Sand (10)			Silt (33)			Clay (57)	
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.22	Grey/ Brown	Silty Sand	High	Loose	Fine	Nil	Nil	30% <5mm	Nil
0.22 – 0.85	Grey	Silty Clay	Moderate	Firm to Very Firm	Fine	High	Nil	5% <2mm	Nil

General Location of Sampling	Entrance Channel	Type of Core Sampler	Piston						
Site Number	13-5	Depth Retained	0.82m						
Date/Sample Time	12 December 2011; 12:40pm	Weather Conditions	Calm to moderate seas, 8-10 knots wind						
Water Depth at Site	8.6m	General Information							
PSD (%)									
Gravel (0)		Sand (28)	Silt (30)	Clay (42)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.17	Grey	Silt	High	Very Weak	Fine	Nil	Nil	20% <5mm	Marine
0.17 – 0.69	Grey	Silt	Moderate	Weak	Fine	Low	Nil	Trace <2mm	Marine
0.69 – 0.82	Grey	Clay	Moderate	Firm	Nil	High	Nil	Nil	Faint marine

General Location of Sampling	Entrance Channel		Type of Core Sampler		Piston				
Site Number	13-6		Depth Retained		0.81m				
Date/Sample Time	12 December 2011; 12:20pm		Weather Conditions		Calm seas, 5 knots wind				
Water Depth at Site	12m		General Information						
PSD (%)									
Gravel (0)		Sand (20)			Silt (33)			Clay (47)	
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.21	Grey	Silt	High	Very Weak	Fine	Nil	Nil	Trace <5mm	Nil
0.21 – 0.81	Grey with black mottle	Silt	Moderate	Weak	Fine	Moderate	Nil	Trace <2mm	Faint marine

General Location of Sampling	Entrance Channel		Type of Core Sampler		Piston				
Site Number	13-7		Depth Retained		0.88m				
Date/Sample Time	12 December 2011; 11:55am		Weather Conditions		Calm seas, 5 knots wind				
Water Depth at Site	9.9m		General Information						
PSD (%)									
Gravel (1)		Sand (9)		Silt (40)		Clay (50)			
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0.0 – 0.09	Grey	Silt	High	Loose	Fine	Nil	Nil	50% <50mm	Marine
0.09 – 0.88	Grey	Silt	Moderate	Weak	Fine	Moderate	Nil	15% <5mm	Marine

General Location of Sampling	Entrance Channel		Type of Core Sampler				Piston			
Site Number	13-8		Depth Retained				0.64m			
Date/Sample Time	12 December 2011; 11:30am		Weather Conditions				Calm to moderate seas, 8 knots wind			
Water Depth at Site	11m		General Information							
PSD (%)										
Gravel (1)		Sand (11)			Silt (35)			Clay (53)		
										
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour	
0.0 – 0.39	Grey	Silt	High	Very Weak	Fine	Low	Nil	Trace <2mm	Marine	
0.39 – 0.64	Grey	Silt	Moderate	Weak	Fine	Moderate	Nil	5% <2mm	Marine	

General Location of Sampling		Entrance Channel		Type of Core Sampler			Piston			
Site Number		13-9		Depth Retained			0.81m			
Date/Sample Time		12 December 2011; 10:50am		Weather Conditions			Calm seas, 5 knots wind			
Water Depth at Site		17m		General Information						
PSD (%)										
Gravel (0)		Sand (8)			Silt (23)			Clay (69)		
										
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour	
0.0 – 0.2	Grey	Silty Clay	High	Very Weak	Fine	Low	Nil	Trace	Marine	
0.2 – 0.81	Grey	Silty Clay	Moderate	Weak	Fine	Low	Nil	Trace	Marine	

General Location of Sampling									
Site Number		14-1							
Date/Sample Time		14 December 2011; 08:20am							
Water Depth at Site		15m							
Type of Core Sampler		Piston							
Depth Retained		0.8m							
Weather Conditions		Calm seas, 5 knots wind							
General Information		Only 1 core retrieved. Current too strong to collect additional cores							
PSD (%)									
Gravel (0)	Sand (90)	Silt (6)	Clay (4)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.05	Brown	Silt	High	Loose	Fine	Nil	Nil	Nil	Nil
0.05 – 0.8	Light Grey	Sand	High	Loose	Fine	Nil	Nil	5% <2mm	Faint marine

General Location of Sampling		Type of Core Sampler	Piston						
Site Number	15-1	Depth Retained	0.58m						
Date/Sample Time	13 December 2011; 01:05pm	Weather Conditions	Calm to moderate seas, 10 knots wind						
Water Depth at Site	15m	General Information							
PSD (%)									
Gravel (6)		Sand (48)	Silt (21)	Clay (25)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.58	Brown Grey	Sandy Silt	High	Loose to Very Weak	Fine	Nil to low	Nil	Trace	Nil

General Location of Sampling		Breakfast Creek – Toyota Car Yard							
Site Number		BC-1							
Date/Sample Time		15 December 2011; 08:40am							
Water Depth at Site		2.7m							
Type of Core Sampler		Piston							
Depth Retained									
Weather Conditions		Calm seas, 5 knots wind							
General Information		Refusal at <5cm – Sample collected in zip lock bags.							
PSD (%)									
Gravel (24)	Sand (56)	Silt (8)	Clay (12)						
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
Surface	Grey/ Black	Silty Gravel	High	Loose	Coarse	Nil	90% <5mm	Trace shell 20% organics	Sulphurous

General Location of Sampling	Breakfast Creek	Type of Core Sampler	Piston						
Site Number	BC-2	Depth Retained	0.87m						
Date/Sample Time	15 December 2011; 09:20am	Weather Conditions	Calm seas, 5 knots wind						
Water Depth at Site	2.4m	General Information							
PSD (%)									
Gravel (0)		Sand (9)	Silt (33)	Clay (58)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.4	Grey	Silt	High	Very Weak	Fine	Low	Nil	Trace organics	Marine
0.4 – 0.87	Dark Grey	Silty Clay	Moderate	Weak	Nil	Moderate	Nil	Nil	Faint marine

General Location of Sampling	Mouth of Breakfast Creek	Type of Core Sampler	Piston						
Site Number	BC-3	Depth Retained	0.85m						
Date/Sample Time	15 December 2011; 09:30am	Weather Conditions	Calm seas; 5 knots wind						
Water Depth at Site	3.6m	General Information							
PSD (%)									
Gravel (1)		Sand (12)	Silt (39)	Clay (48)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0.0 – 0.13	Grey	Sandy Silt	High	Loose	Coarse	Nil	10% <5mm	5% shell	Marine
0.13 – 0.59	Dark Grey	Silty Clay	Moderate	Very Weak	Nil	Low	Nil	Nil	Nil
0.59 – 0.85	Dark Grey/ Black	Silty Clay	Moderate	Weak	Nil	Moderate	Nil	Nil shell 20% organics	Hydrocarbons

General Location of Sampling	Teneriffe	Type of Core Sampler	Piston						
Site Number	BC-4	Depth Retained	0.84m						
Date/Sample Time	15 December 2011; 10:00am	Weather Conditions	Calm seas; 5 knots wind						
Water Depth at Site	7.4m	General Information							
PSD (%)									
Gravel (2)		Sand (20)	Silt (28)	Clay (50)					
									
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/ Biota	Odour
0.0 – 0.84	Dark Grey	Silty Clay	Low	Weak	Fine	Moderate	Nil	Nil	Nil



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 3 Primary Laboratory Analytical Report (AAA)



REPORT OF ANALYSIS

Laboratory Reference: A11/5962-A [R00]

Client: WorleyParsons Services Pty Ltd
Level 3, 60 Albert Street
Brisbane QLD 4000

Contact: Vivian Seto

Order No: 301001-01247
Project: Port Bris SAP 2012
Sample Type: Sediment
No. of Samples: 45
Date Received: 15/12/2011
Date Completed: 16/01/2012

Laboratory Contact Details:

Client Services Manager: Trent Biggin
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.





Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	RT - 5	RT - 5A	RT - 6	RT - 6A
Date Sampled:	-	-	12/12/2011	12/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	34.7	38.8	28.9	25.8
Trace Elements						
Arsenic	04-001	mg/kg	13	14	12	14
Cadmium	04-001	mg/kg	<0.1	0.10	<0.1	<0.1
Chromium	04-001	mg/kg	43	43	11	41
Copper	04-001	mg/kg	5.4	5.9	3.9	5.2
Lead	04-001	mg/kg	1.4	1.4	1.4	1.4
Mercury	04-002	mg/kg	<0.01	<0.01	<0.01	<0.01
Nickel	04-001	mg/kg	15	15	3.2	14
Phosphorus	04-001	mg/kg	220	250	300	260
Zinc	04-001	mg/kg	8.5	8.3	8.7	7.8
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	69	63	68	68
Surrogate 2 Recovery	04-021	%	65	58	61	66
Surrogate 3 Recovery	04-021	%	70	66	71	67
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	<50	<50	<50
TPHC29-36	04-020	mg/kg	<50	<50	<50	<50
Surrogate Recovery	04-020	%	102	88	109	109
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	RT - 5	RT - 5A	RT - 6	RT - 6A
Date Sampled:	-	-	12/12/2011	12/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Poly Aromatic Hydrocarbons						
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	1.0	<1.0	<1.0	1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	94	84	102	108
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	RT - 5	RT - 5A	RT - 6	RT - 6A
Date Sampled:	-	-	12/12/2011	12/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	110	99	118	132
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Surrogate 1 Recovery	04-026	%	77	77	83	79
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	430	480	210	110
Total Kjeldahl Nitrogen	SUB	mg/kg	430	480	210	110



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	RT - 5	RT - 5A	RT - 6	RT - 6A
Date Sampled:	-	-	12/12/2011	12/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.82	0.78	0.25	0.18
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	RT - 7	RT - 7A	ST - 1	ST - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	54.6	52.2	33.9	54.8
Trace Elements						
Arsenic	04-001	mg/kg	15	15	13	14
Cadmium	04-001	mg/kg	0.10	<0.1	<0.1	0.1
Chromium	04-001	mg/kg	42	40	45	40
Copper	04-001	mg/kg	4.9	5.3	5.5	5.2
Lead	04-001	mg/kg	1.2	1.4	1.2	1.2
Mercury	04-002	mg/kg	<0.01	<0.01	<0.01	<0.01
Nickel	04-001	mg/kg	14	14	16	14
Phosphorus	04-001	mg/kg	240	270	240	240
Zinc	04-001	mg/kg	7.2	7.7	7.9	7.2
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	46	62	71	59
Surrogate 2 Recovery	04-021	%	43	59	68	53
Surrogate 3 Recovery	04-021	%	51	66	75	60



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	RT - 7	RT - 7A	ST - 1	ST - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	57	51	<50	72
TPHC29-36	04-020	mg/kg	54	54	<50	72
Surrogate Recovery	04-020	%	102	94	99	114
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	<5	<5	<5	<5
1-Methylnaphthalene	04-022	µg/kg	<5	<5	<5	<5
2-Methylnaphthalene	04-022	µg/kg	<5	<5	<5	<5
Acenaphthylene	04-022	µg/kg	32	<5	<5	<5
Acenaphthene	04-022	µg/kg	5	<5	<5	<5
Fluorene	04-022	µg/kg	7	<5	<5	<5
Phenanthrene	04-022	µg/kg	200	10	<5	10
Anthracene	04-022	µg/kg	40	<5	<5	7
Fluoranthene	04-022	µg/kg	3,200	50	<5	80
Pyrene	04-022	µg/kg	2,400	110	<5	73
Benz(a)anthracene	04-022	µg/kg	100	30	<5	20
Chrysene	04-022	µg/kg	800	30	6	50
Benzo(b)&(k)fluoranthene	04-022	µg/kg	900	80	30	80
Benzo(a)pyrene	04-022	µg/kg	190	36	22	37
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	200	30	20	30
Dibenz(a,h)anthracene	04-022	µg/kg	19	8	<5	8
Benzo(g,h,i)perylene	04-022	µg/kg	100	40	30	40
Coronene	04-022	µg/kg	18	<10	<10	10
Benzo(e)pyrene	04-022	µg/kg	260	32	17	32
Perylene	04-022	µg/kg	100	70	40	300
Total PAHs (as above)	04-022	µg/kg	8,490	540	170	770
Surrogate 1 Recovery	04-022	%	78	75	80	85



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	RT - 7	RT - 7A	ST - 1	ST - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Surrogate 2 Recovery	04-022	%	92	84	81	97
Surrogate 3 Recovery	04-022	%	89	85	94	98
Date Extracted	04-022	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-022	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	250	<1.0	2.0
<i>p,p'</i> -DDE	04-023	µg/kg	2.0	13	<1.0	4.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	88	85	97	98
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	RT - 7	RT - 7A	ST - 1	ST - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	114	109	112	124
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Hexa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	RT - 7	RT - 7A	ST - 1	ST - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Octa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Total PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Surrogate 1 Recovery	04-029	%	121	109	112	122
Surrogate 2 Recovery	04-029	%	110	101	105	109
Date Extracted	04-029	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-029	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	1.4	8.6	<0.50	2.6
Tributyl tin	04-026	µgSn/kg	5.4	160	<0.50	3.2
Surrogate 1 Recovery	04-026	%	86	84	85	86
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	990	1,070	380	1,270
Total Kjeldahl Nitrogen	SUB	mg/kg	990	1,070	380	1,270
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	1.1	1.2	0.61	2.0
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	ST - 3	11 - 11	11 - 12	12 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	41.8	20.0	47.0	57.6
Trace Elements						
Arsenic	04-001	mg/kg	16	16	16	16
Cadmium	04-001	mg/kg	<0.1	0.10	<0.1	<0.1
Chromium	04-001	mg/kg	36	39	39	41
Copper	04-001	mg/kg	4.3	5.3	4.7	5.4
Lead	04-001	mg/kg	1.2	1.4	1.3	1.4
Mercury	04-002	mg/kg	<0.01	<0.01	<0.01	<0.01
Nickel	04-001	mg/kg	12	13	13	14
Phosphorus	04-001	mg/kg	260	300	280	270
Zinc	04-001	mg/kg	6.5	7.6	6.5	7.6
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	63	72	64	56
Surrogate 2 Recovery	04-021	%	61	71	60	54
Surrogate 3 Recovery	04-021	%	66	78	65	61
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	<50	<50	58
TPHC29-36	04-020	mg/kg	<50	<50	<50	89
Surrogate Recovery	04-020	%	98	97	90	92
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	19/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	ST - 3	11 - 11	11 - 12	12 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	14/12/2011
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	7.0
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	6
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	[NA]	14
Acenaphthene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Fluorene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Phenanthrene	04-022	µg/kg	[NA]	[NA]	[NA]	40
Anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	20
Fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	200
Pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	180
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	80
Chrysene	04-022	µg/kg	[NA]	[NA]	[NA]	80
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	200
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	97
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	80
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	[NA]	100
Coronene	04-022	µg/kg	[NA]	[NA]	[NA]	23
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	74
Perylene	04-022	µg/kg	[NA]	[NA]	[NA]	300
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	[NA]	1,550
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	[NA]	84
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	[NA]	92
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	[NA]	95
Date Extracted	04-022	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-022	-	[NA]	[NA]	[NA]	22/12/2011
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
cis-Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	ST - 3	11 - 11	11 - 12	12 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	14/12/2011
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	2.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	2.0	<1.0	3.0	10
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	92	108	91	94
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	ST - 3	11 - 11	11 - 12	12 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	14/12/2011
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	113	121	125	116
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	5.0
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	15
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	20
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	[NA]	121
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	[NA]	109
Date Extracted	04-029	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-029	-	[NA]	[NA]	[NA]	22/12/2011
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	2.1	<0.50	1.0	1.5



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	ST - 3	11 - 11	11 - 12	12 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	14/12/2011
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	7.7	<0.50	1.0	1.5
Surrogate 1 Recovery	04-026	%	90	91	84	79
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	560	22	690	970
Total Kjeldahl Nitrogen	SUB	mg/kg	560	22	690	970
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.68	0.04	1.1	1.8
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		[NA]	[NA]	[NA]	See Comments
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	[NA]	See comments

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	50.2	44.3	45.0	44.4
Trace Elements						
Arsenic	04-001	mg/kg	17	14	14	13
Cadmium	04-001	mg/kg	<0.1	<0.1	<0.1	<0.1
Chromium	04-001	mg/kg	40	45	43	44
Copper	04-001	mg/kg	4.7	6.0	5.9	5.9
Lead	04-001	mg/kg	1.1	1.4	1.3	1.4
Mercury	04-002	mg/kg	<0.01	<0.01	<0.01	<0.01
Nickel	04-001	mg/kg	13	16	15	15
Phosphorus	04-001	mg/kg	260	230	230	240
Zinc	04-001	mg/kg	6.7	8.7	7.9	8.5
BTEX						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	57	60	57	67
Surrogate 2 Recovery	04-021	%	55	58	59	68
Surrogate 3 Recovery	04-021	%	64	66	65	80
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	19/12/2011	19/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	55	<50	56	<50
TPHC29-36	04-020	mg/kg	71	<50	<50	<50
Surrogate Recovery	04-020	%	94	97	91	93
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	5	[NA]	5	[NA]
1-Methylnaphthalene	04-022	µg/kg	<5	[NA]	<5	[NA]
2-Methylnaphthalene	04-022	µg/kg	<5	[NA]	<5	[NA]
Acenaphthylene	04-022	µg/kg	12	[NA]	7.0	[NA]
Acenaphthene	04-022	µg/kg	7	[NA]	<5	[NA]
Fluorene	04-022	µg/kg	8	[NA]	<5	[NA]
Phenanthrene	04-022	µg/kg	40	[NA]	10	[NA]
Anthracene	04-022	µg/kg	20	[NA]	9	[NA]
Fluoranthene	04-022	µg/kg	100	[NA]	60	[NA]
Pyrene	04-022	µg/kg	140	[NA]	67	[NA]
Benz(a)anthracene	04-022	µg/kg	50	[NA]	40	[NA]
Chrysene	04-022	µg/kg	60	[NA]	40	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	100	[NA]	90	[NA]



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Benzo(a)pyrene	04-022	µg/kg	88	[NA]	53	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	80	[NA]	40	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	14	[NA]	11	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	100	[NA]	50	[NA]
Coronene	04-022	µg/kg	20	[NA]	<10	[NA]
Benzo(e)pyrene	04-022	µg/kg	62	[NA]	37	[NA]
Perylene	04-022	µg/kg	200	[NA]	30	[NA]
Total PAHs (as above)	04-022	µg/kg	1,220	[NA]	550	[NA]
Surrogate 1 Recovery	04-022	%	83	[NA]	72	[NA]
Surrogate 2 Recovery	04-022	%	96	[NA]	77	[NA]
Surrogate 3 Recovery	04-022	%	98	[NA]	81	[NA]
Date Extracted	04-022	-	19/12/2011	[NA]	19/12/2011	[NA]
Date Analysed	04-022	-	22/12/2011	[NA]	22/12/2011	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	2.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	5.0	3.0	3.0	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlorthane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	97	93	81	104
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	118	123	97	119
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Di-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Tri-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Tetra-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Penta-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Hexa-PCB congeners	04-029	µg/kg	<5.0	[NA]	25	[NA]
Hepta-PCB congeners	04-029	µg/kg	<5.0	[NA]	24	[NA]
Octa-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Nona-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Deca-PCB congeners	04-029	µg/kg	<5.0	[NA]	<5.0	[NA]
Total PCB congeners	04-029	µg/kg	<5.0	[NA]	49	[NA]
Surrogate 1 Recovery	04-029	%	124	[NA]	101	[NA]
Surrogate 2 Recovery	04-029	%	108	[NA]	99	[NA]
Date Extracted	04-029	-	19/12/2011	[NA]	19/12/2011	[NA]
Date Analysed	04-029	-	22/12/2011	[NA]	22/12/2011	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	1.3	0.90	<0.50	<0.50
Tributyl tin	04-026	µgSn/kg	2.0	0.80	<0.50	<0.50
Surrogate 1 Recovery	04-026	%	80	80	77	79
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	920	820	840	530
Total Kjeldahl Nitrogen	SUB	mg/kg	920	820	840	530
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	1.3	1.1	1.3	0.73
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		See Comments	[NA]	See Comments	[NA]
Total Actual Acidity	SUB	mol/T	See comments	[NA]	See comments	[NA]



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	12 - 2	12 - 3	13 - 1	13 - 2
Date Sampled:	-	-	14/12/2011	14/12/2011	13/12/2011	12/12/2011
Analysis Description	Method	Units				
Gross Alpha	SUB	mBq/g	<60	[NA]	<60	[NA]
Gross Beta	SUB	mBq/g	<135	[NA]	<135	[NA]

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	13 - 3	13 - 4	13 - 5	13 - 6
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	12/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	46.9	44.8	49.4	46.4
Trace Elements						
Arsenic	04-001	mg/kg	9.4	8.7	8.2	8.6
Cadmium	04-001	mg/kg	<0.1	<0.1	0.15	<0.1
Chromium	04-001	mg/kg	39	37	45	41
Copper	04-001	mg/kg	18	13	24	17
Lead	04-001	mg/kg	12	7.3	15	9.5
Mercury	04-002	mg/kg	0.03	0.02	0.16	0.08
Nickel	04-001	mg/kg	22	18	20	19
Phosphorus	04-001	mg/kg	440	380	540	500
Zinc	04-001	mg/kg	52	40	75	54
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	60	61	63	57
Surrogate 2 Recovery	04-021	%	61	60	64	56
Surrogate 3 Recovery	04-021	%	69	67	72	63
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	13 - 3	13 - 4	13 - 5	13 - 6
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	12/12/2011
Analysis Description	Method	Units				
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	<50	<50	<50
TPHC29-36	04-020	mg/kg	<50	<50	<50	<50
Surrogate Recovery	04-020	%	94	86	105	100
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	<1.0	3.0	1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	99	106	96	97



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	13 - 3	13 - 4	13 - 5	13 - 6
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	12/12/2011
Analysis Description	Method	Units				
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pyrimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	112	118	119	112
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	13 - 3	13 - 4	13 - 5	13 - 6
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	12/12/2011
Analysis Description	Method	Units				
Dibutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Surrogate 1 Recovery	04-026	%	77	86	77	81
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	610	540	810	730
Total Kjeldahl Nitrogen	SUB	mg/kg	610	540	810	730
Nitrate as N	SUB	mg/kg	<0.1	0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.89	0.68	1.1	0.96
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments

Laboratory Reference:	-	-	/21	/22	/23	/24
Client Reference:	-	-	13 - 7	13 - 8	13 - 9	14 - 1
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	49.9	49.4	56.9	21.2
Trace Elements						
Arsenic	04-001	mg/kg	9.1	9.5	8.1	1.5
Cadmium	04-001	mg/kg	<0.1	<0.1	<0.1	<0.1
Chromium	04-001	mg/kg	40	41	45	5.3
Copper	04-001	mg/kg	16	17	22	1.9
Lead	04-001	mg/kg	6.6	9.4	13	1.3
Mercury	04-002	mg/kg	0.03	0.07	0.1	<0.01
Nickel	04-001	mg/kg	21	20	22	2.6
Phosphorus	04-001	mg/kg	450	480	510	93
Zinc	04-001	mg/kg	47	56	65	8.1
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23	/24
Client Reference:	-	-	13 - 7	13 - 8	13 - 9	14 - 1
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	14/12/2011
Analysis Description	Method	Units				
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	63	59	57	68
Surrogate 2 Recovery	04-021	%	63	59	56	69
Surrogate 3 Recovery	04-021	%	69	66	63	77
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	<50	<50	<50
TPHC29-36	04-020	mg/kg	<50	<50	<50	<50
Surrogate Recovery	04-020	%	94	98	90	97
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Acenaphthene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Fluorene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Phenanthrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	9
Pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	9.0
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Chrysene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	<10
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23	/24
Client Reference:	-	-	13 - 7	13 - 8	13 - 9	14 - 1
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	14/12/2011
Analysis Description	Method	Units				
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Coronene	04-022	µg/kg	[NA]	[NA]	[NA]	<10
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Perylene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	[NA]	<100
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	[NA]	74
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	[NA]	81
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	[NA]	101
Date Extracted	04-022	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-022	-	[NA]	[NA]	[NA]	22/12/2011
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	1.0	4.0	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23	/24
Client Reference:	-	-	13 - 7	13 - 8	13 - 9	14 - 1
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	14/12/2011
Analysis Description	Method	Units				
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlorthane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	100	97	112	102
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	114	112	129	114
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23	/24
Client Reference:	-	-	13 - 7	13 - 8	13 - 9	14 - 1
Date Sampled:	-	-	12/12/2011	12/12/2011	12/12/2011	14/12/2011
Analysis Description	Method	Units				
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	[NA]	105
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	[NA]	103
Date Extracted	04-029	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-029	-	[NA]	[NA]	[NA]	22/12/2011
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Surrogate 1 Recovery	04-026	%	81	76	82	79
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	750	790	1,180	84
Total Kjeldahl Nitrogen	SUB	mg/kg	750	790	1,180	84
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	0.3
Total Organic Carbon	SUB	%	0.84	1.1	1.2	0.08
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		[NA]	[NA]	[NA]	See Comments
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	[NA]	See comments



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/25	/26	/27	/28
Client Reference:	-	-	15 - 1	8 - 2	8 - 3	8 - 4
Date Sampled:	-	-	13/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	44.9	47.6	56.2	47.9
Trace Elements						
Arsenic	04-001	mg/kg	6.4	7.2	7.1	7.2
Cadmium	04-001	mg/kg	<0.1	<0.1	0.16	0.34
Chromium	04-001	mg/kg	31	33	43	43
Copper	04-001	mg/kg	18	27	30	30
Lead	04-001	mg/kg	9.7	18	18	18
Mercury	04-002	mg/kg	0.05	0.15	0.14	0.27
Nickel	04-001	mg/kg	17	19	20	19
Phosphorus	04-001	mg/kg	460	730	610	670
Zinc	04-001	mg/kg	57	82	88	86
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	66	61	65	57
Surrogate 2 Recovery	04-021	%	64	60	67	59
Surrogate 3 Recovery	04-021	%	72	65	69	65
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	12	<10	<10
TPHC15-28	04-020	mg/kg	<50	100	67	58
TPHC29-36	04-020	mg/kg	<50	120	72	63
Surrogate Recovery	04-020	%	102	104	109	105
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/25	/26	/27	/28
Client Reference:	-	-	15 - 1	8 - 2	8 - 3	8 - 4
Date Sampled:	-	-	13/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
1-Methylnaphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
2-Methylnaphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Acenaphthylene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Acenaphthene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Fluorene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Phenanthrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Anthracene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Fluoranthene	04-022	µg/kg	20	[NA]	[NA]	[NA]
Pyrene	04-022	µg/kg	23	[NA]	[NA]	[NA]
Benz(a)anthracene	04-022	µg/kg	9	[NA]	[NA]	[NA]
Chrysene	04-022	µg/kg	10	[NA]	[NA]	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	30	[NA]	[NA]	[NA]
Benzo(a)pyrene	04-022	µg/kg	13	[NA]	[NA]	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	10	[NA]	[NA]	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	10	[NA]	[NA]	[NA]
Coronene	04-022	µg/kg	<10	[NA]	[NA]	[NA]
Benzo(e)pyrene	04-022	µg/kg	12	[NA]	[NA]	[NA]
Perylene	04-022	µg/kg	60	[NA]	[NA]	[NA]
Total PAHs (as above)	04-022	µg/kg	200	[NA]	[NA]	[NA]
Surrogate 1 Recovery	04-022	%	80	[NA]	[NA]	[NA]
Surrogate 2 Recovery	04-022	%	88	[NA]	[NA]	[NA]
Surrogate 3 Recovery	04-022	%	100	[NA]	[NA]	[NA]
Date Extracted	04-022	-	19/12/2011	[NA]	[NA]	[NA]
Date Analysed	04-022	-	22/12/2011	[NA]	[NA]	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
cis-Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/25	/26	/27	/28
Client Reference:	-	-	15 - 1	8 - 2	8 - 3	8 - 4
Date Sampled:	-	-	13/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	3.0	3.0
<i>p,p'</i> -DDE	04-023	µg/kg	2.0	4.0	4.0	4.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	98	86	98	91
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/25	/26	/27	/28
Client Reference:	-	-	15 - 1	8 - 2	8 - 3	8 - 4
Date Sampled:	-	-	13/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	114	110	121	115
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Di-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Tri-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Tetra-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Penta-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Hexa-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Hepta-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Octa-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Nona-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Deca-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Total PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Surrogate 1 Recovery	04-029	%	115	[NA]	[NA]	[NA]
Surrogate 2 Recovery	04-029	%	109	[NA]	[NA]	[NA]
Date Extracted	04-029	-	19/12/2011	[NA]	[NA]	[NA]
Date Analysed	04-029	-	22/12/2011	[NA]	[NA]	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	0.50	1.1	2.4	3.2



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/25	/26	/27	/28
Client Reference:	-	-	15 - 1	8 - 2	8 - 3	8 - 4
Date Sampled:	-	-	13/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	<0.50	4.5	0.80	0.50
Surrogate 1 Recovery	04-026	%	84	73	84	82
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	560	1,000	1,110	770
Total Kjeldahl Nitrogen	SUB	mg/kg	560	1,000	1,110	770
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.75	2.0	1.3	1.1
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		See Comments	[NA]	[NA]	[NA]
Total Actual Acidity	SUB	mol/T	See comments	[NA]	[NA]	[NA]

Laboratory Reference:	-	-	/29	/30	/31	/32
Client Reference:	-	-	9 - 1	9 - 2	9 - 4	10 - 1
Date Sampled:	-	-	14/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	33.6	49.8	55.5	46.1
Trace Elements						
Arsenic	04-001	mg/kg	1.3	8.2	7.2	7.3
Cadmium	04-001	mg/kg	<0.1	0.49	<0.1	<0.1
Chromium	04-001	mg/kg	100	47	40	39
Copper	04-001	mg/kg	40	32	30	30
Lead	04-001	mg/kg	1.3	19	15	16
Mercury	04-002	mg/kg	<0.01	0.24	0.1	0.12
Nickel	04-001	mg/kg	110	19	23	24
Phosphorus	04-001	mg/kg	240	660	700	830
Zinc	04-001	mg/kg	51	95	90	86
BTEX						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/29	/30	/31	/32
Client Reference:	-	-	9 - 1	9 - 2	9 - 4	10 - 1
Date Sampled:	-	-	14/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	69	56	58	55
Surrogate 2 Recovery	04-021	%	68	56	59	55
Surrogate 3 Recovery	04-021	%	78	64	66	59
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	110	63	79
TPHC29-36	04-020	mg/kg	<50	100	73	91
Surrogate Recovery	04-020	%	99	96	101	109
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
1-Methylnaphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
2-Methylnaphthalene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Acenaphthylene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Acenaphthene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Fluorene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Phenanthrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Anthracene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Fluoranthene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Pyrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Benz(a)anthracene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Chrysene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10	[NA]	[NA]	[NA]



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/29	/30	/31	/32
Client Reference:	-	-	9 - 1	9 - 2	9 - 4	10 - 1
Date Sampled:	-	-	14/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Benzo(a)pyrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Coronene	04-022	µg/kg	<10	[NA]	[NA]	[NA]
Benzo(e)pyrene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Perylene	04-022	µg/kg	<5	[NA]	[NA]	[NA]
Total PAHs (as above)	04-022	µg/kg	<100	[NA]	[NA]	[NA]
Surrogate 1 Recovery	04-022	%	77	[NA]	[NA]	[NA]
Surrogate 2 Recovery	04-022	%	79	[NA]	[NA]	[NA]
Surrogate 3 Recovery	04-022	%	100	[NA]	[NA]	[NA]
Date Extracted	04-022	-	19/12/2011	[NA]	[NA]	[NA]
Date Analysed	04-022	-	22/12/2011	[NA]	[NA]	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	17	2.0	2.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	10	3.0	4.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/29	/30	/31	/32
Client Reference:	-	-	9 - 1	9 - 2	9 - 4	10 - 1
Date Sampled:	-	-	14/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlorthane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	108	80	88	89
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	121	116	115	115
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/29	/30	/31	/32
Client Reference:	-	-	9 - 1	9 - 2	9 - 4	10 - 1
Date Sampled:	-	-	14/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Di-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Tri-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Tetra-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Penta-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Hexa-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Hepta-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Octa-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Nona-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Deca-PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Total PCB congeners	04-029	µg/kg	<5.0	[NA]	[NA]	[NA]
Surrogate 1 Recovery	04-029	%	111	[NA]	[NA]	[NA]
Surrogate 2 Recovery	04-029	%	108	[NA]	[NA]	[NA]
Date Extracted	04-029	-	19/12/2011	[NA]	[NA]	[NA]
Date Analysed	04-029	-	22/12/2011	[NA]	[NA]	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	0.90	0.90	1.1
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	0.80	1.2
Surrogate 1 Recovery	04-026	%	79	82	90	77
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	220	990	1,260	1,090
Total Kjeldahl Nitrogen	SUB	mg/kg	220	990	1,260	1,090
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.12	1.1	1.3	1.5
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		See Comments	[NA]	[NA]	[NA]
Total Actual Acidity	SUB	mol/T	See comments	[NA]	[NA]	[NA]



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/33	/34	/35	/36
Client Reference:	-	-	10 - 5	10 - 6	10 - 8	11 - 1
Date Sampled:	-	-	13/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	44.2	46.7	48.5	40.4
Trace Elements						
Arsenic	04-001	mg/kg	6.0	7.3	7.1	7.8
Cadmium	04-001	mg/kg	<0.1	<0.1	<0.1	<0.1
Chromium	04-001	mg/kg	34	35	38	38
Copper	04-001	mg/kg	25	27	30	25
Lead	04-001	mg/kg	13	14	16	7.7
Mercury	04-002	mg/kg	0.09	0.09	0.12	0.04
Nickel	04-001	mg/kg	22	21	24	21
Phosphorus	04-001	mg/kg	710	650	800	540
Zinc	04-001	mg/kg	68	75	81	50
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	48	57	59	66
Surrogate 2 Recovery	04-021	%	49	56	57	63
Surrogate 3 Recovery	04-021	%	54	62	60	71
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	51	60	53	<50
TPHC29-36	04-020	mg/kg	65	64	64	<50
Surrogate Recovery	04-020	%	112	88	97	88
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Poly Aromatic Hydrocarbons						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/33	/34	/35	/36
Client Reference:	-	-	10 - 5	10 - 6	10 - 8	11 - 1
Date Sampled:	-	-	13/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	[NA]	9.0	[NA]	[NA]
1-Methylnaphthalene	04-022	µg/kg	[NA]	5	[NA]	[NA]
2-Methylnaphthalene	04-022	µg/kg	[NA]	6	[NA]	[NA]
Acenaphthylene	04-022	µg/kg	[NA]	7.0	[NA]	[NA]
Acenaphthene	04-022	µg/kg	[NA]	9	[NA]	[NA]
Fluorene	04-022	µg/kg	[NA]	10	[NA]	[NA]
Phenanthrene	04-022	µg/kg	[NA]	50	[NA]	[NA]
Anthracene	04-022	µg/kg	[NA]	20	[NA]	[NA]
Fluoranthene	04-022	µg/kg	[NA]	200	[NA]	[NA]
Pyrene	04-022	µg/kg	[NA]	150	[NA]	[NA]
Benz(a)anthracene	04-022	µg/kg	[NA]	60	[NA]	[NA]
Chrysene	04-022	µg/kg	[NA]	60	[NA]	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	100	[NA]	[NA]
Benzo(a)pyrene	04-022	µg/kg	[NA]	73	[NA]	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	50	[NA]	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	10	[NA]	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	40	[NA]	[NA]
Coronene	04-022	µg/kg	[NA]	<10	[NA]	[NA]
Benzo(e)pyrene	04-022	µg/kg	[NA]	52	[NA]	[NA]
Perylene	04-022	µg/kg	[NA]	200	[NA]	[NA]
Total PAHs (as above)	04-022	µg/kg	[NA]	1,100	[NA]	[NA]
Surrogate 1 Recovery	04-022	%	[NA]	60	[NA]	[NA]
Surrogate 2 Recovery	04-022	%	[NA]	70	[NA]	[NA]
Surrogate 3 Recovery	04-022	%	[NA]	69	[NA]	[NA]
Date Extracted	04-022	-	[NA]	19/12/2011	[NA]	[NA]
Date Analysed	04-022	-	[NA]	22/12/2011	[NA]	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
cis-Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/33	/34	/35	/36
Client Reference:	-	-	10 - 5	10 - 6	10 - 8	11 - 1
Date Sampled:	-	-	13/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	4.0	3.0	5.0	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	6.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	90	64	80	98
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/33	/34	/35	/36
Client Reference:	-	-	10 - 5	10 - 6	10 - 8	11 - 1
Date Sampled:	-	-	13/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	121	90	110	112
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Di-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Tri-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Tetra-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Penta-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Hexa-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Hepta-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Octa-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Nona-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Deca-PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Total PCB congeners	04-029	µg/kg	[NA]	<5.0	[NA]	[NA]
Surrogate 1 Recovery	04-029	%	[NA]	85	[NA]	[NA]
Surrogate 2 Recovery	04-029	%	[NA]	80	[NA]	[NA]
Date Extracted	04-029	-	[NA]	19/12/2011	[NA]	[NA]
Date Analysed	04-029	-	[NA]	22/12/2011	[NA]	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	1.0	0.90	1.5	<0.50



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/33	/34	/35	/36
Client Reference:	-	-	10 - 5	10 - 6	10 - 8	11 - 1
Date Sampled:	-	-	13/12/2011	13/12/2011	13/12/2011	13/12/2011
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	1.2	1.7	2.1	<0.50
Surrogate 1 Recovery	04-026	%	81	82	58	70
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	950	940	1,170	730
Total Kjeldahl Nitrogen	SUB	mg/kg	950	940	1,170	730
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	1.5	1.5	1.5	0.97
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		[NA]	See Comments	[NA]	[NA]
Total Actual Acidity	SUB	mol/T	[NA]	See comments	[NA]	[NA]

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	38.6	36.9	44.1	37.7
Trace Elements						
Arsenic	04-001	mg/kg	8.7	5.5	6.5	7.0
Cadmium	04-001	mg/kg	<0.1	<0.1	<0.1	<0.1
Chromium	04-001	mg/kg	38	30	39	34
Copper	04-001	mg/kg	24	20	23	16
Lead	04-001	mg/kg	7.4	11	13	5.6
Mercury	04-002	mg/kg	0.04	0.09	0.08	0.04
Nickel	04-001	mg/kg	21	17	19	18
Phosphorus	04-001	mg/kg	450	500	520	400
Zinc	04-001	mg/kg	50	89	69	42
BTEX						



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	69	62	61	71
Surrogate 2 Recovery	04-021	%	70	58	62	75
Surrogate 3 Recovery	04-021	%	77	66	70	83
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	<50	<50	<50	<50
TPHC29-36	04-020	mg/kg	<50	<50	<50	<50
Surrogate Recovery	04-020	%	94	98	90	98
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	20/12/2011	21/12/2011	21/12/2011	21/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Acenaphthene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Fluorene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Phenanthrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	7
Pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	5
Chrysene	04-022	µg/kg	[NA]	[NA]	[NA]	7
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	8
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	[NA]	5
Coronene	04-022	µg/kg	[NA]	[NA]	[NA]	<10
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	7.0
Perylene	04-022	µg/kg	[NA]	[NA]	[NA]	90
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	[NA]	160
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	[NA]	81
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	[NA]	87
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	[NA]	104
Date Extracted	04-022	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-022	-	[NA]	[NA]	[NA]	22/12/2011
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	3.0	2.0	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlorthane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	99	95	87	105
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	116	122	110	120
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	[NA]	117
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	[NA]	110
Date Extracted	04-029	-	[NA]	[NA]	[NA]	19/12/2011
Date Analysed	04-029	-	[NA]	[NA]	[NA]	22/12/2011
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	0.60	1.1	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50	0.90	1.2	<0.50
Surrogate 1 Recovery	04-026	%	75	84	79	75
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	590	690	640	330
Total Kjeldahl Nitrogen	SUB	mg/kg	590	690	640	330
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	0.97	0.96	0.71	0.50
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		[NA]	[NA]	[NA]	See Comments
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	[NA]	See comments



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/37	/38	/39	/40
Client Reference:	-	-	11 - 3	11 - 4	11 - 5	11 - 8
Date Sampled:	-	-	12/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Gross Alpha	SUB	mBq/g	[NA]	[NA]	[NA]	<60
Gross Beta	SUB	mBq/g	[NA]	[NA]	[NA]	<135

Laboratory Reference:	-	-	/41	/42	/43	/44
Client Reference:	-	-	11 - 9	6 - 2	6 - 3	7 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	51.4	41.7	47.3	40.6
Trace Elements						
Arsenic	04-001	mg/kg	8.2	5.7	7.4	5.3
Cadmium	04-001	mg/kg	0.10	0.13	0.11	<0.1
Chromium	04-001	mg/kg	38	37	37	29
Copper	04-001	mg/kg	31	23	30	21
Lead	04-001	mg/kg	15	11	16	11
Mercury	04-002	mg/kg	0.11	0.07	0.11	0.07
Nickel	04-001	mg/kg	22	20	23	15
Phosphorus	04-001	mg/kg	690	850	790	470
Zinc	04-001	mg/kg	79	70	85	64
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	56	69	59	61
Surrogate 2 Recovery	04-021	%	52	63	55	60
Surrogate 3 Recovery	04-021	%	53	66	55	66
Date Extracted	04-021	-	16/12/2011	16/12/2011	16/12/2011	16/12/2011
Date Analysed	04-021	-	20/12/2011	20/12/2011	20/12/2011	20/12/2011



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/41	/42	/43	/44
Client Reference:	-	-	11 - 9	6 - 2	6 - 3	7 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	55	<50	52	<50
TPHC29-36	04-020	mg/kg	65	<50	70	<50
Surrogate Recovery	04-020	%	#	103	105	108
Date Extracted	04-020	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-020	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	[NA]	[NA]	7.0	<5
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	<5	<5
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	<5	<5
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	10	<5
Acenaphthene	04-022	µg/kg	[NA]	[NA]	7	<5
Fluorene	04-022	µg/kg	[NA]	[NA]	9	<5
Phenanthrene	04-022	µg/kg	[NA]	[NA]	70	20
Anthracene	04-022	µg/kg	[NA]	[NA]	20	8
Fluoranthene	04-022	µg/kg	[NA]	[NA]	300	90
Pyrene	04-022	µg/kg	[NA]	[NA]	250	84
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	100	30
Chrysene	04-022	µg/kg	[NA]	[NA]	100	100
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	200	100
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	110	40
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	80	30
Dibenzo(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	12	7
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	90	30
Coronene	04-022	µg/kg	[NA]	[NA]	12	<10
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	77	40
Perylene	04-022	µg/kg	[NA]	[NA]	300	90
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	1,740	690
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	84	87
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	95	99
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	99	106



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/41	/42	/43	/44
Client Reference:	-	-	11 - 9	6 - 2	6 - 3	7 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Date Extracted	04-022	-	[NA]	[NA]	19/12/2011	19/12/2011
Date Analysed	04-022	-	[NA]	[NA]	22/12/2011	22/12/2011
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	2.0	<1.0	3.0	4.0
<i>p,p'</i> -DDE	04-023	µg/kg	4.0	2.0	4.0	3.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	96	102	95	104
Date Extracted	04-023	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-023	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/41	/42	/43	/44
Client Reference:	-	-	11 - 9	6 - 2	6 - 3	7 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	117	121	115	131
Date Extracted	04-024	-	19/12/2011	19/12/2011	19/12/2011	19/12/2011
Date Analysed	04-024	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/41	/42	/43	/44
Client Reference:	-	-	11 - 9	6 - 2	6 - 3	7 - 1
Date Sampled:	-	-	14/12/2011	14/12/2011	14/12/2011	14/12/2011
Analysis Description	Method	Units				
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	<5.0
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	120	123
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	110	113
Date Extracted	04-029	-	[NA]	[NA]	19/12/2011	19/12/2011
Date Analysed	04-029	-	[NA]	[NA]	22/12/2011	22/12/2011
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	0.90	2.2	1.3	1.5
Tributyl tin	04-026	µgSn/kg	1.1	6.4	1.4	2.5
Surrogate 1 Recovery	04-026	%	82	75	81	83
Date Extracted	04-026	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-026	-	22/12/2011	22/12/2011	22/12/2011	22/12/2011
Subcontract Analysis						
Total Nitrogen	SUB	mg/kg	1,070	440	1,150	530
Total Kjeldahl Nitrogen	SUB	mg/kg	1,070	440	1,150	530
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	0.1	<0.1	<0.1
Total Organic Carbon	SUB	%	1.5	0.74	1.5	0.95
Particle Size Distribution	SUB		See comments	See comments	See comments	See comments
Chromium Reducible Suite	SUB		[NA]	[NA]	See Comments	See Comments
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	See comments	See comments
Gross Alpha	SUB	mBq/g	[NA]	[NA]	<60	<60
Gross Beta	SUB	mBq/g	[NA]	[NA]	<135	<135



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/45
Client Reference:	-	-	8 - 1
Date Sampled:	-	-	14/12/2011
Analysis Description	Method	Units	
Moisture Content			
Moisture Content	04-004	%	56.1
Trace Elements			
Arsenic	04-001	mg/kg	7.8
Cadmium	04-001	mg/kg	<0.1
Chromium	04-001	mg/kg	44
Copper	04-001	mg/kg	36
Lead	04-001	mg/kg	17
Mercury	04-002	mg/kg	0.13
Nickel	04-001	mg/kg	21
Phosphorus	04-001	mg/kg	700
Zinc	04-001	mg/kg	98
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	%	61
Surrogate 2 Recovery	04-021	%	60
Surrogate 3 Recovery	04-021	%	64
Date Extracted	04-021	-	16/12/2011
Date Analysed	04-021	-	20/12/2011
Total Petroleum Hydrocarbons			
TPHC6-C9	04-021	mg/kg	<10
TPHC10-14	04-020	mg/kg	<10
TPHC15-28	04-020	mg/kg	56
TPHC29-36	04-020	mg/kg	67
Surrogate Recovery	04-020	%	95
Date Extracted	04-020	-	19/12/2011
Date Analysed	04-020	-	21/12/2011
Poly Aromatic Hydrocarbons			



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/45
Client Reference:	-	-	8 - 1
Date Sampled:	-	-	14/12/2011
Analysis Description	Method	Units	
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	20
Anthracene	04-022	µg/kg	8
Fluoranthene	04-022	µg/kg	80
Pyrene	04-022	µg/kg	78
Benz(a)anthracene	04-022	µg/kg	30
Chrysene	04-022	µg/kg	40
Benzo(b)&(k)fluoranthene	04-022	µg/kg	90
Benzo(a)pyrene	04-022	µg/kg	44
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	30
Dibenz(a,h)anthracene	04-022	µg/kg	8
Benzo(g,h,i)perylene	04-022	µg/kg	30
Coronene	04-022	µg/kg	<10
Benzo(e)pyrene	04-022	µg/kg	38
Perylene	04-022	µg/kg	300
Total PAHs (as above)	04-022	µg/kg	770
Surrogate 1 Recovery	04-022	%	83
Surrogate 2 Recovery	04-022	%	99
Surrogate 3 Recovery	04-022	%	102
Date Extracted	04-022	-	19/12/2011
Date Analysed	04-022	-	22/12/2011
Organochlorine Pesticides			
Aldrin	04-023	µg/kg	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/45
Client Reference:	-	-	8 - 1
Date Sampled:	-	-	14/12/2011
Analysis Description	Method	Units	
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	3.0
<i>p,p'</i> -DDE	04-023	µg/kg	3.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0
Dieldrin	04-023	µg/kg	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0
<i>beta</i> -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
Oxychlordane	04-023	µg/kg	<1.0
Surrogate Recovery	04-023	%	100
Date Extracted	04-023	-	19/12/2011
Date Analysed	04-023	-	22/12/2011
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
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



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/45
Client Reference:	-	-	8 - 1
Date Sampled:	-	-	14/12/2011
Analysis Description	Method	Units	
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
Fenchlorvos	04-024	µg/kg	<20
Mevinphos	04-024	µg/kg	<20
Trifluralin	04-024	µg/kg	<20
Surrogate Recovery	04-024	%	127
Date Extracted	04-024	-	19/12/2011
Date Analysed	04-024	-	22/12/2011
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	%	121
Surrogate 2 Recovery	04-029	%	112
Date Extracted	04-029	-	19/12/2011
Date Analysed	04-029	-	22/12/2011
Organotins			
Monobutyl tin	04-026	µgSn/kg	<0.50
Dibutyl tin	04-026	µgSn/kg	2.7



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/45
Client Reference:	-	-	8 - 1
Date Sampled:	-	-	14/12/2011
Analysis Description	Method	Units	
Tributyl tin	04-026	µgSn/kg	1.7
Surrogate 1 Recovery	04-026	%	73
Date Extracted	04-026	-	21/12/2011
Date Analysed	04-026	-	22/12/2011
Subcontract Analysis			
Total Nitrogen	SUB	mg/kg	1,170
Total Kjeldahl Nitrogen	SUB	mg/kg	1,170
Nitrate as N	SUB	mg/kg	<0.1
Nitrite as N	SUB	mg/kg	<0.1
Total Organic Carbon	SUB	%	1.4
Particle Size Distribution	SUB		See comments
Chromium Reducible Suite	SUB		See Comments
Total Actual Acidity	SUB	mol/T	See comments
Gross Alpha	SUB	mBq/g	<60
Gross Beta	SUB	mBq/g	<135

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	TRH C6-9 & BTEX by P&T GCMS, mg/kg
04-020	TRH 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

- Spike recovery for P could not be accurately determined due to a significant background analyte concentration. Monobutyltin spike recovery biased low due to matrix interferences.

- Spike recovery for PAH's in sample #5 not included due to a significant background analyte concentration. Duplicate failed due to sample heterogeneity.

Analysis was subcontracted to Sydney Analytical Laboratories (NATA Number 1884); ref SAL report number SAL23909.

CRS / TAA analysis was subcontracted to Envirolab Services (NATA Number 2901); ref Envirolab certificate number 66660.

Radionuclides (Gross Alpha/Beta Analysis) was subcontracted to Western Radiation Services (NATA # 14174); ref report number WRS-J6701.

PSD analysis was subcontracted to Golder Associates (NATA Number 1446); see attached Golder job number 117634002/2.



