# Port of Brisbane Sediment Sampling and Analysis Plan Implementation Report – 2018

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# Document Control Sheet

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| **Synopsis:** | **A report describing the physio-chemical characteristics of sediment to be dredging during the maintenance dredging program at the Port of Brisbane (2018). The assessment was carried out in accordance with the project sampling and analysis plan (SAP) and the National Assessment Guidelines for Dredging (2009).** | |

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# Executive Summary

Port of Brisbane Pty Ltd (PBPL) proposes to undertake its annual maintenance dredging within the navigational areas of the Brisbane River and Moreton Bay, primarily using the Trailer Suction Hopper Dredge 'Brisbane'.

The physical and chemical properties of proposed dredged sediment were characterised in accordance with the National Assessment Guidelines for Dredging (NAGD) to assess the suitability of dredged material for unconfined ocean disposal. The dredge area was divided into different dredging subareas based on existing contaminant data, comprising Zone 2 (Colmslie to Pinkenba), Zone 3 (within Port reaches) and Zone 4 (Entrance Channel). Zone 1 (upstream of the dredge area) is not part of the annual dredging and samples from this zone were collected as 'background' samples upstream of dredged areas. Sediment was also sampled at the Mud Island Dredge Material Placement Area (MIDMPA) and reference sites in Bramble Bay north of the Port of Brisbane.

Sediments within Zone 2 were characterised by a high proportion of fines (clays and silts), whereas Zones 3 and 4 generally were comprised of sands and fines. The Moreton Bay reference sites were comprised almost entirely of fines, whereas the MIDMPA were similar to Zone 4 being characterised by an equal proportion of sand and fines. These results are mostly consistent with previous sampling.

The sediments in the dredging zones were found to be suitable for ocean disposal in accordance with the NAGD based on the following results:

- The upper 95% confidence limits (95% UCL) of the mean concentrations of most analysed metals and metalloids (except nickel and mercury) were less than respective NAGD screening levels, and therefore considered suitable for ocean disposal with NAGD with respect to these metals and metalloids.
- The 95% UCL nickel concentrations slightly exceeded the NAGD screening level of 21 mg/kg within dredge Zones 2 (27.9 mg/kg), 3 (21.4 mg/kg) and 4 (22.2 mg/kg), but were similar to Moreton Bay reference area.
- The 95% UCL mercury concentration for the overall dredge area (0.08 mg/kg) was less than the NAGD screening level of 0.15 mg/kg. The 95% UCL for Zones 2 (0.11 mg/kg), 3 (0.07 mg/kg) and 4 (0.07 mg/kg) were also less than the NAGD screening level.
- The nickel and mercury concentrations recorded in 2018 were consistent with that recorded in 2013-2017. Also consistent with previous years, Phase 3 bioavailability testing indicated that nickel and mercury were below levels of concern.
- All organic contaminants including organotins, Total Petroleum Hydrocarbons (TPHs), Polyaromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs) and organochlorine pesticides (OCPs) had concentrations below the LOR or the 95% UCLs were below the respective NAGD screening levels. DDE, a break-down product of the persistent pesticide DDT, had elevated concentrations in individual samples, but the 95% UCL was less than the screening level of 2.2 µg/kg within all dredge zones (Zone 2 = 2.1 µg/kg, 3 = 2.0 µg/kg, 4 = 1.8 µg/kg). Bioavailability testing also indicated that DDT and its metabolites were below levels of concern
- Acid Sulfate Soil testing indicated that while sediments were characterised as potential acid sulfate soils (PASS), the acid neutralizing capacity at all sites was sufficient for neutralising acids upon oxidation.

The evaluation of laboratory and field QA/QC procedures and assessments indicated that all sampling, sample handling and storage and laboratory analysis was undertaken to a high standard providing scientific confidence that the presented results are valid to allow an assessment of sediment quality against the NAGD.

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# 1 Introduction

## 1.1 Background

Port of Brisbane Pty Ltd (PBPL) is required to maintain a minimum depth of clearance below the keel of vessels calling at the port to allow for effective shipping access to the port and ensure ship safety. PBPL undertakes an annual maintenance dredging program to ensure these minimum depths are maintained.

PBPL propose to undertake its annual 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 to the North West Channel located in northern Moreton Bay.