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	<0.4	A11/5962-A-1	13 13 RPD: 0	A11/5962-A-1	113%
Cadmium	mg/kg	<0.1	A11/5962-A-1	<0.1 <0.1	A11/5962-A-1	116%
Chromium	mg/kg	<0.1	A11/5962-A-1	43 43 RPD: 0	A11/5962-A-1	86%
Copper	mg/kg	<0.1	A11/5962-A-1	5.4 5.4 RPD: 0	A11/5962-A-1	110%
Lead	mg/kg	<0.5	A11/5962-A-1	1.4 1.3 RPD: 7	A11/5962-A-1	80%
Mercury	mg/kg	<0.01	A11/5962-A-1	<0.01 <0.01	A11/5962-A-1	116%
Nickel	mg/kg	<0.1	A11/5962-A-1	15 15 RPD: 0	A11/5962-A-1	80%
Phosphorus	mg/kg	<1	A11/5962-A-1	220 220 RPD: 0	A11/5962-A-1	102%
Zinc	mg/kg	<0.5	A11/5962-A-1	8.5 8.5 RPD: 0	A11/5962-A-1	78%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	A11/5962-A-1	<0.20 <0.20	External	92%
Toluene	mg/kg	<0.20	A11/5962-A-1	<0.20 <0.20	External	94%
Ethyl Benzene	mg/kg	<0.20	A11/5962-A-1	<0.20 <0.20	External	93%
m+p xylenes	mg/kg	<0.40	A11/5962-A-1	<0.40 <0.40	External	92%
o-xylene	mg/kg	<0.20	A11/5962-A-1	<0.20 <0.20	External	92%
Total BTEX	mg/kg	<1.2	A11/5962-A-1	<1.2 <1.2	External	[NA]
Surrogate 1 Recovery	%	98	A11/5962-A-1	69 68 RPD: 1	External	87%
Surrogate 2 Recovery	%	90	A11/5962-A-1	65 50 RPD: 26	External	89%
Surrogate 3 Recovery	%	91	A11/5962-A-1	70 54 RPD: 26	External	94%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	<10	A11/5962-A-1	<10 <10	External	91%
TPHC10-14	mg/kg	<10	A11/5962-A-1	<10 [NT]	External	94%
TPHC15-28	mg/kg	<50	A11/5962-A-1	<50 [NT]	External	101%
TPHC29-36	mg/kg	<50	A11/5962-A-1	<50 [NT]	External	97%
Surrogate Recovery	%	101	A11/5962-A-1	102 54 RPD: 62	External	100%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	A11/5962-A-5	<5 <5	A11/5962-A-5	90%
1-Methylnaphthalene	µg/kg	<5	A11/5962-A-5	<5 <5	A11/5962-A-5	100%
2-Methylnaphthalene	µg/kg	<5	A11/5962-A-5	<5 <5	A11/5962-A-5	99%
Acenaphthylene	µg/kg	<5	A11/5962-A-5	32 <5	A11/5962-A-5	#
Acenaphthene	µg/kg	<5	A11/5962-A-5	5 <5	A11/5962-A-5	79%
Fluorene	µg/kg	<5	A11/5962-A-5	7 <5	A11/5962-A-5	94%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Phenanthrene	µg/kg	<5	A11/5962-A-5	200 10 RPD: 181	A11/5962-A-5	#
Anthracene	µg/kg	<5	A11/5962-A-5	40 6 RPD: 148	A11/5962-A-5	85%
Fluoranthene	µg/kg	<5	A11/5962-A-5	3200 70 RPD: 191	A11/5962-A-5	#
Pyrene	µg/kg	<5	A11/5962-A-5	2400 140 RPD: 178	A11/5962-A-5	#
Benz(a)anthracene	µg/kg	<5	A11/5962-A-5	100 30 RPD: 108	A11/5962-A-5	82%
Chrysene	µg/kg	<5	A11/5962-A-5	800 50 RPD: 176	A11/5962-A-5	#
Benzo(b)&(k)fluoranthene	µg/kg	<10	A11/5962-A-5	900 80 RPD: 167	A11/5962-A-5	#
Benzo(a)pyrene	µg/kg	<5	A11/5962-A-5	190 38 RPD: 133	A11/5962-A-5	97%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	A11/5962-A-5	200 30 RPD: 148	A11/5962-A-5	#
Dibenz(a,h)anthracene	µg/kg	<5	A11/5962-A-5	19 8 RPD: 81	A11/5962-A-5	114%
Benzo(g,h,i)perylene	µg/kg	<5	A11/5962-A-5	100 30 RPD: 108	A11/5962-A-5	#
Coronene	µg/kg	<10	A11/5962-A-5	18 <10	A11/5962-A-5	80%
Benzo(e)pyrene	µg/kg	<5	A11/5962-A-5	260 36 RPD: 151	A11/5962-A-5	#
Perylene	µg/kg	<5	A11/5962-A-5	100 100 RPD: 0	A11/5962-A-5	76%
Total PAHs (as above)	µg/kg	<100	A11/5962-A-5	8490 640 RPD: 172	A11/5962-A-5	80%
Surrogate 1 Recovery	%	101	A11/5962-A-5	78 88 RPD: 12	A11/5962-A-5	63%
Surrogate 2 Recovery	%	73	A11/5962-A-5	92 101 RPD: 9	A11/5962-A-5	89%
Surrogate 3 Recovery	%	99	A11/5962-A-5	89 104 RPD: 16	A11/5962-A-5	86%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	76%
<i>alpha</i> -BHC	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	102%
<i>beta</i> -BHC	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	118%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	113%
<i>delta</i> -BHC	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	109%
<i>cis</i> -Chlordane	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	90%
<i>trans</i> -Chlordane	µg/kg	<1.0	A11/5962-A-5	1.0 <1.0	A11/5962-A-5	92%
<i>p,p'</i> -DDD	µg/kg	<1.0	A11/5962-A-5	<1.0 4.0	A11/5962-A-5	106%
<i>p,p'</i> -DDE	µg/kg	<1.0	A11/5962-A-5	2.0 2.0 RPD: 0	A11/5962-A-5	96%
<i>p,p'</i> -DDT	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	86%
Dieldrin	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	95%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	87%
<i>beta</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	102%
Endosulfan Sulphate	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	93%
Endrin	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	96%
Endrin ketone	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	106%
Endrin aldehyde	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	82%
Heptachlor	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	102%
Heptachlor epoxide	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	94%
Hexachlorobenzene	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	90%
Methoxychlor	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	103%
Oxychlordane	µg/kg	<1.0	A11/5962-A-5	<1.0 <1.0	A11/5962-A-5	NT



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Surrogate Recovery	%	83	A11/5962-A-5	88 103 RPD: 16	A11/5962-A-5	89%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	98%
Demeton-S-methyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	117%
Dimethoate	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	115%
Diazinon	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	93%
Chlorpyrifos-methyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	103%
Parathion-methyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	125%
Pirimiphos-methyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	104%
Fenitrothion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	123%
Malathion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	95%
Chlorpyrifos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	94%
Fenthion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	96%
Parathion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	133%
Chlorfenvinphos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	107%
Bromophos-ethyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	100%
Methidathion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	124%
Fenamiphos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	120%
Prothiofos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	89%
Ethion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	108%
Carbophenothion	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	108%
Phosalone	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	112%
Azinphos-methyl	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	113%
Fenchlorvos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	90%
Mevinphos	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	104%
Trifluralin	µg/kg	<20	A11/5962-A-5	<20 <20	A11/5962-A-5	123%
Surrogate Recovery	%	92	A11/5962-A-5	114 130 RPD: 13	A11/5962-A-5	92%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	94%
Di-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	101%
Tri-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	97%
Tetra-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	106%
Penta-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	100%
Hexa-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	97%
Hepta-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	96%
Octa-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	99%
Nona-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	99%
Deca-PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	96%
Total PCB congeners	µg/kg	<5.0	A11/5962-A-5	<5.0 <5.0	A11/5962-A-5	99%
Surrogate 1 Recovery	%	88	A11/5962-A-5	121 124 RPD: 2	A11/5962-A-5	110%
Surrogate 2 Recovery	%	91	A11/5962-A-5	110 113 RPD: 3	A11/5962-A-5	99%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Monobutyl tin	µgSn/kg	<0.50	A11/5962-A-1	<0.50 <0.50	A11/5962-A-1	13%
Dibutyl tin	µgSn/kg	<0.50	A11/5962-A-1	<0.50 <0.50	A11/5962-A-1	86%
Tributyl tin	µgSn/kg	<0.50	A11/5962-A-1	<0.50 <0.50	A11/5962-A-1	89%
Surrogate 1 Recovery	%	94	A11/5962-A-1	77 82 RPD: 6	A11/5962-A-1	72%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results
Total Actual Acidity	mol/T	NT	[NT]	[NT]

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	<0.4	A11/5962-A-11	16 16 RPD: 0	A11/5962-A-24	NT
Cadmium	mg/kg	<0.1	A11/5962-A-11	<0.1 <0.1	A11/5962-A-24	NT
Chromium	mg/kg	<0.1	A11/5962-A-11	39 39 RPD: 0	A11/5962-A-24	NT
Copper	mg/kg	<0.1	A11/5962-A-11	4.7 4.6 RPD: 2	A11/5962-A-24	NT
Lead	mg/kg	<0.5	A11/5962-A-11	1.3 1.2 RPD: 8	A11/5962-A-24	NT
Mercury	mg/kg	<0.01	A11/5962-A-11	<0.01 <0.01	A11/5962-A-24	104%
Nickel	mg/kg	<0.1	A11/5962-A-11	13 13 RPD: 0	A11/5962-A-24	NT
Phosphorus	mg/kg	<1	A11/5962-A-11	280 280 RPD: 0	A11/5962-A-24	NT
Zinc	mg/kg	<0.5	A11/5962-A-11	6.5 6.5 RPD: 0	A11/5962-A-24	NT



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	A11/5962-A-11	<0.20 <0.20	External	93%
Toluene	mg/kg	<0.20	A11/5962-A-11	<0.20 <0.20	External	95%
Ethyl Benzene	mg/kg	<0.20	A11/5962-A-11	<0.20 <0.20	External	94%
m+p xylenes	mg/kg	<0.40	A11/5962-A-11	<0.40 <0.40	External	92%
o-xylene	mg/kg	<0.20	A11/5962-A-11	<0.20 <0.20	External	95%
Total BTEX	mg/kg	<1.2	A11/5962-A-11	<1.2 <1.2	External	[NA]
Surrogate 1 Recovery	%	101	A11/5962-A-11	64 54 RPD: 17	External	90%
Surrogate 2 Recovery	%	93	A11/5962-A-11	60 50 RPD: 18	External	90%
Surrogate 3 Recovery	%	97	A11/5962-A-11	65 57 RPD: 13	External	98%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	<10	A11/5962-A-11	<10 <10	External	92%
TPHC10-14	mg/kg	<10	A11/5962-A-11	<10 <10	External	88%
TPHC15-28	mg/kg	<50	A11/5962-A-11	<50 110	External	94%
TPHC29-36	mg/kg	<50	A11/5962-A-11	<50 89	External	86%
Surrogate Recovery	%	97	A11/5962-A-11	90 102 RPD: 12	External	86%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	87%
1-Methylnaphthalene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	93%
2-Methylnaphthalene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	93%
Acenaphthylene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	88%
Acenaphthene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	86%
Fluorene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	102%
Phenanthrene	µg/kg	<5	A11/5962-A-25	<5 5	A11/5962-A-25	93%
Anthracene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	99%
Fluoranthene	µg/kg	<5	A11/5962-A-25	20 20 RPD: 0	A11/5962-A-25	132%
Pyrene	µg/kg	<5	A11/5962-A-25	23 24 RPD: 4	A11/5962-A-25	112%
Benz(a)anthracene	µg/kg	<5	A11/5962-A-25	9 7 RPD: 25	A11/5962-A-25	91%
Chrysene	µg/kg	<5	A11/5962-A-25	10 10 RPD: 0	A11/5962-A-25	109%
Benzo(b)&(k)fluoranthene	µg/kg	<10	A11/5962-A-25	30 30 RPD: 0	A11/5962-A-25	101%
Benzo(a)pyrene	µg/kg	<5	A11/5962-A-25	13 12 RPD: 8	A11/5962-A-25	101%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	A11/5962-A-25	10 8 RPD: 22	A11/5962-A-25	121%
Dibenz(a,h)anthracene	µg/kg	<5	A11/5962-A-25	<5 <5	A11/5962-A-25	119%
Benzo(g,h,i)perylene	µg/kg	<5	A11/5962-A-25	10 10 RPD: 0	A11/5962-A-25	94%
Coronene	µg/kg	<10	A11/5962-A-25	<10 <10	A11/5962-A-25	99%
Benzo(e)pyrene	µg/kg	<5	A11/5962-A-25	12 12 RPD: 0	A11/5962-A-25	111%
Perylene	µg/kg	<5	A11/5962-A-25	60 60 RPD: 0	A11/5962-A-25	85%
Total PAHs (as above)	µg/kg	<100	A11/5962-A-25	200 210 RPD: 5	A11/5962-A-25	101%
Surrogate 1 Recovery	%	118	A11/5962-A-25	80 70 RPD: 13	A11/5962-A-25	71%
Surrogate 2 Recovery	%	79	A11/5962-A-25	88 79 RPD: 11	A11/5962-A-25	96%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Surrogate 3 Recovery	%	106	A11/5962-A-25	100 89 RPD: 12	A11/5962-A-25	102%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	83%
<i>alpha</i> -BHC	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	103%
<i>beta</i> -BHC	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	105%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	109%
<i>delta</i> -BHC	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	97%
<i>cis</i> -Chlordane	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	98%
<i>trans</i> -Chlordane	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	99%
<i>p,p'</i> -DDD	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	115%
<i>p,p'</i> -DDE	µg/kg	<1.0	A11/5962-A-11	3.0 3.0 RPD: 0	A11/5962-A-25	102%
<i>p,p'</i> -DDT	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	79%
Dieldrin	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	102%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	92%
<i>beta</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	103%
Endosulfan Sulphate	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	94%
Endrin	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	100%
Endrin ketone	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	84%
Endrin aldehyde	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	94%
Heptachlor	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	99%
Heptachlor epoxide	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	102%
Hexachlorobenzene	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	92%
Methoxychlor	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	96%
Oxychlordane	µg/kg	<1.0	A11/5962-A-11	<1.0 <1.0	A11/5962-A-25	NT
Surrogate Recovery	%	97	A11/5962-A-11	91 94 RPD: 3	A11/5962-A-25	98%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	106%
Demeton-S-methyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	117%
Dimethoate	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	120%
Diazinon	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	98%
Chlorpyrifos-methyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	108%
Parathion-methyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	136%
Pirimiphos-methyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	110%
Fenitrothion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	127%
Malathion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	100%
Chlorpyrifos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	100%
Fenthion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	101%
Parathion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	138%
Chlorfenvinphos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	119%
Bromophos-ethyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	105%
Methidathion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	129%
Fenamiphos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	130%
Prothiofos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	96%
Ethion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	109%
Carbophenothion	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	121%
Phosalone	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	112%
Azinphos-methyl	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	109%
Fenchlorvos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	94%
Mevinphos	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	102%
Trifluralin	µg/kg	<20	A11/5962-A-11	<20 <20	A11/5962-A-25	133%
Surrogate Recovery	%	104	A11/5962-A-11	125 115 RPD: 8	A11/5962-A-25	117%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	96%
Di-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	123%
Tri-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	104%
Tetra-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	110%
Penta-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	101%
Hexa-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	98%
Hepta-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	96%
Octa-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	99%
Nona-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	101%
Deca-PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	98%
Total PCB congeners	µg/kg	<5.0	A11/5962-A-25	<5.0 <5.0	A11/5962-A-25	102%
Surrogate 1 Recovery	%	103	A11/5962-A-25	115 101 RPD: 13	A11/5962-A-25	118%
Surrogate 2 Recovery	%	99	A11/5962-A-25	109 97 RPD: 12	A11/5962-A-25	107%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	NT	A11/5962-A-21	9.1 8.9 RPD: 2	A11/5962-A-42	94%
Cadmium	mg/kg	NT	A11/5962-A-21	<0.1 <0.1	A11/5962-A-42	105%
Chromium	mg/kg	NT	A11/5962-A-21	40 40 RPD: 0	A11/5962-A-42	86%
Copper	mg/kg	NT	A11/5962-A-21	16 16 RPD: 0	A11/5962-A-42	103%
Lead	mg/kg	NT	A11/5962-A-21	6.6 6.6 RPD: 0	A11/5962-A-42	78%
Mercury	mg/kg	NT	A11/5962-A-21	0.03 0.03 RPD: 0	A11/5962-A-42	90%
Nickel	mg/kg	NT	A11/5962-A-21	21 21 RPD: 0	A11/5962-A-42	80%
Phosphorus	mg/kg	NT	A11/5962-A-21	450 450 RPD: 0	A11/5962-A-42	#
Zinc	mg/kg	NT	A11/5962-A-21	47 47 RPD: 0	A11/5962-A-42	75%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	A11/5962-A-21	<0.20 <0.20	External	89%
Toluene	mg/kg	<0.20	A11/5962-A-21	<0.20 <0.20	External	89%
Ethyl Benzene	mg/kg	<0.20	A11/5962-A-21	<0.20 <0.20	External	87%
m+p xylenes	mg/kg	<0.40	A11/5962-A-21	<0.40 <0.40	External	87%
o-xylene	mg/kg	<0.20	A11/5962-A-21	<0.20 <0.20	External	88%
Total BTEX	mg/kg	<1.2	A11/5962-A-21	<1.2 <1.2	External	[NA]
Surrogate 1 Recovery	%	81	A11/5962-A-21	63 52 RPD: 19	External	92%
Surrogate 2 Recovery	%	82	A11/5962-A-21	63 52 RPD: 19	External	88%
Surrogate 3 Recovery	%	87	A11/5962-A-21	69 61 RPD: 12	External	88%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	<10	A11/5962-A-21	<10 <10	External	89%
TPHC10-14	mg/kg	<10	A11/5962-A-21	<10 [NT]	External	98%
TPHC15-28	mg/kg	<50	A11/5962-A-21	<50 [NT]	External	105%
TPHC29-36	mg/kg	<50	A11/5962-A-21	<50 [NT]	External	99%
Surrogate Recovery	%	88	A11/5962-A-21	94 61 RPD: 43	External	100%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	89%
1-Methylnaphthalene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	100%
2-Methylnaphthalene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	98%
Acenaphthylene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	91%
Acenaphthene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	89%
Fluorene	µg/kg	<5	A11/5962-A-45	<5 <5	A11/5962-A-45	98%
Phenanthrene	µg/kg	<5	A11/5962-A-45	20 20 RPD: 0	A11/5962-A-45	86%
Anthracene	µg/kg	<5	A11/5962-A-45	8 7 RPD: 13	A11/5962-A-45	92%
Fluoranthene	µg/kg	<5	A11/5962-A-45	80 70 RPD: 13	A11/5962-A-45	134%
Pyrene	µg/kg	<5	A11/5962-A-45	78 68 RPD: 14	A11/5962-A-45	107%
Benz(a)anthracene	µg/kg	<5	A11/5962-A-45	30 20 RPD: 40	A11/5962-A-45	103%
Chrysene	µg/kg	<5	A11/5962-A-45	40 30 RPD: 29	A11/5962-A-45	111%
Benzo(b)&(k)fluoranthene	µg/kg	<10	A11/5962-A-45	90 70 RPD: 25	A11/5962-A-45	96%
Benzo(a)pyrene	µg/kg	<5	A11/5962-A-45	44 37 RPD: 17	A11/5962-A-45	88%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	A11/5962-A-45	30 30 RPD: 0	A11/5962-A-45	119%
Dibenz(a,h)anthracene	µg/kg	<5	A11/5962-A-45	8 6 RPD: 29	A11/5962-A-45	116%
Benzo(g,h,i)perylene	µg/kg	<5	A11/5962-A-45	30 30 RPD: 0	A11/5962-A-45	98%
Coronene	µg/kg	<10	A11/5962-A-45	<10 <10	A11/5962-A-45	93%
Benzo(e)pyrene	µg/kg	<5	A11/5962-A-45	38 33 RPD: 14	A11/5962-A-45	93%
Perylene	µg/kg	<5	A11/5962-A-45	300 300 RPD: 0	A11/5962-A-45	66%
Total PAHs (as above)	µg/kg	<100	A11/5962-A-45	770 690 RPD: 11	A11/5962-A-45	98%
Surrogate 1 Recovery	%	133	A11/5962-A-45	83 78 RPD: 6	A11/5962-A-45	65%
Surrogate 2 Recovery	%	80	A11/5962-A-45	99 97 RPD: 2	A11/5962-A-45	92%
Surrogate 3 Recovery	%	104	A11/5962-A-45	102 100 RPD: 2	A11/5962-A-45	91%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	79%
<i>alpha</i> -BHC	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	106%
<i>beta</i> -BHC	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	110%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	113%
<i>delta</i> -BHC	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	93%
<i>cis</i> -Chlordane	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	93%
<i>trans</i> -Chlordane	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	112%
<i>p,p'</i> -DDD	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	110%
<i>p,p'</i> -DDE	µg/kg	<1.0	A11/5962-A-25	2.0 1.0 RPD: 67	A11/5962-A-45	98%
<i>p,p'</i> -DDT	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	82%
Dieldrin	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	99%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	93%
<i>beta</i> -Endosulfan	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	97%
Endosulfan Sulphate	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	93%
Endrin	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	101%
Endrin ketone	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	80%
Endrin aldehyde	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	96%
Heptachlor	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	93%
Heptachlor epoxide	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	96%
Hexachlorobenzene	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	91%
Methoxychlor	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	80%
Oxychlordane	µg/kg	<1.0	A11/5962-A-25	<1.0 <1.0	A11/5962-A-45	NT
Surrogate Recovery	%	104	A11/5962-A-25	98 87 RPD: 12	A11/5962-A-45	91%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	99%
Demeton-S-methyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	123%
Dimethoate	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	123%
Diazinon	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	97%
Chlorpyrifos-methyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	107%
Parathion-methyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	128%
Pirimiphos-methyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	109%
Fenitrothion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	128%
Malathion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	102%
Chlorpyrifos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	99%
Fenthion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	101%
Parathion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	127%
Chlorfenvinphos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	122%
Bromophos-ethyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	87%
Methidathion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	140%
Fenamiphos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	128%
Prothiofos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	93%
Ethion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	113%
Carbophenothion	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	125%
Phosalone	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	119%
Azinphos-methyl	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	103%
Fenchlorvos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	92%
Mevinphos	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	108%
Trifluralin	µg/kg	<20	A11/5962-A-25	<20 <20	A11/5962-A-45	132%
Surrogate Recovery	%	115	A11/5962-A-25	114 104 RPD: 9	A11/5962-A-45	121%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	96%
Di-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	116%
Tri-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	97%
Tetra-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	109%
Penta-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	98%
Hexa-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	99%
Hepta-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	96%
Octa-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	100%
Nona-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	100%
Deca-PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	98%
Total PCB congeners	µg/kg	<5.0	A11/5962-A-45	<5.0 <5.0	A11/5962-A-45	101%
Surrogate 1 Recovery	%	109	A11/5962-A-45	121 120 RPD: 1	A11/5962-A-45	112%
Surrogate 2 Recovery	%	109	A11/5962-A-45	112 108 RPD: 4	A11/5962-A-45	98%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Arsenic	mg/kg	[NT]	A11/5962-A-31	7.2 7.1 RPD: 1
Cadmium	mg/kg	[NT]	A11/5962-A-31	<0.1 <0.1
Chromium	mg/kg	[NT]	A11/5962-A-31	40 40 RPD: 0
Copper	mg/kg	[NT]	A11/5962-A-31	30 30 RPD: 0
Lead	mg/kg	[NT]	A11/5962-A-31	15 15 RPD: 0
Mercury	mg/kg	[NT]	A11/5962-A-31	0.1 0.09 RPD: 11
Nickel	mg/kg	[NT]	A11/5962-A-31	23 23 RPD: 0
Phosphorus	mg/kg	[NT]	A11/5962-A-31	700 700 RPD: 0
Zinc	mg/kg	[NT]	A11/5962-A-31	90 91 RPD: 1

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	A11/5962-A-31	<0.20 <0.20	A11/5962-A-1	65%
Toluene	mg/kg	[NT]	A11/5962-A-31	<0.20 <0.20	A11/5962-A-1	70%
Ethyl Benzene	mg/kg	[NT]	A11/5962-A-31	<0.20 <0.20	A11/5962-A-1	72%
m+p xylenes	mg/kg	[NT]	A11/5962-A-31	<0.40 <0.40	A11/5962-A-1	76%
o-xylene	mg/kg	[NT]	A11/5962-A-31	<0.20 <0.20	A11/5962-A-1	71%
Total BTEX	mg/kg	[NT]	A11/5962-A-31	<1.2 <1.2	A11/5962-A-1	[NA]
Surrogate 1 Recovery	%	[NT]	A11/5962-A-31	58 53 RPD: 9	A11/5962-A-1	63%
Surrogate 2 Recovery	%	[NT]	A11/5962-A-31	59 53 RPD: 11	A11/5962-A-1	64%
Surrogate 3 Recovery	%	[NT]	A11/5962-A-31	66 59 RPD: 11	A11/5962-A-1	68%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/5962-A-31	<10 <10	A11/5962-A-1	63%
TPHC10-14	mg/kg	[NT]	A11/5962-A-31	<10 <10	A11/5962-A-1	92%
TPHC15-28	mg/kg	[NT]	A11/5962-A-31	63 <50	A11/5962-A-1	96%
TPHC29-36	mg/kg	[NT]	A11/5962-A-31	73 64 RPD: 13	A11/5962-A-1	87%
Surrogate Recovery	%	[NT]	A11/5962-A-31	101 97 RPD: 4	A11/5962-A-1	89%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	[NT]	[NT]	[NT]	External	85%
1-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	124%
2-Methylnaphthalene	µg/kg	[NT]	[NT]	[NT]	External	128%
Acenaphthylene	µg/kg	[NT]	[NT]	[NT]	External	74%
Acenaphthene	µg/kg	[NT]	[NT]	[NT]	External	77%
Fluorene	µg/kg	[NT]	[NT]	[NT]	External	90%
Phenanthrene	µg/kg	[NT]	[NT]	[NT]	External	80%
Anthracene	µg/kg	[NT]	[NT]	[NT]	External	87%
Fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	101%
Pyrene	µg/kg	[NT]	[NT]	[NT]	External	101%
Benz(a)anthracene	µg/kg	[NT]	[NT]	[NT]	External	85%
Chrysene	µg/kg	[NT]	[NT]	[NT]	External	104%
Benzo(b)&(k)fluoranthene	µg/kg	[NT]	[NT]	[NT]	External	96%
Benzo(a)pyrene	µg/kg	[NT]	[NT]	[NT]	External	95%
Indeno(1,2,3-cd)pyrene	µg/kg	[NT]	[NT]	[NT]	External	88%
Dibenz(a,h)anthracene	µg/kg	[NT]	[NT]	[NT]	External	94%
Benzo(g,h,i)perylene	µg/kg	[NT]	[NT]	[NT]	External	87%
Coronene	µg/kg	[NT]	[NT]	[NT]	External	76%
Benzo(e)pyrene	µg/kg	[NT]	[NT]	[NT]	External	97%
Perylene	µg/kg	[NT]	[NT]	[NT]	External	73%
Total PAHs (as above)	µg/kg	[NT]	[NT]	[NT]	External	92%
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	75%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	87%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	105%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	76%
<i>alpha</i> -BHC	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	82%
<i>beta</i> -BHC	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	79%
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	77%
<i>delta</i> -BHC	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	79%
<i>cis</i> -Chlordane	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	93%
<i>trans</i> -Chlordane	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	91%
<i>p,p'</i> -DDD	µg/kg	[NT]	A11/5962-A-31	2.0 <1.0	External	116%
<i>p,p'</i> -DDE	µg/kg	[NT]	A11/5962-A-31	3.0 3.0 RPD: 0	External	109%
<i>p,p'</i> -DDT	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	128%
Dieldrin	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	98%
<i>alpha</i> -Endosulfan	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	100%
<i>beta</i> -Endosulfan	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	97%
Endosulfan Sulphate	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	83%
Endrin	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	77%
Endrin ketone	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	80%
Endrin aldehyde	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	78%
Heptachlor	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	74%
Heptachlor epoxide	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	85%
Hexachlorobenzene	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	90%
Methoxychlor	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	102%
Oxychlordane	µg/kg	[NT]	A11/5962-A-31	<1.0 <1.0	External	NT
Surrogate Recovery	%	[NT]	A11/5962-A-31	88 91 RPD: 3	External	106%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	106%
Demeton-S-methyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	89%
Dimethoate	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	90%
Diazinon	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	81%
Chlorpyrifos-methyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	83%
Parathion-methyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	74%
Pirimiphos-methyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	86%
Fenitrothion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	76%
Malathion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	80%
Chlorpyrifos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	82%
Fenthion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	76%
Parathion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	71%
Chlorfenvinphos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	90%
Bromophos-ethyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	94%
Methidathion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	87%
Fenamiphos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	108%
Prothiofos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	87%
Ethion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	83%
Carbophenothion	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	92%
Phosalone	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	77%
Azinphos-methyl	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	78%
Fenchlorvos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	74%
Mevinphos	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	89%
Trifluralin	µg/kg	[NT]	A11/5962-A-31	<20 <20	External	74%
Surrogate Recovery	%	[NT]	A11/5962-A-31	115 115 RPD: 0	External	122%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	100%
Di-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	104%
Tri-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	106%
Tetra-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	100%
Penta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	97%
Hexa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	97%
Hepta-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	96%
Octa-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	94%
Nona-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	98%
Deca-PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	95%
Total PCB congeners	µg/kg	[NT]	[NT]	[NT]	External	98%
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	92%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	100%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Arsenic	mg/kg	[NT]	A11/5962-A-42	5.7 5.6 RPD: 2
Cadmium	mg/kg	[NT]	A11/5962-A-42	0.13 <0.1
Chromium	mg/kg	[NT]	A11/5962-A-42	37 37 RPD: 0
Copper	mg/kg	[NT]	A11/5962-A-42	23 23 RPD: 0
Lead	mg/kg	[NT]	A11/5962-A-42	11 11 RPD: 0
Mercury	mg/kg	[NT]	A11/5962-A-42	0.07 0.07 RPD: 0
Nickel	mg/kg	[NT]	A11/5962-A-42	20 20 RPD: 0
Phosphorus	mg/kg	[NT]	A11/5962-A-42	850 850 RPD: 0
Zinc	mg/kg	[NT]	A11/5962-A-42	70 69 RPD: 1

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	A11/5962-A-41	<0.20 <0.20	A11/5962-A-21	61%
Toluene	mg/kg	[NT]	A11/5962-A-41	<0.20 <0.20	A11/5962-A-21	65%
Ethyl Benzene	mg/kg	[NT]	A11/5962-A-41	<0.20 <0.20	A11/5962-A-21	65%
m+p xylenes	mg/kg	[NT]	A11/5962-A-41	<0.40 <0.40	A11/5962-A-21	66%
o-xylene	mg/kg	[NT]	A11/5962-A-41	<0.20 <0.20	A11/5962-A-21	69%
Total BTEX	mg/kg	[NT]	A11/5962-A-41	<1.2 <1.2	A11/5962-A-21	[NA]
Surrogate 1 Recovery	%	[NT]	A11/5962-A-41	56 63 RPD: 12	A11/5962-A-21	62%
Surrogate 2 Recovery	%	[NT]	A11/5962-A-41	52 57 RPD: 9	A11/5962-A-21	59%
Surrogate 3 Recovery	%	[NT]	A11/5962-A-41	53 59 RPD: 11	A11/5962-A-21	70%



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/5962-A-41	<10 <10	A11/5962-A-21	57%
TPHC10-14	mg/kg	[NT]	A11/5962-A-41	<10 [NT]	A11/5962-A-21	87%
TPHC15-28	mg/kg	[NT]	A11/5962-A-41	55 [NT]	A11/5962-A-21	96%
TPHC29-36	mg/kg	[NT]	A11/5962-A-41	65 [NT]	A11/5962-A-21	86%
Surrogate Recovery	%	[NT]	A11/5962-A-41	# 59	A11/5962-A-21	90%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Aldrin	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>alpha</i> -BHC	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>beta</i> -BHC	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>delta</i> -BHC	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>cis</i> -Chlordane	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>trans</i> -Chlordane	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>p,p'</i> -DDD	µg/kg	[NT]	A11/5962-A-45	3.0 2.0 RPD: 40
<i>p,p'</i> -DDE	µg/kg	[NT]	A11/5962-A-45	3.0 3.0 RPD: 0
<i>p,p'</i> -DDT	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Dieldrin	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>alpha</i> -Endosulfan	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
<i>beta</i> -Endosulfan	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Endosulfan Sulphate	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Endrin	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Endrin ketone	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Endrin aldehyde	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Heptachlor	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Heptachlor epoxide	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Hexachlorobenzene	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Methoxychlor	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Oxychlordane	µg/kg	[NT]	A11/5962-A-45	<1.0 <1.0
Surrogate Recovery	%	[NT]	A11/5962-A-45	100 98 RPD: 2



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Dichlorvos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Demeton-S-methyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Dimethoate	µg/kg	[NT]	A11/5962-A-45	<20 <20
Diazinon	µg/kg	[NT]	A11/5962-A-45	<20 <20
Chlorpyrifos-methyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Parathion-methyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Pirimiphos-methyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Fenitrothion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Malathion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Chlorpyrifos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Fenthion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Parathion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Chlorfenvinphos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Bromophos-ethyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Methidathion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Fenamiphos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Prothiofos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Ethion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Carbophenothion	µg/kg	[NT]	A11/5962-A-45	<20 <20
Phosalone	µg/kg	[NT]	A11/5962-A-45	<20 <20
Azinphos-methyl	µg/kg	[NT]	A11/5962-A-45	<20 <20
Fenchlorvos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Mevinphos	µg/kg	[NT]	A11/5962-A-45	<20 <20
Trifluralin	µg/kg	[NT]	A11/5962-A-45	<20 <20
Surrogate Recovery	%	[NT]	A11/5962-A-45	127 124 RPD: 2



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	[NT]	[NT]	External	91%
Toluene	mg/kg	[NT]	[NT]	[NT]	External	104%
Ethyl Benzene	mg/kg	[NT]	[NT]	[NT]	External	98%
m+p xylenes	mg/kg	[NT]	[NT]	[NT]	External	95%
o-xylene	mg/kg	[NT]	[NT]	[NT]	External	99%
Total BTEX	mg/kg	[NT]	[NT]	[NT]	External	[NA]
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	90%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	103%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	105%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/5962-A-5	<10 [NT]	External	92%
TPHC10-14	mg/kg	[NT]	A11/5962-A-5	<10 <10	External	[NT]
TPHC15-28	mg/kg	[NT]	A11/5962-A-5	57 57 RPD: 0	External	[NT]
TPHC29-36	mg/kg	[NT]	A11/5962-A-5	54 64 RPD: 17	External	[NT]
Surrogate Recovery	%	[NT]	A11/5962-A-5	102 118 RPD: 15	External	105%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Aldrin	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
alpha-BHC	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
beta-BHC	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
gamma-BHC (Lindane)	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
delta-BHC	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
cis-Chlordane	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
trans-Chlordane	µg/kg	[NT]	A11/5962-A-5	1.0 <1.0
p,p'-DDD	µg/kg	[NT]	A11/5962-A-5	<1.0 4.0
p,p'-DDE	µg/kg	[NT]	A11/5962-A-5	2.0 2.0 RPD: 0
p,p'-DDT	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Dieldrin	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
alpha-Endosulfan	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
beta-Endosulfan	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Endosulfan Sulphate	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Endrin	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Endrin ketone	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Endrin aldehyde	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Heptachlor	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Heptachlor epoxide	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Hexachlorobenzene	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Methoxychlor	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Oxychlordane	µg/kg	[NT]	A11/5962-A-5	<1.0 <1.0
Surrogate Recovery	%	[NT]	A11/5962-A-5	88 103 RPD: 16



Batch Number: A11/5962-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	96%
Cadmium	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	108%
Chromium	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	87%
Copper	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	106%
Lead	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	79%
Mercury	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	NT
Nickel	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	80%
Phosphorus	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	96%
Zinc	mg/kg	[NT]	[NT]	[NT]	A11/5962-A-22	77%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
TPHC6-C9	mg/kg	[NT]	A11/5962-A-25	<10 [NT]
TPHC10-14	mg/kg	[NT]	A11/5962-A-25	<10 <10
TPHC15-28	mg/kg	[NT]	A11/5962-A-25	<50 <50
TPHC29-36	mg/kg	[NT]	A11/5962-A-25	<50 <50
Surrogate Recovery	%	[NT]	A11/5962-A-25	102 92 RPD: 10

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/5962-A-45	<10 [NT]	A11/5962-A-41	[NT]
TPHC10-14	mg/kg	[NT]	A11/5962-A-45	<10 14	A11/5962-A-41	89%
TPHC15-28	mg/kg	[NT]	A11/5962-A-45	56 130 RPD: 80	A11/5962-A-41	90%
TPHC29-36	mg/kg	[NT]	A11/5962-A-45	67 110 RPD: 49	A11/5962-A-41	81%
Surrogate Recovery	%	[NT]	A11/5962-A-45	95 102 RPD: 7	A11/5962-A-41	89%

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.



REPORT OF ANALYSIS

Laboratory Reference: A11/5962-B [R00]

Client: WorleyParsons Services Pty Ltd
Level 3, 60 Albert Street
Brisbane QLD 4000

Contact: Vivian Seto

Order No: 301001-01247
Project: Port Bris SAP 2012
Sample Type: Water
No. of Samples: 2
Date Received: 15/12/2011
Date Completed: 21/12/2011

Laboratory Contact Details:

Client Services Manager: Trent Biggin
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.



Issue Date: 17 January 2012

Page 1 of 4

Advanced Analytical Australia Pty Ltd
ABN 20 105 644 979
11 Julius Avenue
North Ryde NSW 2113 Australia

Ph: + 61 2 9888 9077
Fax: + 61 2 9888 9577
contact@advancedanalytical.com.au
www.advancedanalytical.com.au



Batch Number: A11/5962-B [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2
Client Reference:	-	-	9 - 10	10 - 6
Date Sampled:	-	-	14/12/2011	13/12/2011
Analysis Description	Method	Units		
BTEX				
Benzene	04-021	µg/L	<1.0	<1.0
Toluene	04-021	µg/L	<2.0	<2.0
Ethyl Benzene	04-021	µg/L	<2.0	<2.0
m+p xylenes	04-021	µg/L	<4.0	<4.0
o-xylene	04-021	µg/L	<2.0	<2.0
Total BTEX	04-021	µg/L	<11	<11
Surrogate 1 Recovery	04-021	%	111	110
Surrogate 2 Recovery	04-021	%	95	94
Surrogate 3 Recovery	04-021	%	97	94
Date Extracted	04-021	-	16/12/2011	16/12/2011
Date Analysed	04-021	-	17/12/2011	17/12/2011
Total Petroleum Hydrocarbons				
TPHC6-C9	04-021	µg/L	<25	<25
Surrogate Recovery	04-030	%	97	94
Date Extracted	04-030	-	16/12/11	16/12/11
Date Analysed	04-030	-	16/12/11	16/12/11

Method	Method Description
04-021	TRH C6-9 & BTEX by P&T GCMS, µg/L
04-030	TRH by GC-FID, µg/L

Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required



Batch Number: A11/5962-B [R00]
Project Reference: Port Bris SAP 2012

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	µg/L	<1.0	A11/5962-B-1	<1.0 <1.0	External	107%
Toluene	µg/L	<2.0	A11/5962-B-1	<2.0 <2.0	External	103%
Ethyl Benzene	µg/L	<2.0	A11/5962-B-1	<2.0 <2.0	External	104%
m+p xylenes	µg/L	<4.0	A11/5962-B-1	<4.0 <4.0	External	106%
o-xylene	µg/L	<2.0	A11/5962-B-1	<2.0 <2.0	External	107%
Total BTEX	µg/L	<11	A11/5962-B-1	<11 <11	External	[NA]
Surrogate 1 Recovery	%	113	A11/5962-B-1	111 110 RPD: 1	External	102%
Surrogate 2 Recovery	%	100	A11/5962-B-1	95 96 RPD: 1	External	97%
Surrogate 3 Recovery	%	103	A11/5962-B-1	97 98 RPD: 1	External	97%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	µg/L	<25	A11/5962-B-1	<25 <25	External	105%
TPHC10-14	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC15-28	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC29-36	µg/L	[NT]	[NT]	[NT]	External	[NT]
Surrogate Recovery	%	103	A11/5962-B-1	97 98 RPD: 1	External	97%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	108%
Toluene	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	103%
Ethyl Benzene	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	104%
m+p xylenes	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	106%
o-xylene	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	107%
Total BTEX	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	[NA]
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	A11/5962-B-1	106%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	A11/5962-B-1	100%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	A11/5962-B-1	101%



Batch Number: A11/5962-B [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	106%
TPHC10-14	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	[NT]
TPHC15-28	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	[NT]
TPHC29-36	µg/L	[NT]	[NT]	[NT]	A11/5962-B-1	[NT]
Surrogate Recovery	%	[NT]	[NT]	[NT]	A11/5962-B-1	101%

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.



REPORT OF ANALYSIS

Laboratory Reference: A11/6127-A [R00]

Client: WorleyParsons Services Pty Ltd
Level 3, 60 Albert Street
Brisbane QLD 4000

Contact: Vivian Seto

Order No: 301001-01247
Project: Port Bris SAP 2012
Sample Type: Sediment
No. of Samples: 23
Date Received: 19/12/2011
Date Completed: 19/01/2012

Laboratory Contact Details:

Client Services Manager: Trent Biggin
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.





Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	1 - 0	2 - 0	3 - 0	4 - 0
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	16/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	31.0	50.4	49.0	51.6
Trace Elements						
Arsenic	04-001	mg/kg	4.2	9.1	5.4	8.4
Cadmium	04-001	mg/kg	<0.1	0.32	<0.1	0.14
Chromium	04-001	mg/kg	32	41	37	43
Copper	04-001	mg/kg	16	48	18	63
Lead	04-001	mg/kg	5.2	360	6.2	38
Mercury	04-002	mg/kg	0.03	0.43	0.04	0.14
Nickel	04-001	mg/kg	20	21	22	22
Phosphorus	04-001	mg/kg	410	640	500	830
Zinc	04-001	mg/kg	45	220	52	170
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	81	69	70	68
Surrogate 2 Recovery	04-021	%	80	66	63	63
Surrogate 3 Recovery	04-021	%	76	65	67	65
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	29/12/2011	29/12/2011	29/12/2011	29/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	21	<10	<10
TPHC15-28	04-020	mg/kg	<50	360	<50	87
TPHC29-36	04-020	mg/kg	<50	260	<50	97
Surrogate Recovery	04-020	%	95	104	94	94
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	4/01/2012	5/01/2012	5/01/2012	5/01/2012



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	1 - 0	2 - 0	3 - 0	4 - 0
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	16/12/2011
Analysis Description	Method	Units				
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	<5	56	<5	[NA]
1-Methylnaphthalene	04-022	µg/kg	<5	86	<5	[NA]
2-Methylnaphthalene	04-022	µg/kg	<5	170	<5	[NA]
Acenaphthylene	04-022	µg/kg	<5	92	<5	[NA]
Acenaphthene	04-022	µg/kg	<5	50	<5	[NA]
Fluorene	04-022	µg/kg	<5	60	<5	[NA]
Phenanthrene	04-022	µg/kg	<5	200	<5	[NA]
Anthracene	04-022	µg/kg	<5	100	<5	[NA]
Fluoranthene	04-022	µg/kg	<5	800	<5	[NA]
Pyrene	04-022	µg/kg	<5	990	<5	[NA]
Benz(a)anthracene	04-022	µg/kg	<5	400	<5	[NA]
Chrysene	04-022	µg/kg	<5	300	<5	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10	900	<10	[NA]
Benzo(a)pyrene	04-022	µg/kg	<5	520	<5	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5	500	<5	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	<5	72	<5	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	<5	500	<5	[NA]
Coronene	04-022	µg/kg	<10	150	<10	[NA]
Benzo(e)pyrene	04-022	µg/kg	<5	360	<5	[NA]
Perylene	04-022	µg/kg	400	1000	900	[NA]
Total PAHs (as above)	04-022	µg/kg	360	6,990	900	[NA]
Surrogate 1 Recovery	04-022	%	49	67	48	[NA]
Surrogate 2 Recovery	04-022	%	100	92	96	[NA]
Surrogate 3 Recovery	04-022	%	99	87	93	[NA]
Date Extracted	04-022	-	28/12/2011	28/12/2011	28/12/2011	[NA]
Date Analysed	04-022	-	9/01/2012	14/01/2012	14/01/2012	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	1 - 0	2 - 0	3 - 0	4 - 0
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	16/12/2011
Analysis Description	Method	Units				
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	69	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	28	<1.0	4.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	102	84	97	93
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	9/01/2012	9/01/2012	9/01/2012	9/01/2012
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	1 - 0	2 - 0	3 - 0	4 - 0
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	16/12/2011
Analysis Description	Method	Units				
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	100	96	93	111
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-024	-	9/01/2012	9/01/2012	9/01/2012	9/01/2012
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Di-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Tri-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Tetra-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Penta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Hexa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Hepta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Octa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Nona-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Deca-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Total PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	[NA]
Surrogate 1 Recovery	04-029	%	102	126	113	[NA]
Surrogate 2 Recovery	04-029	%	97	103	100	[NA]
Date Extracted	04-029	-	28/12/2011	28/12/2011	28/12/2011	[NA]
Date Analysed	04-029	-	9/01/2012	9/01/2012	9/01/2012	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1	/2	/3	/4
Client Reference:	-	-	1 - 0	2 - 0	3 - 0	4 - 0
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	16/12/2011
Analysis Description	Method	Units				
Dibutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	20
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	230
Surrogate 1 Recovery	04-026	%	75	74	68	72
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis						
Total Organic Carbon	SUB	%	0.52	1.4	1.5	1.5
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	340	810	1,120	1,170
Total Nitrogen	SUB	mg/kg	340	810	1,120	1,170
Particle Size Distribution	SUB		See comment	See comment	See comment	See comment
Chromium Reducible Suite	SUB		See comment	See comment	See comment	[NA]
Total Actual Acidity	SUB	mol/T	See comment	See comment	See comment	[NA]



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	4 - 4	4 - 5	4 - 7	4 - 8
Date Sampled:	-	-	16/12/2011	16/12/2013	16/12/2014	16/12/2015
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	50.9	50.3	56.7	45.5
Trace Elements						
Arsenic	04-001	mg/kg	7.5	7.2	6.9	7.6
Cadmium	04-001	mg/kg	<0.1	0.21	<0.1	<0.1
Chromium	04-001	mg/kg	39	45	36	37
Copper	04-001	mg/kg	38	60	39	50
Lead	04-001	mg/kg	25	28	27	22
Mercury	04-002	mg/kg	0.15	0.18	0.11	0.13
Nickel	04-001	mg/kg	21	22	19	19
Phosphorus	04-001	mg/kg	750	930	800	750
Zinc	04-001	mg/kg	130	140	140	130
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	62	63	61	67
Surrogate 2 Recovery	04-021	%	55	56	53	63
Surrogate 3 Recovery	04-021	%	57	60	57	66
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	29/12/2011	29/12/2011	30/12/2011	30/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	<10	<10
TPHC15-28	04-020	mg/kg	72	99	97	91
TPHC29-36	04-020	mg/kg	100	120	130	100
Surrogate Recovery	04-020	%	88	89	97	114
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	5/01/2012	5/01/2012	5/01/2012	5/01/2012
Poly Aromatic Hydrocarbons						



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	4 - 4	4 - 5	4 - 7	4 - 8
Date Sampled:	-	-	16/12/2011	16/12/2013	16/12/2014	16/12/2015
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	[NA]	[NA]	11	[NA]
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	7	[NA]
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	9	[NA]
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	15	[NA]
Acenaphthene	04-022	µg/kg	[NA]	[NA]	7	[NA]
Fluorene	04-022	µg/kg	[NA]	[NA]	10	[NA]
Phenanthrene	04-022	µg/kg	[NA]	[NA]	100	[NA]
Anthracene	04-022	µg/kg	[NA]	[NA]	30	[NA]
Fluoranthene	04-022	µg/kg	[NA]	[NA]	300	[NA]
Pyrene	04-022	µg/kg	[NA]	[NA]	270	[NA]
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	200	[NA]
Chrysene	04-022	µg/kg	[NA]	[NA]	100	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	300	[NA]
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	150	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	100	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	13	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	100	[NA]
Coronene	04-022	µg/kg	[NA]	[NA]	53	[NA]
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	120	[NA]
Perylene	04-022	µg/kg	[NA]	[NA]	600	[NA]
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	2,550	[NA]
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	53	[NA]
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	110	[NA]
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	99	[NA]
Date Extracted	04-022	-	[NA]	[NA]	28/12/2011	[NA]
Date Analysed	04-022	-	[NA]	[NA]	10/01/2012	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
cis-Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	4 - 4	4 - 5	4 - 7	4 - 8
Date Sampled:	-	-	16/12/2011	16/12/2013	16/12/2014	16/12/2015
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	2.0	1.0	1.0
<i>p,p'</i> -DDE	04-023	µg/kg	3.0	4.0	3.0	3.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	94	94	98	99
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	9/01/2012	9/01/2012	10/01/2012	10/01/2012
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	4 - 4	4 - 5	4 - 7	4 - 8
Date Sampled:	-	-	16/12/2011	16/12/2013	16/12/2014	16/12/2015
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	97	111	104	105
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-024	-	9/01/2012	9/01/2012	10/01/2012	10/01/2012
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	<5.0	[NA]
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	119	[NA]
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	105	[NA]
Date Extracted	04-029	-	[NA]	[NA]	28/12/2011	[NA]
Date Analysed	04-029	-	[NA]	[NA]	10/01/2012	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	1.8	3.9	2.6	2.4



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/5	/6	/7	/8
Client Reference:	-	-	4 - 4	4 - 5	4 - 7	4 - 8
Date Sampled:	-	-	16/12/2011	16/12/2013	16/12/2014	16/12/2015
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	1.0	1.8	1.8	9.9
Surrogate 1 Recovery	04-026	%	68	68	74	70
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis						
Total Organic Carbon	SUB	%	1.0	1.5	1.8	2.3
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	800	1,070	1,270	1,190
Total Nitrogen	SUB	mg/kg	800	1,070	1,270	1,190
Particle Size Distribution	SUB		See comment	See comment	See comment	See comment
Chromium Reducible Suite	SUB		[NA]	[NA]	See comment	[NA]
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	See comment	[NA]
Gross Alpha	SUB	mBq/g	[NA]	[NA]	<60	[NA]
Gross Beta	SUB	mBq/g	[NA]	[NA]	<135	[NA]



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	4 - 9	4 - 10	4 - 13	5 - 0
Date Sampled:	-	-	16/12/2016	16/12/2017	16/12/2018	16/12/2019
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	51.2	57.1	59.9	61.3
Trace Elements						
Arsenic	04-001	mg/kg	8.2	5.3	7.4	8.7
Cadmium	04-001	mg/kg	0.38	<0.1	<0.1	<0.1
Chromium	04-001	mg/kg	37	37	43	40
Copper	04-001	mg/kg	41	29	47	45
Lead	04-001	mg/kg	34	16	26	27
Mercury	04-002	mg/kg	0.56	0.08	0.12	0.13
Nickel	04-001	mg/kg	22	26	22	21
Phosphorus	04-001	mg/kg	560	850	830	820
Zinc	04-001	mg/kg	130	100	140	140
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	71	49	50	60
Surrogate 2 Recovery	04-021	%	64	43	44	55
Surrogate 3 Recovery	04-021	%	70	48	50	55
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	18	<10	<20	20
TPHC15-28	04-020	mg/kg	380	92	120	130
TPHC29-36	04-020	mg/kg	250	140	130	130
Surrogate Recovery	04-020	%	94	112	113	94
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	5/01/2012	5/01/2012	5/01/2012	5/01/2012
Poly Aromatic Hydrocarbons						



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	4 - 9	4 - 10	4 - 13	5 - 0
Date Sampled:	-	-	16/12/2016	16/12/2017	16/12/2018	16/12/2019
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	8.0
1-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	6
2-Methylnaphthalene	04-022	µg/kg	[NA]	[NA]	[NA]	6
Acenaphthylene	04-022	µg/kg	[NA]	[NA]	[NA]	8.0
Acenaphthene	04-022	µg/kg	[NA]	[NA]	[NA]	<5
Fluorene	04-022	µg/kg	[NA]	[NA]	[NA]	7
Phenanthrene	04-022	µg/kg	[NA]	[NA]	[NA]	40
Anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	10
Fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	100
Pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	110
Benz(a)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	60
Chrysene	04-022	µg/kg	[NA]	[NA]	[NA]	50
Benzo(b)&(k)fluoranthene	04-022	µg/kg	[NA]	[NA]	[NA]	100
Benzo(a)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	63
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	60
Dibenz(a,h)anthracene	04-022	µg/kg	[NA]	[NA]	[NA]	6
Benzo(g,h,i)perylene	04-022	µg/kg	[NA]	[NA]	[NA]	60
Coronene	04-022	µg/kg	[NA]	[NA]	[NA]	27
Benzo(e)pyrene	04-022	µg/kg	[NA]	[NA]	[NA]	59
Perylene	04-022	µg/kg	[NA]	[NA]	[NA]	200
Total PAHs (as above)	04-022	µg/kg	[NA]	[NA]	[NA]	1,070
Surrogate 1 Recovery	04-022	%	[NA]	[NA]	[NA]	63
Surrogate 2 Recovery	04-022	%	[NA]	[NA]	[NA]	107
Surrogate 3 Recovery	04-022	%	[NA]	[NA]	[NA]	94
Date Extracted	04-022	-	[NA]	[NA]	[NA]	28/12/2011
Date Analysed	04-022	-	[NA]	[NA]	[NA]	10/01/2012
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
alpha-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
beta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
gamma-BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
delta-BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
cis-Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	4 - 9	4 - 10	4 - 13	5 - 0
Date Sampled:	-	-	16/12/2016	16/12/2017	16/12/2018	16/12/2019
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	1.0	1.0	2.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	5.0	3.0	3.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	91	94	95	94
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	4 - 9	4 - 10	4 - 13	5 - 0
Date Sampled:	-	-	16/12/2016	16/12/2017	16/12/2018	16/12/2019
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	99	100	102	101
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-024	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Di-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tri-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Tetra-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Penta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hexa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Hepta-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Octa-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Nona-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Deca-PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Total PCB congeners	04-029	µg/kg	[NA]	[NA]	[NA]	<5.0
Surrogate 1 Recovery	04-029	%	[NA]	[NA]	[NA]	111
Surrogate 2 Recovery	04-029	%	[NA]	[NA]	[NA]	95
Date Extracted	04-029	-	[NA]	[NA]	[NA]	28/12/2011
Date Analysed	04-029	-	[NA]	[NA]	[NA]	10/01/2012
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	1.0	<0.50	2.8



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/9	/10	/11	/12
Client Reference:	-	-	4 - 9	4 - 10	4 - 13	5 - 0
Date Sampled:	-	-	16/12/2016	16/12/2017	16/12/2018	16/12/2019
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	0.90	1.2	4.5	4.9
Surrogate 1 Recovery	04-026	%	71	69	70	71
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis						
Total Organic Carbon	SUB	%	1.6	1.9	1.7	1.8
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	950	1,510	1,440	1,470
Total Nitrogen	SUB	mg/kg	950	1,510	1,440	1,470
Particle Size Distribution	SUB		See comment	See comment	See comment	See comment
Chromium Reducible Suite	SUB		[NA]	[NA]	[NA]	See comment
Total Actual Acidity	SUB	mol/T	[NA]	[NA]	[NA]	See comment
Gross Alpha	SUB	mBq/g	[NA]	[NA]	[NA]	<60
Gross Beta	SUB	mBq/g	[NA]	[NA]	[NA]	<135



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	BC - 1	BC - 2	BC - 3	BC - 4
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	15/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	35.0	58.0	59.4	54.9
Trace Elements						
Arsenic	04-001	mg/kg	10	9.3	8.1	6.8
Cadmium	04-001	mg/kg	0.15	0.28	<0.1	0.27
Chromium	04-001	mg/kg	23	48	42	43
Copper	04-001	mg/kg	30	64	51	43
Lead	04-001	mg/kg	47	99	36	36
Mercury	04-002	mg/kg	0.07	0.25	0.17	0.18
Nickel	04-001	mg/kg	13	24	20	26
Phosphorus	04-001	mg/kg	450	820	900	970
Zinc	04-001	mg/kg	170	200	170	150
BTEX						
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	73	64	59	53
Surrogate 2 Recovery	04-021	%	67	60	52	47
Surrogate 3 Recovery	04-021	%	67	65	54	58
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	30/12/2011	30/12/2011	30/12/2011	23/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	37	<10	17	12
TPHC15-28	04-020	mg/kg	240	120	140	120
TPHC29-36	04-020	mg/kg	290	140	140	110
Surrogate Recovery	04-020	%	119	84	106	102
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	5/01/2012	11/01/2012	5/01/2012	5/01/2012
Poly Aromatic Hydrocarbons						



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	BC - 1	BC - 2	BC - 3	BC - 4
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	15/12/2011
Analysis Description	Method	Units				
Naphthalene	04-022	µg/kg	<5	15	16	21
1-Methylnaphthalene	04-022	µg/kg	<5	7	7	12
2-Methylnaphthalene	04-022	µg/kg	<5	12	10	18
Acenaphthylene	04-022	µg/kg	9.0	18	25	15
Acenaphthene	04-022	µg/kg	<5	5	9	10
Fluorene	04-022	µg/kg	<5	9	10	20
Phenanthrene	04-022	µg/kg	30	50	100	60
Anthracene	04-022	µg/kg	10	20	40	20
Fluoranthene	04-022	µg/kg	200	200	400	200
Pyrene	04-022	µg/kg	140	200	360	180
Benz(a)anthracene	04-022	µg/kg	80	100	200	80
Chrysene	04-022	µg/kg	60	100	200	70
Benzo(b)&(k)fluoranthene	04-022	µg/kg	200	300	300	200
Benzo(a)pyrene	04-022	µg/kg	97	140	190	80
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	100	100	200	70
Dibenz(a,h)anthracene	04-022	µg/kg	8	14	17	7
Benzo(g,h,i)perylene	04-022	µg/kg	90	200	200	80
Coronene	04-022	µg/kg	23	36	38	19
Benzo(e)pyrene	04-022	µg/kg	69	110	140	74
Perylene	04-022	µg/kg	60	100	500	1,800
Total PAHs (as above)	04-022	µg/kg	1,130	1,790	2,950	2,900
Surrogate 1 Recovery	04-022	%	56	60	65	60
Surrogate 2 Recovery	04-022	%	103	98	113	104
Surrogate 3 Recovery	04-022	%	90	88	102	95
Date Extracted	04-022	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-022	-	10/01/2012	10/01/2012	10/01/2012	14/01/2012
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	BC - 1	BC - 2	BC - 3	BC - 4
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	15/12/2011
Analysis Description	Method	Units				
<i>trans</i> -Chlordane	04-023	µg/kg	2.0	1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	3.0	2.0	1.0	2.0
<i>p,p'</i> -DDE	04-023	µg/kg	3.0	7.0	5.0	9.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	95	88	101	93
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	BC - 1	BC - 2	BC - 3	BC - 4
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	15/12/2011
Analysis Description	Method	Units				
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	111	103	104	98
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-024	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0	5.0	<5.0	<5.0
Hexa-PCB congeners	04-029	µg/kg	<5.0	7.0	5.0	5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Octa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0	<5.0
Total PCB congeners	04-029	µg/kg	<5.0	12	5.0	5.0
Surrogate 1 Recovery	04-029	%	94	98	119	108
Surrogate 2 Recovery	04-029	%	86	117	100	90
Date Extracted	04-029	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-029	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	1.4	10	5.5	5.1



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/13	/14	/15	/16
Client Reference:	-	-	BC - 1	BC - 2	BC - 3	BC - 4
Date Sampled:	-	-	15/12/2011	15/12/2011	15/12/2011	15/12/2011
Analysis Description	Method	Units				
Tributyl tin	04-026	µgSn/kg	1.5	1.9	3.4	1.8
Surrogate 1 Recovery	04-026	%	74	70	68	72
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis						
Total Organic Carbon	SUB	%	1.5	2.2	2.1	1.8
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	540	1,280	1,380	1,230
Total Nitrogen	SUB	mg/kg	540	1,280	1,380	1,230
Particle Size Distribution	SUB		See comment	See comment	See comment	See comment
Chromium Reducible Suite	SUB		See comment	See comment	See comment	See comment
Total Actual Acidity	SUB	mol/T	See comment	See comment	See comment	See comment

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	RT - 1	RT - 1A	RT - 2	RT - 2A
Date Sampled:	-	-	15/12/2011	15/12/2011	16/12/2011	16/12/2011
Analysis Description	Method	Units				
Moisture Content						
Moisture Content	04-004	%	52.5	54.9	53.3	49.0
Trace Elements						
Arsenic	04-001	mg/kg	5.7	6.6	8.6	7.4
Cadmium	04-001	mg/kg	<0.1	<0.1	0.54	0.30
Chromium	04-001	mg/kg	39	40	45	42
Copper	04-001	mg/kg	20	20	44	36
Lead	04-001	mg/kg	6.8	6.7	37	28
Mercury	04-002	mg/kg	0.04	0.04	0.58	0.44
Nickel	04-001	mg/kg	23	23	25	24
Phosphorus	04-001	mg/kg	630	560	600	580
Zinc	04-001	mg/kg	55	67	140	120
BTEX						



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	RT - 1	RT - 1A	RT - 2	RT - 2A
Date Sampled:	-	-	15/12/2011	15/12/2011	16/12/2011	16/12/2011
Analysis Description	Method	Units				
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	66	58	65	59
Surrogate 2 Recovery	04-021	%	57	50	54	52
Surrogate 3 Recovery	04-021	%	67	60	63	64
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	23/12/2011	23/12/2011	23/12/2011	23/12/2011
Total Petroleum Hydrocarbons						
TPHC6-C9	04-021	mg/kg	<10	<10	<10	<10
TPHC10-14	04-020	mg/kg	<10	<10	27	13
TPHC15-28	04-020	mg/kg	<50	<50	770	320
TPHC29-36	04-020	mg/kg	<50	<50	360	170
Surrogate Recovery	04-020	%	103	106	113	104
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	5/01/2012	5/01/2012	5/01/2012	5/01/2012
Poly Aromatic Hydrocarbons						
Naphthalene	04-022	µg/kg	<5	<5	[NA]	[NA]
1-Methylnaphthalene	04-022	µg/kg	<5	<5	[NA]	[NA]
2-Methylnaphthalene	04-022	µg/kg	<5	<5	[NA]	[NA]
Acenaphthylene	04-022	µg/kg	<5	<5	[NA]	[NA]
Acenaphthene	04-022	µg/kg	<5	<5	[NA]	[NA]
Fluorene	04-022	µg/kg	<5	<5	[NA]	[NA]
Phenanthrene	04-022	µg/kg	<5	<5	[NA]	[NA]
Anthracene	04-022	µg/kg	<5	<5	[NA]	[NA]
Fluoranthene	04-022	µg/kg	<5	8	[NA]	[NA]
Pyrene	04-022	µg/kg	<5	6.0	[NA]	[NA]
Benz(a)anthracene	04-022	µg/kg	<5	<5	[NA]	[NA]
Chrysene	04-022	µg/kg	<5	<5	[NA]	[NA]
Benzo(b)&(k)fluoranthene	04-022	µg/kg	<10	<10	[NA]	[NA]



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	RT - 1	RT - 1A	RT - 2	RT - 2A
Date Sampled:	-	-	15/12/2011	15/12/2011	16/12/2011	16/12/2011
Analysis Description	Method	Units				
Benzo(a)pyrene	04-022	µg/kg	<5	<5	[NA]	[NA]
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	<5	<5	[NA]	[NA]
Dibenz(a,h)anthracene	04-022	µg/kg	<5	<5	[NA]	[NA]
Benzo(g,h,i)perylene	04-022	µg/kg	<5	<5	[NA]	[NA]
Coronene	04-022	µg/kg	<10	<10	[NA]	[NA]
Benzo(e)pyrene	04-022	µg/kg	<5	<5	[NA]	[NA]
Perylene	04-022	µg/kg	1,200	1,700	[NA]	[NA]
Total PAHs (as above)	04-022	µg/kg	1,180	1,670	[NA]	[NA]
Surrogate 1 Recovery	04-022	%	53	76	[NA]	[NA]
Surrogate 2 Recovery	04-022	%	106	107	[NA]	[NA]
Surrogate 3 Recovery	04-022	%	107	105	[NA]	[NA]
Date Extracted	04-022	-	28/12/2011	28/12/2011	[NA]	[NA]
Date Analysed	04-022	-	14/01/2012	14/01/2012	[NA]	[NA]
Organochlorine Pesticides						
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDE	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	RT - 1	RT - 1A	RT - 2	RT - 2A
Date Sampled:	-	-	15/12/2011	15/12/2011	16/12/2011	16/12/2011
Analysis Description	Method	Units				
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Oxychlorthane	04-023	µg/kg	<1.0	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	107	107	101	96
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Organophosphate Pesticides						
Dichlorvos	04-024	µg/kg	<20	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20	<20
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20	<20
Surrogate Recovery	04-024	%	106	104	105	102
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011	28/12/2011



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/17	/18	/19	/20
Client Reference:	-	-	RT - 1	RT - 1A	RT - 2	RT - 2A
Date Sampled:	-	-	15/12/2011	15/12/2011	16/12/2011	16/12/2011
Analysis Description	Method	Units				
Date Analysed	04-024	-	10/01/2012	10/01/2012	10/01/2012	10/01/2012
Polychlorinated Biphenyls						
Mono-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Di-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Tri-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Tetra-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Penta-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Hexa-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Hepta-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Octa-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Nona-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Deca-PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Total PCB congeners	04-029	µg/kg	<5.0	<5.0	[NA]	[NA]
Surrogate 1 Recovery	04-029	%	101	123	[NA]	[NA]
Surrogate 2 Recovery	04-029	%	98	107	[NA]	[NA]
Date Extracted	04-029	-	28/12/2011	28/12/2011	[NA]	[NA]
Date Analysed	04-029	-	10/01/2012	10/01/2012	[NA]	[NA]
Organotins						
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Tributyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50	<0.50
Surrogate 1 Recovery	04-026	%	67	63	65	70
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis						
Total Organic Carbon	SUB	%	1.5	1.4	1.7	1.6
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	1,080	920	1,050	990
Total Nitrogen	SUB	mg/kg	1,080	920	1,050	990
Particle Size Distribution	SUB		See comment	See comment	See comment	See comment



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23
Client Reference:	-	-	RT - 3	RT - 3A	IB - 1
Date Sampled:	-	-	15/12/2011	15/12/2011	14/12/2011
Analysis Description	Method	Units			
Moisture Content					
Moisture Content	04-004	%	56.7	55.9	56.5
Trace Elements					
Arsenic	04-001	mg/kg	7.8	7.5	7.3
Cadmium	04-001	mg/kg	0.27	0.21	0.15
Chromium	04-001	mg/kg	44	43	43
Copper	04-001	mg/kg	48	57	29
Lead	04-001	mg/kg	37	36	18
Mercury	04-002	mg/kg	0.18	0.14	0.19
Nickel	04-001	mg/kg	25	26	21
Phosphorus	04-001	mg/kg	890	870	660
Zinc	04-001	mg/kg	140	140	94
BTEX					
Benzene	04-021	mg/kg	<0.20	<0.20	<0.20
Toluene	04-021	mg/kg	<0.20	<0.20	<0.20
Ethyl Benzene	04-021	mg/kg	<0.20	<0.20	<0.20
m+p xylenes	04-021	mg/kg	<0.40	<0.40	<0.40
o-xylene	04-021	mg/kg	<0.20	<0.20	<0.20
Total BTEX	04-021	mg/kg	<1.2	<1.2	<1.2
Surrogate 1 Recovery	04-021	%	64	62	54
Surrogate 2 Recovery	04-021	%	56	58	48
Surrogate 3 Recovery	04-021	%	62	64	58
Date Extracted	04-021	-	21/12/2011	21/12/2011	21/12/2011
Date Analysed	04-021	-	23/12/2011	23/12/2011	23/12/2011
Total Petroleum Hydrocarbons					
TPHC6-C9	04-021	mg/kg	<10	<10	<10
TPHC10-14	04-020	mg/kg	24	<10	14
TPHC15-28	04-020	mg/kg	220	120	89
TPHC29-36	04-020	mg/kg	170	110	80
Surrogate Recovery	04-020	%	112	113	98
Date Extracted	04-020	-	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-020	-	5/01/2012	5/01/2012	5/01/2012
Poly Aromatic Hydrocarbons					



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23
Client Reference:	-	-	RT - 3	RT - 3A	IB - 1
Date Sampled:	-	-	15/12/2011	15/12/2011	14/12/2011
Analysis Description	Method	Units			
Naphthalene	04-022	µg/kg	33	14	13
1-Methylnaphthalene	04-022	µg/kg	17	8	8
2-Methylnaphthalene	04-022	µg/kg	28	14	9
Acenaphthylene	04-022	µg/kg	25	16	7.0
Acenaphthene	04-022	µg/kg	20	10	<5
Fluorene	04-022	µg/kg	30	20	6
Phenanthrene	04-022	µg/kg	60	70	20
Anthracene	04-022	µg/kg	30	20	8
Fluoranthene	04-022	µg/kg	200	200	70
Pyrene	04-022	µg/kg	300	230	77
Benz(a)anthracene	04-022	µg/kg	100	100	40
Chrysene	04-022	µg/kg	80	90	40
Benzo(b)&(k)fluoranthene	04-022	µg/kg	200	200	100
Benzo(a)pyrene	04-022	µg/kg	120	100	49
Indeno(1,2,3-cd)pyrene	04-022	µg/kg	100	90	50
Dibenz(a,h)anthracene	04-022	µg/kg	9	7	<5
Benzo(g,h,i)perylene	04-022	µg/kg	100	100	50
Coronene	04-022	µg/kg	28	26	<10
Benzo(e)pyrene	04-022	µg/kg	110	84	45
Perylene	04-022	µg/kg	1,900	1,400	100
Total PAHs (as above)	04-022	µg/kg	3,500	2,800	730
Surrogate 1 Recovery	04-022	%	83	91	86
Surrogate 2 Recovery	04-022	%	110	109	101
Surrogate 3 Recovery	04-022	%	97	98	98
Date Extracted	04-022	-	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-022	-	14/01/2012	14/01/2012	10/01/2012
Organochlorine Pesticides					
Aldrin	04-023	µg/kg	<1.0	<1.0	<1.0
<i>alpha</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0
<i>beta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0
<i>gamma</i> -BHC (Lindane)	04-023	µg/kg	<1.0	<1.0	<1.0
<i>delta</i> -BHC	04-023	µg/kg	<1.0	<1.0	<1.0
<i>cis</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23
Client Reference:	-	-	RT - 3	RT - 3A	IB - 1
Date Sampled:	-	-	15/12/2011	15/12/2011	14/12/2011
Analysis Description	Method	Units			
<i>trans</i> -Chlordane	04-023	µg/kg	<1.0	<1.0	<1.0
<i>p,p'</i> -DDD	04-023	µg/kg	3.0	3.0	3.0
<i>p,p'</i> -DDE	04-023	µg/kg	10	11	5.0
<i>p,p'</i> -DDT	04-023	µg/kg	<1.0	<1.0	<1.0
Dieldrin	04-023	µg/kg	<1.0	<1.0	<1.0
<i>alpha</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0
<i>beta</i> -Endosulfan	04-023	µg/kg	<1.0	<1.0	<1.0
Endosulfan Sulphate	04-023	µg/kg	<1.0	<1.0	<1.0
Endrin	04-023	µg/kg	<1.0	<1.0	<1.0
Endrin ketone	04-023	µg/kg	<1.0	<1.0	<1.0
Endrin aldehyde	04-023	µg/kg	<1.0	<1.0	<1.0
Heptachlor	04-023	µg/kg	<1.0	<1.0	<1.0
Heptachlor epoxide	04-023	µg/kg	<1.0	<1.0	<1.0
Hexachlorobenzene	04-023	µg/kg	<1.0	<1.0	<1.0
Methoxychlor	04-023	µg/kg	<1.0	<1.0	<1.0
Oxychlordane	04-023	µg/kg	<1.0	<1.0	<1.0
Surrogate Recovery	04-023	%	98	96	95
Date Extracted	04-023	-	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-023	-	10/01/2012	10/01/2012	10/01/2012
Organophosphate Pesticides					
Dichlorvos	04-024	µg/kg	<20	<20	<20
Demeton-S-methyl	04-024	µg/kg	<20	<20	<20
Dimethoate	04-024	µg/kg	<20	<20	<20
Diazinon	04-024	µg/kg	<20	<20	<20
Chlorpyrifos-methyl	04-024	µg/kg	<20	<20	<20
Parathion-methyl	04-024	µg/kg	<20	<20	<20
Pirimiphos-methyl	04-024	µg/kg	<20	<20	<20
Fenitrothion	04-024	µg/kg	<20	<20	<20
Malathion	04-024	µg/kg	<20	<20	<20
Chlorpyrifos	04-024	µg/kg	<20	<20	<20
Fenthion	04-024	µg/kg	<20	<20	<20
Parathion	04-024	µg/kg	<20	<20	<20
Chlorfenvinphos	04-024	µg/kg	<20	<20	<20



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23
Client Reference:	-	-	RT - 3	RT - 3A	IB - 1
Date Sampled:	-	-	15/12/2011	15/12/2011	14/12/2011
Analysis Description	Method	Units			
Bromophos-ethyl	04-024	µg/kg	<20	<20	<20
Methidathion	04-024	µg/kg	<20	<20	<20
Fenamiphos	04-024	µg/kg	<20	<20	<20
Prothiofos	04-024	µg/kg	<20	<20	<20
Ethion	04-024	µg/kg	<20	<20	<20
Carbophenothion	04-024	µg/kg	<20	<20	<20
Phosalone	04-024	µg/kg	<20	<20	<20
Azinphos-methyl	04-024	µg/kg	<20	<20	<20
Fenchlorvos	04-024	µg/kg	<20	<20	<20
Mevinphos	04-024	µg/kg	<20	<20	<20
Trifluralin	04-024	µg/kg	<20	<20	<20
Surrogate Recovery	04-024	%	101	106	104
Date Extracted	04-024	-	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-024	-	10/01/2012	10/01/2012	10/01/2012
Polychlorinated Biphenyls					
Mono-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Di-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Tri-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Tetra-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Penta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Hexa-PCB congeners	04-029	µg/kg	5.0	<5.0	<5.0
Hepta-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Octa-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Nona-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Deca-PCB congeners	04-029	µg/kg	<5.0	<5.0	<5.0
Total PCB congeners	04-029	µg/kg	5.0	<5.0	<5.0
Surrogate 1 Recovery	04-029	%	136	134	135
Surrogate 2 Recovery	04-029	%	114	109	112
Date Extracted	04-029	-	28/12/2011	28/12/2011	28/12/2011
Date Analysed	04-029	-	10/01/2012	10/01/2012	10/01/2012
Organotins					
Monobutyl tin	04-026	µgSn/kg	<0.50	<0.50	<0.50
Dibutyl tin	04-026	µgSn/kg	5.0	5.3	2.4



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/21	/22	/23
Client Reference:	-	-	RT - 3	RT - 3A	IB - 1
Date Sampled:	-	-	15/12/2011	15/12/2011	14/12/2011
Analysis Description	Method	Units			
Tributyl tin	04-026	µgSn/kg	1.1	1.1	0.60
Surrogate 1 Recovery	04-026	%	68	73	64
Date Extracted	04-026	-	30/12/2011	30/12/2011	30/12/2011
Date Analysed	04-026	-	31/12/2011	31/12/2011	31/12/2011
Subcontract Analysis					
Total Organic Carbon	SUB	%	2.3	2.0	1.4
Nitrate as N	SUB	mg/kg	<0.1	<0.1	<0.1
Nitrite as N	SUB	mg/kg	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	SUB	mg/kg	1,400	1,350	1,090
Total Nitrogen	SUB	mg/kg	1,400	1,350	1,090
Particle Size Distribution	SUB		See comment	See comment	See comment

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	TRH C6-9 & BTEX by P&T GCMS, mg/kg
04-020	TRH 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.

MBT spike recovery biased low due to matrix affect.

Due to high analyte concentration in sample some matrix spike recoveries not reported.

CRS & TAA analysis was subcontracted to Envirolab Services (NATA Number 2901);
reference Envirolab certificate number 66798.

PSD analysis was subcontracted to Golder Associates (NATA Number 1446); see attached Golder job number 117634002/2

Analysis was subcontracted to Sydney Analytical Laboratories (NATA Number 1884);
reference SAL report number SAL23909B.

Radionuclides (Gross Alpha/Beta Analysis) was subcontracted to Western Radiation Services (NATA # 14174);
reference Western Radiation report number J6705

Issue Date: 19 January 2012

Page 30 of 45

Advanced Analytical Australia Pty Ltd

ABN 20 105 644 979

11 Julius Avenue

Ph: + 61 2 9888 9077

Fax: + 61 2 9888 9577

contact@advancedanalytical.com.au



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	<0.4	A11/6127-A-1	4.2 4.2 RPD: 0	A11/6127-A-1	95%
Cadmium	mg/kg	<0.1	A11/6127-A-1	<0.1 <0.1	A11/6127-A-1	107%
Chromium	mg/kg	<0.1	A11/6127-A-1	32 32 RPD: 0	A11/6127-A-1	94%
Copper	mg/kg	<0.1	A11/6127-A-1	16 16 RPD: 0	A11/6127-A-1	98%
Lead	mg/kg	<0.5	A11/6127-A-1	5.2 5.1 RPD: 2	A11/6127-A-1	89%
Mercury	mg/kg	<0.01	A11/6127-A-1	0.03 0.03 RPD: 0	A11/6127-A-1	97%
Nickel	mg/kg	<0.1	A11/6127-A-1	20 20 RPD: 0	A11/6127-A-1	90%
Phosphorus	mg/kg	<1	A11/6127-A-1	410 410 RPD: 0	A11/6127-A-1	100%
Zinc	mg/kg	<0.5	A11/6127-A-1	45 45 RPD: 0	A11/6127-A-1	92%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	A11/6127-A-1	<0.20 <0.20	A11/6127-A-1	75%
Toluene	mg/kg	<0.20	A11/6127-A-1	<0.20 <0.20	A11/6127-A-1	77%
Ethyl Benzene	mg/kg	<0.20	A11/6127-A-1	<0.20 <0.20	A11/6127-A-1	8%
m+p xylenes	mg/kg	<0.40	A11/6127-A-1	<0.40 <0.40	A11/6127-A-1	78%
o-xylene	mg/kg	<0.20	A11/6127-A-1	<0.20 <0.20	A11/6127-A-1	81%
Total BTEX	mg/kg	<1.2	A11/6127-A-1	<1.2 <1.2	A11/6127-A-1	[NA]
Surrogate 1 Recovery	%	106	A11/6127-A-1	81 78 RPD: 4	A11/6127-A-1	79%
Surrogate 2 Recovery	%	94	A11/6127-A-1	80 72 RPD: 11	A11/6127-A-1	69%
Surrogate 3 Recovery	%	96	A11/6127-A-1	76 77 RPD: 1	A11/6127-A-1	75%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	<10	A11/6127-A-1	<10 <10	A11/6127-A-1	76%
TPHC10-14	mg/kg	<10	A11/6127-A-1	<10 <10	A11/6127-A-1	87%
TPHC15-28	mg/kg	<50	A11/6127-A-1	<50 <50	A11/6127-A-1	94%
TPHC29-36	mg/kg	<50	A11/6127-A-1	<50 <50	A11/6127-A-1	90%
Surrogate Recovery	%	113	A11/6127-A-1	95 96 RPD: 1	A11/6127-A-1	83%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	81%
1-Methylnaphthalene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	84%
2-Methylnaphthalene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	85%
Acenaphthylene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	95%
Acenaphthene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	99%
Fluorene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	104%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Phenanthrene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	98%
Anthracene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	94%
Fluoranthene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	103%
Pyrene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	100%
Benz(a)anthracene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	99%
Chrysene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	96%
Benzo(b)&(k)fluoranthene	µg/kg	<10	A11/6127-A-1	<10 <10	A11/6127-A-1	89%
Benzo(a)pyrene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	85%
Indeno(1,2,3-cd)pyrene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	95%
Dibenz(a,h)anthracene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	66%
Benzo(g,h,i)perylene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	89%
Coronene	µg/kg	<10	A11/6127-A-1	<10 <10	A11/6127-A-1	79%
Benzo(e)pyrene	µg/kg	<5	A11/6127-A-1	<5 <5	A11/6127-A-1	102%
Perylene	µg/kg	<5	A11/6127-A-1	400 200 RPD: 67	A11/6127-A-1	#
Total PAHs (as above)	µg/kg	<100	A11/6127-A-1	360 190 RPD: 62	A11/6127-A-1	[NA]
Surrogate 1 Recovery	%	55	A11/6127-A-1	49 54 RPD: 10	A11/6127-A-1	88%
Surrogate 2 Recovery	%	92	A11/6127-A-1	100 95 RPD: 5	A11/6127-A-1	99%
Surrogate 3 Recovery	%	112	A11/6127-A-1	99 101 RPD: 2	A11/6127-A-1	91%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	99%
<i>alpha</i> -BHC	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	106%
<i>beta</i> -BHC	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	111%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	109%
<i>delta</i> -BHC	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	111%
<i>cis</i> -Chlordane	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	102%
<i>trans</i> -Chlordane	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	294%
<i>p,p'</i> -DDD	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	99%
<i>p,p'</i> -DDE	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	102%
<i>p,p'</i> -DDT	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	87%
Dieldrin	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	102%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	104%
<i>beta</i> -Endosulfan	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	106%
Endosulfan Sulphate	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	101%
Endrin	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	106%
Endrin ketone	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	101%
Endrin aldehyde	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	92%
Heptachlor	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	143%
Heptachlor epoxide	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	100%
Hexachlorobenzene	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	100%
Methoxychlor	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	89%
Oxychlordane	µg/kg	<1.0	A11/6127-A-1	<1.0 <1.0	A11/6127-A-1	[NA]



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Surrogate Recovery	%	115	A11/6127-A-1	102 104 RPD: 2	A11/6127-A-1	97%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	94%
Demeton-S-methyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	133%
Dimethoate	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	128%
Diazinon	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	101%
Chlorpyrifos-methyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	116%
Parathion-methyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	136%
Pirimiphos-methyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	113%
Fenitrothion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	131%
Malathion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	118%
Chlorpyrifos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	105%
Fenthion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	101%
Parathion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	130%
Chlorfenvinphos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	97%
Bromophos-ethyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	122%
Methidathion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	105%
Fenamiphos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	127%
Prothiofos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	140%
Ethion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	93%
Carbophenothion	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	97%
Phosalone	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	83%
Azinphos-methyl	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	119%
Fenchlorvos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	101%
Mevinphos	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	107%
Trifluralin	µg/kg	<20	A11/6127-A-1	<20 <20	A11/6127-A-1	140%
Surrogate Recovery	%	108	A11/6127-A-1	100 98 RPD: 2	A11/6127-A-1	102%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	103%
Di-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	106%
Tri-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	106%
Tetra-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	105%
Penta-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	98%
Hexa-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	98%
Hepta-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	100%
Octa-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	102%
Nona-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	105%
Deca-PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	102%
Total PCB congeners	µg/kg	<5.0	A11/6127-A-1	<5.0 <5.0	A11/6127-A-1	[NA]
Surrogate 1 Recovery	%	113	A11/6127-A-1	102 104 RPD: 2	A11/6127-A-1	116%
Surrogate 2 Recovery	%	104	A11/6127-A-1	97 97 RPD: 0	A11/6127-A-1	91%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Monobutyl tin	µgSn/kg	<0.50	A11/6127-A-1	<0.50 <0.50	A11/6127-A-1	#
Dibutyl tin	µgSn/kg	<0.50	A11/6127-A-1	<0.50 <0.50	A11/6127-A-1	78%
Tributyl tin	µgSn/kg	<0.50	A11/6127-A-1	<0.50 <0.50	A11/6127-A-1	84%
Surrogate 1 Recovery	%	88	A11/6127-A-1	75 72 RPD: 4	A11/6127-A-1	76%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results
Total Actual Acidity	mol/T	<5.0	[NT]	[NT]

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Arsenic	mg/kg	<0.4	A11/6127-A-11	7.4 7.6 RPD: 3	A11/6127-A-22	86%
Cadmium	mg/kg	<0.1	A11/6127-A-11	<0.1 <0.1	A11/6127-A-22	102%
Chromium	mg/kg	<0.1	A11/6127-A-11	43 43 RPD: 0	A11/6127-A-22	81%
Copper	mg/kg	<0.1	A11/6127-A-11	47 47 RPD: 0	A11/6127-A-22	78%
Lead	mg/kg	<0.5	A11/6127-A-11	26 26 RPD: 0	A11/6127-A-22	73%
Mercury	mg/kg	<0.01	A11/6127-A-11	0.12 0.12 RPD: 0	A11/6127-A-22	90%
Nickel	mg/kg	<0.1	A11/6127-A-11	22 22 RPD: 0	A11/6127-A-22	77%
Phosphorus	mg/kg	<1	A11/6127-A-11	830 830 RPD: 0	A11/6127-A-22	87%
Zinc	mg/kg	<0.5	A11/6127-A-11	140 140 RPD: 0	A11/6127-A-22	79%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	<0.20	A11/6127-A-11	<0.20 <0.20	A11/6127-A-21	71%
Toluene	mg/kg	<0.20	A11/6127-A-11	<0.20 <0.20	A11/6127-A-21	76%
Ethyl Benzene	mg/kg	<0.20	A11/6127-A-11	<0.20 <0.20	A11/6127-A-21	79%
m+p xylenes	mg/kg	<0.40	A11/6127-A-11	<0.40 <0.40	A11/6127-A-21	78%
o-xylene	mg/kg	<0.20	A11/6127-A-11	<0.20 <0.20	A11/6127-A-21	76%
Total BTEX	mg/kg	<1.2	A11/6127-A-11	<1.2 <1.2	A11/6127-A-21	[NA]
Surrogate 1 Recovery	%	101	A11/6127-A-11	50 66 RPD: 28	A11/6127-A-21	60%
Surrogate 2 Recovery	%	95	A11/6127-A-11	44 58 RPD: 27	A11/6127-A-21	51%
Surrogate 3 Recovery	%	99	A11/6127-A-11	50 60 RPD: 18	A11/6127-A-21	64%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	<10	A11/6127-A-11	<10 <10	A11/6127-A-21	70%
TPHC10-14	mg/kg	<10	A11/6127-A-11	<20 [NT]	A11/6127-A-21	131%
TPHC15-28	mg/kg	<50	A11/6127-A-11	120 [NT]	A11/6127-A-21	119%
TPHC29-36	mg/kg	<50	A11/6127-A-11	130 [NT]	A11/6127-A-21	93%
Surrogate Recovery	%	97	A11/6127-A-11	113 60 RPD: 61	A11/6127-A-21	108%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	72%
1-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	78%
2-Methylnaphthalene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	77%
Acenaphthylene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	98%
Acenaphthene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	84%
Fluorene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	97%
Phenanthrene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	95%
Anthracene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	89%
Fluoranthene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	#
Pyrene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	#
Benz(a)anthracene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	98%
Chrysene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	78%
Benzo(b)&(k)fluoranthene	µg/kg	<10	[NT]	[NT]	A11/6127-A-21	#
Benzo(a)pyrene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	#
Indeno(1,2,3-cd)pyrene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	101%
Dibenz(a,h)anthracene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	71%
Benzo(g,h,i)perylene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	130%
Coronene	µg/kg	<10	[NT]	[NT]	A11/6127-A-21	127%
Benzo(e)pyrene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	#
Perylene	µg/kg	<5	[NT]	[NT]	A11/6127-A-21	#
Total PAHs (as above)	µg/kg	<100	[NT]	[NT]	A11/6127-A-21	[NA]
Surrogate 1 Recovery	%	54	[NT]	[NT]	A11/6127-A-21	89%
Surrogate 2 Recovery	%	91	[NT]	[NT]	A11/6127-A-21	102%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Surrogate 3 Recovery	%	108	[NT]	[NT]	A11/6127-A-21	78%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	88%
<i>alpha</i> -BHC	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	#
<i>beta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	121%
<i>gamma</i> -BHC (Lindane)	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	96%
<i>delta</i> -BHC	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	117%
<i>cis</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	88%
<i>trans</i> -Chlordane	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	98%
<i>p,p'</i> -DDD	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	101%
<i>p,p'</i> -DDE	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	92%
<i>p,p'</i> -DDT	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	81%
Dieldrin	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	96%
<i>alpha</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	71%
<i>beta</i> -Endosulfan	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	95%
Endosulfan Sulphate	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	96%
Endrin	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	113%
Endrin ketone	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	93%
Endrin aldehyde	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	93%
Heptachlor	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	128%
Heptachlor epoxide	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	88%
Hexachlorobenzene	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	100%
Methoxychlor	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	107%
Oxychlordane	µg/kg	<1.0	[NT]	[NT]	A11/6127-A-21	[NA]
Surrogate Recovery	%	116	[NT]	[NT]	A11/6127-A-21	90%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	96%
Demeton-S-methyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Dimethoate	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Diazinon	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	108%
Chlorpyrifos-methyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	124%
Parathion-methyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Pirimiphos-methyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	125%
Fenitrothion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Malathion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Chlorpyrifos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	112%
Fenthion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	118%
Parathion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Chlorfenvinphos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	115%
Bromophos-ethyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Methidathion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Fenamiphos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Prothiofos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	90%
Ethion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	106%
Carbophenothion	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	120%
Phosalone	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	126%
Azinphos-methyl	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Fenchlorvos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	110%
Mevinphos	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	122%
Trifluralin	µg/kg	<20	[NT]	[NT]	A11/6127-A-21	#
Surrogate Recovery	%	112	[NT]	[NT]	A11/6127-A-21	121%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	109%
Di-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	115%
Tri-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	113%
Tetra-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	124%
Penta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	104%
Hexa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	99%
Hepta-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	100%
Octa-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	103%
Nona-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	105%
Deca-PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	99%
Total PCB congeners	µg/kg	<5.0	[NT]	[NT]	A11/6127-A-21	[NA]
Surrogate 1 Recovery	%	107	[NT]	[NT]	A11/6127-A-21	131%
Surrogate 2 Recovery	%	102	[NT]	[NT]	A11/6127-A-21	100%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results
Arsenic	mg/kg	[NT]	A11/6127-A-21	7.8 7.7 RPD: 1
Cadmium	mg/kg	[NT]	A11/6127-A-21	0.27 0.27 RPD: 0
Chromium	mg/kg	[NT]	A11/6127-A-21	44 45 RPD: 2
Copper	mg/kg	[NT]	A11/6127-A-21	48 48 RPD: 0
Lead	mg/kg	[NT]	A11/6127-A-21	37 38 RPD: 3
Mercury	mg/kg	[NT]	A11/6127-A-21	0.18 0.19 RPD: 5
Nickel	mg/kg	[NT]	A11/6127-A-21	25 25 RPD: 0
Phosphorus	mg/kg	[NT]	A11/6127-A-21	890 890 RPD: 0
Zinc	mg/kg	[NT]	A11/6127-A-21	140 140 RPD: 0

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	A11/6127-A-21	<0.20 <0.20	External	84%
Toluene	mg/kg	[NT]	A11/6127-A-21	<0.20 <0.20	External	84%
Ethyl Benzene	mg/kg	[NT]	A11/6127-A-21	<0.20 <0.20	External	84%
m+p xylenes	mg/kg	[NT]	A11/6127-A-21	<0.40 <0.40	External	81%
o-xylene	mg/kg	[NT]	A11/6127-A-21	<0.20 <0.20	External	85%
Total BTEX	mg/kg	[NT]	A11/6127-A-21	<1.2 <1.2	External	[NA]
Surrogate 1 Recovery	%	[NT]	A11/6127-A-21	64 68 RPD: 6	External	92%
Surrogate 2 Recovery	%	[NT]	A11/6127-A-21	56 60 RPD: 7	External	82%
Surrogate 3 Recovery	%	[NT]	A11/6127-A-21	62 66 RPD: 6	External	85%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/6127-A-21	<10 <10	External	81%
TPHC10-14	mg/kg	[NT]	A11/6127-A-21	24 11 RPD: 74	External	82%
TPHC15-28	mg/kg	[NT]	A11/6127-A-21	220 160 RPD: 32	External	96%
TPHC29-36	mg/kg	[NT]	A11/6127-A-21	170 150 RPD: 12	External	99%
Surrogate Recovery	%	[NT]	A11/6127-A-21	112 97 RPD: 14	External	92%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	[NT]	A11/6127-A-21	33 27 RPD: 20	External	97%
1-Methylnaphthalene	µg/kg	[NT]	A11/6127-A-21	17 15 RPD: 12	External	97%
2-Methylnaphthalene	µg/kg	[NT]	A11/6127-A-21	28 25 RPD: 11	External	100%
Acenaphthylene	µg/kg	[NT]	A11/6127-A-21	25 35 RPD: 33	External	107%
Acenaphthene	µg/kg	[NT]	A11/6127-A-21	20 20 RPD: 0	External	110%
Fluorene	µg/kg	[NT]	A11/6127-A-21	30 20 RPD: 40	External	111%
Phenanthrene	µg/kg	[NT]	A11/6127-A-21	60 70 RPD: 15	External	99%
Anthracene	µg/kg	[NT]	A11/6127-A-21	30 30 RPD: 0	External	99%
Fluoranthene	µg/kg	[NT]	A11/6127-A-21	200 300 RPD: 40	External	107%
Pyrene	µg/kg	[NT]	A11/6127-A-21	300 360 RPD: 18	External	106%
Benz(a)anthracene	µg/kg	[NT]	A11/6127-A-21	100 100 RPD: 0	External	94%
Chrysene	µg/kg	[NT]	A11/6127-A-21	80 100 RPD: 22	External	103%
Benzo(b)&(k)fluoranthene	µg/kg	[NT]	A11/6127-A-21	200 300 RPD: 40	External	90%
Benzo(a)pyrene	µg/kg	[NT]	A11/6127-A-21	120 170 RPD: 34	External	103%
Indeno(1,2,3-cd)pyrene	µg/kg	[NT]	A11/6127-A-21	100 200 RPD: 67	External	118%
Dibenz(a,h)anthracene	µg/kg	[NT]	A11/6127-A-21	9 17 RPD: 62	External	79%
Benzo(g,h,i)perylene	µg/kg	[NT]	A11/6127-A-21	100 100 RPD: 0	External	101%
Coronene	µg/kg	[NT]	A11/6127-A-21	28 29 RPD: 4	External	95%
Benzo(e)pyrene	µg/kg	[NT]	A11/6127-A-21	110 150 RPD: 31	External	103%
Perylene	µg/kg	[NT]	A11/6127-A-21	1900 1800 RPD: 5	External	71%
Total PAHs (as above)	µg/kg	[NT]	A11/6127-A-21	3500 4000 RPD: 13	External	[NA]
Surrogate 1 Recovery	%	[NT]	A11/6127-A-21	83 84 RPD: 1	External	104%
Surrogate 2 Recovery	%	[NT]	A11/6127-A-21	110 103 RPD: 7	External	105%
Surrogate 3 Recovery	%	[NT]	A11/6127-A-21	97 95 RPD: 2	External	103%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	106%
<i>alpha</i> -BHC	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	106%
<i>beta</i> -BHC	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	105%
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	110%
<i>delta</i> -BHC	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	109%
<i>cis</i> -Chlordane	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	111%
<i>trans</i> -Chlordane	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	105%
<i>p,p'</i> -DDD	µg/kg	[NT]	A11/6127-A-21	3.0 5.0 RPD: 50	External	103%
<i>p,p'</i> -DDE	µg/kg	[NT]	A11/6127-A-21	10 12 RPD: 18	External	113%
<i>p,p'</i> -DDT	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	91%
Dieldrin	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	113%
<i>alpha</i> -Endosulfan	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	112%
<i>beta</i> -Endosulfan	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	111%
Endosulfan Sulphate	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	108%
Endrin	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	111%
Endrin ketone	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	109%
Endrin aldehyde	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	51%
Heptachlor	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	118%
Heptachlor epoxide	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	100%
Hexachlorobenzene	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	107%
Methoxychlor	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	93%
Oxychlordane	µg/kg	[NT]	A11/6127-A-21	<1.0 <1.0	External	[NA]
Surrogate Recovery	%	[NT]	A11/6127-A-21	98 93 RPD: 5	External	111%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	105%
Demeton-S-methyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	133%
Dimethoate	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	127%
Diazinon	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	104%
Chlorpyrifos-methyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	114%
Parathion-methyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	107%
Pirimiphos-methyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	112%
Fenitrothion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	104%
Malathion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	110%
Chlorpyrifos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	109%
Fenthion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	103%
Parathion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	101%
Chlorfenvinphos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	98%
Bromophos-ethyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	109%
Methidathion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	106%
Fenamiphos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	131%
Prothiofos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	100%
Ethion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	96%
Carbophenothion	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	106%
Phosalone	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	99%
Azinphos-methyl	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	118%
Fenchlorvos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	103%
Mevinphos	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	109%
Trifluralin	µg/kg	[NT]	A11/6127-A-21	<20 <20	External	108%
Surrogate Recovery	%	[NT]	A11/6127-A-21	101 102 RPD: 1	External	115%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	118%
Di-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	116%
Tri-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	115%
Tetra-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	106%
Penta-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	107%
Hexa-PCB congeners	µg/kg	[NT]	A11/6127-A-21	5.0 5.0 RPD: 0	External	105%
Hepta-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	107%
Octa-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	107%
Nona-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	110%
Deca-PCB congeners	µg/kg	[NT]	A11/6127-A-21	<5.0 <5.0	External	110%
Total PCB congeners	µg/kg	[NT]	A11/6127-A-21	5.0 5.0 RPD: 0	External	[NA]
Surrogate 1 Recovery	%	[NT]	A11/6127-A-21	136 132 RPD: 3	External	129%
Surrogate 2 Recovery	%	[NT]	A11/6127-A-21	114 107 RPD: 6	External	95%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	mg/kg	[NT]	[NT]	[NT]	External	102%
Toluene	mg/kg	[NT]	[NT]	[NT]	External	105%
Ethyl Benzene	mg/kg	[NT]	[NT]	[NT]	External	103%
m+p xylenes	mg/kg	[NT]	[NT]	[NT]	External	99%
o-xylene	mg/kg	[NT]	[NT]	[NT]	External	101%
Total BTEX	mg/kg	[NT]	[NT]	[NT]	External	[NA]
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	100%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	94%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	98%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	mg/kg	[NT]	A11/6127-A-12	<10 [NT]	External	99%
TPHC10-14	mg/kg	[NT]	A11/6127-A-12	20 <20	External	96%
TPHC15-28	mg/kg	[NT]	A11/6127-A-12	130 130 RPD: 0	External	105%
TPHC29-36	mg/kg	[NT]	A11/6127-A-12	130 140 RPD: 7	External	102%
Surrogate Recovery	%	[NT]	A11/6127-A-12	94 98 RPD: 4	External	95%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Naphthalene	µg/kg	[NT]	A11/6127-A-12	8.0 9.0 RPD: 12	External	104%
1-Methylnaphthalene	µg/kg	[NT]	A11/6127-A-12	6 6 RPD: 0	External	107%
2-Methylnaphthalene	µg/kg	[NT]	A11/6127-A-12	6 7 RPD: 15	External	106%
Acenaphthylene	µg/kg	[NT]	A11/6127-A-12	8.0 10 RPD: 22	External	110%
Acenaphthene	µg/kg	[NT]	A11/6127-A-12	<5 5	External	115%
Fluorene	µg/kg	[NT]	A11/6127-A-12	7 8 RPD: 13	External	114%
Phenanthrene	µg/kg	[NT]	A11/6127-A-12	40 40 RPD: 0	External	104%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Anthracene	µg/kg	[NT]	A11/6127-A-12	10 10 RPD: 0	External	104%
Fluoranthene	µg/kg	[NT]	A11/6127-A-12	100 100 RPD: 0	External	111%
Pyrene	µg/kg	[NT]	A11/6127-A-12	110 120 RPD: 9	External	111%
Benz(a)anthracene	µg/kg	[NT]	A11/6127-A-12	60 70 RPD: 15	External	98%
Chrysene	µg/kg	[NT]	A11/6127-A-12	50 70 RPD: 33	External	106%
Benzo(b)&(k)fluoranthene	µg/kg	[NT]	A11/6127-A-12	100 200 RPD: 67	External	93%
Benzo(a)pyrene	µg/kg	[NT]	A11/6127-A-12	63 75 RPD: 17	External	114%
Indeno(1,2,3-cd)pyrene	µg/kg	[NT]	A11/6127-A-12	60 70 RPD: 15	External	103%
Dibenz(a,h)anthracene	µg/kg	[NT]	A11/6127-A-12	6 8 RPD: 29	External	102%
Benzo(g,h,i)perylene	µg/kg	[NT]	A11/6127-A-12	60 80 RPD: 29	External	103%
Coronene	µg/kg	[NT]	A11/6127-A-12	27 30 RPD: 11	External	100%
Benzo(e)pyrene	µg/kg	[NT]	A11/6127-A-12	59 70 RPD: 17	External	111%
Perylene	µg/kg	[NT]	A11/6127-A-12	200 300 RPD: 40	External	75%
Total PAHs (as above)	µg/kg	[NT]	A11/6127-A-12	1070 1230 RPD: 14	External	[NA]
Surrogate 1 Recovery	%	[NT]	A11/6127-A-12	63 50 RPD: 23	External	107%
Surrogate 2 Recovery	%	[NT]	A11/6127-A-12	107 108 RPD: 1	External	110%
Surrogate 3 Recovery	%	[NT]	A11/6127-A-12	94 98 RPD: 4	External	108%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Aldrin	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	110%
<i>alpha</i> -BHC	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	112%
<i>beta</i> -BHC	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	110%
<i>gamma</i> -BHC (Lindane)	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	113%
<i>delta</i> -BHC	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	113%
<i>cis</i> -Chlordane	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	116%
<i>trans</i> -Chlordane	µg/kg	[NT]	A11/6127-A-12	<1.0 1.0	External	111%
<i>p,p'</i> -DDD	µg/kg	[NT]	A11/6127-A-12	2.0 2.0 RPD: 0	External	108%
<i>p,p'</i> -DDE	µg/kg	[NT]	A11/6127-A-12	3.0 3.0 RPD: 0	External	117%
<i>p,p'</i> -DDT	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	94%
Dieldrin	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	118%
<i>alpha</i> -Endosulfan	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	114%
<i>beta</i> -Endosulfan	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	109%
Endosulfan Sulphate	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	112%
Endrin	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	112%
Endrin ketone	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	111%
Endrin aldehyde	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	96%
Heptachlor	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	124%
Heptachlor epoxide	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	104%
Hexachlorobenzene	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	112%
Methoxychlor	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	89%
Oxychlordane	µg/kg	[NT]	A11/6127-A-12	<1.0 <1.0	External	[NA]
Surrogate Recovery	%	[NT]	A11/6127-A-12	94 97 RPD: 3	External	116%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Dichlorvos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	111%
Demeton-S-methyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	136%
Dimethoate	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	128%
Diazinon	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	106%
Chlorpyrifos-methyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	120%
Parathion-methyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	114%
Pirimiphos-methyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	118%
Fenitrothion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	108%
Malathion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	116%
Chlorpyrifos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	113%
Fenthion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	106%
Parathion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	102%
Chlorfenvinphos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	103%
Bromophos-ethyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	115%
Methidathion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	109%
Fenamiphos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	129%
Prothiofos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	116%
Ethion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	101%
Carbophenothion	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	110%
Phosalone	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	99%
Azinphos-methyl	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	121%
Fenchlorvos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	109%
Mevinphos	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	112%
Trifluralin	µg/kg	[NT]	A11/6127-A-12	<20 <20	External	108%
Surrogate Recovery	%	[NT]	A11/6127-A-12	101 100 RPD: 1	External	119%



Batch Number: A11/6127-A [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Mono-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	122%
Di-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	119%
Tri-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	119%
Tetra-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	112%
Penta-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	112%
Hexa-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	110%
Hepta-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	113%
Octa-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	113%
Nona-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	117%
Deca-PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	114%
Total PCB congeners	µg/kg	[NT]	A11/6127-A-12	<5.0 <5.0	External	[NA]
Surrogate 1 Recovery	%	[NT]	A11/6127-A-12	111 107 RPD: 4	External	134%
Surrogate 2 Recovery	%	[NT]	A11/6127-A-12	95 99 RPD: 4	External	99%

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.



REPORT OF ANALYSIS

Laboratory Reference: A11/6127-B [R00]

Client: WorleyParsons Services Pty Ltd
Level 3, 60 Albert Street
Brisbane QLD 4000

Contact: Vivian Seto

Order No: 301001-01247
Project: Port Bris SAP 2012
Sample Type: Water
No. of Samples: 1
Date Received: 19/12/2011
Date Completed: 6/01/2012

Laboratory Contact Details:

Client Services Manager: Trent Biggin
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.



Issue Date: 19 January 2012

Page 1 of 4

Advanced Analytical Australia Pty Ltd
ABN 20 105 644 979
11 Julius Avenue
North Ryde NSW 2113 Australia

Ph: + 61 2 9888 9077
Fax: + 61 2 9888 9577
contact@advancedanalytical.com.au
www.advancedanalytical.com.au



Batch Number: A11/6127-B [R00]
Project Reference: Port Bris SAP 2012

Laboratory Reference:	-	-	/1
Client Reference:	-	-	4 - 9
Date Sampled:	-	-	16/12/2011
Analysis Description	Method	Units	
BTEX			
Benzene	04-021	µg/L	<1.0
Toluene	04-021	µg/L	<2.0
Ethyl Benzene	04-021	µg/L	<2.0
m+p xylenes	04-021	µg/L	<4.0
o-xylene	04-021	µg/L	<2.0
Total BTEX	04-021	µg/L	<11
Surrogate 1 Recovery	04-021	%	101
Surrogate 2 Recovery	04-021	%	94
Surrogate 3 Recovery	04-021	%	88
Date Extracted	04-021	-	28/12/11
Date Analysed	04-021	-	28/12/11
Total Petroleum Hydrocarbons			
TPHC6-C9	04-021	µg/L	<25
Surrogate Recovery	04-030	%	88
Date Extracted	04-030	-	28/12/11
Date Analysed	04-030	-	28/12/11

Method	Method Description
04-021	TRH C6-9 & BTEX by P&T GCMS, µg/L
04-030	TRH by GC-FID, µg/L

Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required



Batch Number: A11/6127-B [R00]
Project Reference: Port Bris SAP 2012

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	µg/L	<1.0	[NT]	[NT]	External	101%
Toluene	µg/L	<2.0	[NT]	[NT]	External	99%
Ethyl Benzene	µg/L	<2.0	[NT]	[NT]	External	98%
m+p xylenes	µg/L	<4.0	[NT]	[NT]	External	102%
o-xylene	µg/L	<2.0	[NT]	[NT]	External	101%
Total BTEX	µg/L	<11	[NT]	[NT]	External	[NA]
Surrogate 1 Recovery	%	102	[NT]	[NT]	External	88%
Surrogate 2 Recovery	%	95	[NT]	[NT]	External	96%
Surrogate 3 Recovery	%	92	[NT]	[NT]	External	90%

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	µg/L	<25	[NT]	[NT]	External	103%
TPHC10-14	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC15-28	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC29-36	µg/L	[NT]	[NT]	[NT]	External	[NT]
Surrogate Recovery	%	92	[NT]	[NT]	External	90%

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Benzene	µg/L	[NT]	[NT]	[NT]	External	100%
Toluene	µg/L	[NT]	[NT]	[NT]	External	95%
Ethyl Benzene	µg/L	[NT]	[NT]	[NT]	External	94%
m+p xylenes	µg/L	[NT]	[NT]	[NT]	External	97%
o-xylene	µg/L	[NT]	[NT]	[NT]	External	97%
Total BTEX	µg/L	[NT]	[NT]	[NT]	External	[NA]
Surrogate 1 Recovery	%	[NT]	[NT]	[NT]	External	92%
Surrogate 2 Recovery	%	[NT]	[NT]	[NT]	External	93%
Surrogate 3 Recovery	%	[NT]	[NT]	[NT]	External	92%



Batch Number: A11/6127-B [R00]
Project Reference: Port Bris SAP 2012

TEST	Units	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
TPHC6-C9	µg/L	[NT]	[NT]	[NT]	External	95%
TPHC10-14	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC15-28	µg/L	[NT]	[NT]	[NT]	External	[NT]
TPHC29-36	µg/L	[NT]	[NT]	[NT]	External	[NT]
Surrogate Recovery	%	[NT]	[NT]	[NT]	External	92%

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.



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 4 Acid Sulfate Soils Analytical Report (Envirolab Services)



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS

66660

Client:

Advanced Analytical Aust. Pty Ltd (QLD)

Unit 1, 482 Kingsford Smith Dr

Hamilton

QLD 4007

Attention: Trent Biggin

Sample log in details:

Your Reference:

A11/5962

No. of samples:

11 soils

Date samples received / completed instructions received

16/12/11

/ 16/12/11

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:

23/12/11

/ 12/01/12

Date of Preliminary Report:

Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025.

Tests not covered by NATA are denoted with *.

Results Approved By:


Matt Mansfield
Approved Signatory

Envirolab Reference: 66660

Revision No: R 01



Chromium Suite Our Reference: Your Reference Type of sample	UNITS ----- -----	66660-1 A115962/12 soil	66660-2 A115962/13 soil	66660-3 A115962/15 soil	66660-4 A115962/24 soil	66660-5 A115962/25 soil
Chromium Reducible Sulfur	%w/w	0.23	0.22	0.29	0.03	0.25
a-Chromium Reducible Sulfur	moles H ⁺ /t	140	140	180	18	160
pH _{kcl}	pH units	7.8	7.8	8.3	9.4	8.5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5

Chromium Suite Our Reference: Your Reference Type of sample	UNITS ----- -----	66660-6 A115962/29 soil	66660-7 A115962/34 soil	66660-8 A115962/40 soil	66660-9 A115962/43 soil	66660-10 A115962/44 soil
Chromium Reducible Sulfur	%w/w	<0.005	0.27	0.30	0.24	0.23
a-Chromium Reducible Sulfur	moles H ⁺ /t	<3	170	190	150	150
pH _{kcl}	pH units	7.4	8.4	8.6	8.3	8.3
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5

Chromium Suite Our Reference: Your Reference Type of sample	UNITS ----- -----	66660-11 A115962/45 soil
Chromium Reducible Sulfur	%w/w	0.39
a-Chromium Reducible Sulfur	moles H ⁺ /t	240
pH _{kcl}	pH units	8.1
s-TAA pH 6.5	%w/w S	<0.01
TAA pH 6.5	moles H ⁺ /t	<5

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Chromium Suite						Base Duplicate %RPD		
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	66660-1	0.23 0.23 RPD: 0	LCS	74%
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	66660-1	140 140 RPD: 0	[NR]	[NR]
pH _{kcl}	pH units		Inorg-068	[NT]	66660-1	7.8 7.9 RPD: 1	LCS	100%
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	66660-1	<0.01 <0.01	[NR]	[NR]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	66660-1	<5 <5	LCS	113%
QUALITY CONTROL Chromium Suite	UNITS	Dup. Sm#		Duplicate Base + Duplicate + %RPD				
Chromium Reducible Sulfur	%w/w	66660-11		0.39 0.38 RPD: 3				
a-Chromium Reducible Sulfur	moles H ⁺ /t	66660-11		240 240 RPD: 0				
pH _{kcl}	pH units	66660-11		8.1 8.2 RPD: 1				
s-TAA pH 6.5	%w/w S	66660-11		<0.01 <0.01				
TAA pH 6.5	moles H ⁺ /t	66660-11		<5 <5				

Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
 Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS

66798

Client:

Advanced Analytical Aust. Pty Ltd (QLD)

Unit 1, 482 Kingsford Smith Dr

Hamilton

QLD 4007

Attention: Trent Biggin

Sample log in details:

Your Reference:

A11/6127

No. of samples:

9 soils

Date samples received / completed instructions received

20/12/11

/ 20/12/11

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:

4/01/12

/

29/12/11

Date of Preliminary Report:

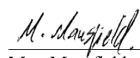
Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025.

Tests not covered by NATA are denoted with *.

Results Approved By:


Matt Mansfield
Approved Signatory



Chromium Suite Our Reference: Your Reference Type of sample	UNITS ----- -----	66798-1 A116127/1 soil	66798-2 A116127/2 soil	66798-3 A116127/3 soil	66798-4 A116127/7 soil	66798-5 A116127/12 soil
Chromium Reducible Sulfur	%w/w	0.21	0.53	0.52	0.48	0.23
a-Chromium Reducible Sulfur	moles H ⁺ /t	130	330	320	300	150
pH _{kd}	pH units	6.6	8.2	7.1	8.2	8.4
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5	<5

Chromium Suite Our Reference: Your Reference Type of sample	UNITS ----- -----	66798-6 A116127/13 soil	66798-7 A116127/14 soil	66798-8 A116127/15 soil	66798-9 A116127/16 soil
Chromium Reducible Sulfur	%w/w	0.20	0.44	0.38	0.27
a-Chromium Reducible Sulfur	moles H ⁺ /t	120	280	240	170
pH _{kd}	pH units	8.4	8.2	8.6	8.5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H ⁺ /t	<5	<5	<5	<5

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

Client Reference: A11/6127

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Chromium Suite						Base Duplicate %RPD		
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	66798-1	0.21 0.19 RPD: 10	LCS	82%
a-Chromium Reducible Sulfur	moles H ⁺ /t	3	Inorg-068	<3	66798-1	130 120 RPD: 8	[NR]	[NR]
pH _{KCl}	pH units		Inorg-068	[NT]	66798-1	6.6 6.6 RPD: 0	LCS	103%
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	66798-1	<0.01 <0.01	[NR]	[NR]
TAA pH 6.5	moles H ⁺ /t	5	Inorg-068	<5	66798-1	<5 <5	LCS	103%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 5 Particle Size Analysis (Golder Associates)



**BRISBANE
LABORATORY**

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone:(07) 3840 9500 Fax:(07) 3840 9501
www.golder.com.au

TEST RESULTS

Client : Advanced Analytical Australia	Job No. : 117634002/2
Project : Delivered Samples	Date Received : 16-Dec-11
Project Ref. : A11/5962	Sampled by : Client

BULK DENSITY SUMMARY

Reg'n No.	Sample ID	Sample No.	Bulk Density (t/m ³)
11307260	11-11 14/12/2011	10	1.754
11307271	13-7 12/12/2011	21	1.431
11307272	13-8 12/12/2011	22	1.420
11307281	9-4 13/12/2011	31	1.342
11307282	10-1 13/12/2011	32	1.394
11307291	11-9 14/12/2011	41	1.356
11307292	6-2 14/12/2011	42	1.526
11307293	6-3 14/12/2011	43	1.343

Remarks :

Prepared by : *NF*

Checked by *KB*



**BRISBANE
LABORATORY**

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone:(07) 3840 9500 Fax:(07) 3840 9501
www.golder.com.au

TEST RESULTS

Client : Advanced Analytical Australia
Project : Delivered Samples
Project Ref. : A11/5962

Job No. : 117634002/2
Date Received : 16-Dec-11
Sampled by : Client

PARTICLE SIZE SUMMARY

Reg'n No.	Sample ID	Sample No.	Percent Gravel (+ 2 mm)	Percent Sand (2 mm - 0.060 mm)	Percent Silt (0.060 mm - 0.002)	Percent Clay (-0.002 mm)
11307260	11-11 14/12/2011	10	0	77	13	10
11307261	11-12 13/12/2011	11	4	22	36	38
11307262	12-1 14/12/2011	12	0	26	37	37
11307263	12-2 14/12/2011	13	0	26	44	30
11307264	12-3 14/12/2011	14	0	30	40	30
11307265	13-1 13/12/2011	15	1	34	23	42
11307266	13-2 12/12/2011	16	3	29	30	38
11307267	13-3 12/12/2011	17	0	12	42	46
11307268	13-4 12/12/2011	18	0	10	33	57
11307269	13-5 12/12/2011	19	0	28	30	42
11307270	13-6 12/12/2011	20	0	20	33	47
11307271	13-7 12/12/2011	21	1	9	40	50
11307272	13-8 12/12/2011	22	1	11	35	53
11307273	13-9 12/12/2011	23	0	8	23	69
11307274	14-1 14/12/2011	24	0	90	6	4
11307275	15-1 13/12/2011	25	6	48	21	25
11307276	8-2 14/12/2011	26	0	42	28	30
11307277	8-3 14/12/2011	27	0	11	30	59
11307278	8-4 14/12/2011	28	0	17	32	51
11307279	9-1 14/12/2011	29	11	67	17	5
11307280	9-2 13/12/2011	30	0	16	46	38
11307281	9-4 13/12/2011	31	1	31	41	27
11307282	10-1 13/12/2011	32	1	40	39	20
11307283	10-5 13/12/2011	33	0	45	31	24
11307284	10-6 13/12/2011	34	0	32	41	27
11307285	10-8 13/12/2011	35	1	33	40	26
11307286	11-1 13/12/2011	36	4	7	43	46
11307287	11-3 12/12/2011	37	0	8	46	46
11307288	11-4 14/12/2011	38	1	53	26	20
11307289	11-5 14/12/2011	39	1	29	35	35
11307290	11-8 14/12/2011	40	11	45	24	20
11307291	11-9 14/12/2011	41	1	27	45	27
11307292	6-2 14/12/2011	42	0	44	34	22
11307293	6-3 14/12/2011	43	2	30	46	22
11307294	7-1 14/12/2011	44	1	51	26	22
11307295	8-1 14/12/2011	45	2	18	44	36

Remarks :

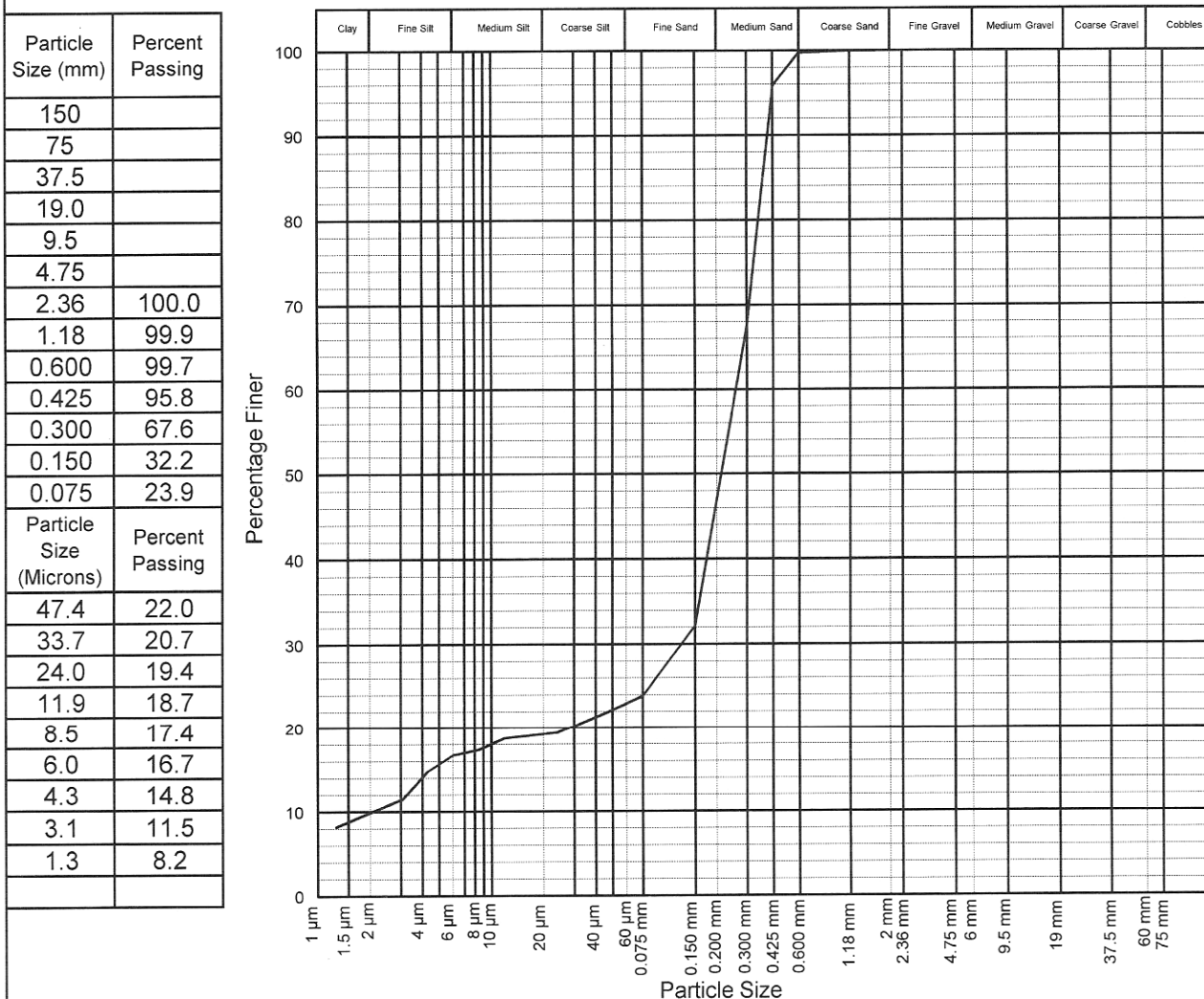
Test Procedure : AS 1289 3.6.3

Prepared by : KB

Checked by NF

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11986
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307260
Sample ID :	11-11 14/12/2011	AAA Lab. ID :	A11/5962/10
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SC) Clayey SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>NF</i>	

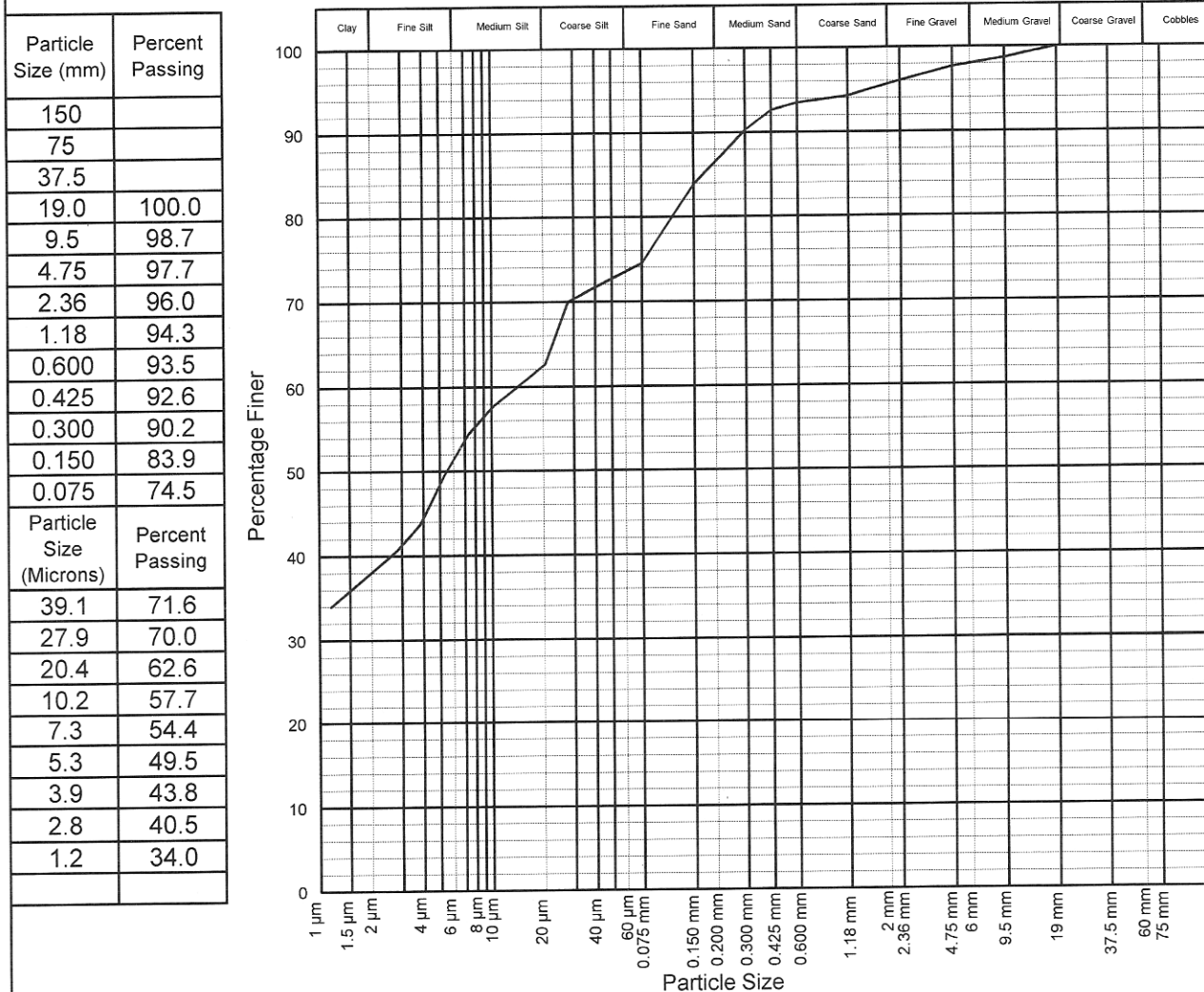
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Nick Farrer
Approved Signatory

12/11/12
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11987
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307261
Sample ID :	11-12 13/12/2011	AAA Lab. ID :	A11/5962/11
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <u>VR</u>		Checked by : <u>AK</u>	

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


Nick Farrer
Approved Signatory

 12/1/12
Senior Technical Officer
NATA Accred. No. : 1961

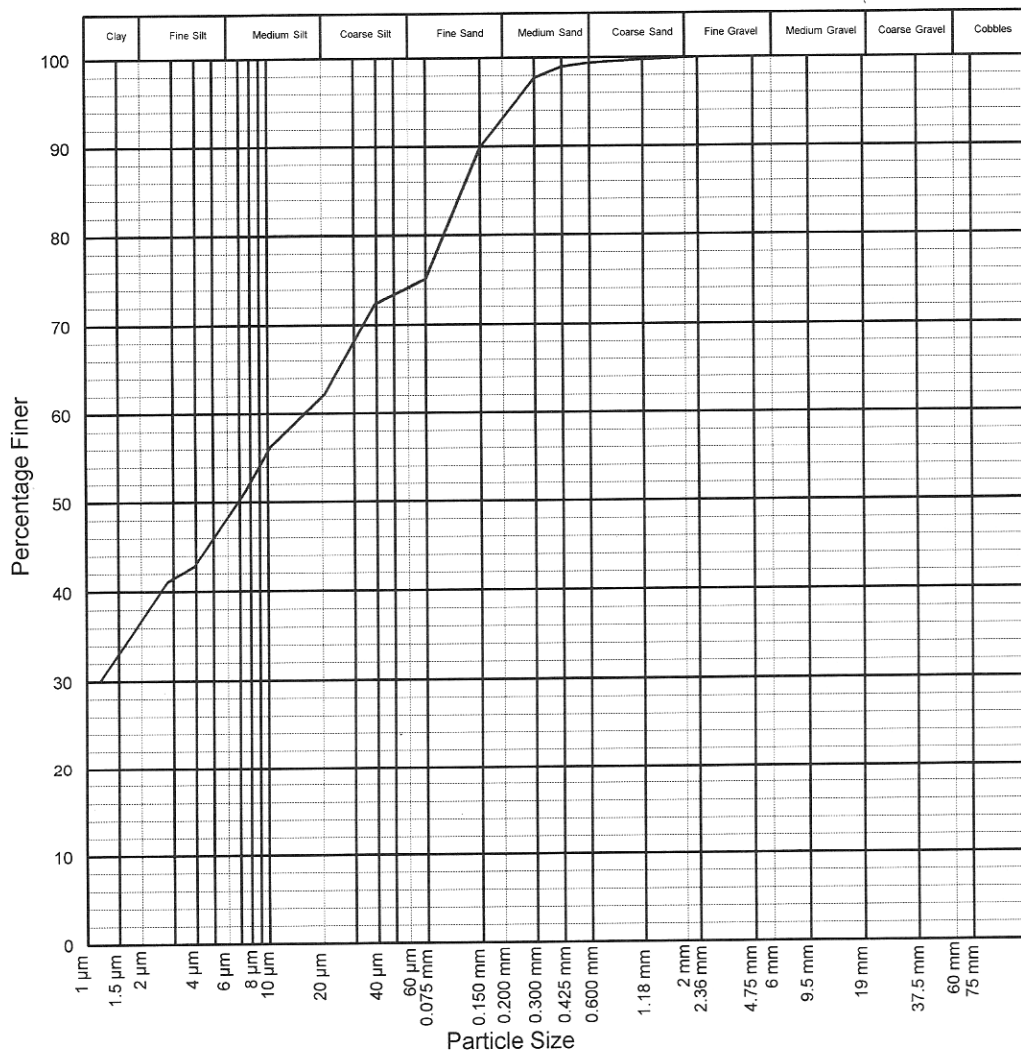
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 12-1 14/12/2011

Report No. : R11988
Job No. : 117634002/2
Reg'n No. : 11307262
AAA Lab. ID : A11/5962/12
Date Received : 16/12/2011
Sampled By : Client

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	99.4
0.425	99.0
0.300	97.7
0.150	89.9
0.075	75.1
Particle Size (Microns)	Percent Passing
39.4	72.4
28.6	67.3
20.7	62.2
10.4	56.3
7.5	51.2
5.4	47.0
3.9	42.8
2.8	41.1
1.2	30.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (Cl) Silty CLAY, grey, some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NT	

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

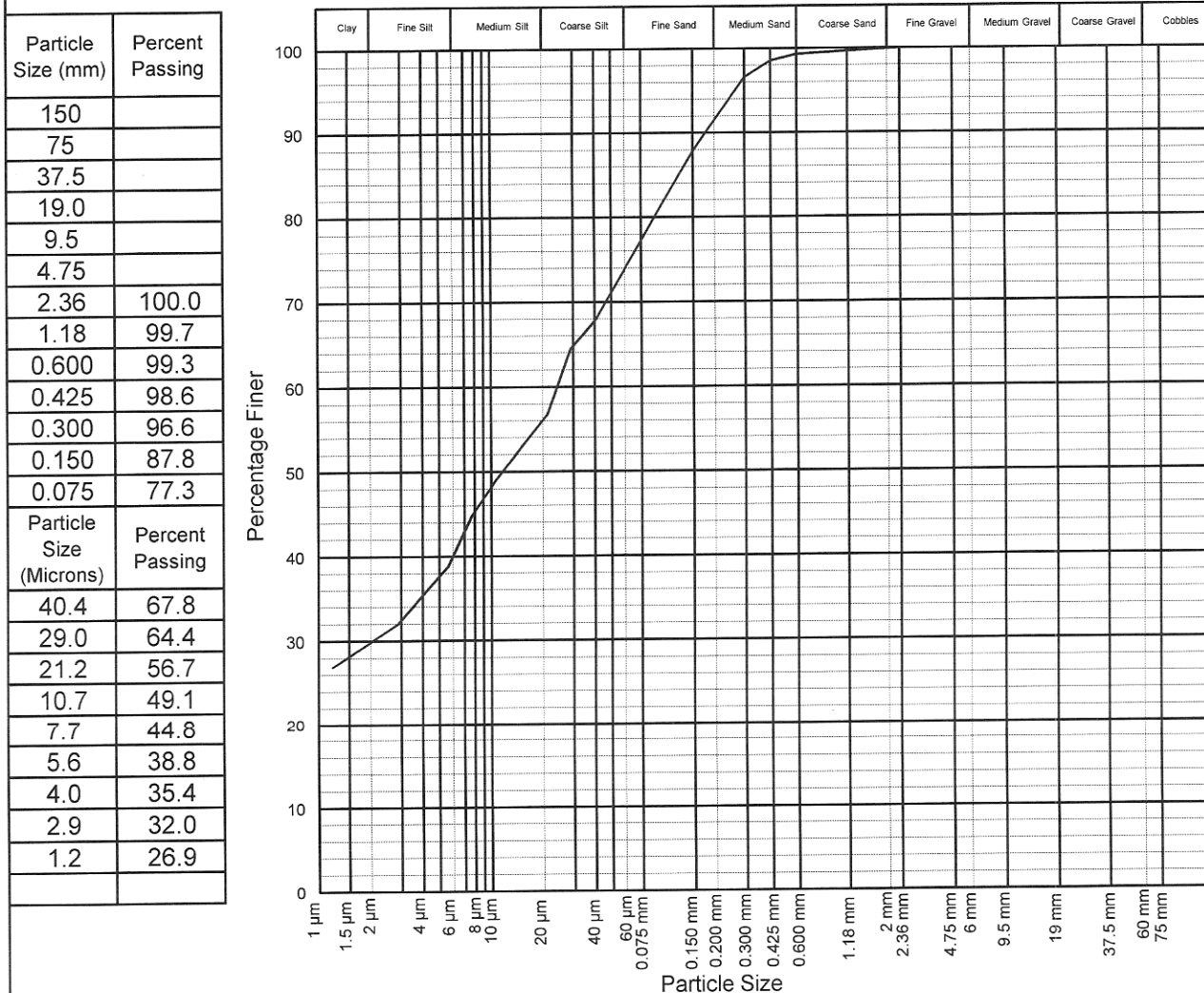

Nick Farrer
Approved Signatory

NT 12/11/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11989
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307263
Sample ID :	12-2 14/12/2011	AAA Lab. ID :	A11/5962/13
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>W</i>	

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

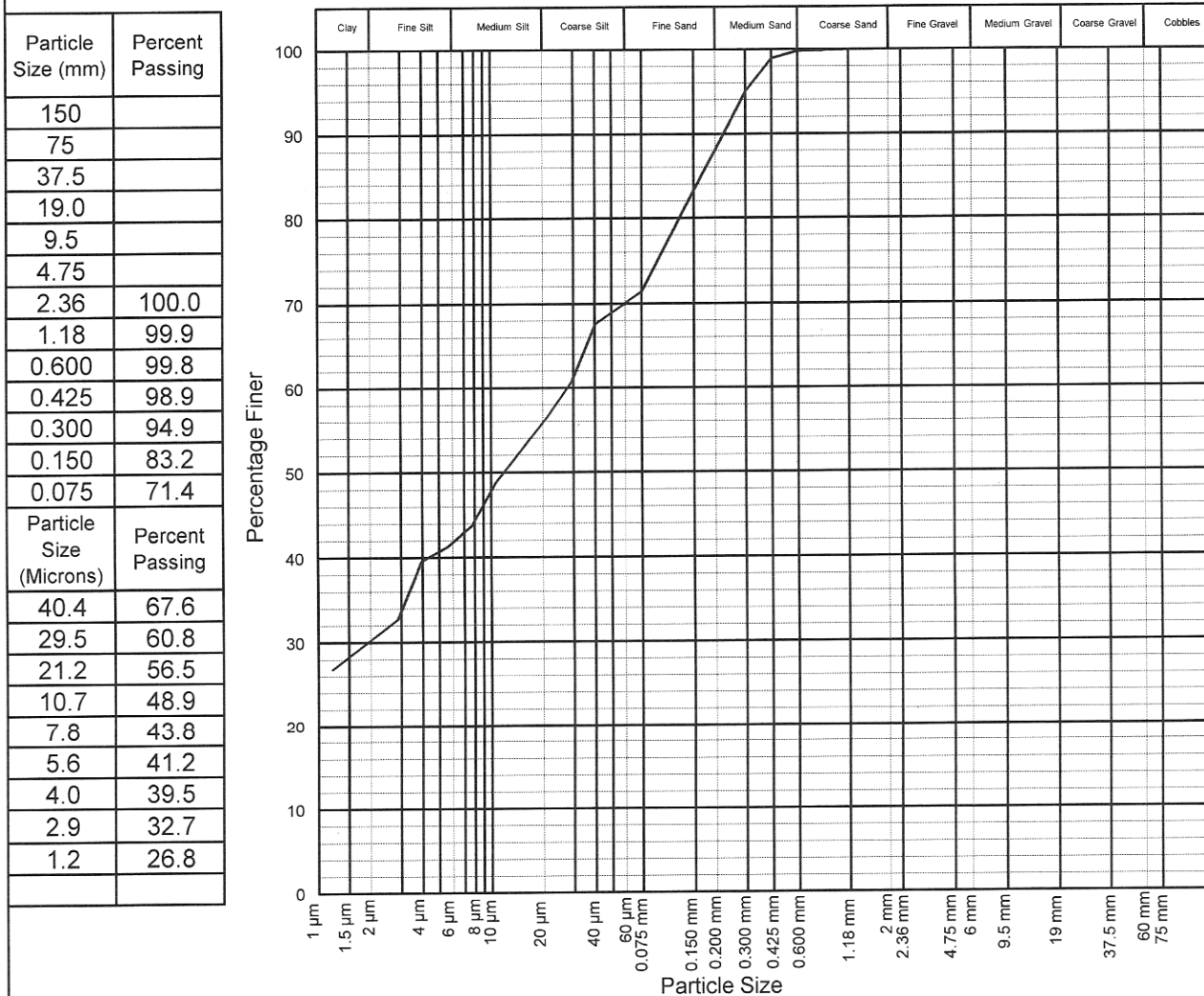

Nick Farrer
Approved Signatory

Nick Farrer 12/11/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11990
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307264
Sample ID :	12-3 14/12/2011	AAA Lab. ID :	A11/5962/14
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NF	

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


Nick Farrer
Approved Signatory

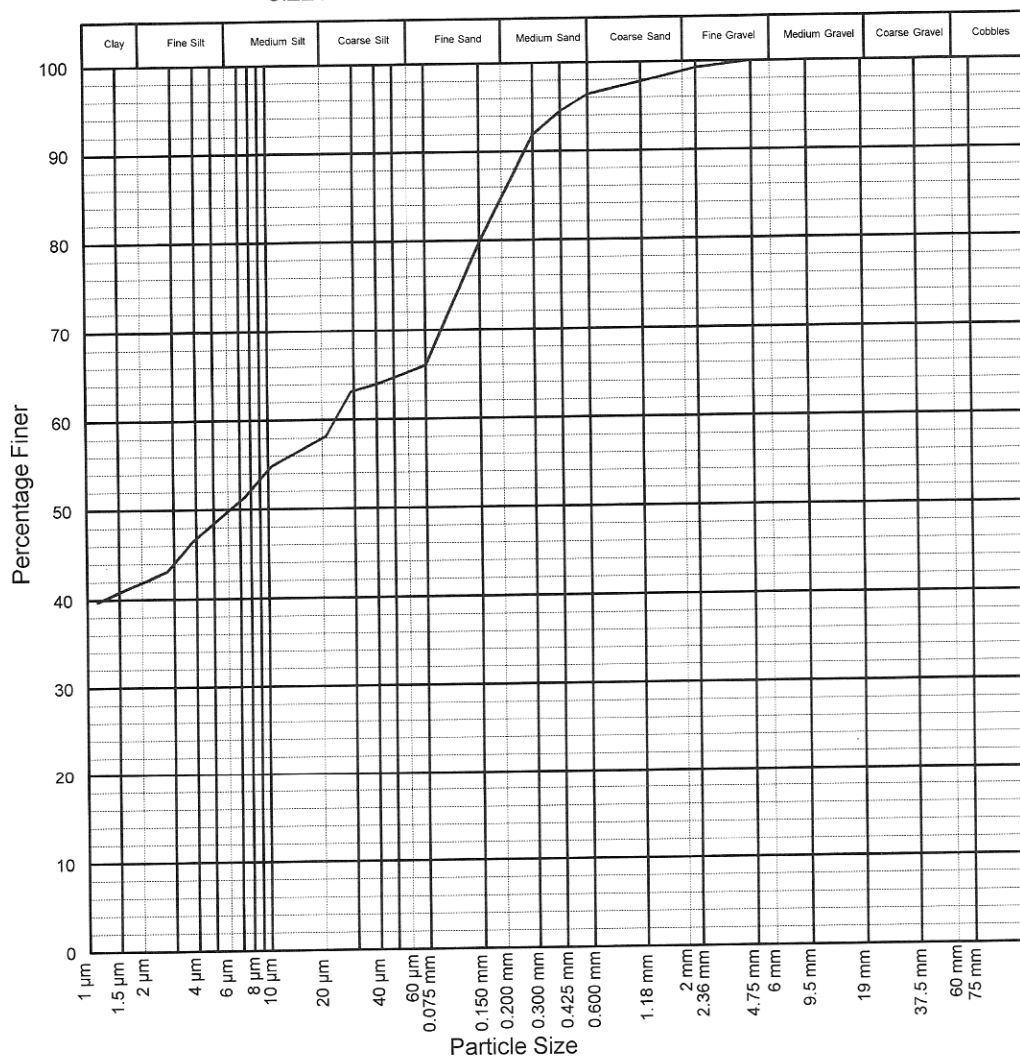
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11991
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307265
Sample ID :	13-1 13/12/2011	AAA Lab. ID :	A11/5962/15
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.2
1.18	97.8
0.600	96.4
0.425	94.5
0.300	91.9
0.150	79.8
0.075	66.0
Particle Size (Microns)	Percent Passing
40.9	64.0
29.0	63.2
21.0	58.2
10.4	54.8
7.5	51.5
5.4	49.0
3.8	46.5
2.7	43.1
1.1	39.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KR</i>		Checked by : <i>mf</i>	

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


Nick Farrer
Approved Signatory

Nick Farrer 12/1/12
Senior Technical Officer
NATA Accred. No. : 1961



BRISBANE
LABORATORY

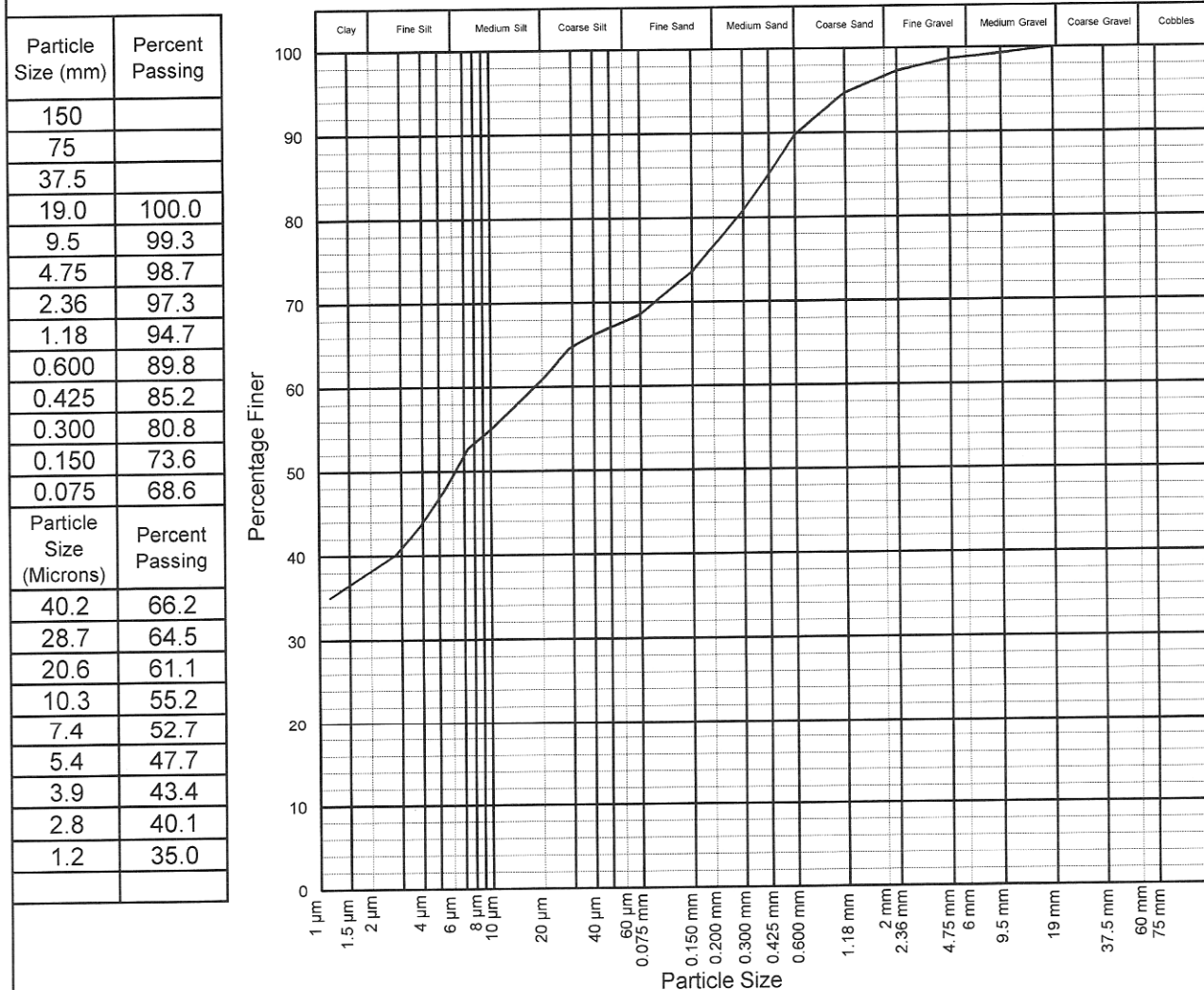
28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 13-2 12/12/2011

Report No. : R11992
Job No. : 117634002/2
Reg'n No. : 11307266
AAA Lab. ID : A11/5962/16
Date Received : 16/12/2011
Sampled By : Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>ME</i>	

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

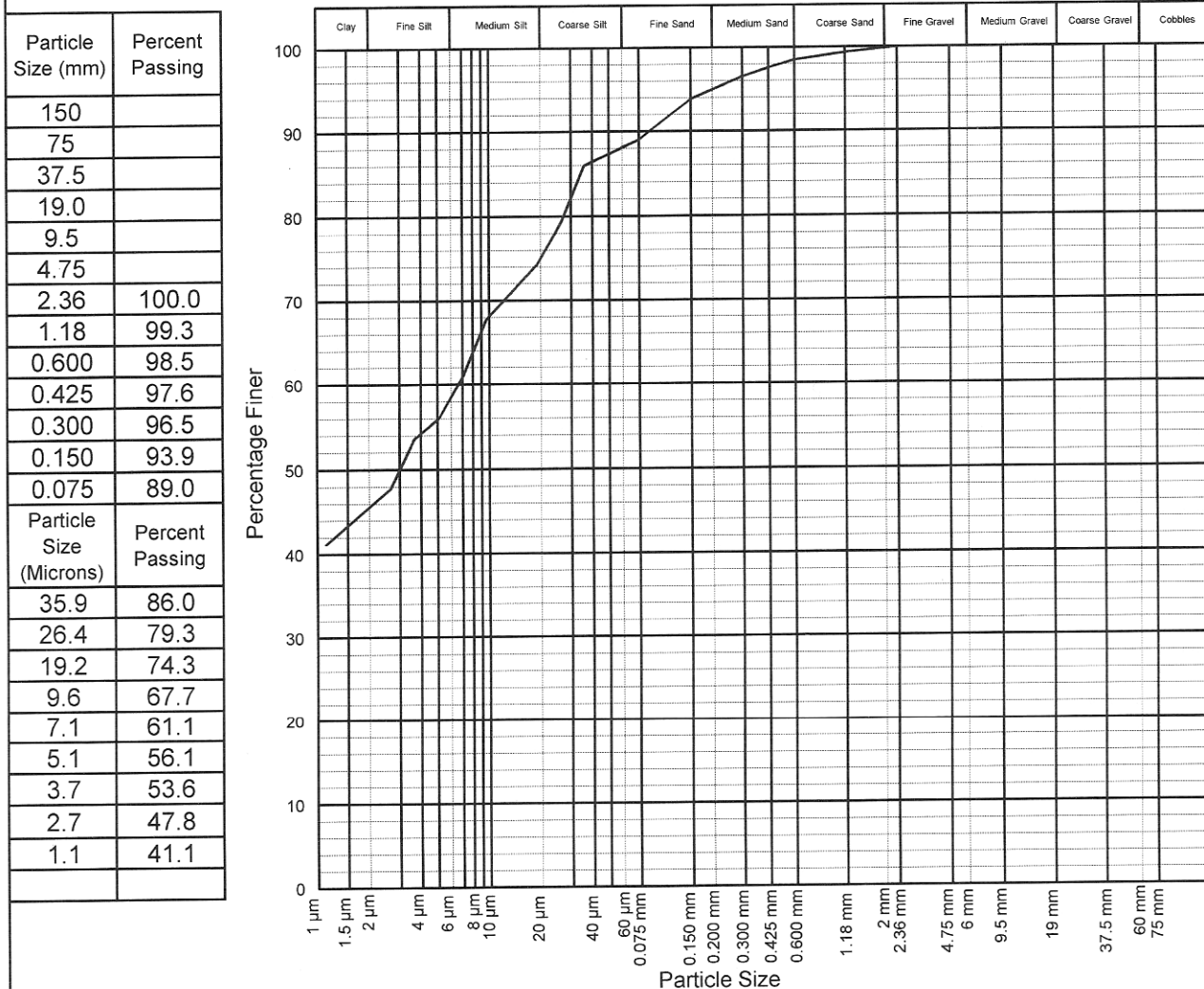


Nick Farrer
Approved Signatory

ME 12/11/12
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11993
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307267
Sample ID :	13-3 12/12/2011	AAA Lab. ID :	A11/5962/17
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MF</i>	

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

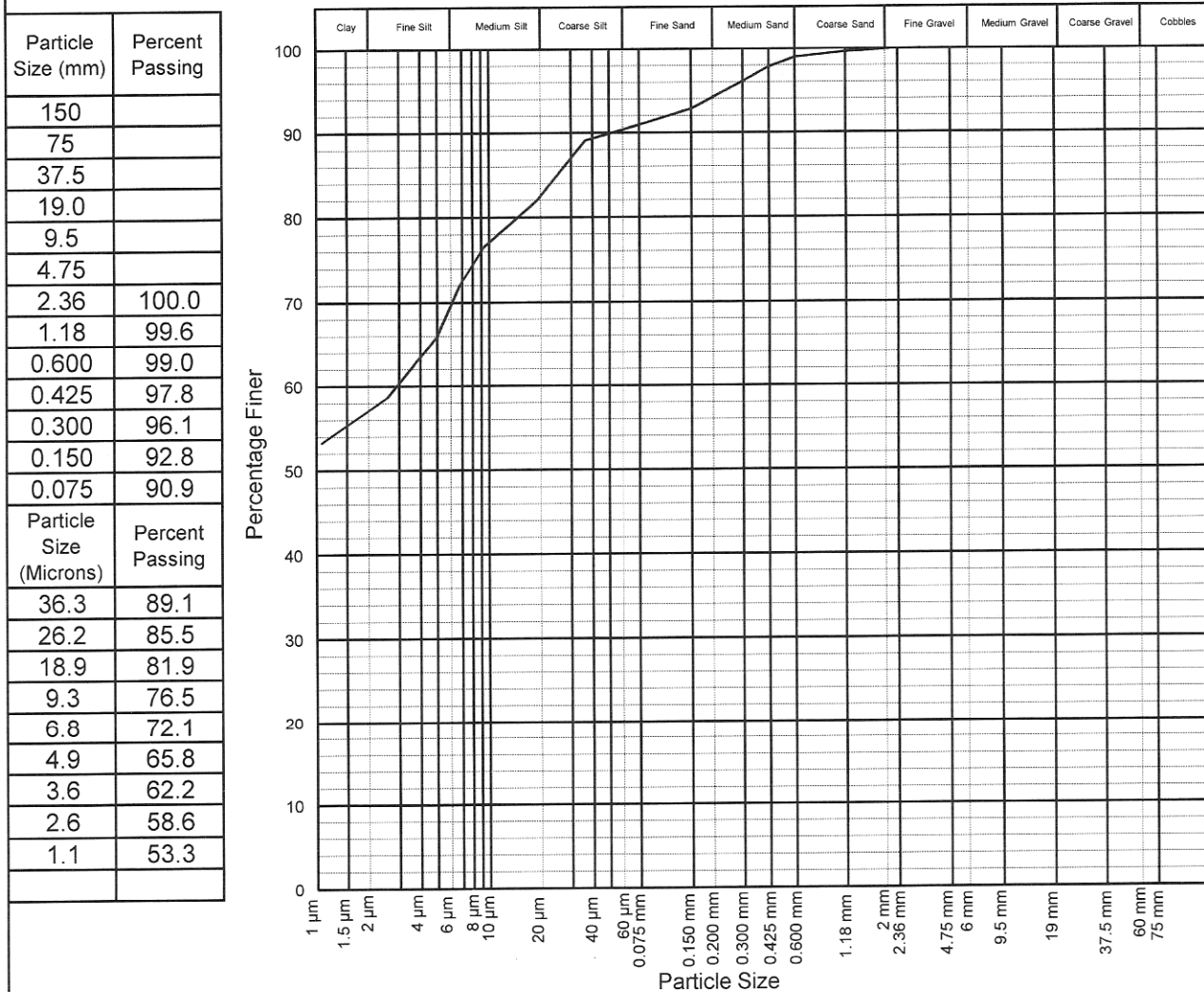

Nick Farrer
Approved Signatory

Nick Farrer 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11994
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307268
Sample ID :	13-4 12/12/2011	AAA Lab. ID :	A11/5962/18
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : MK	

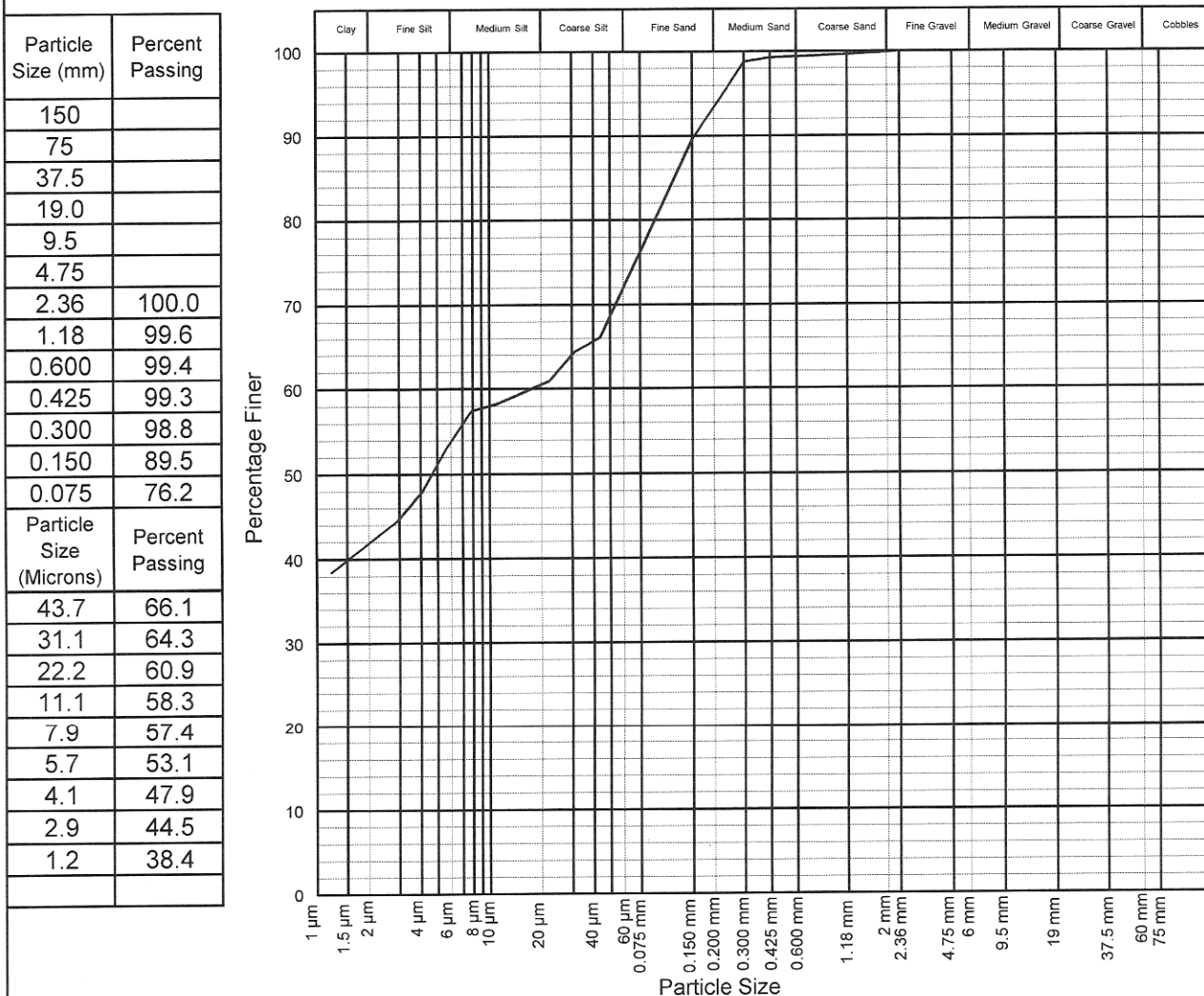
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Approved Signatory


Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11995
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307269
Sample ID :	13-5 12/12/2011	AAA Lab. ID :	A11/5962/19
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, with some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : MK	

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

Nick Farrer
Approved Signatory

Nick Farrer 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961



BRISBANE
LABORATORY

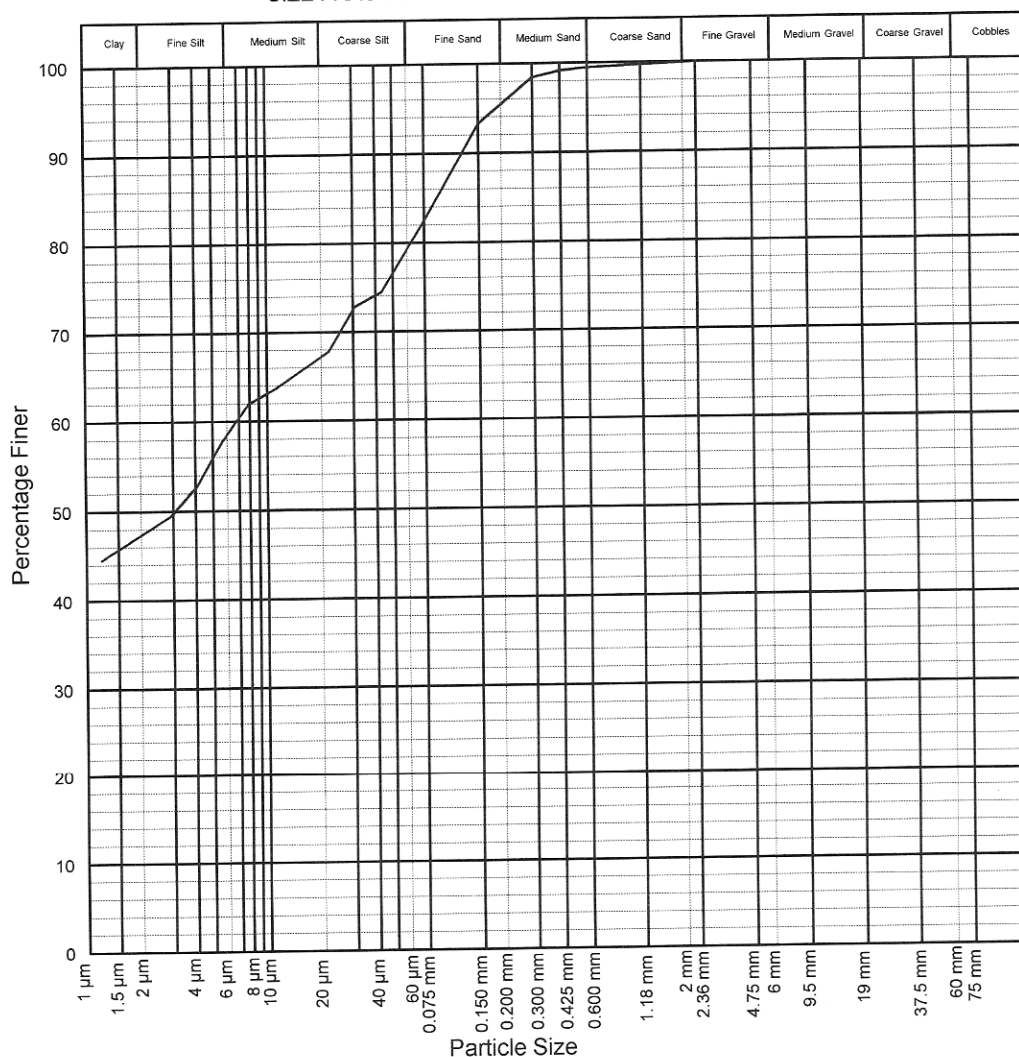
28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11996
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307270
Sample ID :	13-6 12/12/2011	AAA Lab. ID :	A11/5962/20
		Date Received :	16/12/2011
		Sampled By :	Client

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	99.4
0.425	99.1
0.300	98.4
0.150	93.2
0.075	82.5
Particle Size (Microns)	Percent Passing
43.1	74.4
30.6	72.8
22.0	67.8
11.1	63.6
7.9	62.0
5.7	57.8
4.1	52.8
2.9	49.5
1.2	44.5



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, with some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MF</i>	

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



Nick Farrer
Approved Signatory

MF 12/11/12
Senior Technical Officer
NATA Accred. No. : 1961

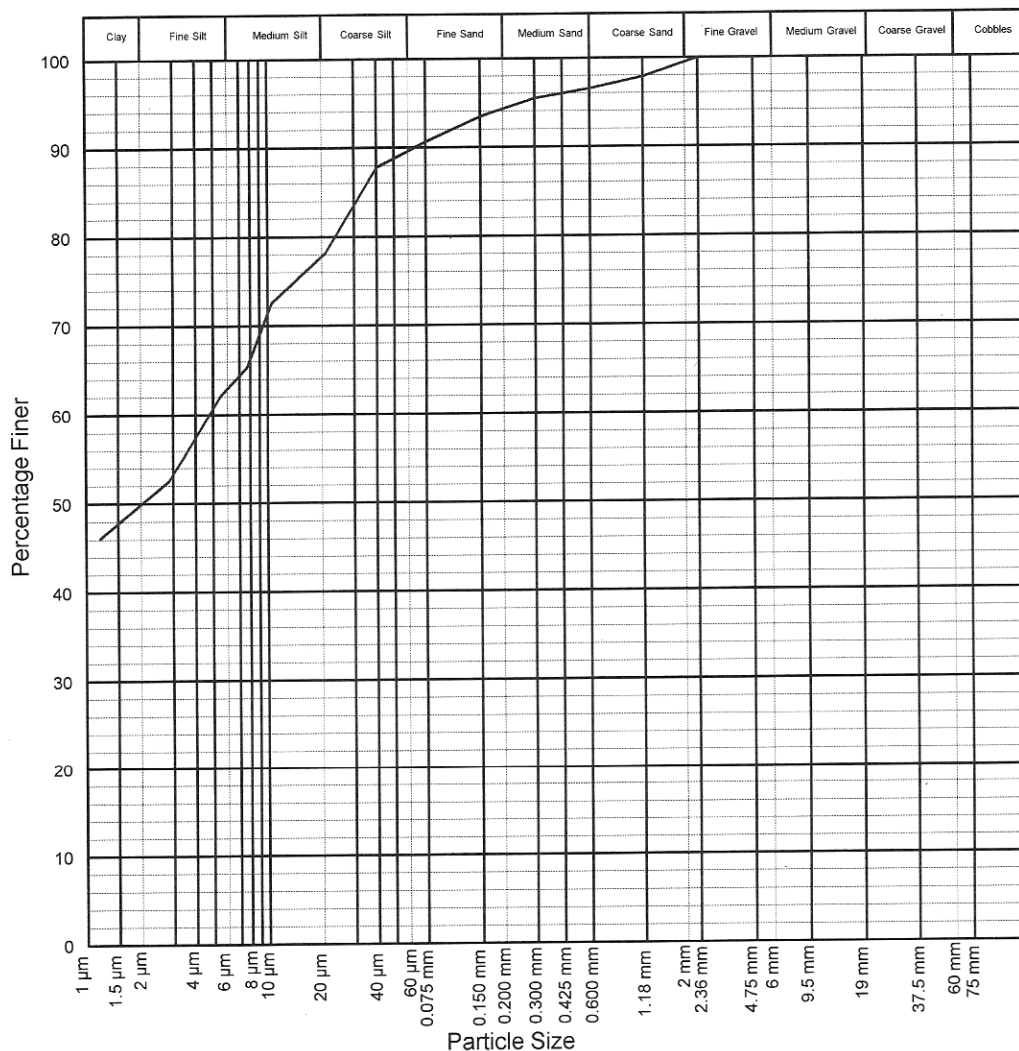
Golder Form No. R08 Hydrometer
RL1 - 28/07/03

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11997
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307271
Sample ID :	13-7 12/12/2011	AAA Lab. ID :	A11/5962/21
		Date Received :	16/12/2011
		Sampled By :	Client

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	97.8
0.600	96.5
0.425	96.0
0.300	95.4
0.150	93.4
0.075	90.6
Particle Size (Microns)	Percent Passing
40.1	87.8
29.0	83.0
20.9	78.1
10.6	72.5
7.7	65.3
5.5	62.1
4.0	57.3
2.9	52.5
1.2	46.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (Cl) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NP	

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


Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

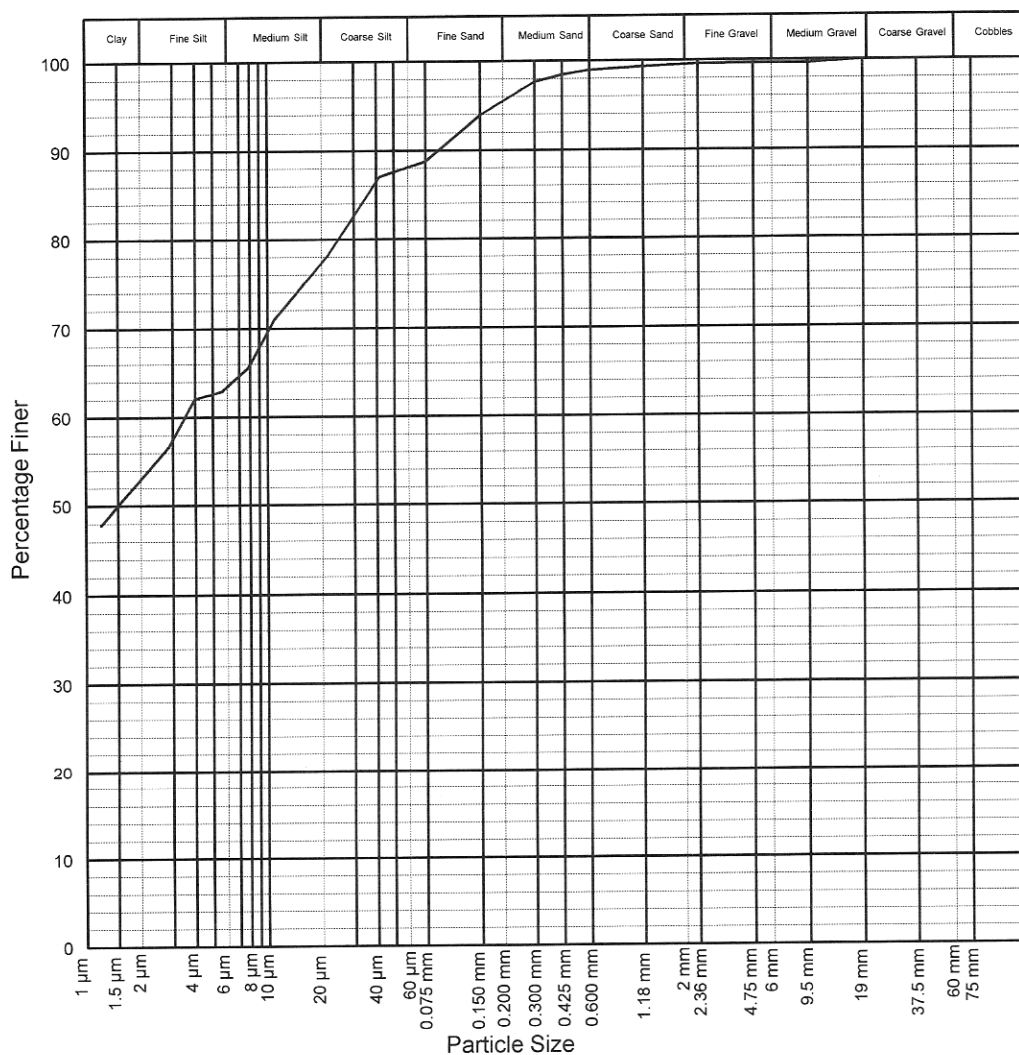
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 13-8 12/12/2011

Report No. : R11998
Job No. : 117634002/2
Reg'n No. : 11307272
AAA Lab. ID : A11/5962/22
Date Received : 16/12/2011
Sampled By : Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	99.6
4.75	99.6
2.36	99.6
1.18	99.3
0.600	98.9
0.425	98.4
0.300	97.7
0.150	93.9
0.075	88.8
Particle Size (Microns)	Percent Passing
41.8	87.1
30.0	82.6
21.5	78.1
10.9	71.0
7.9	65.6
5.6	63.0
4.0	62.1
2.9	56.7
1.2	47.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (Cl) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MC</i>	

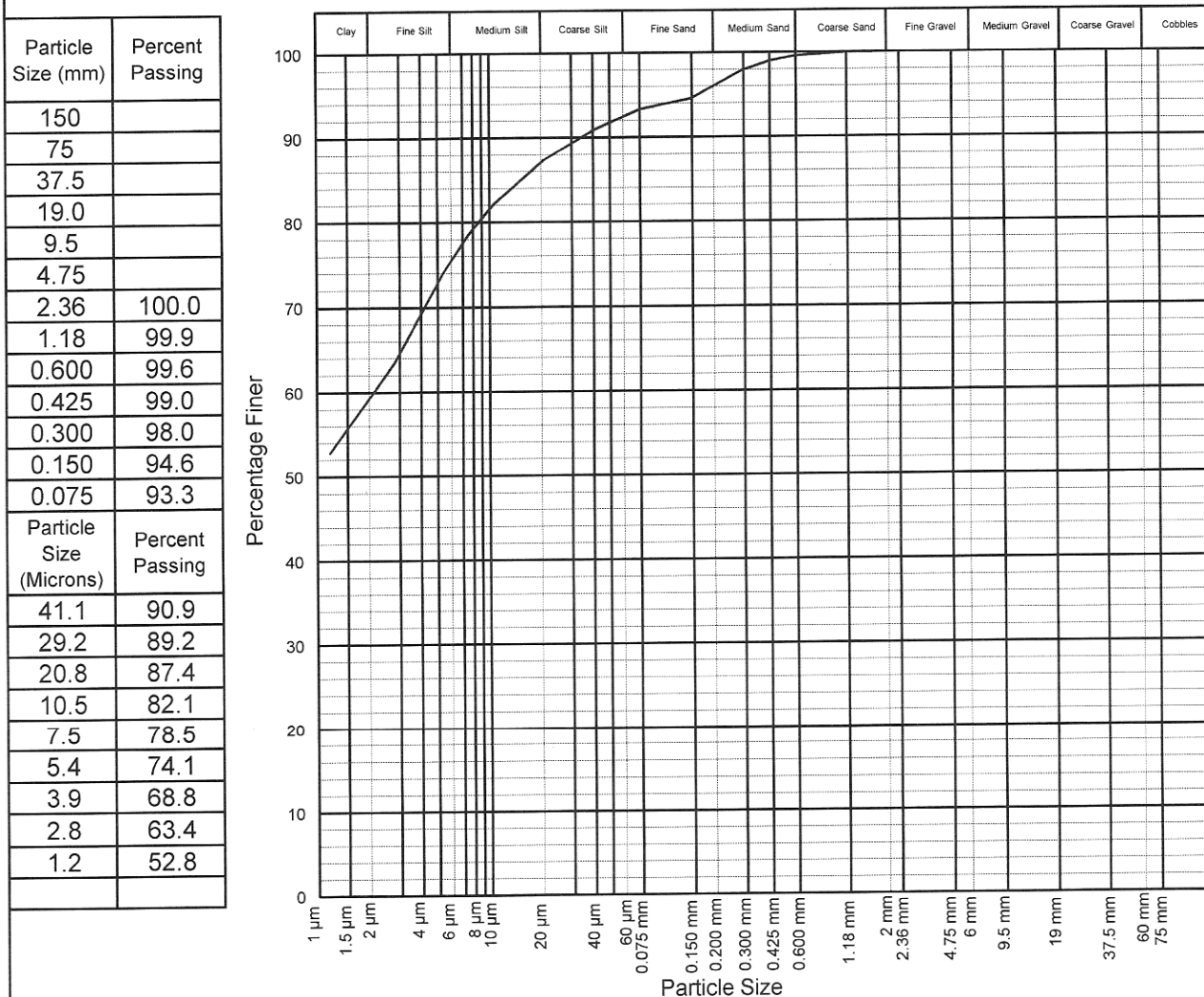
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Approved Signatory

12/1/12
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R11999
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307273
Sample ID :	13-9 12/12/2011	AAA Lab. ID :	A11/5962/23
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>mk</i>	

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

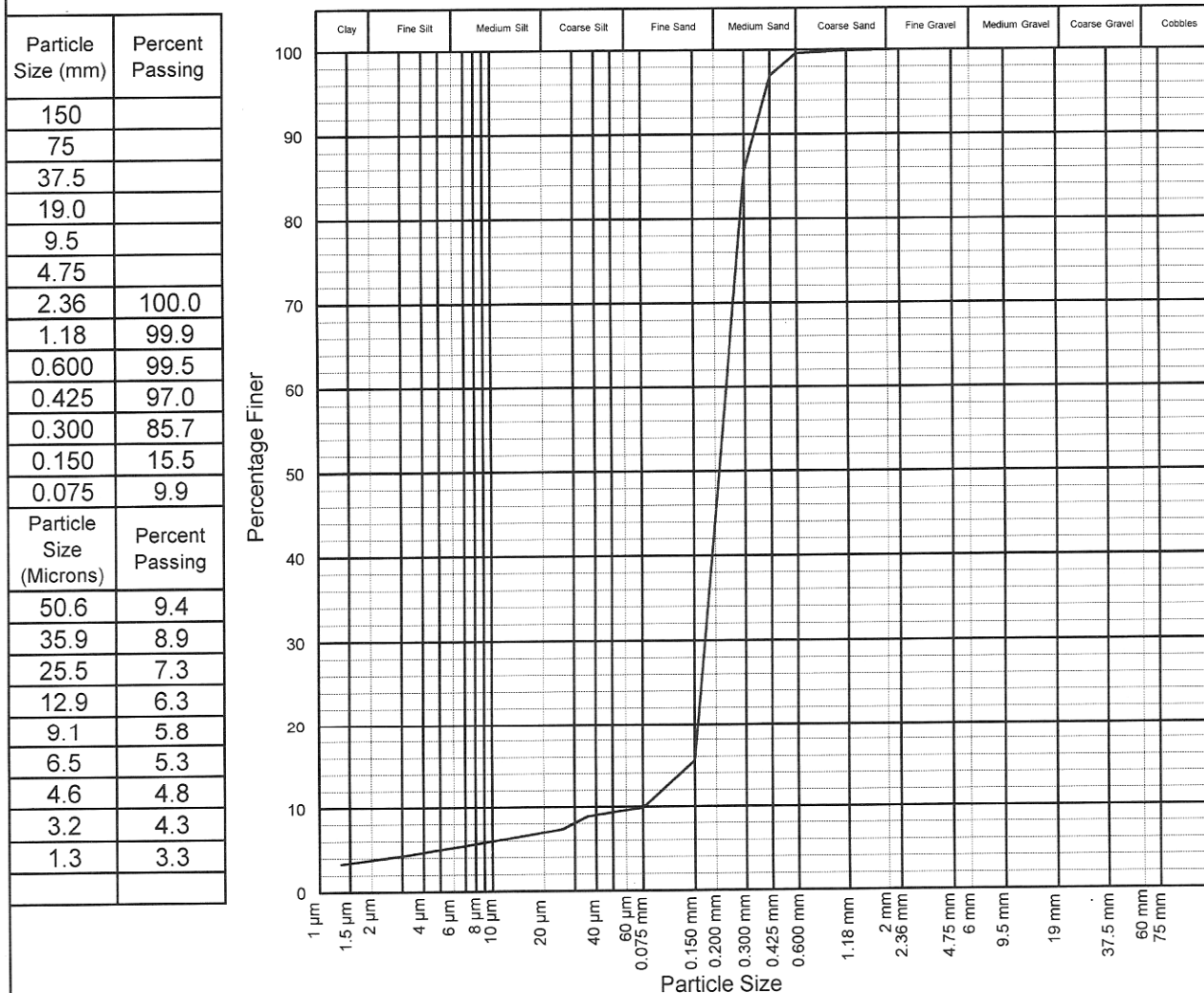

Nick Farrer
Approved Signatory

Nhm 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12000
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307274
Sample ID :	14-1 14/12/2011	AAA Lab. ID :	A11/5962/24
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SM/SP) Silty SAND/SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NF	

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


Nick Farrer
Approved Signatory

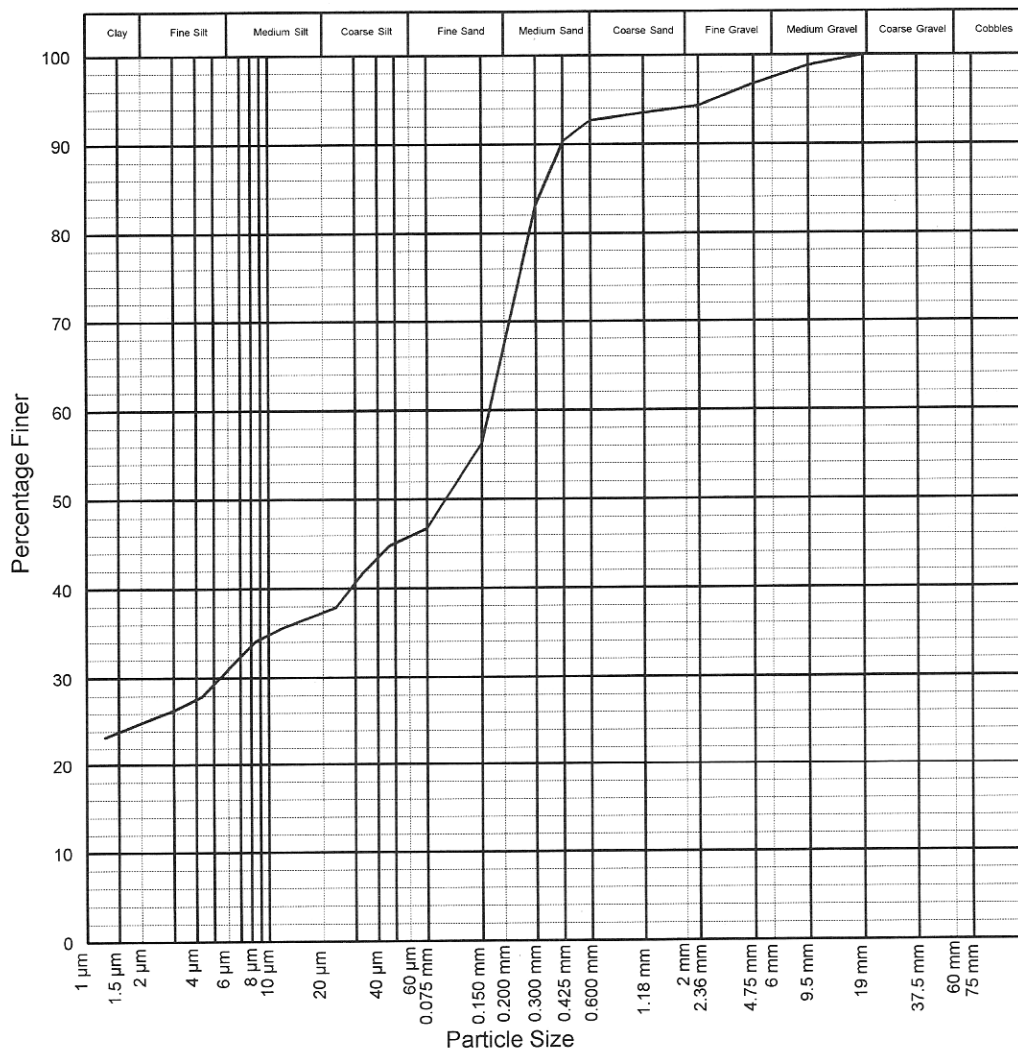
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12001
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307275
Sample ID :	15-1 13/12/2011	AAA Lab. ID :	A11/5962/25
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	100.0
9.5	98.8
4.75	96.7
2.36	94.3
1.18	93.5
0.600	92.7
0.425	90.3
0.300	83.1
0.150	56.3
0.075	46.8
Particle Size (Microns)	Percent Passing
46.1	44.8
32.9	41.7
23.6	37.9
11.8	35.6
8.4	34.0
6.0	31.0
4.3	27.9
3.1	26.4
1.3	23.3



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SC) Clayey SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NK	

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

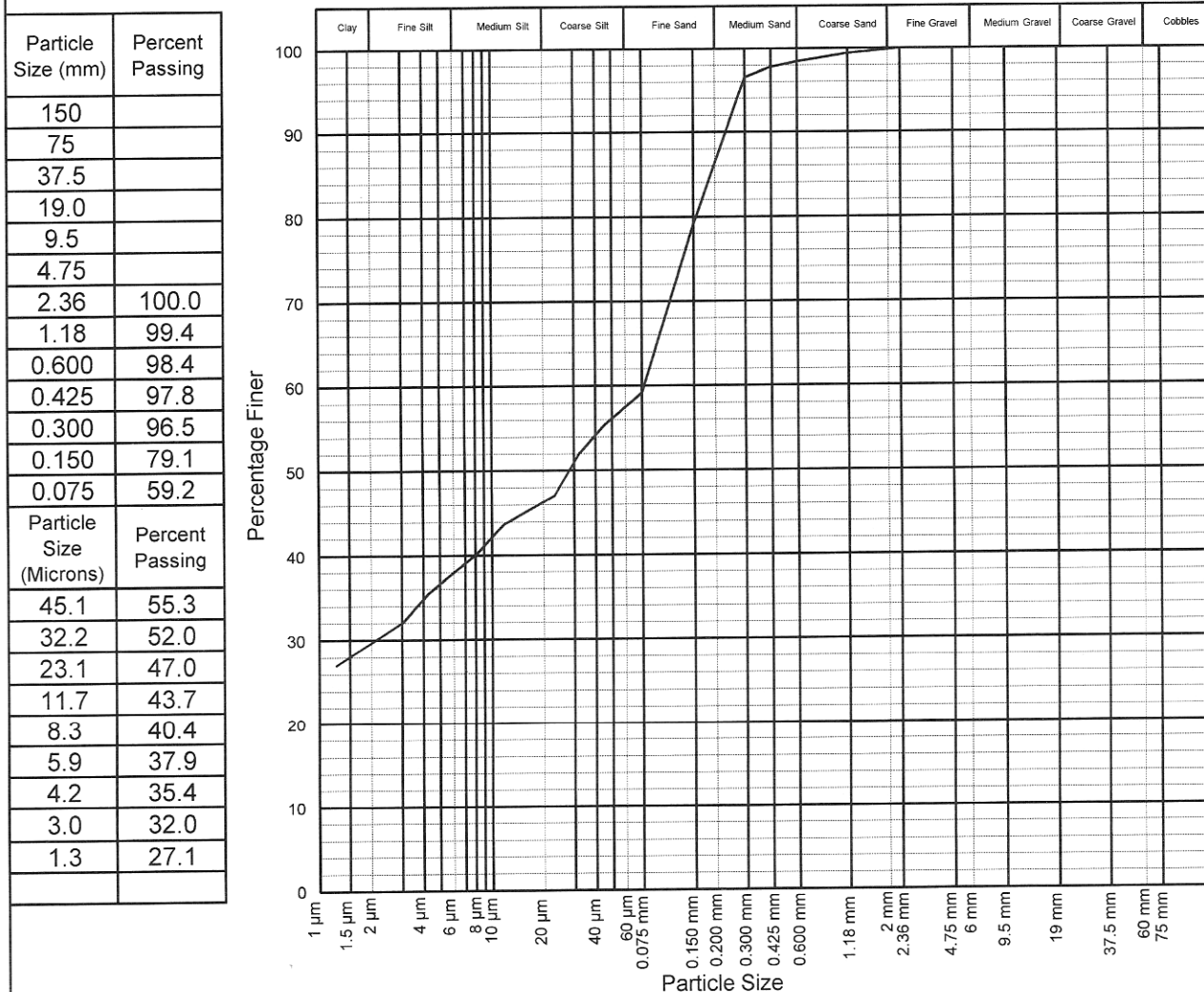

Nick Farrer
Approved Signatory

Nick Farrer 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12002
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307276
Sample ID :	8-2 14/12/2011	AAA Lab. ID :	A11/5962/26
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MB</i>	

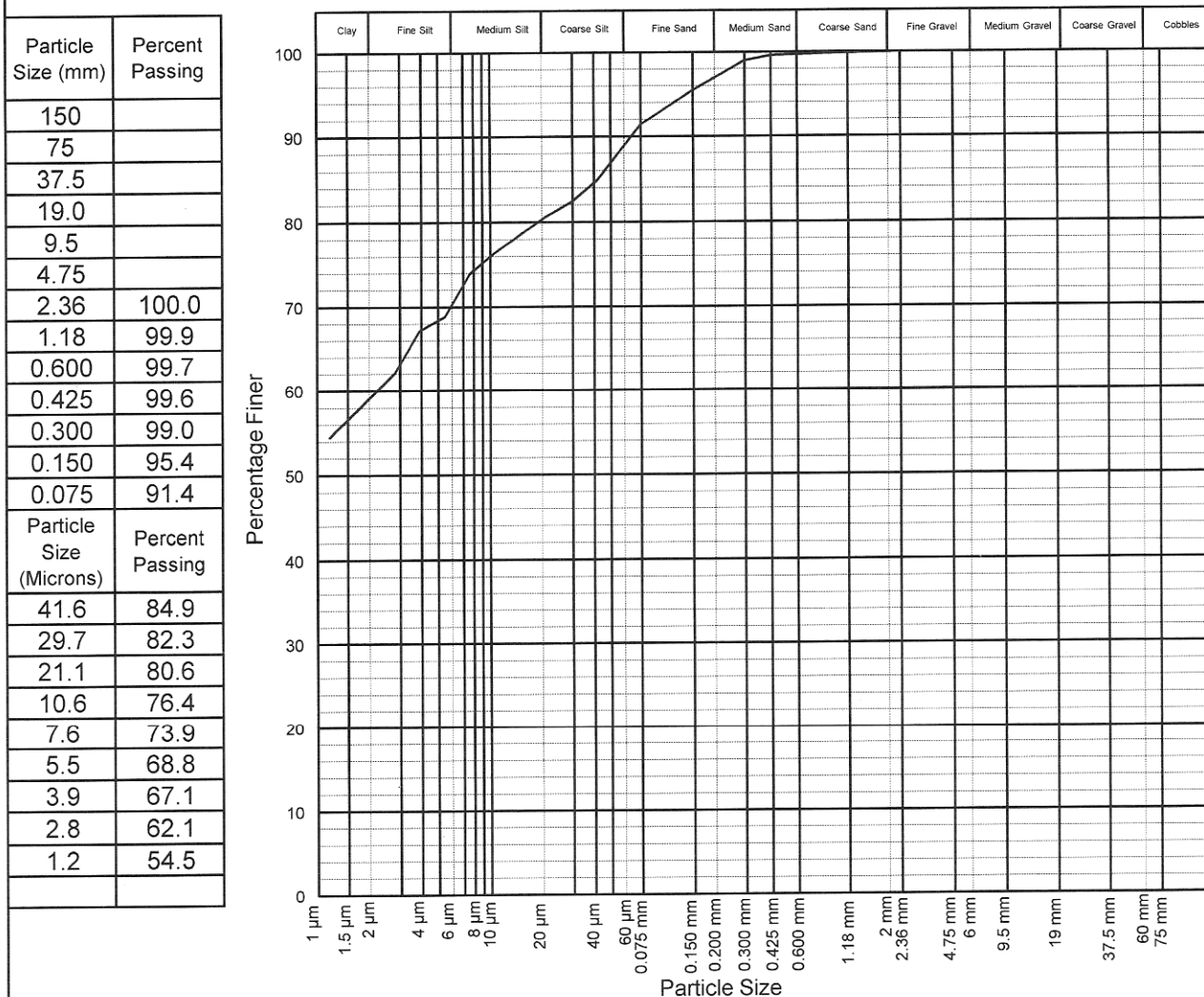
This document is issued in accordance with NATA's accreditation requirements.


MB 12/1/12
Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12003
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307277
Sample ID :	8-3 14/12/2011	AAA Lab. ID :	A11/5962/27
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(Cl) Silty CLAY, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : KB	Checked by : <i>MB</i>		

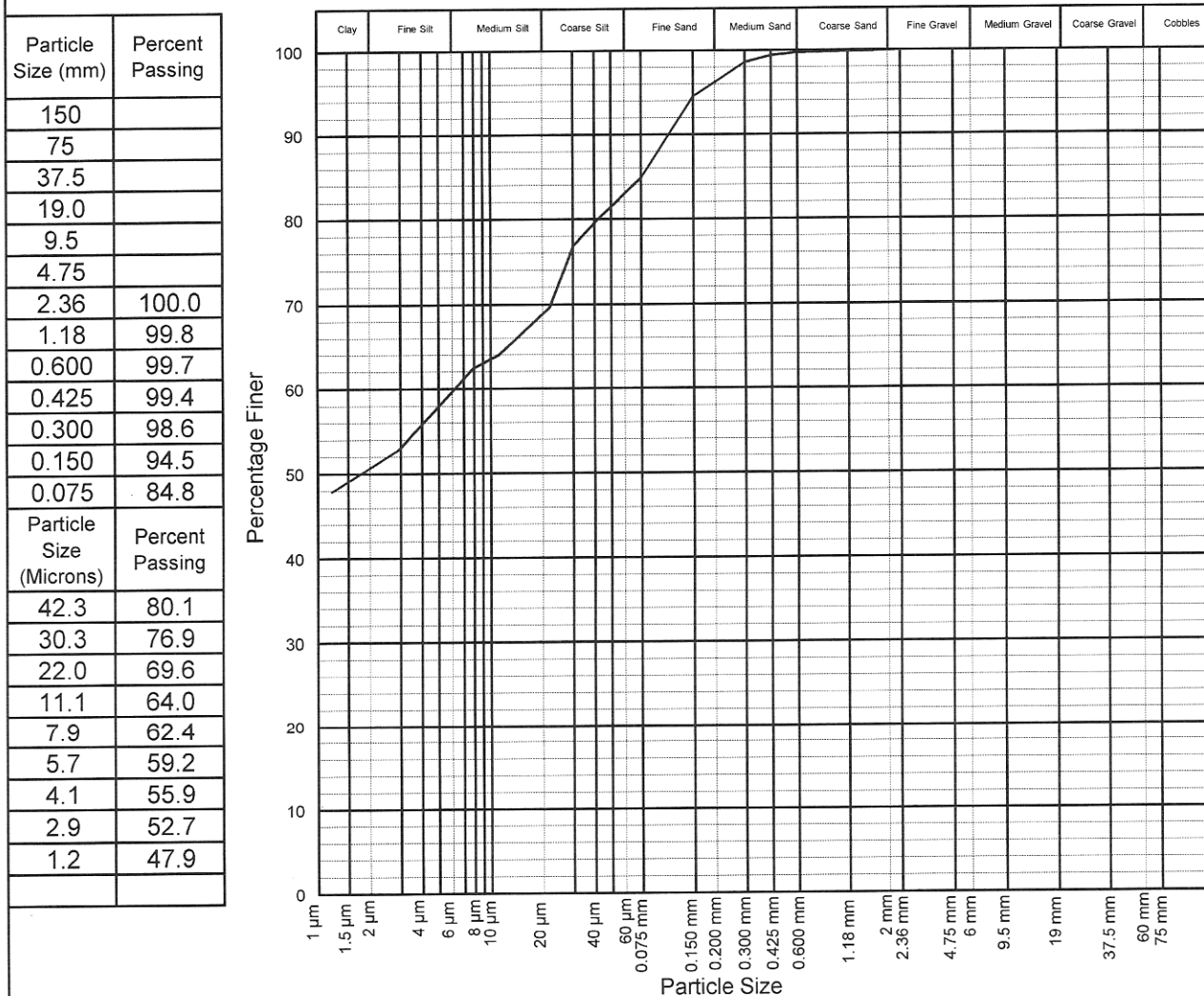
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Nick Farrer
Approved Signatory

MB 12/1/11
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12004
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307278
Sample ID :	8-4 14/12/2011	AAA Lab. ID :	A11/5962/28
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, with some sand & shell			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : m	

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

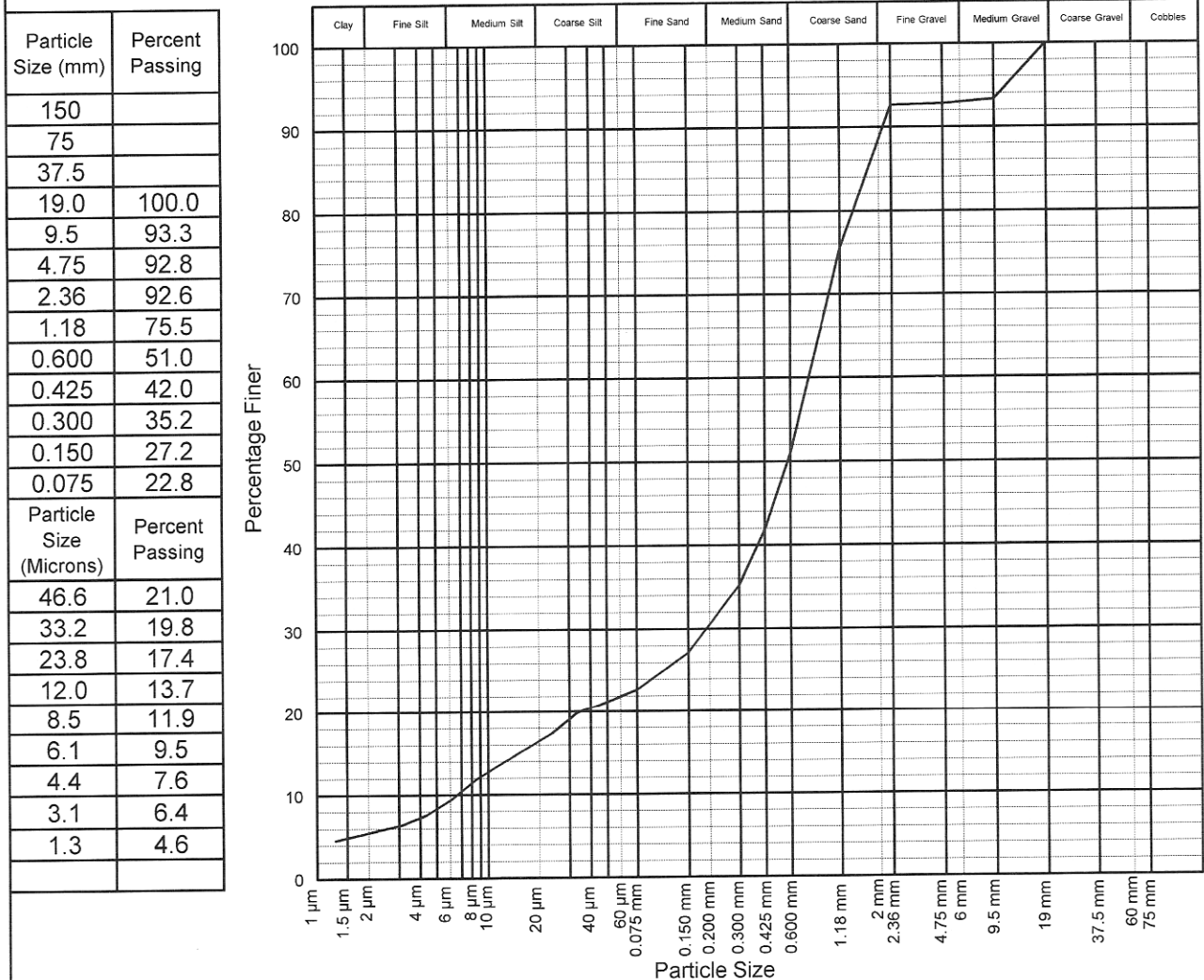

Nick Farrer
Approved Signatory

Handwritten signature 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12005
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307279
Sample ID :	9-1 14/12/2011	AAA Lab. ID :	A11/5962/29
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SM) Silty SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>MF</i>	

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


Nick Farrer
Approved Signatory

Nick Farrer 14/1/12

Senior Technical Officer
NATA Accred. No. : 1961



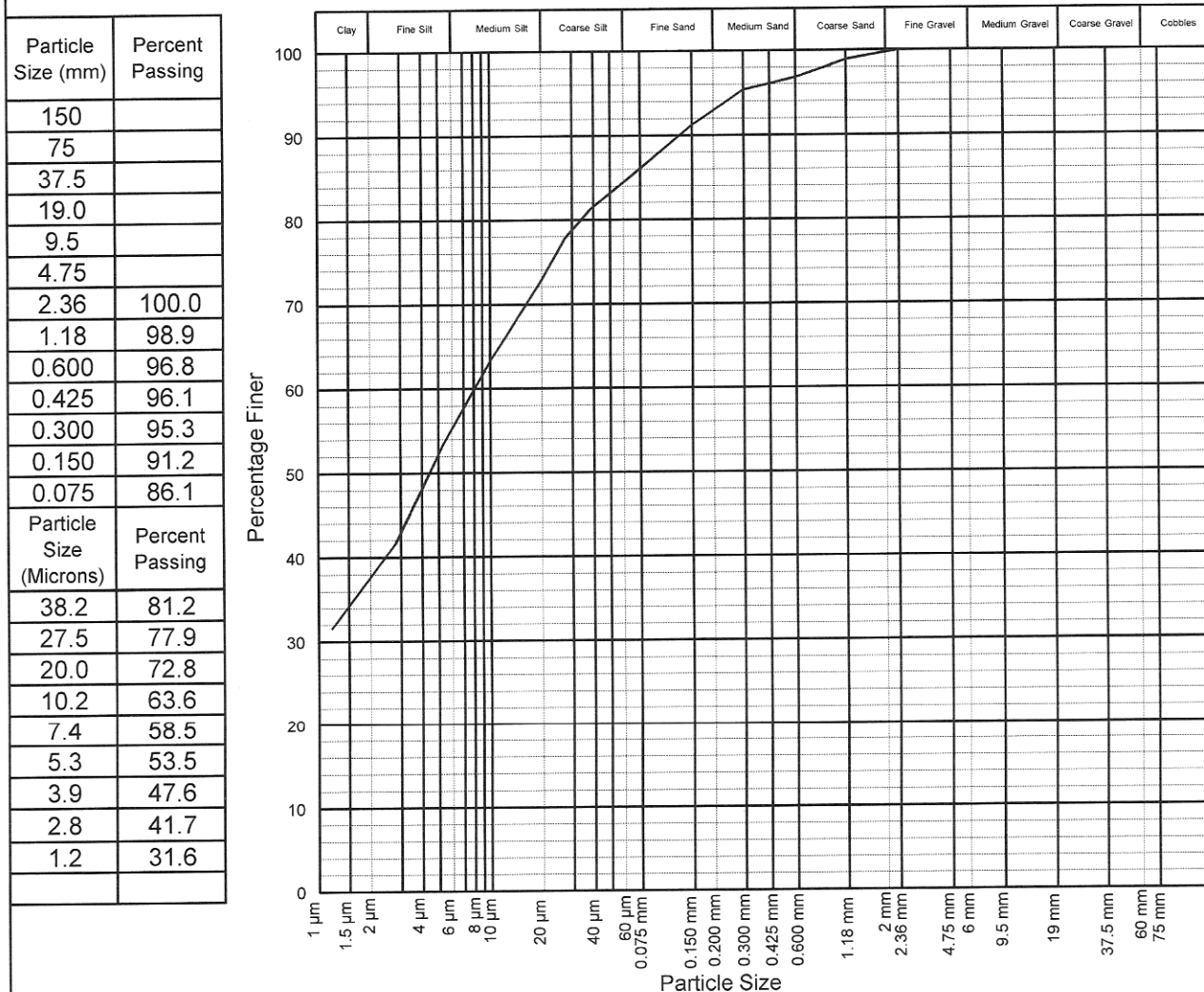
BRISBANE
LABORATORY

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12006
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307280
Sample ID :	9-2 13/12/2011	AAA Lab. ID :	A11/5962/30
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, with some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MC</i>	

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



Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

Golder Form No. R08 Hydrometer
RL1 - 28/07/03

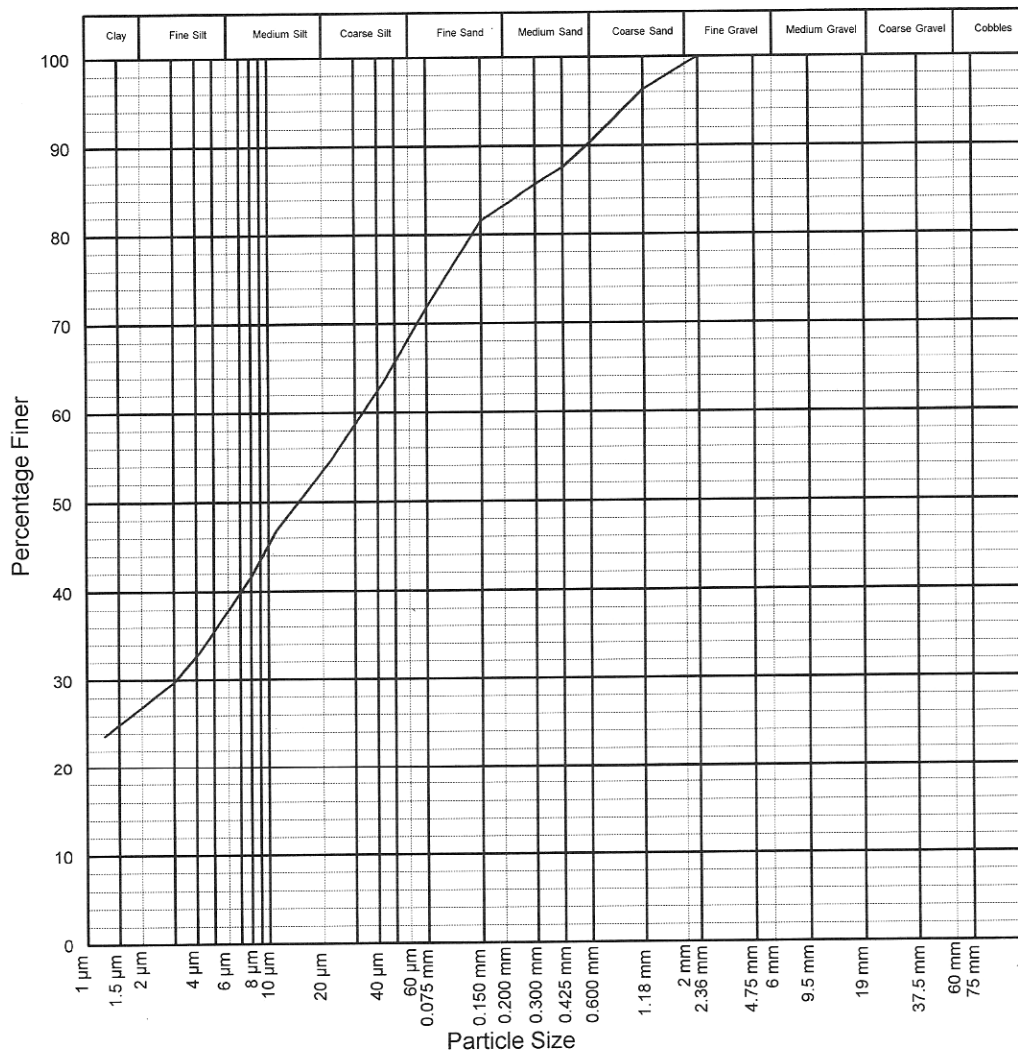
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 9-4 13/12/2011

Report No. : R12007
Job No. : 117634002/2
Reg'n No. : 11307281
AAA Lab. ID : A11/5962/31
Date Received : 16/12/2011
Sampled By : Client

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	96.3
0.600	90.3
0.425	87.6
0.300	85.6
0.150	81.5
0.075	71.8
Particle Size (Microns)	Percent Passing
42.6	63.2
30.7	58.9
22.1	54.6
11.2	46.9
8.1	41.7
5.8	37.4
4.2	33.1
3.0	29.7
1.2	23.7



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Sandy CLAY, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : <i>KB</i>	Checked by : <i>NT</i>		

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

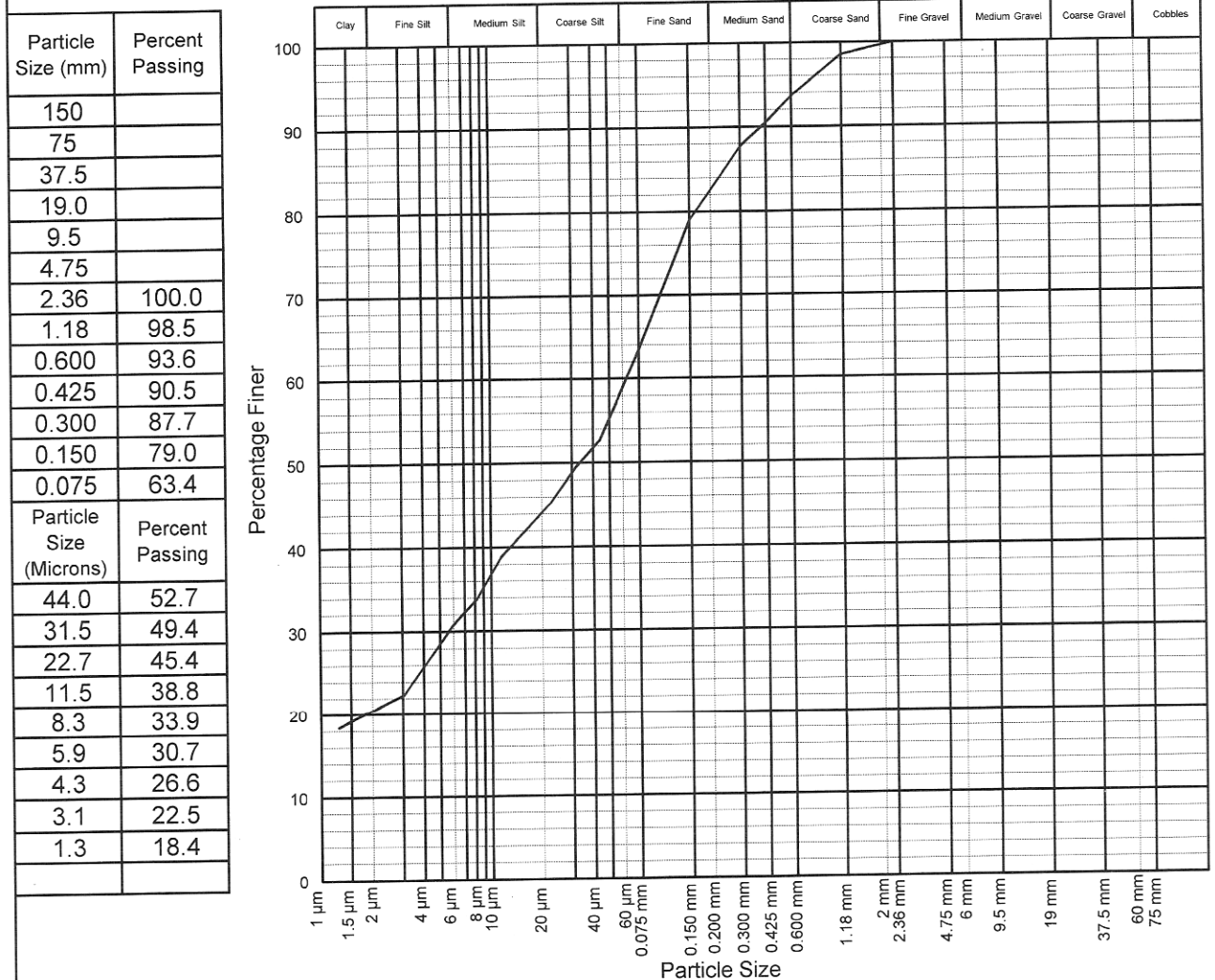

Nick Farrer
Approved Signatory

Nick Farrer

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12008
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307282
Sample ID :	10-1 13/12/2011	AAA Lab. ID :	A11/5962/32
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>mf</i>	

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

Nick Farrer
Approved Signatory

Nhan 12/1/12
Senior Technical Officer
NATA Accred. No. : 1961



BRISBANE
LABORATORY

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

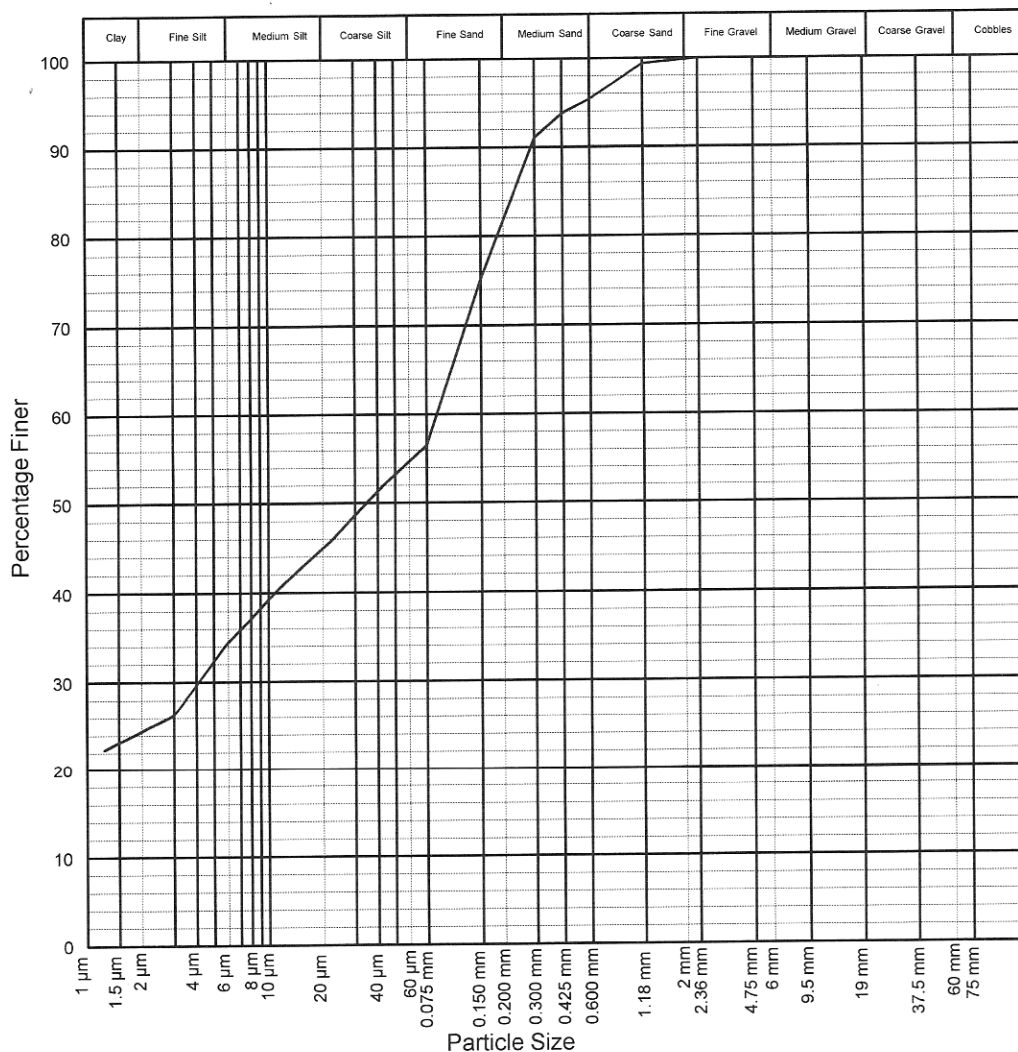
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 10-5 13/12/2011

Report No. : R12009
Job No. : 117634002/2
Reg'n No. : 11307283
AAA Lab. ID : A11/5962/33
Date Received : 16/12/2011
Sampled By : Client

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	99.4
0.600	95.4
0.425	93.8
0.300	91.0
0.150	75.2
0.075	56.6
Particle Size (Microns)	Percent Passing
43.7	52.2
31.3	49.0
22.4	45.9
11.3	40.4
8.1	37.3
5.8	34.1
4.2	30.2
3.0	26.3
1.2	22.4



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Sandy CLAY, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by :	KB		
Checked by :	MK		

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



Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

Golder Form No. R08 Hydrometer
RL1 - 28/07/03



BRISBANE
LABORATORY

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

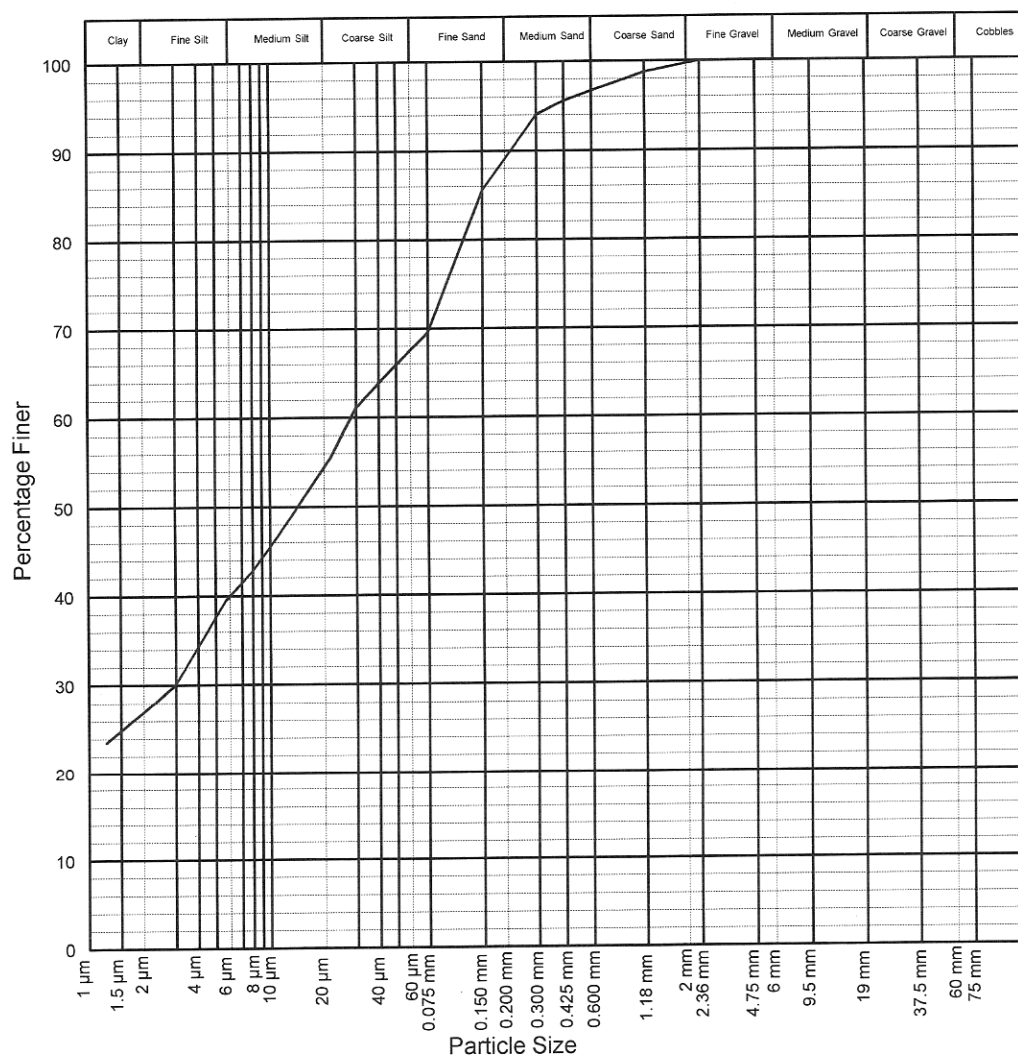
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 10-6 13/12/2011

Report No. : R12010
Job No. : 117634002/2
Reg'n No. : 11307284
AAA Lab. ID : A11/5962/34
Date Received : 16/12/2011
Sampled By : Client

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	98.7
0.600	96.7
0.425	95.6
0.300	94.1
0.150	85.6
0.075	69.5
Particle Size (Microns)	Percent Passing
41.5	64.2
29.8	61.0
21.6	55.5
11.0	46.7
7.9	42.7
5.7	39.5
4.1	34.7
3.0	29.9
1.2	23.6



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(Cl) Sandy CLAY, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : KB	Checked by : <i>mf</i>		

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



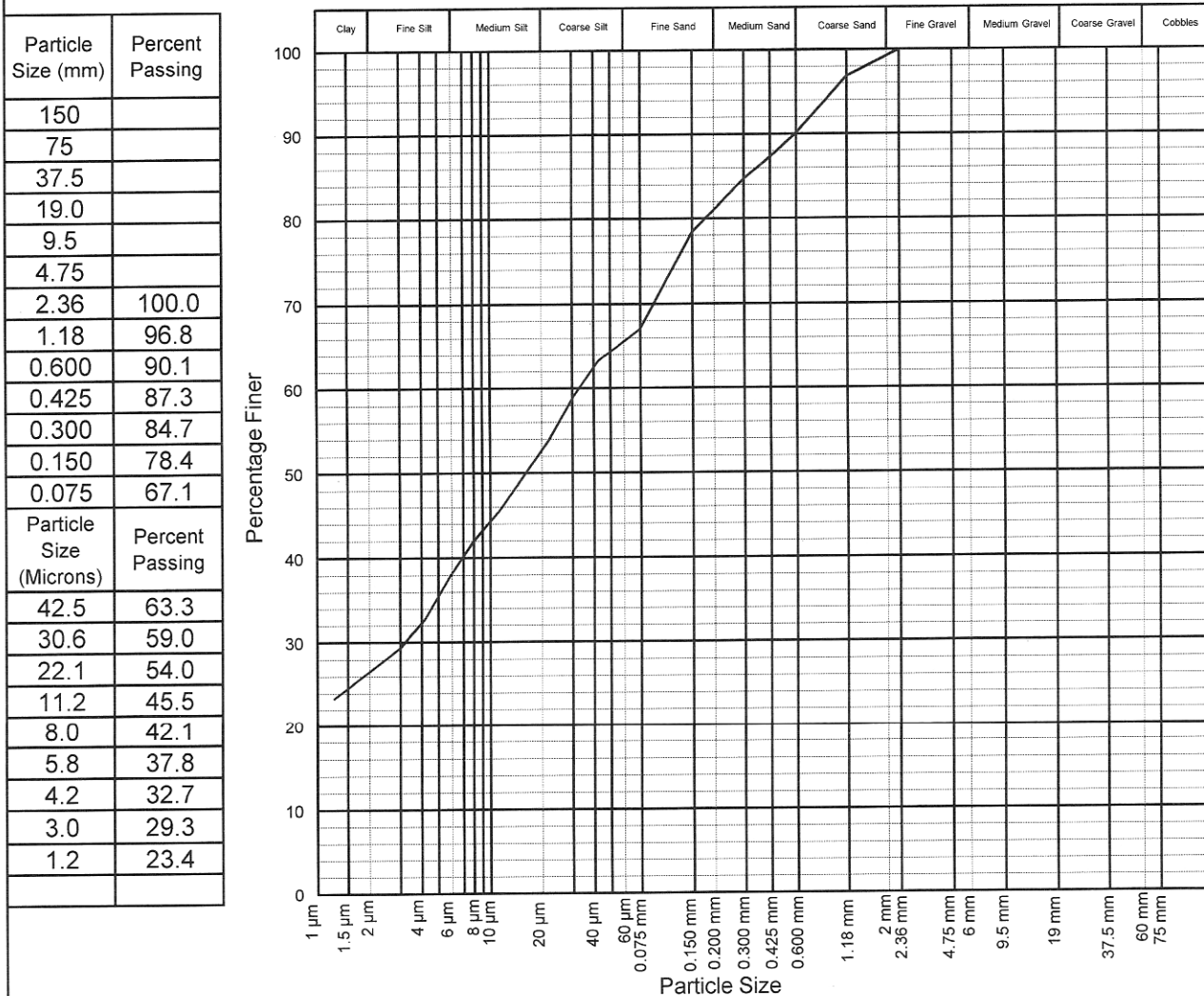
Nick Farrer
Approved Signatory

Nick Farrer 16/12/11
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12011
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307285
Sample ID :	10-8 13/12/2011	AAA Lab. ID :	A11/5962/35
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MB</i>	

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

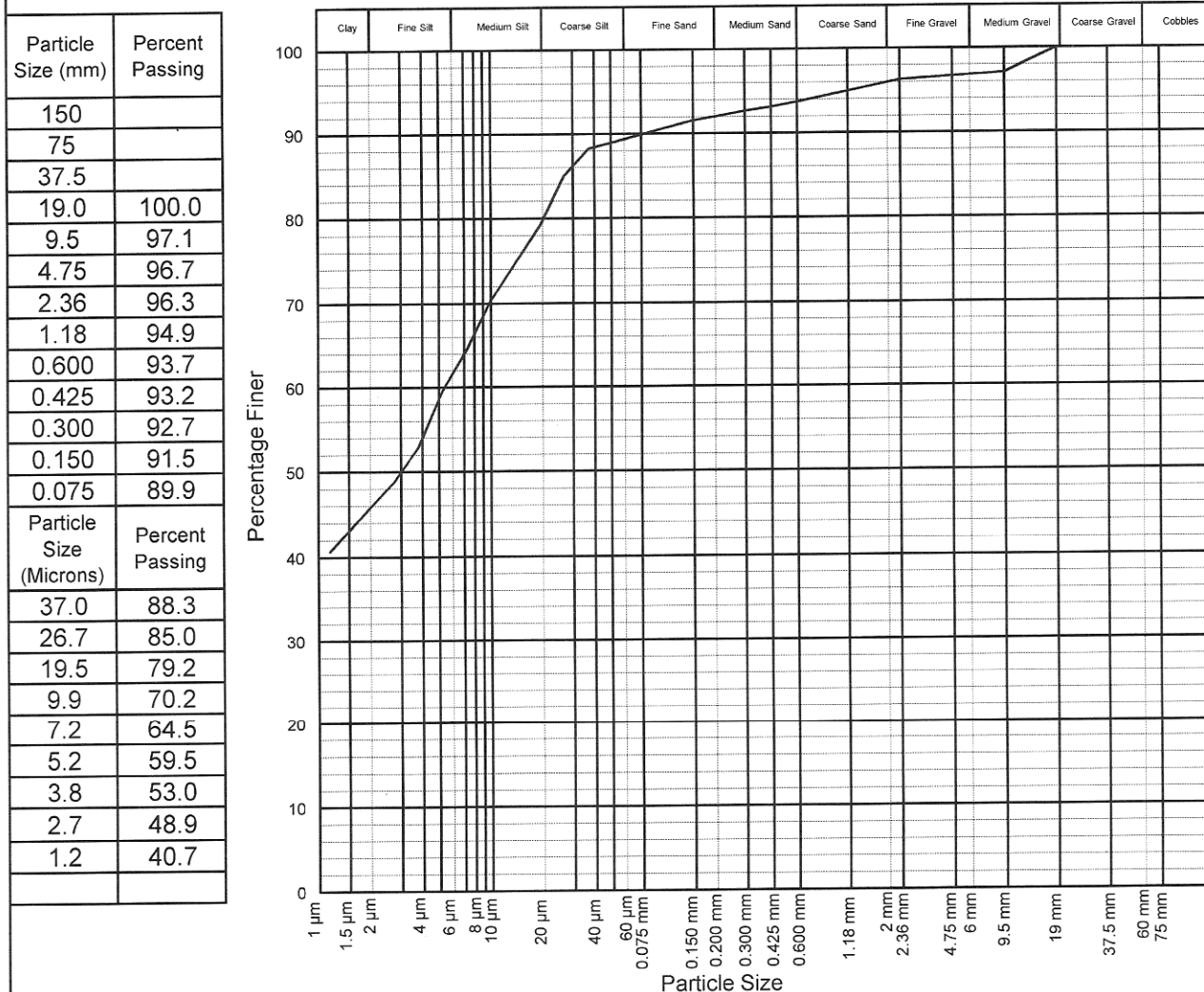

Nick Farrer
Approved Signatory

MB 12/12/11

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12012
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307286
Sample ID :	11-1 13/12/2011	AAA Lab. ID :	A11/5962/36
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NF	

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

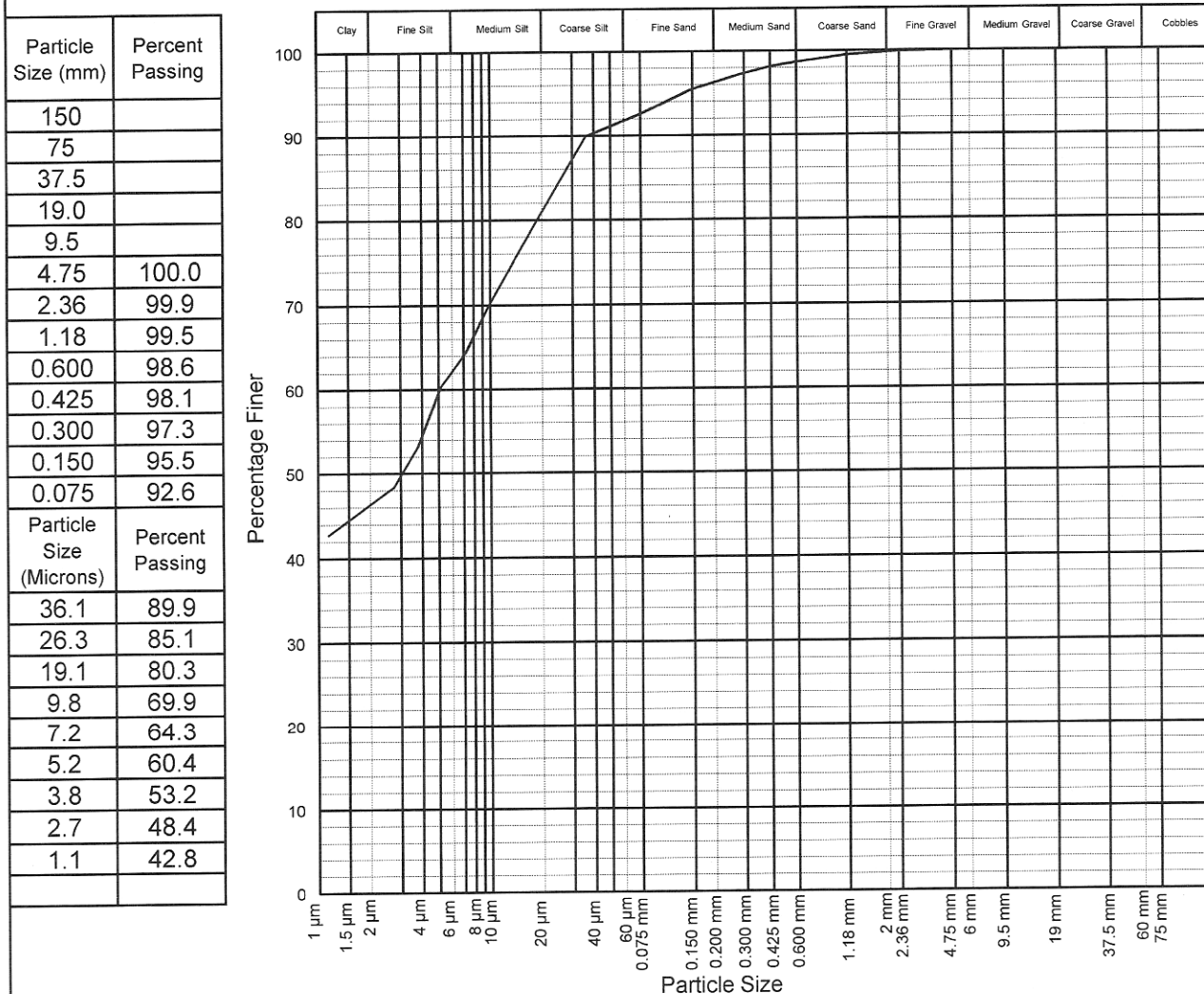
Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12013
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307287
Sample ID :	11-3 12/12/2011	AAA Lab. ID :	A11/5962/37
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CH) Silty CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>W</i>	

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

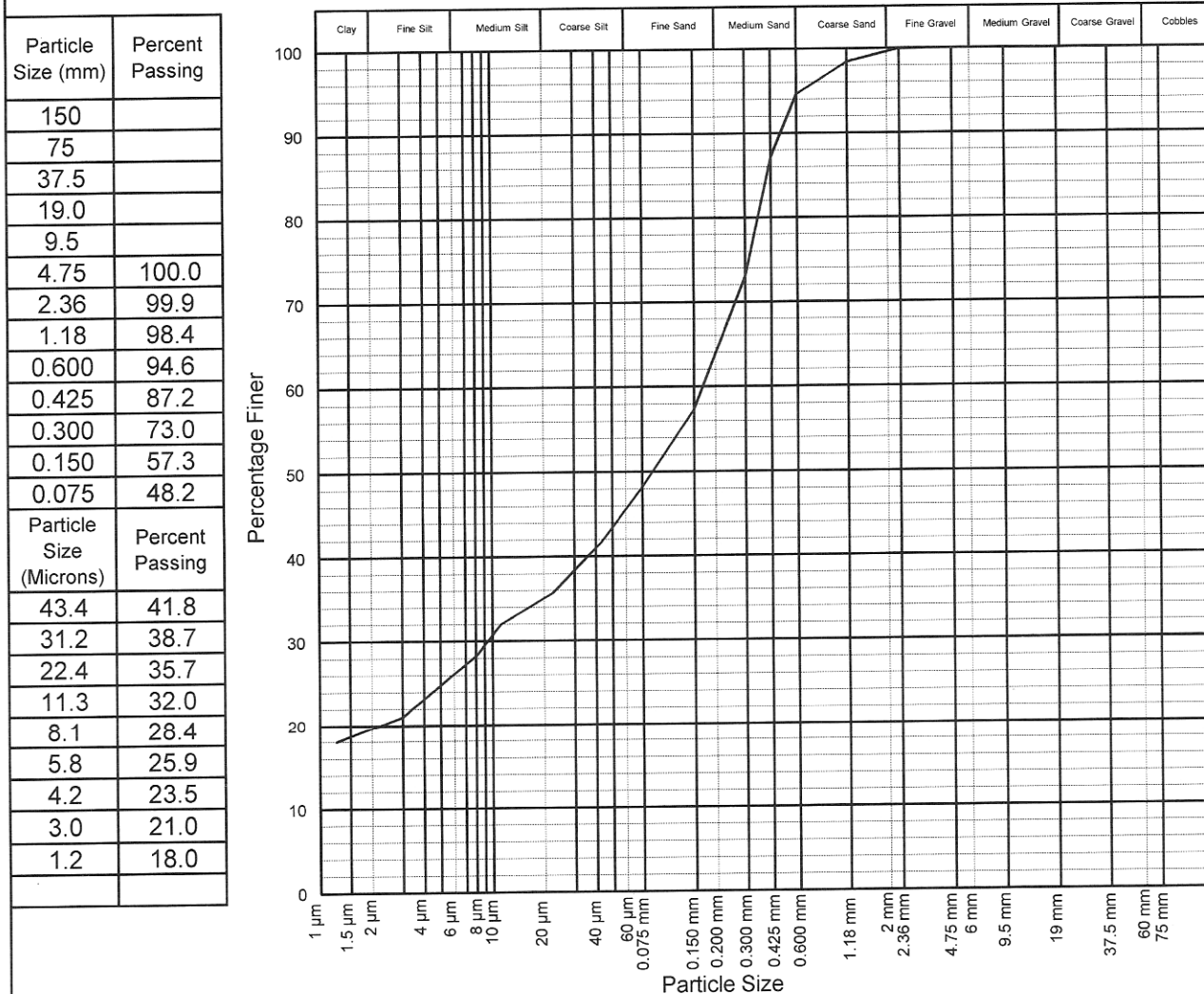

Nick Farrer
Approved Signatory

Nick Farrer 12/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

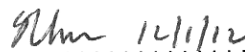
Client :	Advanced Analytical Australia	Report No. :	R12014
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307288
Sample ID :	11-4 14/12/2011	AAA Lab. ID :	A11/5962/38
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SC) Clayey SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : NT	

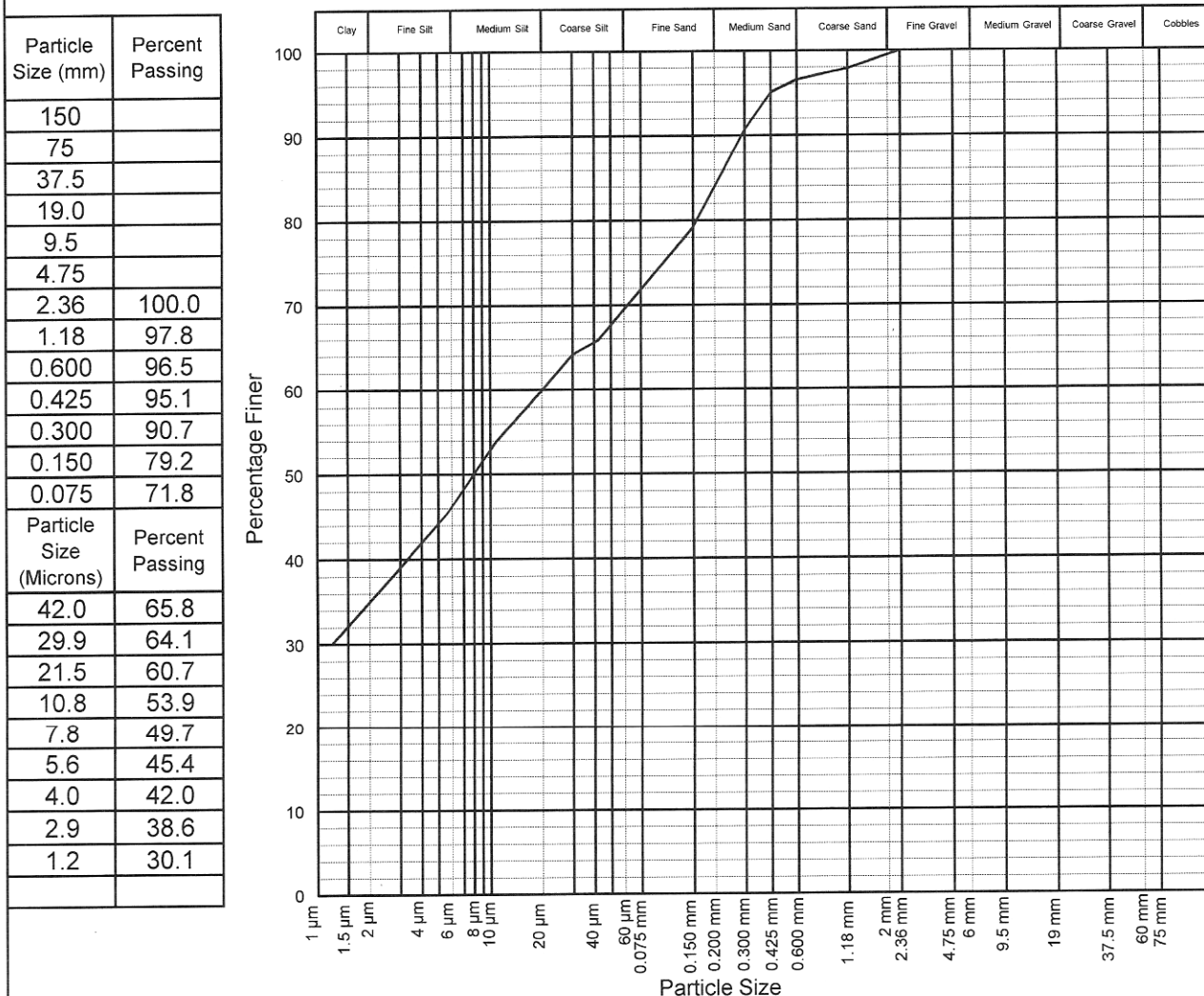
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Approved Signatory


Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12015
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307289
Sample ID :	11-5 14/12/2011	AAA Lab. ID :	A11/5962/39
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>NF</i>	

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


Nick Farrer
Approved Signatory

Nick Farrer 14/1/12

Senior Technical Officer
NATA Accred. No. : 1961



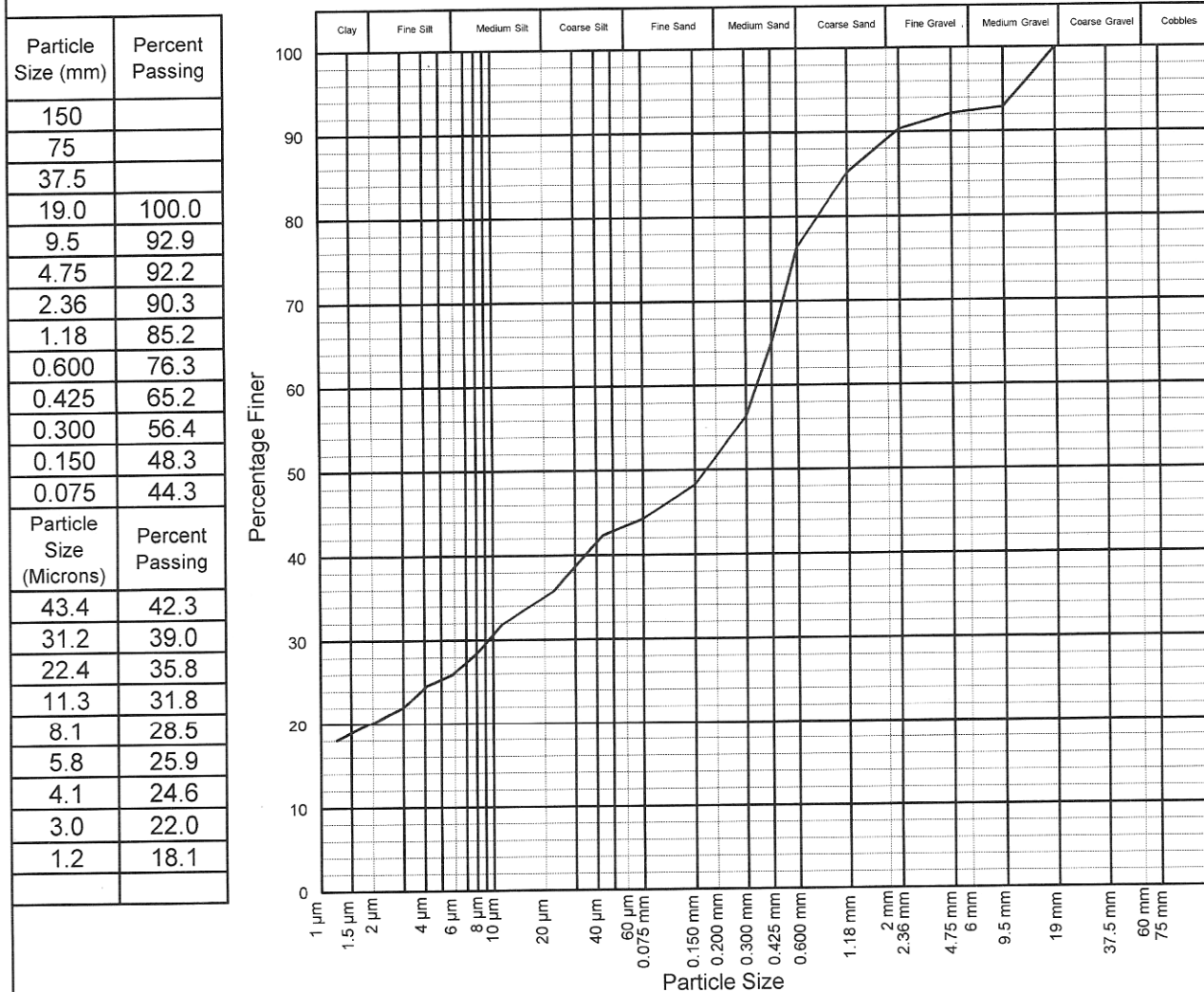
BRISBANE
LABORATORY

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12016
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307290
Sample ID :	11-8 14/12/2011	AAA Lab. ID :	A11/5962/40
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SC) Clayey SAND, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : MK	

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



Nick Farrer
Approved Signatory

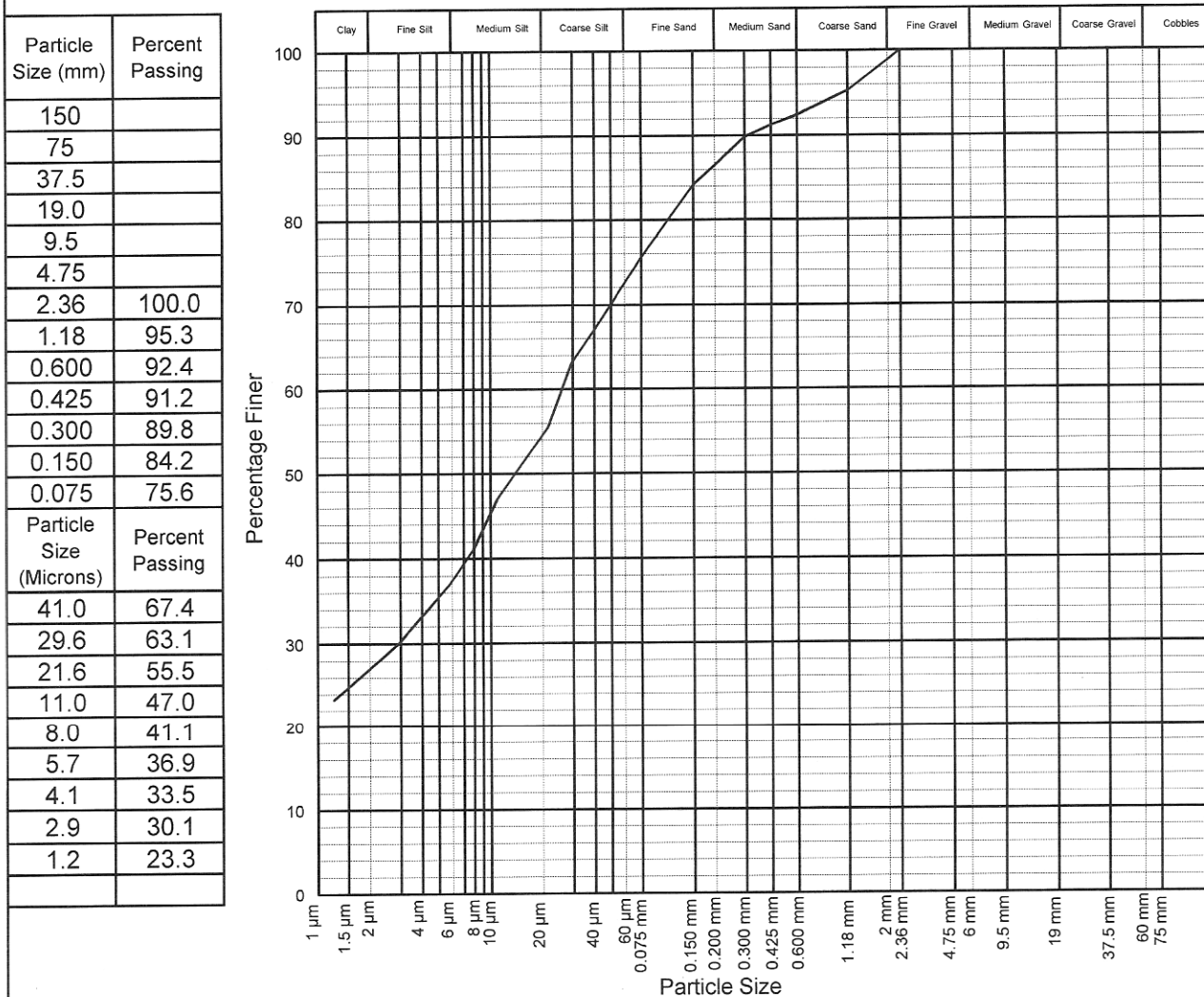
Senior Technical Officer
NATA Accred. No. : 1961

Golder Form No. R08 Hydrometer
RL1 - 28/07/03

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12017
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307291
Sample ID :	11-9 14/12/2011	AAA Lab. ID :	A11/5962/41
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, with some sand			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>M</i>	

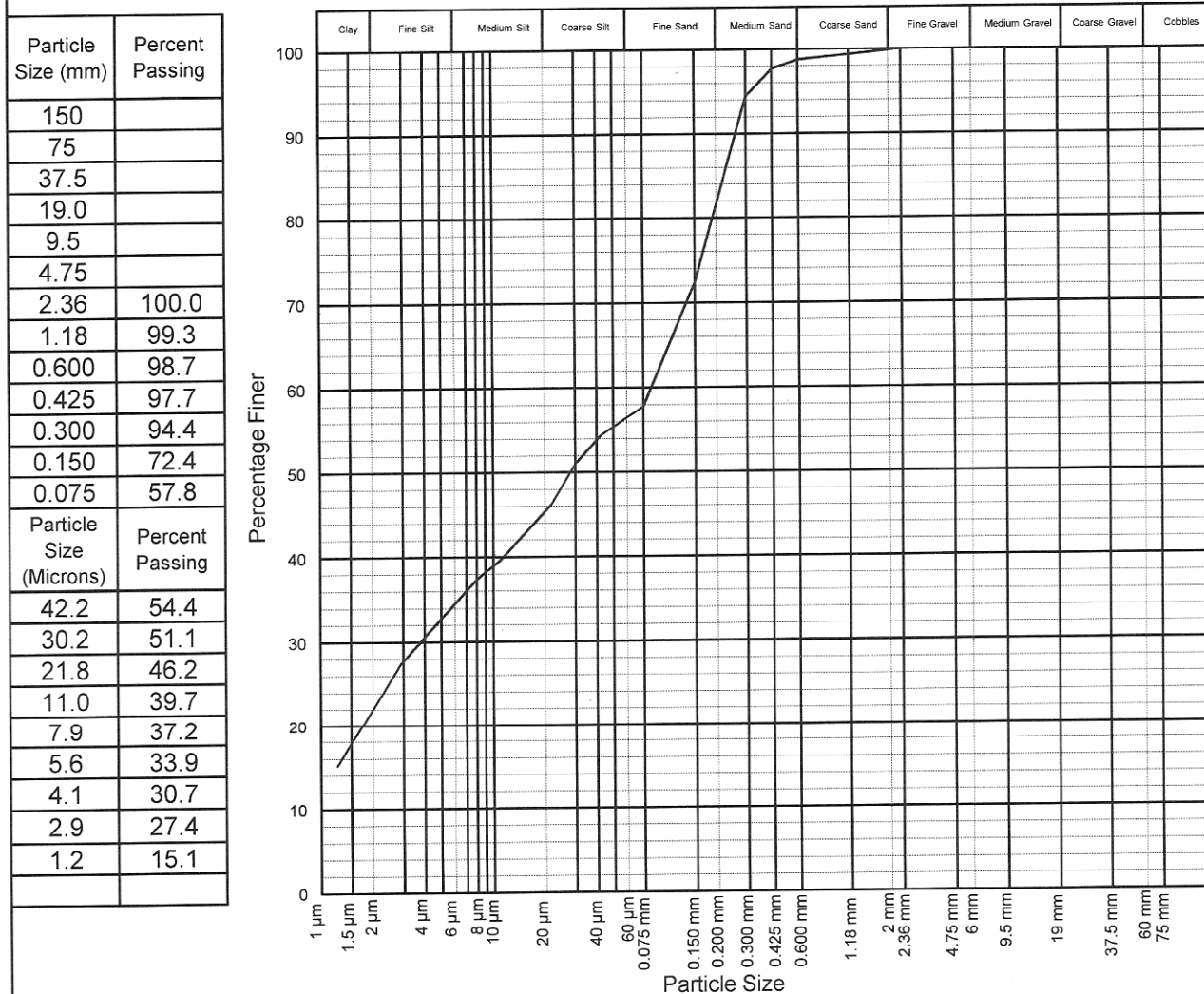
This document is issued in accordance with NATA's accreditation requirements.


Nick Farrer
Approved Signatory

Mhm 12/1/12
Senior Technical Officer
NATA Accred. No. : 1981

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12018
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307292
Sample ID :	6-2 14/12/2011	AAA Lab. ID :	A11/5962/42
		Date Received :	16/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : <i>KB</i>		Checked by : <i>MF</i>	

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


Nick Farrer
Approved Signatory

Nick Farrer
Senior Technical Officer
NATA Accred. No. : 1961



BRISBANE
LABORATORY

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone: (07) 3840 9500 Fax: (07) 3840 9501
www.golder.com.au

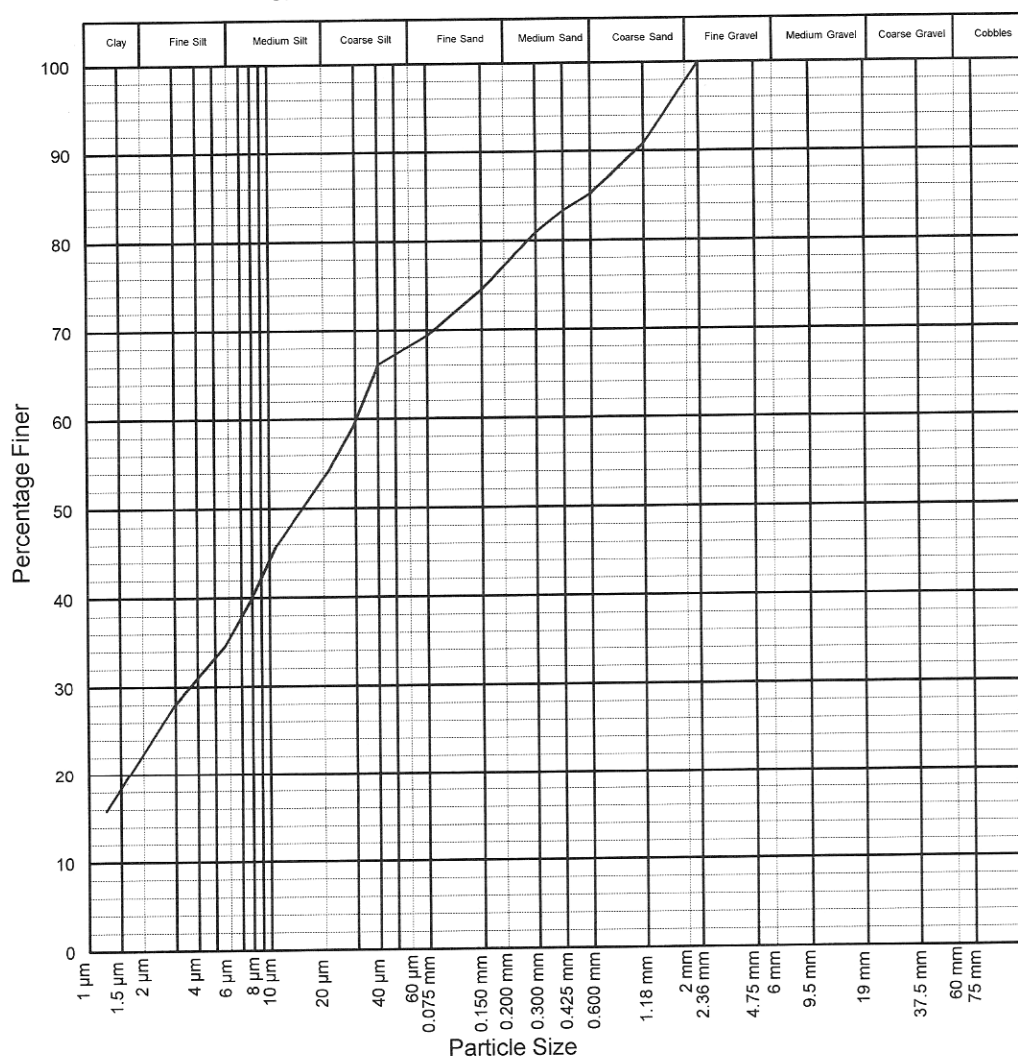
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 6-3 14/12/2011

Report No. : R12019
Job No. : 117634002/2
Reg'n No. : 11307293
AAA Lab. ID : A11/5962/43
Date Received : 16/12/2011
Sampled By : Client

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	90.8
0.600	85.3
0.425	83.4
0.300	80.9
0.150	74.6
0.075	69.3
Particle Size (Microns)	Percent Passing
40.4	66.1
29.5	59.3
21.3	54.2
10.8	45.7
7.9	39.7
5.7	34.6
4.1	31.2
2.9	27.8
1.2	15.8



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Sandy CLAY, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : KB	Checked by : <i>mk</i>		

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



Nick Farrer
Approved Signatory

Alma 12/1/12
Senior Technical Officer
NATA Accred. No. : 1961

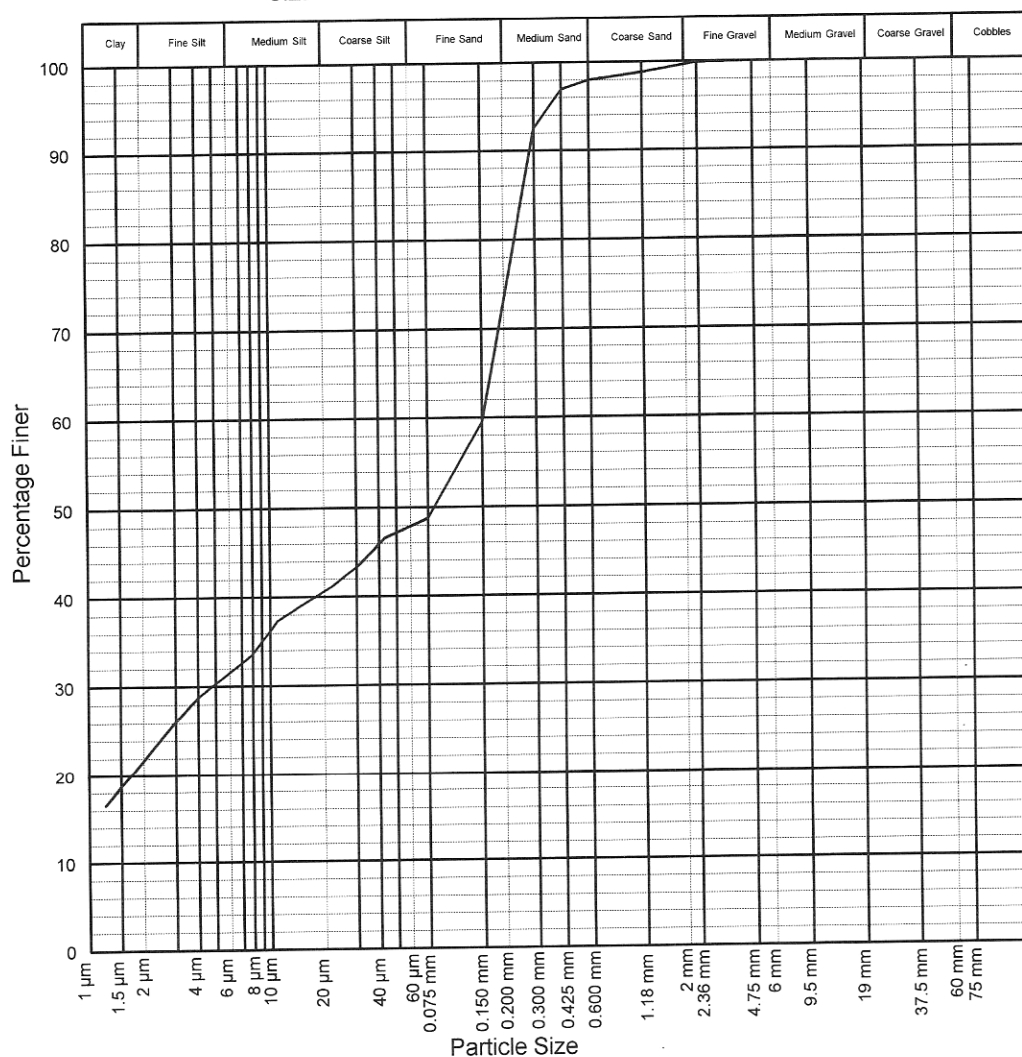
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 7-1 14/12/2011

Report No. : R12020
Job No. : 117634002/2
Reg'n No. : 11307294
AAA Lab. ID : A11/5962/44
Date Received : 16/12/2011
Sampled By : Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726

Particle Size (mm)	Percent Passing
150	
75	
37.5	
19.0	
9.5	
4.75	100.0
2.36	99.9
1.18	98.8
0.600	98.0
0.425	96.9
0.300	92.6
0.150	59.5
0.075	48.8
Particle Size (Microns)	Percent Passing
42.9	46.6
30.8	43.5
22.0	41.2
11.0	37.3
7.9	33.5
5.6	31.2
4.0	28.9
2.9	25.8
1.2	16.6



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(SC) Clayey SAND, grey		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : <i>KB</i>	Checked by : <i>NF</i>		

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


Nick Farrer
Approved Signatory

NF 12/1/12
Senior Technical Officer
NATA Accred. No. : 1961

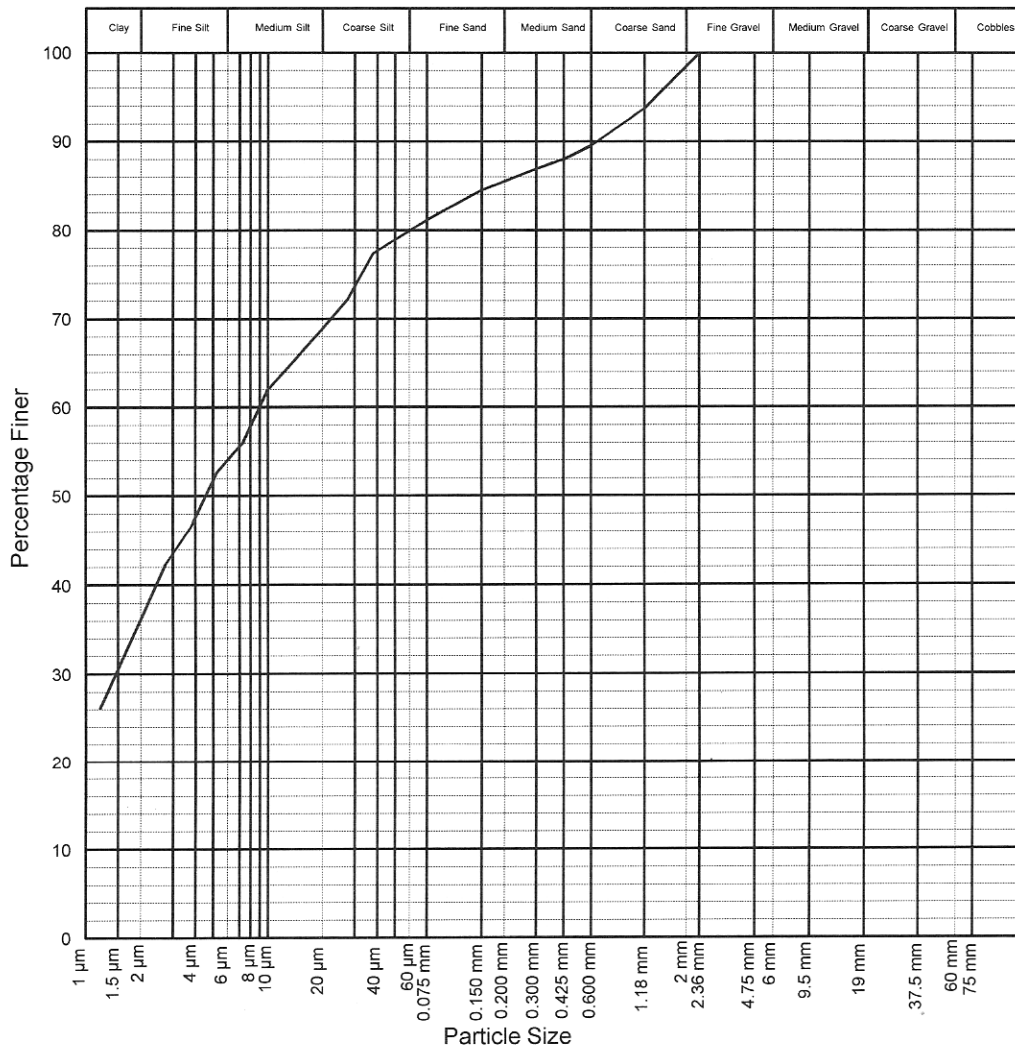
PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client : Advanced Analytical Australia
Address : PO Box 153, Hamilton
Project : Delivered Samples
Sample ID : 8-1 14/12/2011

Report No. : R12021
Job No. : 117634002/2
Reg'n No. : 11307295
AAA Lab. ID : A11/5962/45
Date Received : 16/12/2011
Sampled By : Client

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	93.7
0.600	89.5
0.425	88.0
0.300	86.9
0.150	84.5
0.075	81.2
Particle Size (Microns)	Percent Passing
38.1	77.4
27.6	72.2
19.9	68.8
10.0	62.0
7.3	56.0
5.2	52.6
3.8	46.6
2.7	42.3
1.2	26.1



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Silty CLAY, grey, with some sand		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by : KB	Checked by : MK		

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


Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961



**BRISBANE
LABORATORY**

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone:(07) 3840 9500 Fax:(07) 3840 9501
www.golder.com.au

TEST RESULTS

Client :	Advanced Analytical Australia	Job No. :	117634002/2
Project :	Delivered Samples	Date Received :	20-Dec-11
Project Ref. :	A11/6127	Sampled by :	Client

PARTICLE SIZE SUMMARY

Reg'n No.	Sample ID	Sample No.	Percent Gravel (+ 2 mm)	Percent Sand (2 mm - 0.060 mm)	Percent Silt (0.060 mm - 0.002)	Percent Clay (-0.002 mm)
11307352	1-0 15/12/2011	1	1	58	17	24
11307353	2-0 15/12/2011	2	0	40	25	35
11307354	3-0 15/12/2011	3	0	6	43	51
11307355	4-0 15/12/2011	4	0	14	30	56
11307356	4-4 16/12/2011	5	6	21	33	40
11307357	4-5 16/12/2011	6	1	21	27	51
11307358	4-7 16/12/2011	7	1	19	34	46
11307359	4-8 16/12/2011	8	6	28	34	32
11307360	4-9 16/12/2011	9	2	15	31	52
11307361	4-10 16/12/2011	10	0	26	36	38
11307362	4-13 16/12/2011	11	0	3	37	60
11307363	5-0 16/12/2011	12	0	5	39	56
11307364	BC-1 15/12/2011	13	24	56	8	12
11307365	BC-2 15/12/2011	14	0	9	33	58
11307366	BC-3 15/12/2011	15	1	12	39	48
11307367	BC-4 15/12/2011	16	2	20	28	50

Remarks :

Test Procedure : AS 1289 3.6.3

Prepared by : *MK*

Checked by *KB*



**BRISBANE
LABORATORY**

28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone:(07) 3840 9500 Fax:(07) 3840 9501
www.golder.com.au

TEST RESULTS

Client : Advanced Analytical Australia	Job No. : 117634002/2
Project : Delivered Samples	Date Received : 20-Dec-11
Project Ref. : A11/6127	Sampled by : Client

BULK DENSITY SUMMARY

Reg'n No.	Sample ID	Sample No.	Bulk Density (t/m ³)
11307358	4-7 16/12/2011	7	1.403
11307359	4-8 16/12/2011	8	1.318

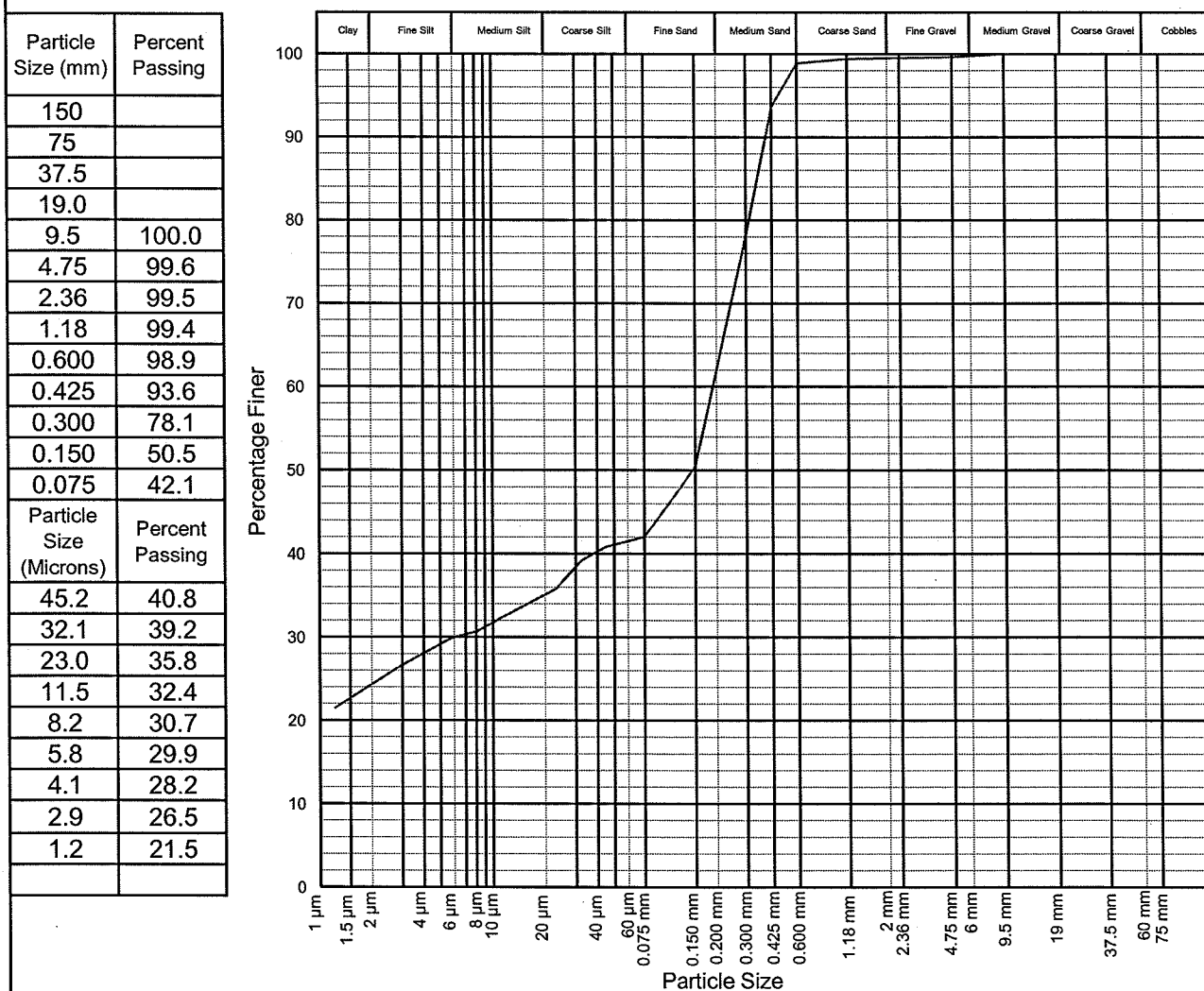
Remarks :

Prepared by : KB

Checked by *NF*

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12042
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307352
Sample ID :	1-0 15/12/2011	AAA Lab. ID :	A11/6127/1
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (SC) Clayey SAND, grey.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>NT</i>	

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

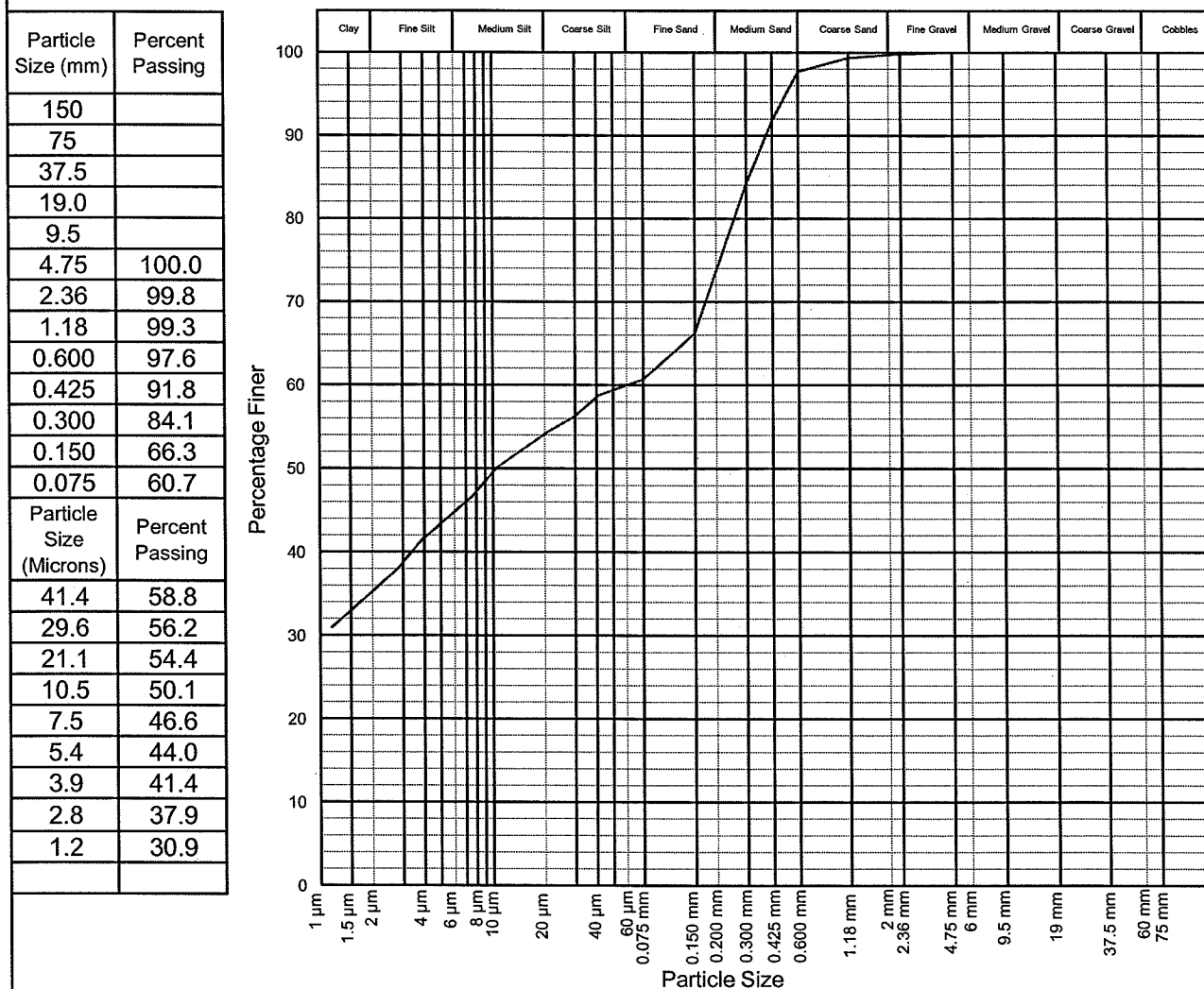

Nick Farrer
Approved Signatory

NT 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12043
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307353
Sample ID :	2-0 15/12/2011	AAA Lab. ID :	A11/6127/2
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>NF</i>	

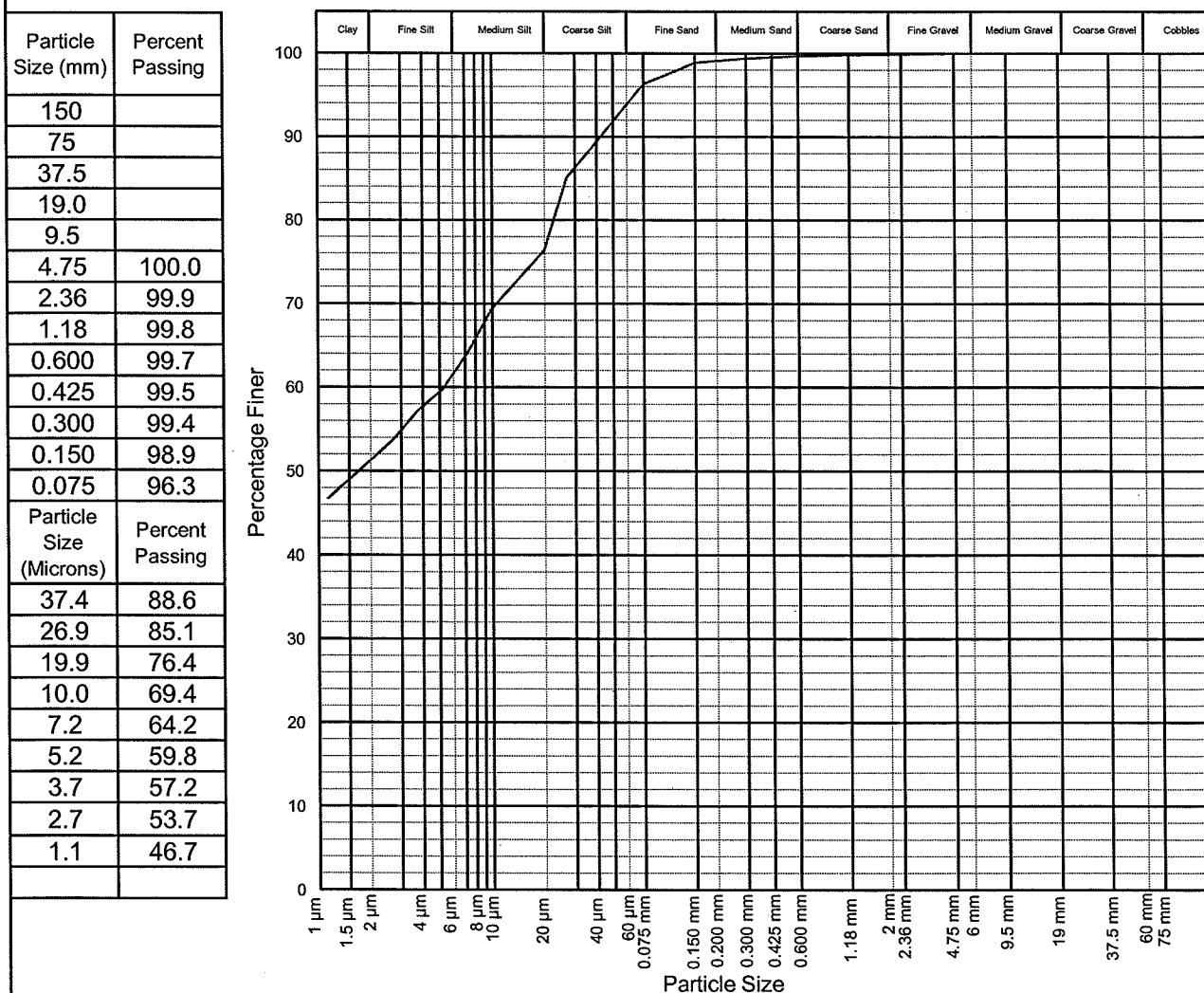
This document is issued in accordance with
NATA's accreditation requirements.

NF 18/1/12
.....
Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12044
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307354
Sample ID :	3-0 15/12/2011	AAA Lab. ID :	A11/6127/3
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CH) Silty CLAY, grey, trace of sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>mf</i>

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

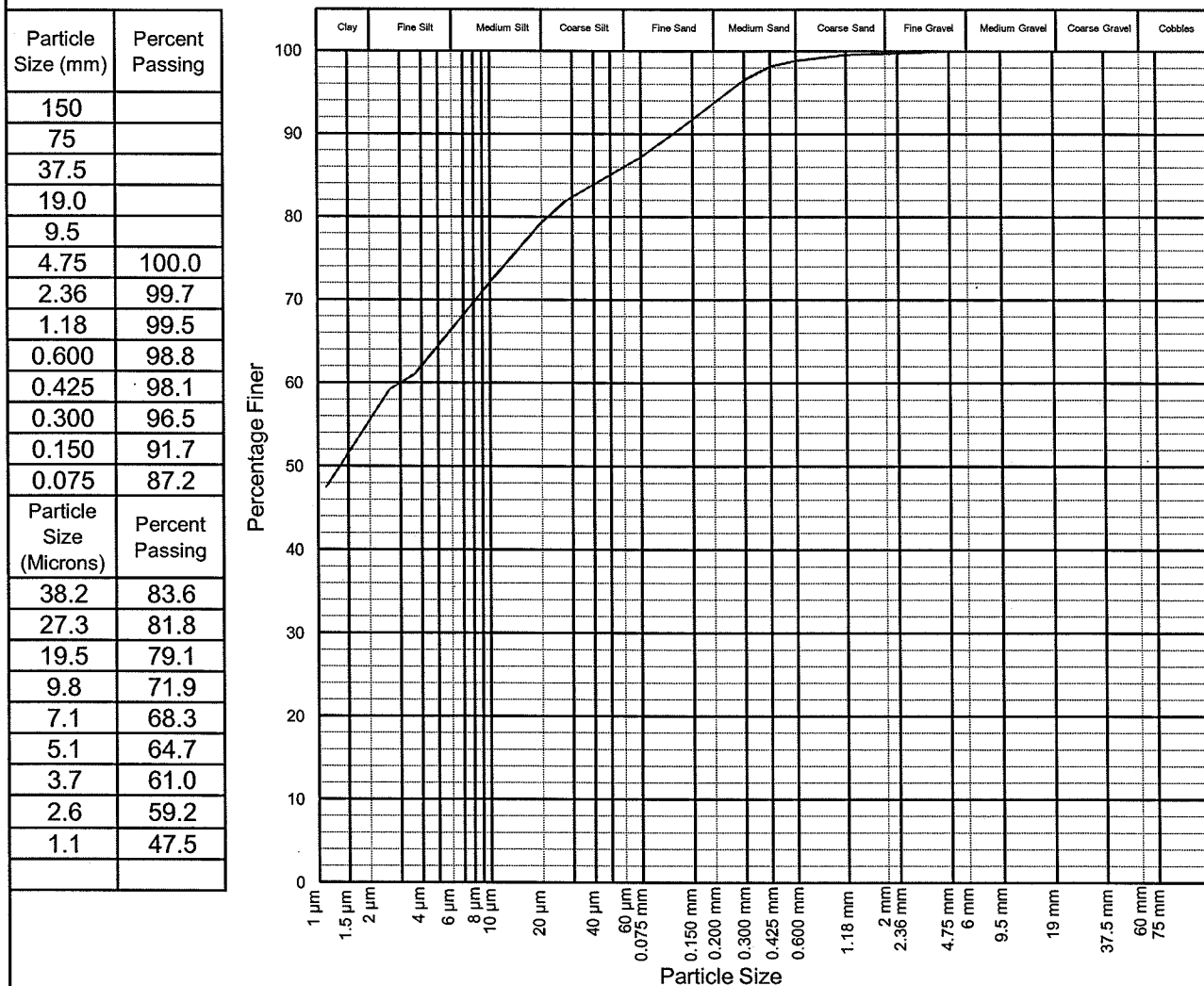

Nick Farrer
Approved Signatory

mf 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12045
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307355
Sample ID :	4-0 16/12/2011	AAA Lab. ID :	A11/6127/4
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CH) Silty CLAY, grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>W</i>

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

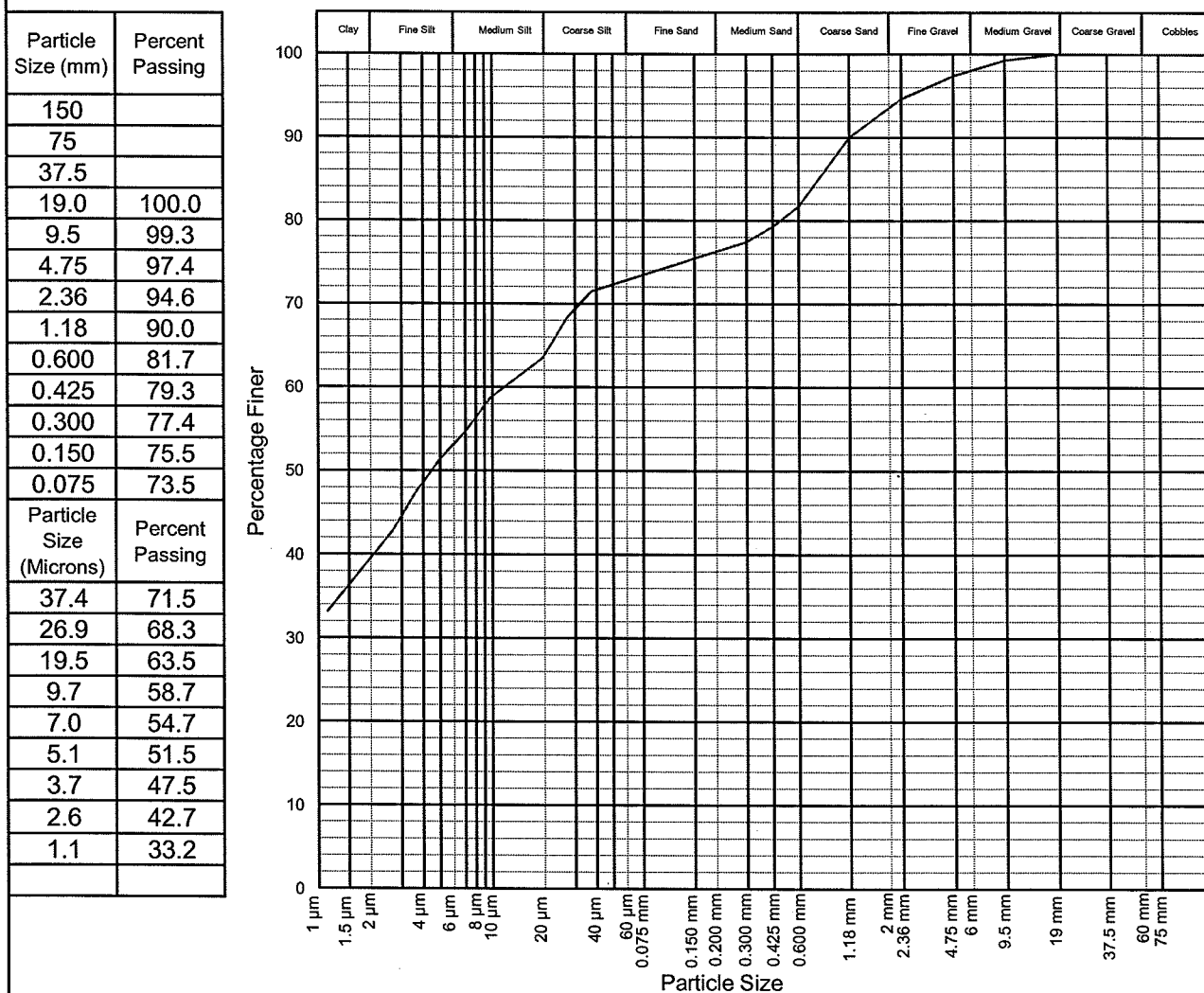

Nick Farrer
Approved Signatory

W 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12046
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307356
Sample ID :	4-4 16/12/2011	AAA Lab. ID :	A11/6127/5
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Silty CLAY, grey, some sand & trace of gravel.		
Test Procedure :	AS 1289.3.6.3	- Variations to test method a) assumed particle density used b) testing up to 24 hours	
Prepared by :	KB	Checked by :	NF

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

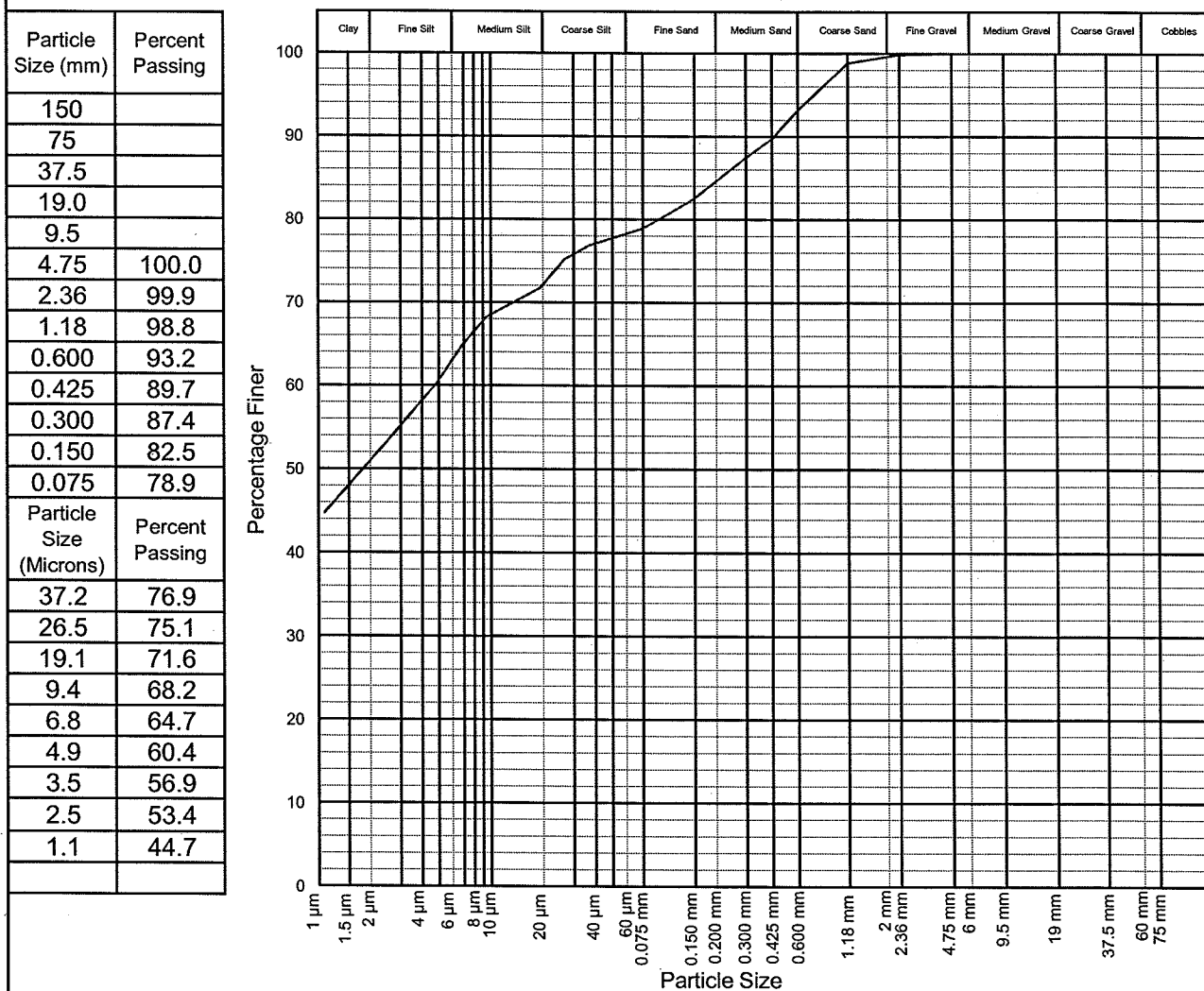
Nick Farrer
Approved Signatory

NF 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12047
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307357
Sample ID :	4-5 16/12/2011	AAA Lab. ID :	A11/6127/6
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, dark grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	mk

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

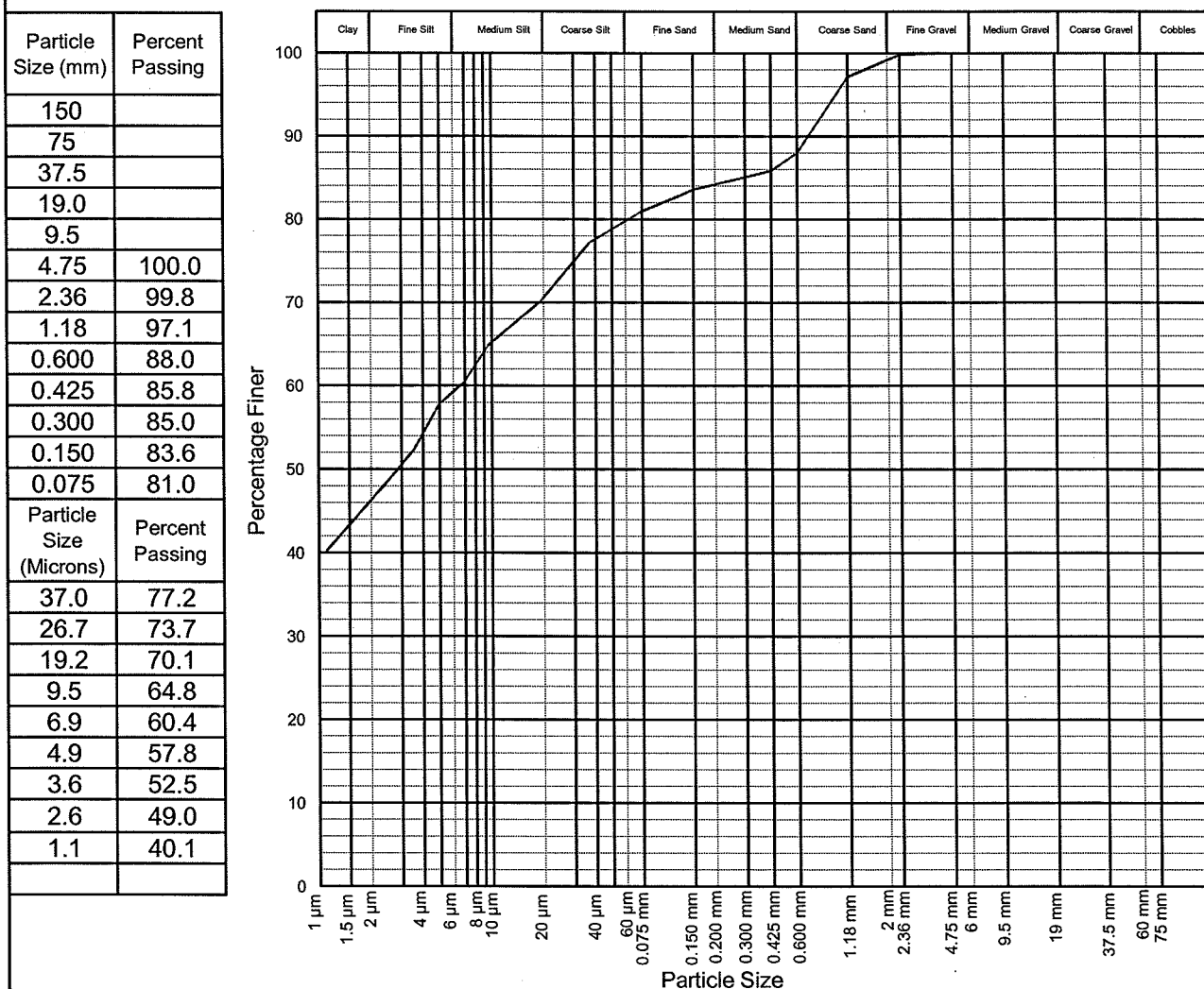

Nick Farrer
Approved Signatory

gfhm 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12048
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307358
Sample ID :	4-7 16/12/2011	AAA Lab. ID :	A11/6127/7
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, dark grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>MF</i>

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

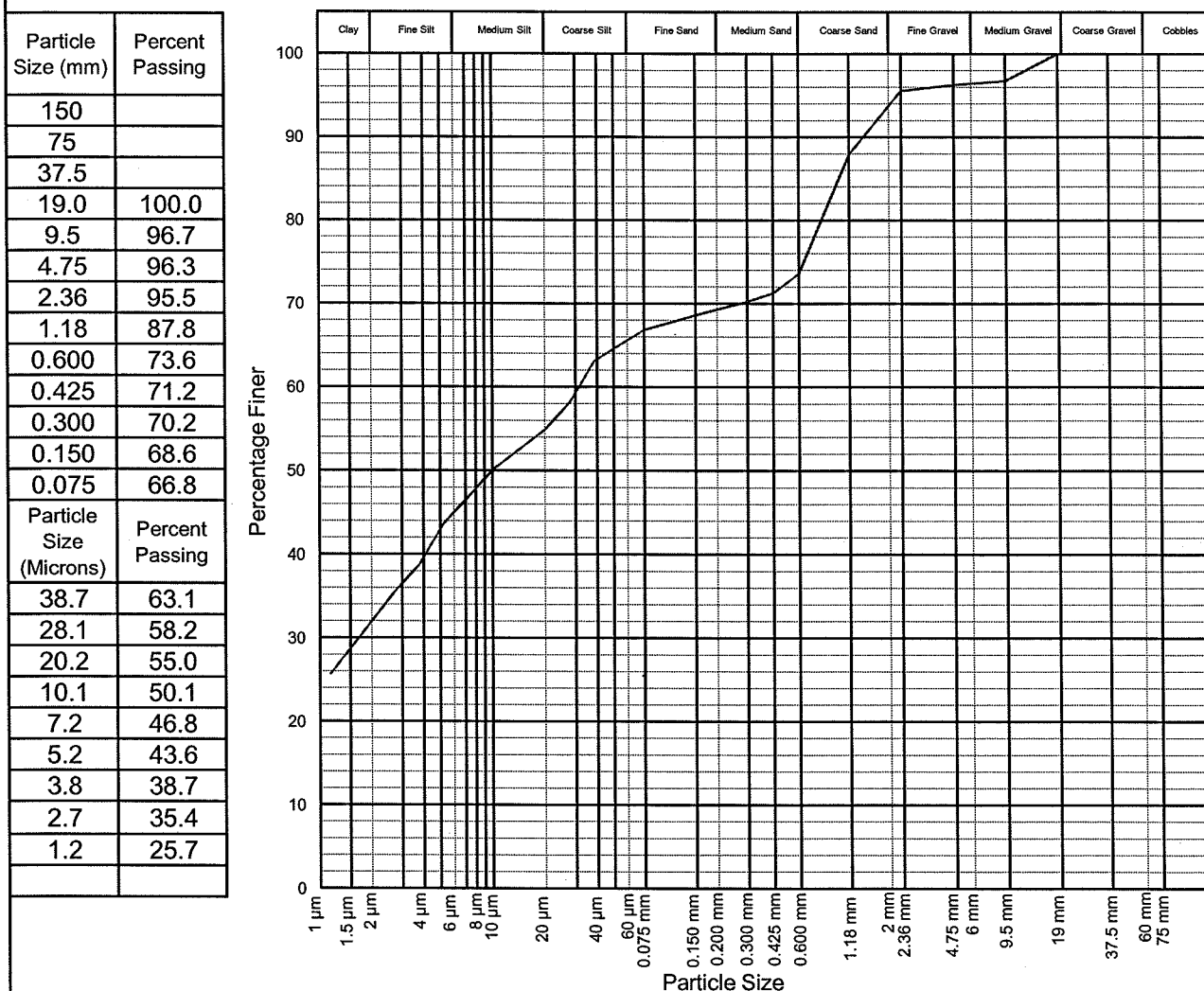
Nick Farrer
Approved Signatory

Nick Farrer 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12049
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307359
Sample ID :	4-8 16/12/2011	AAA Lab. ID :	A11/6127/8
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Sandy CLAY, grey			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>mt</i>

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

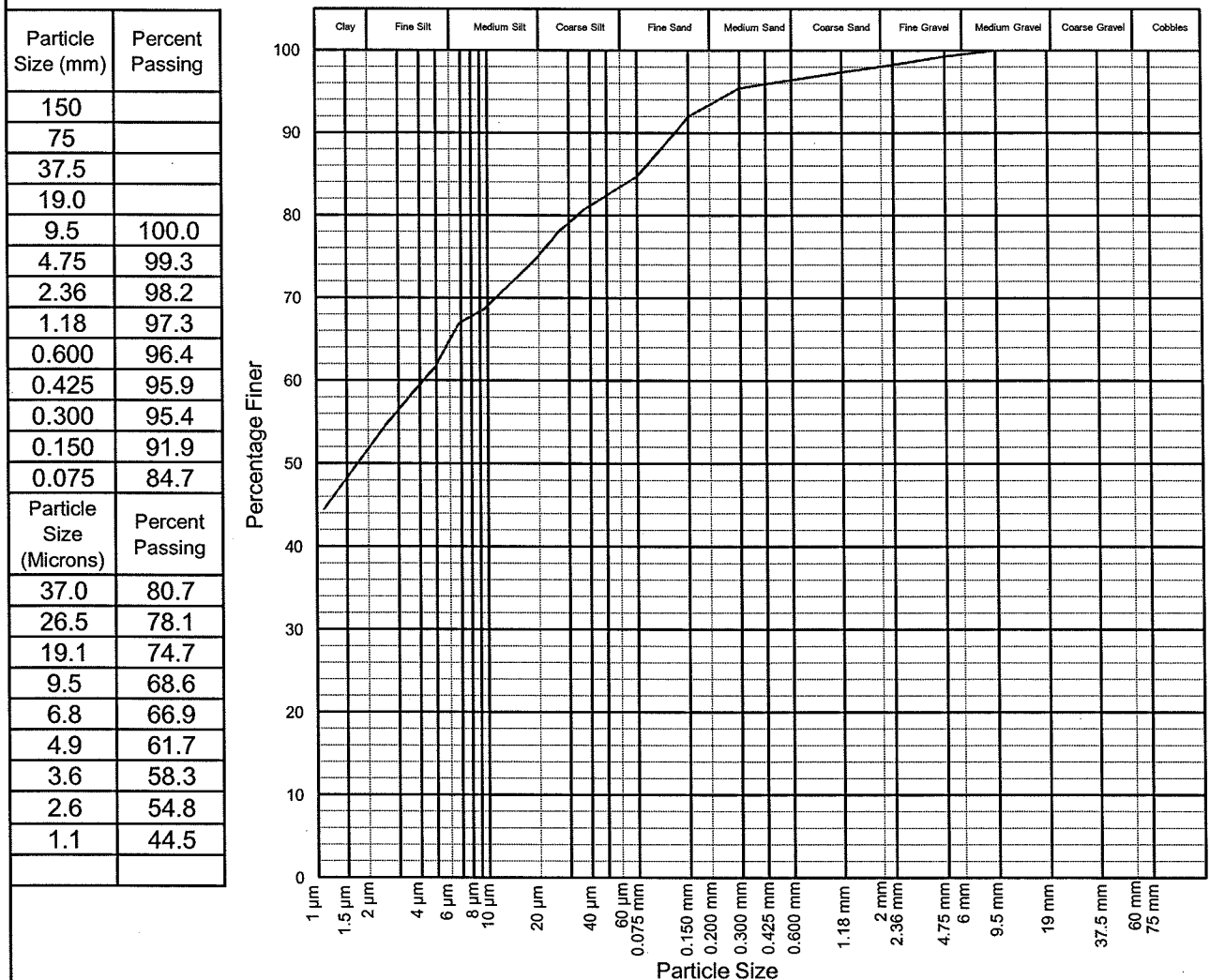

Nick Farrer
Approved Signatory

mt 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12050
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307360
Sample ID :	4-9 16/12/2011	AAA Lab. ID :	A11/6127/9
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, some sand & shell.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>nt</i>

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


Nick Farrer
Approved Signatory

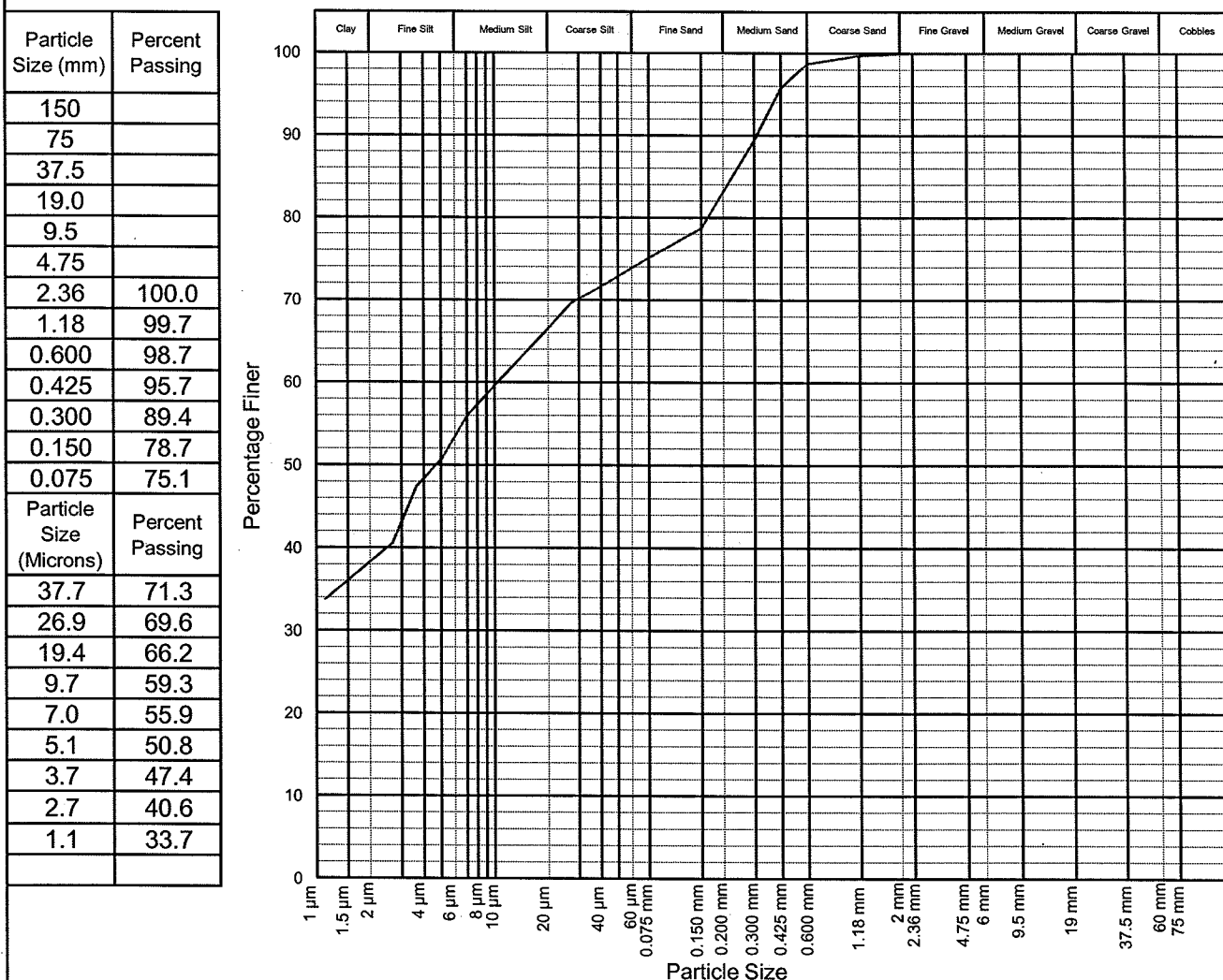
Mhu 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12051
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307361
Sample ID :	4-10 16/12/2011	AAA Lab. ID :	A11/6127/10
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	MT

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

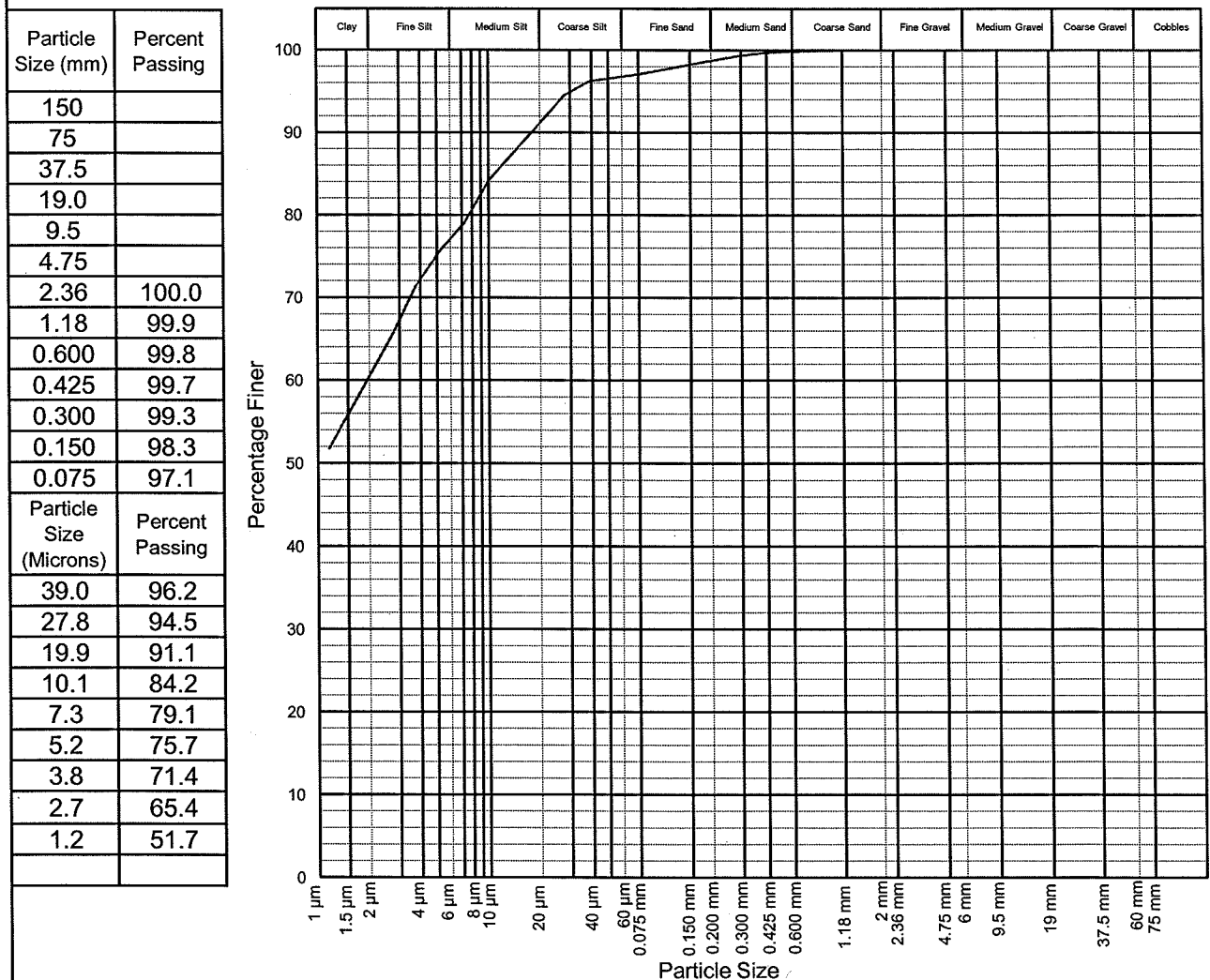

Nick Farrer
Approved Signatory

MT 13/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

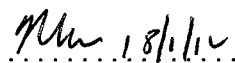
Client :	Advanced Analytical Australia	Report No. :	R12052
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307362
Sample ID :	4-13 16/12/2011	AAA Lab. ID :	A11/6127/11
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CH) Silty CLAY, grey.			
Test Procedure : AS 1289.3.6.3		- Variations to test method a) assumed particle density used b) testing up to 24 hours	
Prepared by :	KB	Checked by :	MT

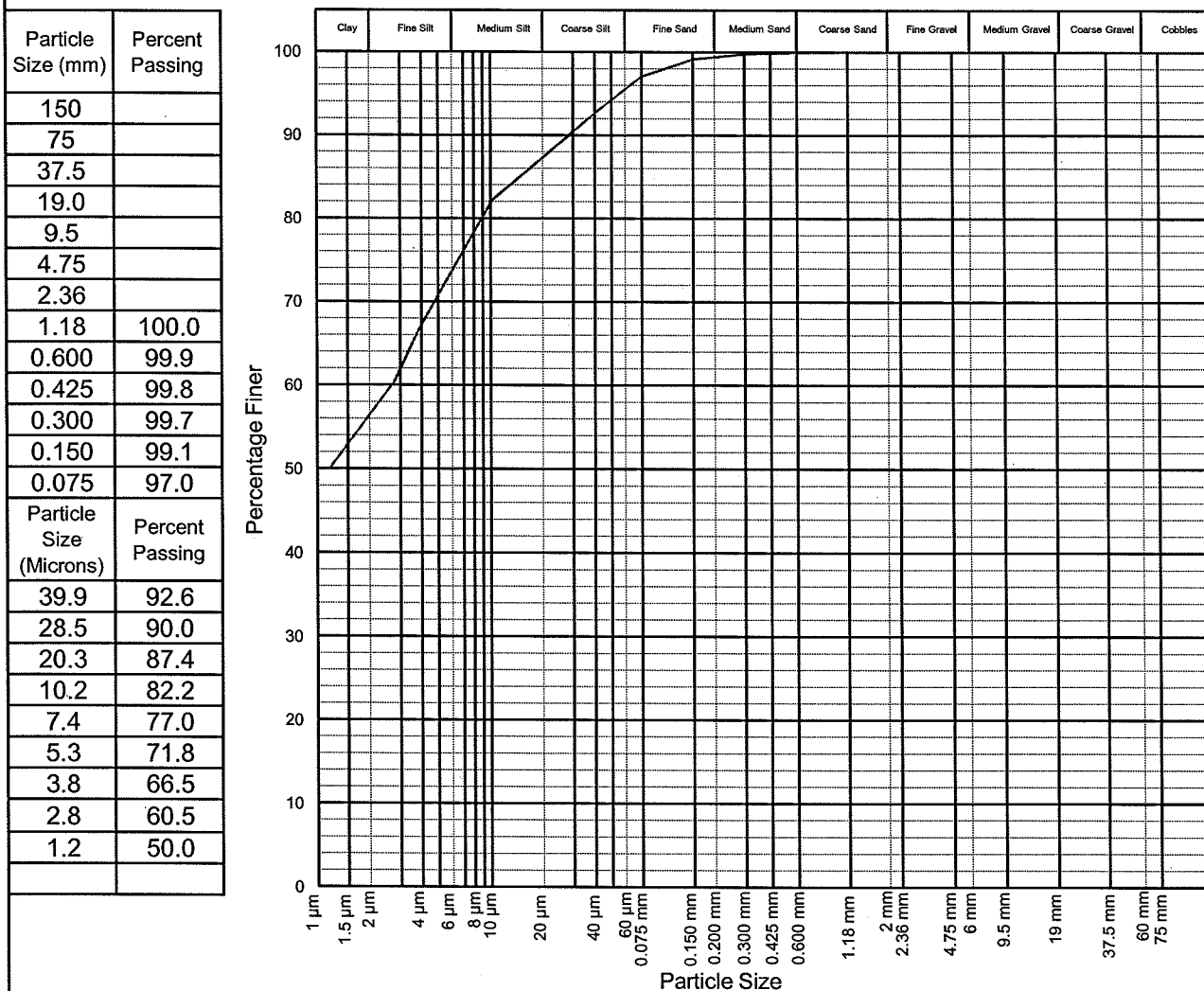
This document is issued in accordance with
NATA's accreditation requirements.

Nick Farrer
Approved Signatory


.....
Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12053
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307363
Sample ID :	5-0 16/12/2011	AAA Lab. ID :	A11/6127/12
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CH) Silty CLAY, grey.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by :	KB	Checked by :	<i>mf</i>

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


Nick Farrer
Approved Signatory

mf 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961



**Golder
Associates**

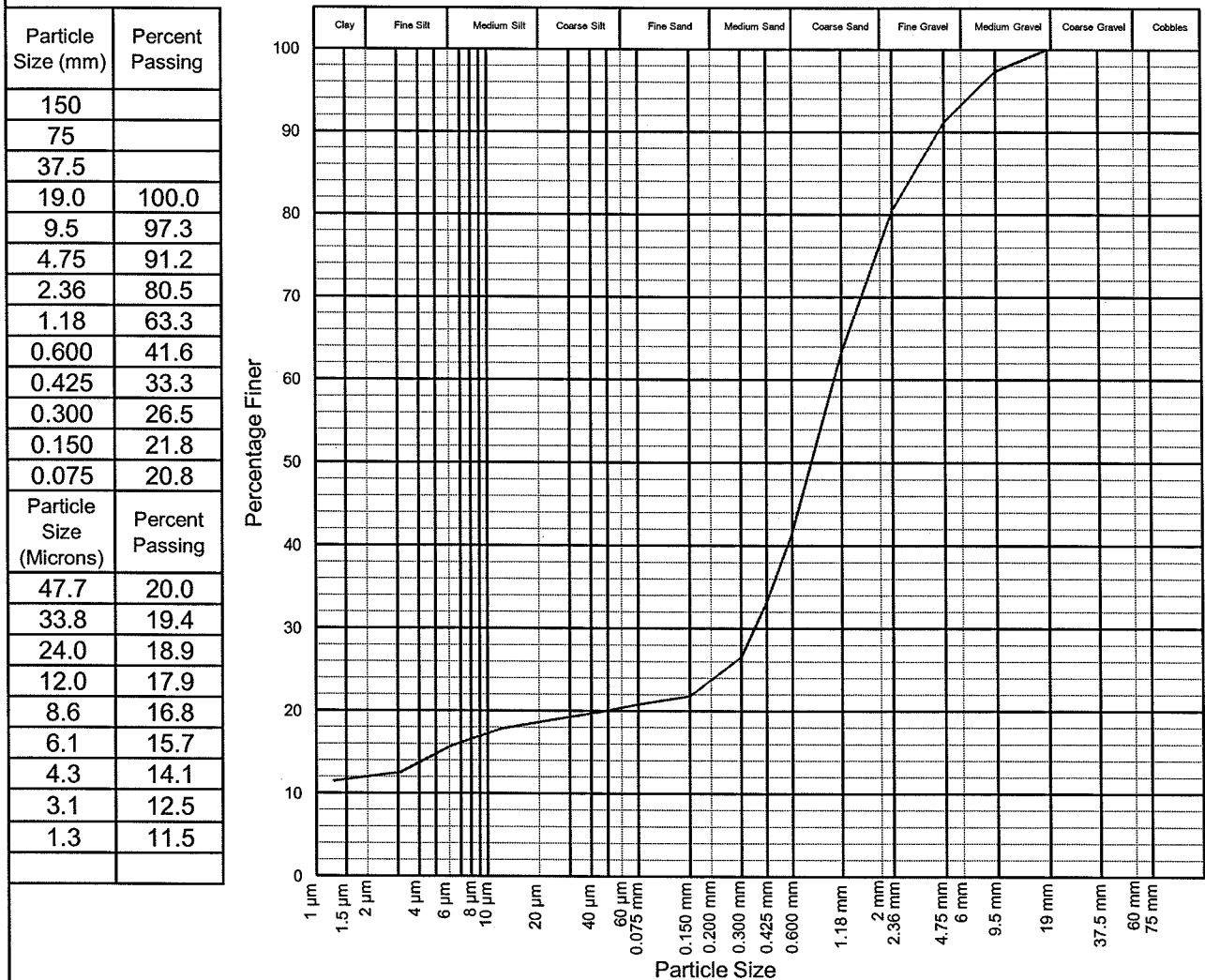
**BRISBANE
LABORATORY**

Page 1 of 1
28 Bank Street West End QLD 4101
PO Box 3427 South Brisbane BC QLD 4101
Phone:(07) 3840 9500 Fax:(07) 3840 9501
www.golder.com.au

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12054
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307364
Sample ID :	BC-1 15/12/2011	AAA Lab. ID :	A11/6127/13
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726



Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(SM) Silty SAND, grey, some gravel.		
Test Procedure :	AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours		
Prepared by :	KB	Checked by :	<i>nk</i>

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



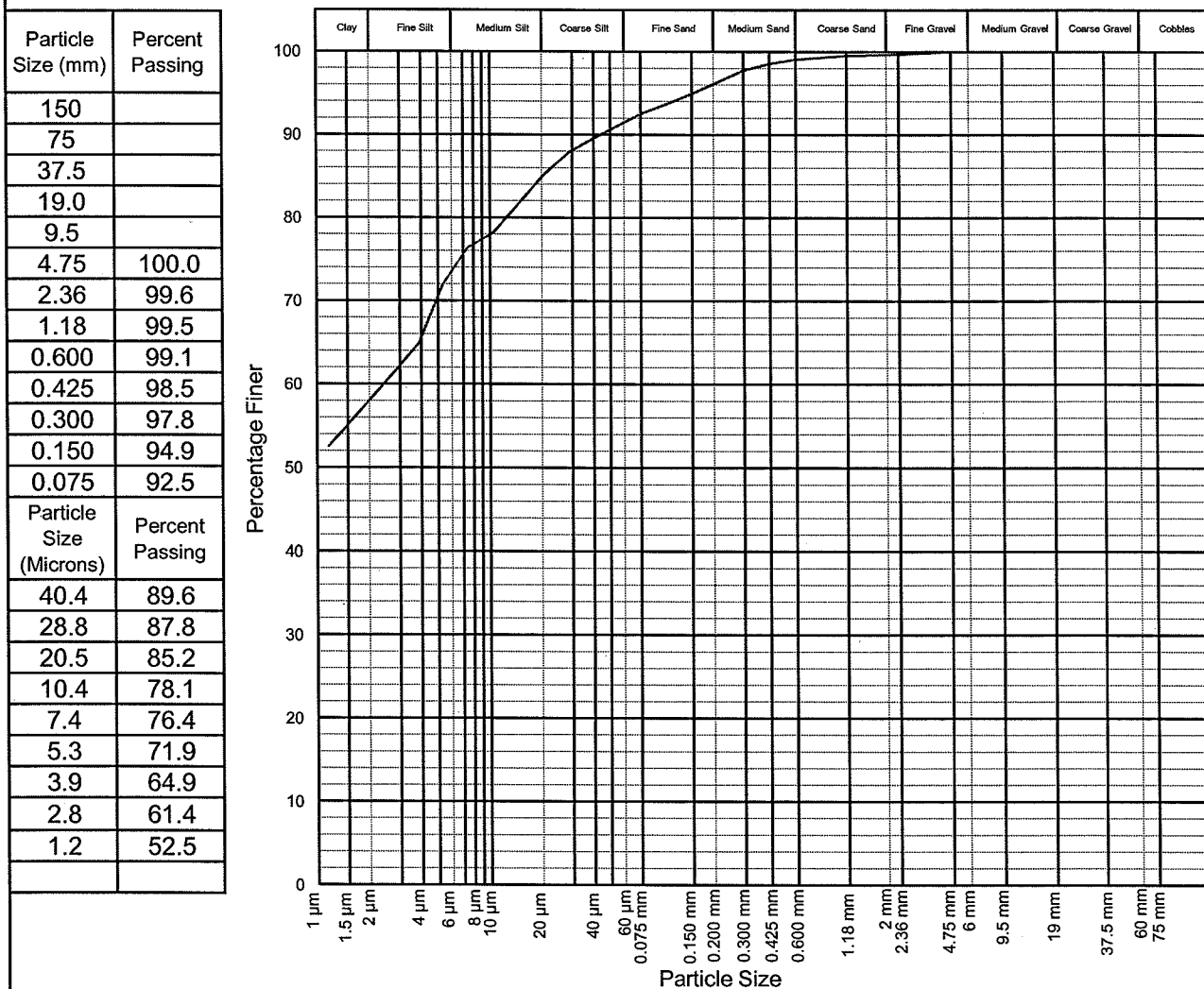
Nick Farrer
Approved Signatory

Senior Technical Officer
NATA Accred. No. : 1961

Golder Form No. R08 Hydrometer
RL1 - 28/07/03

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12055
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307365
Sample ID :	BC-2 15/12/2011	AAA Lab. ID :	A11/6127/14
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description :	(CI) Silty CLAY, grey, trace of sand.		
Test Procedure :	AS 1289.3.6.3	- Variations to test method a) assumed particle density used b) testing up to 24 hours	
Prepared by :	KB	Checked by :	<i>ML</i>

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

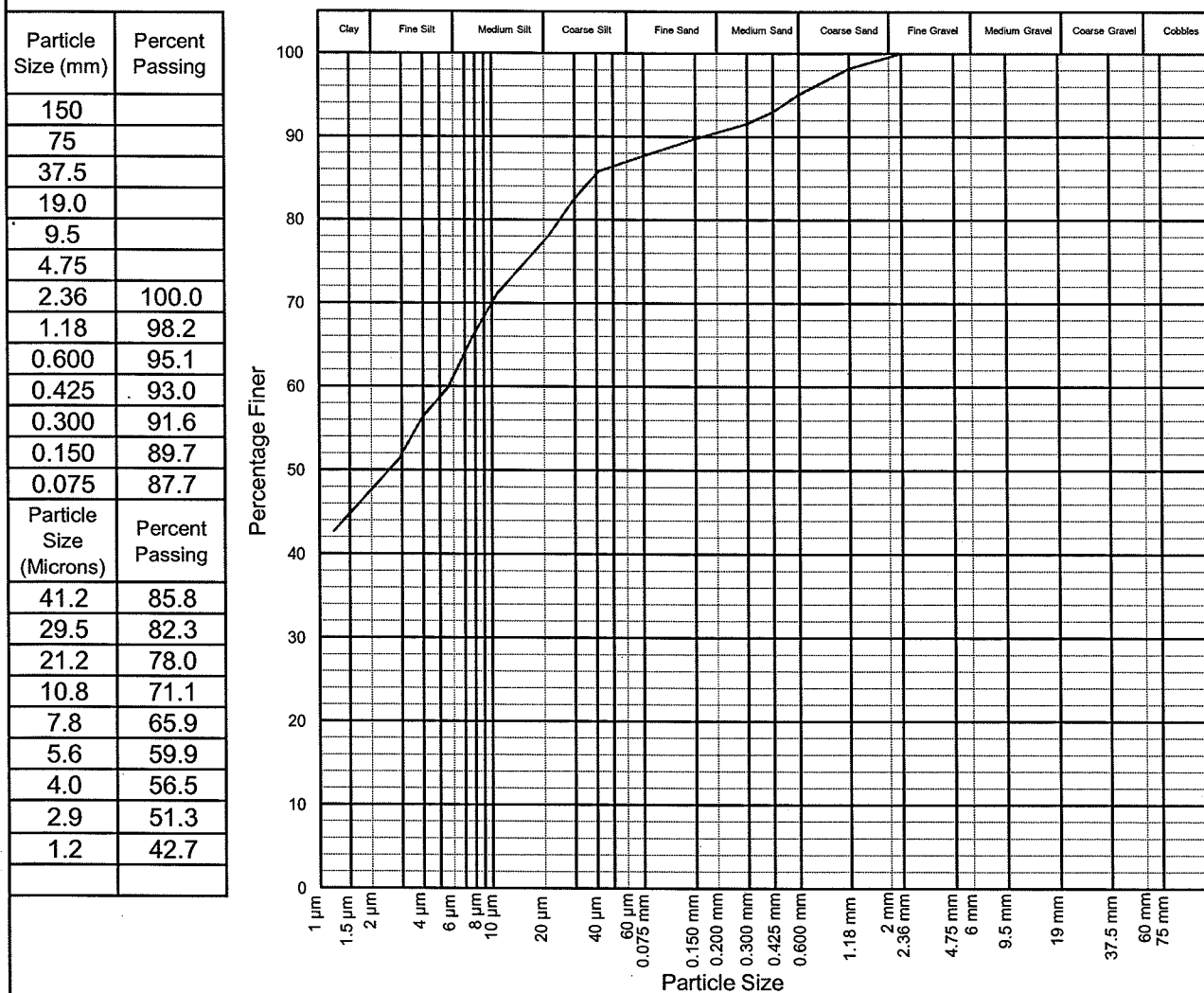

Nick Farrer
Approved Signatory

ML 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12056
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307366
Sample ID :	BC-3 15/12/2011	AAA Lab. ID :	A11/6127/15
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty CLAY, grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB	Checked by : <i>MF</i>		

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

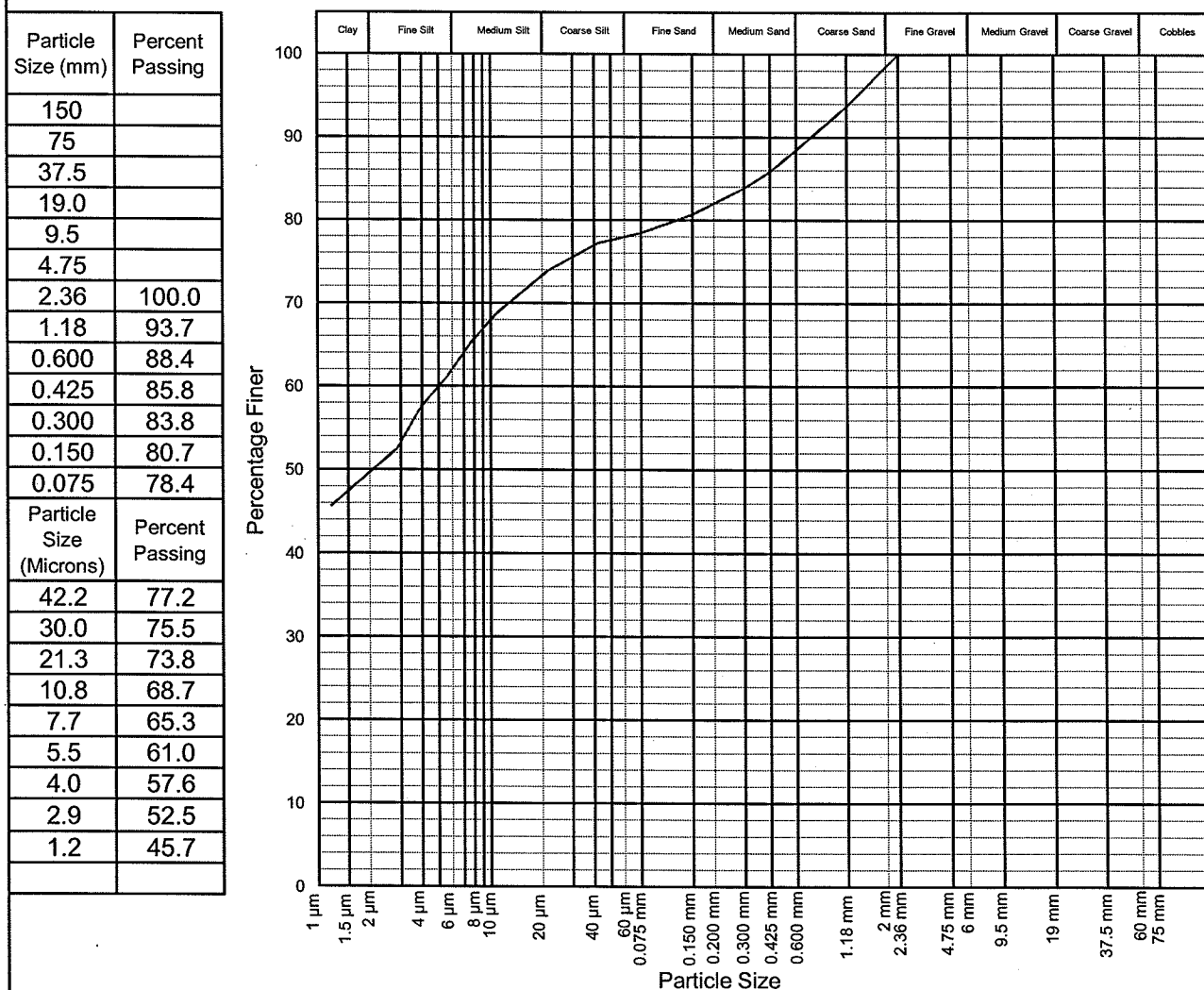

Nick Farrer
Approved Signatory

18/1/12

Senior Technical Officer
NATA Accred. No. : 1961

PARTICLE SIZE DISTRIBUTION BY HYDROMETER

Client :	Advanced Analytical Australia	Report No. :	R12057
Address :	PO Box 153, Hamilton	Job No. :	117634002/2
Project :	Delivered Samples	Reg'n No. :	11307367
Sample ID :	BC-4 15/12/2011	AAA Lab. ID :	A11/6127/16
		Date Received :	20/12/2011
		Sampled By :	Client

SIZE FRACTIONS AS PER AUSTRALIAN STANDARDS AS 1726


Pretreatment	Tested as received	Soil Particle Density (assumed)	2.70 t/m ³
Loss in Pretreatment (%)	-	Type of Hydrometer	ASTM E100
Method of Dispersion	Mixer		
Material Description : (CI) Silty SAND, grey, some sand.			
Test Procedure : AS 1289.3.6.3 - Variations to test method a) assumed particle density used b) testing up to 24 hours			
Prepared by : KB		Checked by : <i>MF</i>	

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


Nick Farrer
Approved Signatory

Mur 18/1/12

Senior Technical Officer
NATA Accred. No. : 1961



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 6 Secondary Laboratory Analytical Report (ALS)

CERTIFICATE OF ANALYSIS

Work Order	: EB1127571	Page	: 1 of 7
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Customer Services
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3239 7400	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61 7 3243 7218
Project	: PBPC SAP 2012	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 19-DEC-2011
Sampler	: Vivian Seto	Issue Date	: 05-JAN-2012
Site	: ----		
Quote number	: EN/034/11	No. of samples received	: 3
		No. of samples analysed	: 3

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
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Organics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY



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 insufficient 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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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 (Total Metals) Sample EB1127407-029 shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.**
- **EP068 (OCOP): Sample shows poor matrix spike recovery due to matrix interference. Confirmed by re-analysis.**
- **EP068 (OCOP): The LOR values for sample ST3A have been raised due to high moisture content.**
- **Organotins: Sample ST1A shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.**



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

Sub-Matrix: SOIL				Client sample ID	ST1A	ST2A	ST3A	----	----
				Client sampling date / time	14-DEC-2011 15:00	14-DEC-2011 15:00	14-DEC-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1127571-001	EB1127571-002	EB1127571-003	----	----	
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%	38.6	42.3	56.9	----	----	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	7	6	9	----	----	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----	
Chromium	7440-47-3	2	mg/kg	30	37	41	----	----	
Copper	7440-50-8	5	mg/kg	12	22	30	----	----	
Lead	7439-92-1	5	mg/kg	8	15	22	----	----	
Nickel	7440-02-0	2	mg/kg	18	23	21	----	----	
Zinc	7440-66-6	5	mg/kg	48	91	128	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.1	<0.1	0.1	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	440	600	1330	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	440	600	1330	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	431	862	897	----	----	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.55	0.67	1.32	----	----	
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.10	mg/kg	<0.10	----	<0.10	----	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.06	----	----	



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				ST1A	ST2A	ST3A		
				14-DEC-2011 15:00	14-DEC-2011 15:00	14-DEC-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1127571-001	EB1127571-002	EB1127571-003	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.06	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.06	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				ST1A	ST2A	ST3A		
				14-DEC-2011 15:00	14-DEC-2011 15:00	14-DEC-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1127571-001	EB1127571-002	EB1127571-003	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	----	----
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	----	----
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	70	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<120	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<120	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	70	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<60	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	140	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	140	----	----
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
EP080: BTEXN								
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	µgSn/kg	<1	1	4	----	----



Analytical Results

Sub-Matrix: **SOIL**

Client sample ID

Client sampling date / time

				ST1A	ST2A	ST3A		
				14-DEC-2011 15:00	14-DEC-2011 15:00	14-DEC-2011 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1127571-001	EB1127571-002	EB1127571-003	----	----
EP090: Organotin Compounds - Continued								
Dibutyltin	1002-53-5	1	µgSn/kg	<1	7	12	----	----
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	58.9	12.7	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	79.6	----	133	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	103	65.9	98.0	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	107	38.2	109	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	83.0	----	68.5	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	92.1	----	84.2	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	118	----	101	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	85.3	----	89.3	----	----
Anthracene-d10	1719-06-8	0.1	%	91.3	----	99.4	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	93.4	----	161	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	97.1	91.3	76.0	----	----
Toluene-D8	2037-26-5	0.1	%	99.6	94.5	68.8	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	97.6	89.9	70.4	----	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.1	%	123	124	117	----	----



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	16.2	133.7
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	138
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	22.8	134.5
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	34.8	154.5
2-Chlorophenol-D4	93951-73-6	41.9	152.8
2,4,6-Tribromophenol	118-79-6	26.0	156.8
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	33.8	156.5
Anthracene-d10	1719-06-8	36.9	153.1
4-Terphenyl-d14	1718-51-0	41.8	172.2
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	52.7	133.7
Toluene-D8	2037-26-5	60.3	131.1
4-Bromofluorobenzene	460-00-4	59.2	126.6
EP090S: Organotin Surrogate			
Tripopyltin	----	35	130

QUALITY CONTROL REPORT

Work Order	: EB1127571	Page	: 1 of 13
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Customer Services
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3239 7400	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61 7 3243 7218
Project	: PBPC SAP 2012	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 19-DEC-2011
C-O-C number	: ----	Issue Date	: 05-JAN-2012
Sampler	: Vivian Seto	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3
Quote number	: EN/034/11		

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

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
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Organics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Stafford Minerals - AY



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 insufficient 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**

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: 2099922)									
EB1127571-002	ST2A	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	42.3	42.2	0.4	0% - 20%
EB1127583-005	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	10.1	9.4	7.3	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 2099960)									
EB1126985-040	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	12	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	10	9	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	85	85	0.0	0% - 50%
		EG005T: Copper	7440-50-8	5	mg/kg	30	33	9.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	29	34	16.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	97	89	8.1	0% - 50%
EB1127407-029	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	37	40	6.8	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	64	70	10.0	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	80	115	# 35.3	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	87	98	12.3	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	125	149	17.2	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2099961)									
EB1126985-040	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EB1127407-029	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2101170)									
EB1127571-001	ST1A	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	0.1	0.1	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2101067)									
EB1127571-001	ST1A	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	440	470	6.6	0% - 20%
EB1127677-028	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	70	100	31.3	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2101068)									
EB1127571-001	ST1A	EK067G: Total Phosphorus as P	----	2	mg/kg	431	444	3.0	0% - 20%
EB1127677-028	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	69	70	0.0	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2101203)									
EB1127571-001	ST1A	EP003: Total Organic Carbon	----	0.02	%	0.55	0.52	4.7	0% - 20%
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2099900)									
EB1127571-001	ST1A	EP066: Total Polychlorinated biphenyls	----	0.10	mg/kg	<0.10	<0.10	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2099899)									
EB1127571-001	ST1A	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	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 (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2099899) - continued									
EB1127571-001	ST1A	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2099899)									
EB1127571-001	ST1A	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	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 (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2099914)									
EB1127558-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EB1127561-012	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	4.9	5.1
EP075(SIM): Acenaphthylene	208-96-8			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Acenaphthene	83-32-9			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Fluorene	86-73-7			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Phenanthrene	85-01-8			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Anthracene	120-12-7			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Fluoranthene	206-44-0			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Pyrene	129-00-0			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benz(a)anthracene	56-55-3			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Chrysene	218-01-9			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(b)fluoranthene	205-99-2			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(k)fluoranthene	207-08-9			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(a)pyrene	50-32-8			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Dibenz(a,h)anthracene	53-70-3			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(g,h,i)perylene	191-24-2			0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----			0.5	mg/kg	4.9	5.1	4.0	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2099895)									
EB1127558-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EB1127571-003	ST3A	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2099913)									

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 (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2099913) - continued									
EB1127558-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.0	No Limit
EB1127561-012	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	270	260	4.8	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	270	260	3.8	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2099895)									
EB1127558-002	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
		EP080: C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	0.0	No Limit
EB1127571-003	ST3A	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
		EP080: C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2099913)									
EB1127558-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EB1127561-012	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	70	60	0.0	No Limit
EP080: BTEXN (QC Lot: 2099895)									
EB1127558-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EB1127571-003	ST3A	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP090: Organotin Compounds (QC Lot: 2101074)									



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 (%)
EP090: Organotin Compounds (QC Lot: 2101074) - continued									
EB1127360-008	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.0	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.0	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<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**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2099960)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	13.11 mg/kg	97.9	90	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2.76 mg/kg	87.4	82	124
EG005T: Chromium	7440-47-3	2	mg/kg	<2	60.93 mg/kg	94.6	89	126
EG005T: Copper	7440-50-8	5	mg/kg	<5	54.68 mg/kg	91.4	89	125
EG005T: Lead	7439-92-1	5	mg/kg	<5	54.76 mg/kg	91.6	83	123
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.23 mg/kg	92.0	86	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	103.88 mg/kg	95.7	86	124
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2099961)								
EG035T: Mercury	7439-97-6	0.10	mg/kg	<0.1	1.34 mg/kg	74.3	73	127
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2101170)								
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	99.6	72	124
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2101067)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	534 mg/kg	87.8	70	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2101068)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	75 mg/kg	102	74	130
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2101203)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	100 %	100	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2099900)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.10	1 mg/kg	107	53.8	113
EP068A: Organochlorine Pesticides (OC) (QCLot: 2099899)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	90.5	58.4	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	85.0	57.7	107
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	69.0	59.3	116
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.7	59.1	118
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	69.9	51	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	107	54	119
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	52	113
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	110	51	113
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	110	51	114
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	53	120
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	50	113
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	58.8	115
EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	103	61.2	116



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 2099899) - continued								
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	116	47	133
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	103	58.5	117
EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.3	58.4	118
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.0	40	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	77.0	47	120
EP068: 4,4'-DDT	50-29-3	0.05	mg/kg	----	0.5 mg/kg	120	52.6	129
		0.2	mg/kg	<0.2	----	----	----	----
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	60	124
EP068: Methoxychlor	72-43-5	0.05	mg/kg	----	0.5 mg/kg	114	52.4	131
		0.2	mg/kg	<0.2	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2099899)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	55.9	43.9	113
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	31.2	115
EP068: Monocrotophos	6923-22-4	0.05	mg/kg	----	0.5 mg/kg	79.7	33	130
		0.2	mg/kg	<0.2	----	----	----	----
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	48	126
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.2	47	117
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	76.9	51	113
EP068: Parathion-methyl	298-00-0	0.05	mg/kg	----	0.5 mg/kg	93.6	51	117
		0.2	mg/kg	<0.2	----	----	----	----
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	57.8	120
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	68	110
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	62.2	115
EP068: Parathion	56-38-2	0.05	mg/kg	----	0.5 mg/kg	94.7	54.7	113
		0.2	mg/kg	<0.2	----	----	----	----
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	49	121
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.7	58	122
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	102	59.8	115
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	32.5	101
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	104	59.6	116
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	87.6	51	118
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	101	56.9	119
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	# 10.0	42	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2099914)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	5.0 mg/kg	101	66	114
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	5.0 mg/kg	104	58	113
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	5.0 mg/kg	105	60	114
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	5.0 mg/kg	# 111	61	111
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	5.0 mg/kg	94.8	60	112



Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2099914) - continued								
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	5.0 mg/kg	105	65	110
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	5.0 mg/kg	# 112	64	111
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	5.0 mg/kg	110	64	136
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	5.0 mg/kg	106	56	115
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	5.0 mg/kg	# 120	57	114
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	5.0 mg/kg	107	44	124
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	5.0 mg/kg	115	48	124
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	5.0 mg/kg	# 128	50	116
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	5.0 mg/kg	118	47	130
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	5.0 mg/kg	120	41	129
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	5.0 mg/kg	117	45	128
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2099895)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	16 mg/kg	103	71	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2099913)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	312 mg/kg	95.0	65	112
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	500 mg/kg	90.0	76.2	122
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2099895)								
EP080: C6 - C10 Fraction	----	10	mg/kg	<10	18.5 mg/kg	107	71	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2099913)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	413 mg/kg	107	63	112
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	360 mg/kg	75.6	74	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 2099895)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	89.8	78	121
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.9	78	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.9	72	119
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	90.3	61	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	92.3	70	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.0	77.1	117
EP090: Organotin Compounds (QCLot: 2101074)								
EP090: Monobutyltin	78763-54-9	1.0	µgSn/kg	----	2.5 µgSn/kg	106	31	113
				<1	----	----	----	----
EP090: Dibutyltin	1002-53-5	1.0	µgSn/kg	----	2.5 µgSn/kg	110	35.6	118
				<1	----	----	----	----



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EP090: Organotin Compounds (QCLot: 2101074) - continued								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	----	2.5 µgSn/kg	81.7	19.5	129
				<0.5	----	----	----	----

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**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EG005T: Total Metals by ICP-AES (QCLot: 2099960)							
EB1126985-041	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	89.4	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	83.2	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	85.3	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	81.8	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	82.5	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	79.9	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	82.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2099961)							
EB1126985-041	Anonymous	EG035T: Mercury	7439-97-6	5.0 mg/kg	79.0	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2101170)							
EB1127571-002	ST2A	EK059G: Nitrite + Nitrate as N (Sol.)	----	2.0 mg/kg	87.5	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2101067)							
EB1127571-002	ST2A	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	103	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2101068)							
EB1127571-002	ST2A	EK067G: Total Phosphorus as P	----	100 mg/kg	# Not Determined	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2099900)							
EB1127571-003	ST3A	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	106	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2099899)							
EB1127571-003	ST3A	EP068: gamma-BHC	58-89-9	0.5 mg/kg	# 60.5	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	75.6	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	# 20.5	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	# 150	70	130
		EP068: Endrin	72-20-8	2 mg/kg	# 135	70	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	71.6	70	130
		EP068B: Organophosphorus Pesticides (OP) (QCLot: 2099899)					
EB1127571-003	ST3A	EP068: Diazinon	333-41-5	0.5 mg/kg	# 48.4	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	83.2	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	129	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	# 131	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	109	70	130
		EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2099914)					
EB1127558-007	Anonymous	EP075(SIM): Acenaphthene	83-32-9	2.5 mg/kg	114	70	130
		EP075(SIM): Pyrene	129-00-0	2.5 mg/kg	127	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2099895)							

Page : 13 of 13
 Work Order : EB1127571
 Client : WORLEY PARSONS - INFRASTRUCTURE MWE
 Project : PBPC SAP 2012



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2099895) - continued							
EB1127558-022	Anonymous	EP080: C6 - C9 Fraction	----	8 mg/kg	79.3	70 130	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2099913)							
EB1127558-007	Anonymous	EP071: C10 - C14 Fraction	----	312 mg/kg	95.9	70 130	
		EP071: C15 - C28 Fraction	----	500 mg/kg	95.5	70 130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2099895)							
EB1127558-022	Anonymous	EP080: C6 - C10 Fraction	----	8 mg/kg	85.0	70 130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2099913)							
EB1127558-007	Anonymous	EP071: >C10 - C16 Fraction	----	413 mg/kg	112	70 130	
		EP071: >C16 - C34 Fraction	----	360 mg/kg	74.3	70 130	
EP080: BTEXN (QCLot: 2099895)							
EB1127558-022	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	88.7	70 130	
		EP080: Toluene	108-88-3	2 mg/kg	92.7	70 130	
EP090: Organotin Compounds (QCLot: 2101074)							
EB1127571-001	ST1A	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# Not Determined	35 130	
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	37.0	20 130	
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	76.5	20 130	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EB1127571	Page	: 1 of 9
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MS VIVIAN SETO	Contact	: Customer Services
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: vivian.seto@worleyparsons.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: +61 07 3239 7400	Telephone	: +61 7 3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61 7 3243 7218
Project	: PBPC SAP 2012	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 19-DEC-2011
C-O-C number	: ----	Issue Date	: 05-JAN-2012
Sampler	: Vivian Seto	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3
Quote number	: EN/034/11		

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 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		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content								
Soil Glass Jar - Unpreserved (EA055-103) ST1A, ST3A	ST2A,	14-DEC-2011	----	----	----	20-DEC-2011	28-DEC-2011	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T) ST1A, ST3A	ST2A,	14-DEC-2011	22-DEC-2011	11-JUN-2012	✓	22-DEC-2011	11-JUN-2012	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) ST1A, ST3A	ST2A,	14-DEC-2011	22-DEC-2011	11-JAN-2012	✓	23-DEC-2011	11-JAN-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) ST1A, ST3A	ST2A,	14-DEC-2011	29-DEC-2011	11-JUN-2012	✓	05-JAN-2012	11-JUN-2012	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) ST1A, ST3A	ST2A,	14-DEC-2011	22-DEC-2011	11-JUN-2012	✓	28-DEC-2011	11-JUN-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) ST1A, ST3A	ST2A,	14-DEC-2011	22-DEC-2011	11-JUN-2012	✓	28-DEC-2011	11-JUN-2012	✓
EP003: Total Organic Carbon (TOC) in Soil								
Pulp Bag (EP003) ST1A, ST3A	ST2A,	14-DEC-2011	21-DEC-2011	21-DEC-2011	✓	21-DEC-2011	18-JAN-2012	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066) ST1A,	ST3A	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	23-DEC-2011	30-JAN-2012	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) ST1A, ST3A	ST2A,	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	23-DEC-2011	30-JAN-2012	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) ST1A, ST3A	ST2A,	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	23-DEC-2011	30-JAN-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071) ST1A, ST3A	ST2A,	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	22-DEC-2011	30-JAN-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) ST1A,	ST3A	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	22-DEC-2011	30-JAN-2012	✓
EP080: BTEX								
Soil Glass Jar - Unpreserved (EP080) ST1A, ST3A	ST2A,	14-DEC-2011	20-DEC-2011	28-DEC-2011	✓	28-DEC-2011	28-DEC-2011	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) ST1A, ST3A	ST2A,	14-DEC-2011	20-DEC-2011	28-DEC-2011	✓	28-DEC-2011	28-DEC-2011	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
Soil Glass Jar - Unpreserved (EP080) ST1A, ST3A	ST2A,	14-DEC-2011	20-DEC-2011	28-DEC-2011	✓	28-DEC-2011	28-DEC-2011	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved (EP090) ST1A, ST3A	ST2A,	14-DEC-2011	21-DEC-2011	28-DEC-2011	✓	03-JAN-2012	30-JAN-2012	✓



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	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	20	10.0	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
Total Organic Carbon	EP003	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	20	5.0	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 Metals by ICP-AES	EG005T	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP003	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organotin Analysis	EP090	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	20	5.0	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 Metals by ICP-AES	EG005T	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP003	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus By Discrete Analyser	EK067G	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							
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	3	33.3	5.0	✓	ALS QCS3 requirement
Organotin Analysis	EP090	1	3	33.3	5.0	✓	ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.7	5.0	✓	ALS QCS3 requirement
Pesticides by GCMS	EP068	1	7	14.3	5.0	✓	ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	2	50.0	5.0	✓	ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	20	5.0	5.0	✓	ALS QCS3 requirement
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
Total Phosphorus By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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 (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
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 (SnCl ₂)(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 SnCl ₂ 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)
Nitrite and Nitrate as N (NO _x)- Soluble by Discrete Analyser	EK059G	SOIL	APHA 21st ed., 4500 NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) in a water extract is determined by Cadmium Reduction, and direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NO _x) By Discrete Analyser	EK062G	SOIL	APHA 21st ed., 4500 Norg/NO ₃ - Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined separately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Total Organic Carbon	EP003	SOIL	In-house C-IR17. 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 CO ₂) is automatically measured by infra-red detector.
Polychlorinated Biphenyls (PCB)	EP066	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)
Pesticides by GCMS	EP068	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 technique is compliant with NEPM (1999) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C ₁₀ - C ₃₆ . This method is compliant with NEPM (1999) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	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)
Organotin Analysis	EP090	SOIL	(USEPA SW 846 - 8270D) Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.



Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
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 (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na ₂ SO ₄ and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na ₂ SO ₄ and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.
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 SW846 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	EB1127407-029	Anonymous	Copper	7440-50-8	35.3 %	0-20%	RPD exceeds LOR based limits
Laboratory Control Spike (LCS) Recoveries							
EP068B: Organophosphorus Pesticides (OP)	2484868-002	----	Azinphos Methyl	86-50-0	10.0 %	42-130%	Recovery less than lower control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	2484879-006	----	Fluorene	86-73-7	111 %	61-111%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	2484879-006	----	Fluoranthene	206-44-0	112 %	64-111%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	2484879-006	----	Chrysene	218-01-9	120 %	57-114%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	2484879-006	----	Benzo(a)pyrene	50-32-8	128 %	50-116%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries							
EK067G: Total Phosphorus as P by Discrete Analyser	EB1127571-002	ST2A	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP068A: Organochlorine Pesticides (OC)	EB1127571-003	ST3A	gamma-BHC	58-89-9	60.5 %	70-130%	Recovery less than lower data quality objective
EP068A: Organochlorine Pesticides (OC)	EB1127571-003	ST3A	Aldrin	309-00-2	20.5 %	70-130%	Recovery less than lower data quality objective
EP068A: Organochlorine Pesticides (OC)	EB1127571-003	ST3A	Dieldrin	60-57-1	150 %	70-130%	Recovery greater than upper data quality objective
EP068A: Organochlorine Pesticides (OC)	EB1127571-003	ST3A	Endrin	72-20-8	135 %	70-130%	Recovery greater than upper data quality objective
EP068B: Organophosphorus Pesticides (OP)	EB1127571-003	ST3A	Diazinon	333-41-5	48.4 %	70-130%	Recovery less than lower data quality objective
EP068B: Organophosphorus Pesticides (OP)	EB1127571-003	ST3A	Bromophos-ethyl	4824-78-6	131 %	70-130%	Recovery greater than upper data quality objective
EP090: Organotin Compounds	EB1127571-001	ST1A	Monobutyltin	78763-54-9	Not Determined	----	Matrix spike recovery not determined due to sample matrix interference.

- For all matrices, no Method Blank value 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.**



WorleyParsons

resources & energy

EcoNomics™

PORT OF BRISBANE PTY LTD
BRISBANE RIVER AND MORETON BAY
ANNUAL SEDIMENT CHARACTERISATION REPORT 2012

Appendix 7 Quality Assurance/ Quality Control Analyses

Replicate Triplicate			Metals								Total Petroleum Hydrocarbons			Organochlorine Pesticides			Organotins	
Sample	Moisture Content	Total Organic Carbon	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	TPH C10-14	TPH C15-28	TPH C29-36	<i>trans</i> -Chlordane	<i>p,p'</i> -DDD	<i>p,p'</i> -DDE	Dibutyl tin	Tributyl tin
Units	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µgSn/kg	µgSn/kg
PQL	0.1	0.01	0.4	0.1	0.1	0.1	0.5	0.01	0.1	0.5	10	50	50	1	1	1	0.5	0.5
11 - 11	20	0.04	16	0.1	39	5.3	1.4	<0.01	13	7.6	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RT - 6	28.9	0.25	12	<0.1	11	3.9	1.4	<0.01	3.2	8.7	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RT - 6A	25.8	0.18	14	<0.1	41	5.2	1.4	<0.01	14	7.8	<10	<50	<50	<1	<1	1	<0.5	<0.5
RSD	18%	68%	14%	ND	55%	16%	0%	ND	59%	7%	ND	ND	ND	ND	ND	ND	ND	ND
13 - 2	44.4	0.73	13	<0.1	44	5.9	1.4	<0.01	15	8.5	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RT - 5	34.7	0.82	13	<0.1	43	5.4	1.4	<0.01	15	8.5	<10	<50	<50	<1	<1	1	<0.5	<0.5
RT - 5A	38.8	0.78	14	0.1	43	5.9	1.4	<0.01	15	8.3	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RSD	12%	6%	4%	ND	1%	5%	0%	ND	0%	1%	ND	ND	ND	ND	ND	ND	ND	ND
7 - 1	40.6	0.95	5.3	<0.1	29	21	11	0.07	15	64	<10	<50	<50	<1	4	3	1.5	2.5
RT - 7	54.6	1.1	15	0.1	42	4.9	1.2	<0.01	14	7.2	<10	57	54	1	<1	2	1.4	5.4
RT - 7A	52.2	1.2	15	<0.1	40	5.3	1.4	<0.01	14	7.7	<10	51	54	<1	250	13	8.6	160
RSD	15%	12%	48%	ND	19%	88%	124%	ND	4%	124%	ND	8%	0%	ND	137%	101%	108%	161%
3 - 0	49	1.5	5.36	<0.1	37.4	17.8	6.22	0.038	21.6	52.5	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RT - 1	52.5	1.5	5.71	<0.1	39.1	20.5	6.76	0.043	23.3	54.8	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RT - 1A	54.9	1.4	6.56	<0.1	39.6	20.4	6.72	0.042	23.1	67.3	<10	<50	<50	<1	<1	<1	<0.5	<0.5
RSD	6%	4%	11%	ND	3%	8%	5%	6%	4%	14%	ND	ND	ND	ND	ND	ND	ND	ND
4 - 9	51.2	1.6	8.22	0.385	36.7	40.9	34.4	0.556	22.1	131	18	384	254	<1	<1	<1	<0.5	0.9
RT - 2	53.3	1.7	8.61	0.537	44.6	44.3	37.4	0.576	25.1	143	27	773	365	<1	<1	<1	<0.5	<0.5
RT - 2A	49	1.6	7.39	0.302	42.2	36	28.4	0.438	24.3	117	13	321	173	<1	<1	<1	<0.5	<0.5
RSD	4%	4%	8%	29%	10%	10%	14%	14%	7%	10%	37%	50%	37%	ND	ND	ND	ND	ND
BC - 4	54.9	1.8	6.83	0.27	43.5	42.6	35.7	0.181	25.7	154	12	120	115	<1	2	9	5.1	1.8
RT - 3	56.7	2.3	7.79	0.273	44.5	48.3	37.5	0.179	25.3	142	24	216	172	<1	3	10	5	1.1
RT - 3A	55.9	2	7.54	0.213	42.6	57.5	36.4	0.145	25.9	142	<10	116	109	<1	3	11	5.3	1.1
RSD	2%	12%	7%	13%	2%	15%	2%	12%	1%	5%	47%	38%	26%	ND	22%	10%	3%	30%

	Nutrients			Polychlorinated Biphenyls		Polycyclic Aromatic Hydrocarbons									
Sample	Total Nitrogen	Total Kjeldahl Nitrogen	Phosphorus	Hexa-PCB congeners	Total PCB congeners	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene
Units	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PQL	20	20	1	5	5	5	5	5	5	5	5	5	5	5	5
11 - 11	22	22	300												
RT - 6	210	210	300												
RT - 6A	110	110	260												
RSD	83%	83%	8%												
13 - 2	530	530	240												
RT - 5	430	430	220												
RT - 5A	480	480	250												
RSD	10%	10%	6%												
7 - 1	530	530	470	<5	<5	<5	<5	<5	<5	<5	<5	20	8	90	84
RT - 7	990	990	240	<5	<5	<5	<5	<5	32	5	7	200	40	3200	2400
RT - 7A	1070	1070	270	<5	<5	<5	<5	<5	<5	<5	<5	10	<5	50	110
RSD	34%	34%	38%	ND	ND	ND	ND	ND	ND	ND	ND	139%	94%	162%	154%
3 - 0	1120	1120	500	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
RT - 1	1080	1080	629	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
RT - 1A	920	920	557	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	8	6
RSD	10%	10%	12%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4 - 9	950	950	560												
RT - 2	1050	1050	604												
RT - 2A	990	990	584												
RSD	5%	5%	4%												
BC - 4	1230	1230	969	5	5	21	12	18	15	10	18	65	21	172	182
RT - 3	1400	1400	894	5	5	33	17	28	25	17	26	65	30	230	305
RT - 3A	1350	1350	868	<5	<5	14	8	14	16	12	18	66	24	205	228
RSD	7%	7%	6%	0%	0%	42%	37%	36%	30%	28%	22%	1%	18%	14%	26%

Polycyclic Aromatic Hydrocarbons											
Sample	Benz(a) anthracene	Chrysene	Benzo(b)& (k)fluoranthene	Benzo(a) pyrene	Indeno(1,2,3-cd) pyrene	Dibenz(a,h) anthracene	Benzo(g,h,i) perylene	Coronene	Benzo(e) pyrene	Perylene	Total PAHs
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PQL	5	5	10	5	5	5	5	10	5	5	100
11 - 11											
RT - 6											
RT - 6A											
RSD											
13 - 2											
RT - 5											
RT - 5A											
RSD											
7 - 1	30	100	100	40	30	7	30	<10	40	90	690
RT - 7	100	800	900	190	200	19	100	18	260	100	8490
RT - 7A	30	30	80	36	30	8	40	<10	32	70	540
RSD	76%	137%	130%	99%	113%	59%	67%	ND	117%	18%	140%
3 - 0	<5	<5	<10	<5	<5	<5	<5	<10	<5	905	905
RT - 1	<5	<5	<10	<5	<5	<5	<5	<10	<5	1184	1184
RT - 1A	<5	<5	<10	<5	<5	<5	<5	<10	<5	1675	1675
RSD	ND	ND	ND	ND	ND	ND	ND	ND	ND	31%	31%
4 - 9											
RT - 2											
RT - 2A											
RSD											
BC - 4	82	75	167	80	74	7	84	19	74	1779	2900
RT - 3	103	85	221	116	97	9	96	28	108	1923	3500
RT - 3A	118	87	193	101	93	7	100	26	84	1430	2800
RSD	18%	8%	14%	18%	14%	15%	9%	19%	20%	15%	12%

Split Triplicate

			Metals								Organochlorine Pesticides		Organotins		Nutrients		
Sample	Moisture Content	Total Organic Carbon	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	<i>p,p'</i> -DDD	<i>p,p'</i> -DDE	Dibutyl tin	Tributyl tin	Total Nitrogen	Total Kjeldahl Nitrogen	Phosphorus
Units	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µgSn/kg	µgSn/kg	mg/kg	mg/kg	mg/kg
PQL	0.1	0.01	0.4	0.1	0.1	0.1	0.5	0.01	0.1	0.5	1	1	0.5	0.5	20	20	1
11 - 8	37.7	0.5	7	<0.1	34	16	5.6	0.04	18	42	<1	<1	<0.5	<0.5	330	330	400
ST - 1	33.9	0.61	13	<0.1	45	5.5	1.2	<0.01	16	7.9	<1	<1	<0.5	<0.5	380	380	240
RPD	10.6%	19.8%	60.0%	ND	27.8%	97.7%	129.4%	ND	11.8%	136.7%	ND	ND	ND	ND	14.1%	14.1%	50.0%
11 - 8	37.7	0.5	7	<0.1	34	16	5.6	0.04	18	42	<1	<1	<0.5	<0.5	330	330	400
ST - 1A	38.6	0.55	7	<1	30	12	8	<0.1	18	48	<50	<50	<1	<0.5	440	440	431
RPD	2.4%	9.5%	0.0%	ND	12.5%	28.6%	35.3%	ND	0.0%	13.3%	ND	ND	ND	ND	28.6%	28.6%	7.5%
6 - 2	41.7	0.74	5.7	0.13	37	23	11	0.07	20	70	<1	2	2.2	6.4	440	440	850
ST - 2	54.8	2	14	0.1	40	5.2	1.2	<0.01	14	7.2	2	4	2.6	3.2	1270	1270	240
RPD	27.2%	92.0%	84.3%	26.1%	7.8%	126.2%	160.7%	ND	35.3%	162.7%	ND	66.7%	16.7%	66.7%	97.1%	97.1%	111.9%
6 - 2	41.7	0.74	5.7	0.13	37	23	11	0.07	20	70	<1	2	2.2	6.4	440	440	850
ST - 2A	42.3	0.67	6	<1	37	22	15	<0.1	23	91	<50	<50	-	-	600	600	862
RPD	1.4%	9.9%	5.1%	ND	0.0%	4.4%	30.8%	ND	14.0%	26.1%	ND	ND	ND	ND	30.8%	30.8%	1.4%
8 - 1	56.1	1.4	7.8	<0.1	44	36	17	0.13	21	98	3	3	2.7	1.7	1170	1170	700
ST - 3	41.8	0.68	16	<0.1	36	4.3	1.2	<0.01	12	6.5	2	2	2.1	7.7	560	560	260
RPD	29.2%	69.2%	68.9%	ND	20.0%	157.3%	173.6%	ND	54.5%	175.1%	40.0%	40.0%	25.0%	127.7%	70.5%	70.5%	91.7%
8 - 1	56.1	1.4	7.8	<0.1	44	36	17	0.13	21	98	3	3	2.7	1.7	1170	1170	700
ST - 3A	56.9	1.32	9	<0.1	41	30	22	<0.1	21	128	<50	<50	-	-	1330	1330	897
RPD	1.4%	5.9%	14.3%	ND	7.1%	18.2%	25.6%	ND	0.0%	26.5%	ND	ND	ND	ND	12.8%	12.8%	24.7%

Interbatch Duplicate

			Metals								Organochlorine Pesticides		Organotins		Nutrients			Total Petroleum Hydrocarbons	
Sample	Moisture Content	Total Organic Carbon	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	p,p'-DDD	p,p'-DDE	Dibutyl tin	Tributyl tin	Total Nitrogen	Total Kjeldahl Nitrogen	Phosphorus	TPH C15-28	TPH C29-36
Units	%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/kg	µgSn/kg	µgSn/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PQL	0.1	0.01	0.4	0.1	0.1	0.1	0.5	0.01	0.1	0.5	1	1	0.5	0.5	20	20	1	50	50
8 - 3	56.2	1.3	7.1	0.16	43	30	18	0.14	20	88	3	4	2.4	0.8	1110	1110	610	67	72
IB - 1	56.5	1.4	7.3	0.153	42.7	29.5	18.4	0.188	20.9	94.4	3	5	2.4	0.6	1090	1090	665	89	80
RPD	0.5%	7.4%	2.8%	4.5%	0.7%	1.7%	2.2%	29.3%	4.4%	7.0%	0.0%	22.2%	0.0%	28.6%	1.8%	1.8%	8.6%	28.2%	10.5%