It is proposed that dredged material is placed at sea within the Mud Island Dredge Material Placement Area (MIDMPA) or on land in the Future Port Expansion (FPE) reclamation area. To assess suitability of dredged material for unconfined ocean placement, characterisation of the physical and chemical properties of proposed dredged sediment was required to be undertaken in accordance with the National Assessment Guidelines for Dredging (Commonwealth of Australia 2009; henceforth NAGD).

This report documents the findings of a sampling campaign conducted in August 2018. The overall aim of this study is to assess the physical and chemical properties of sediments to be dredged from the Port of Brisbane, and based on the approach set out in NAGD, assess the suitability of dredged material for unconfined ocean disposal (if required). The specific objectives of the study were to:

- Describe and quantify the physical properties of sediments to be dredged;
- Quantify concentrations of potential contaminants in sediments to be dredged;
- Compare contaminant concentrations to screening levels set out in NAGD to determine whether there is a need for further assessment; and
- Assess the bioavailability of contaminants and potential toxicity effects based on comparisons of contaminant concentrations to guideline values.

## 1.2 Proposed Dredging

PBPL's area of responsibility in relation to maintenance and capital dredging within port limits can be broadly divided into two locations on the basis of the water body type, navigable depths and nature of dredged material:

- Moreton Bay dredge area (enclosed/open coastal waters); and
- Brisbane River dredge area, including the Port of Brisbane (middle/lower estuary).

This SAP specifically focusses on sediments in the Brisbane River dredge area, as well as the MIDMPA and 'reference' areas in western Moreton Bay. The Brisbane River dredge area extends from Hamilton Reach to the Outer Bar Cutting. Annual maintenance dredging is required to remove sediments accumulated by natural siltation processes within the catchment.

To ensure that declared depths of navigational channels are maintained at all times, PBPL undertakes 'insurance' dredging of up to -0.5 metres below the declared depth. On average, PBPL dredges about 300,000 $m^3$ to 350,000 $m^3$ of material each year. Additional dredging needs to be undertaken following major flood events, as occurred in 2011 and 2013.

The Brisbane River zone is divided into different dredging subareas based on existing contaminant data, comprising Zone 2, Zone 3 and Zone 4. It is noted that Zone 1 is not part of the annual dredging and samples from this zone have been used to collect reference samples upstream of the actual dredging areas.

The following average dredge volumes apply to the dredge subareas (Table 1-1).

**Table 1-1 Approximate Maintenance Dredge Volumes**

| Dredging Subarea | Location | Average Dredge Volume ($m^3$) |
|---|---|---|
| Zone 2 | Hamilton Reach to Lytton Rocks Cutting | 83,000 |
| Zone 3 | Pelican Banks to Inner Bar Cutting | 241,000 |
| Zone 4 | Outer Bar Cutting | 26,000 |

The maintenance dredging program is structured to maximise efficiencies and utilisation of PBPL's largest dredger, the *TSHD Brisbane*. The *TSHD Brisbane* typically carries out the majority of the port's maintenance dredging over a two-month period between January and May (actual period varies depending on other commitments of the *TSHD Brisbane* and siltation patterns). The PBPL may also utilise smaller, more manoeuvrable dredging plant, such as grab dredgers and bed levellers, to maintain more confined areas within the Port Limits.

## 1.3 Offshore Disposal

The PBPL's policy with regard to dredged material is to maximise its beneficial reuse. In general, most of the material dredged by the PBPL from within Port Limits is used in reclamation works associated with development of the port. The reuse of this dredged material provides several benefits, including:

- Reduced pressure on sea disposal sites;
- The placement of any actual or potential acid sulphate material at depth beneath the water surface; and
- The containment of any contaminated material within a designated boundary, disconnected from the marine system and monitored to ensure the immobility of identified contaminants.

In 2009, the reclamation life of the FPE area was estimated to be approximately 30 years, based on the current level of port development at that time. Following extreme flood events in both 2011 and 2013 and the subsequent disposal of additional material in the FPE area, the estimated life of the FPE area was reduced by 20 years to 10 years. Given the importance of the FPE as an area to dispose of material unsuitable for ocean disposal, there has been a shift in thinking around the management of the FPE area.

The current proposed management of dredged material is to, where practical, dispose at sea all dredged material deemed suitable for ocean disposal. This proposed management initiative will ensure the long-term viability of the FPE area for the disposal of material deemed unsuitable for ocean disposal.

In the past, significant quantities of dredged material from the Brisbane River have been placed offshore at the MIDMPA. In recent years, only smaller volumes of dredged material from boat harbours in southern Moreton Bay were placed at the MIDMPA. However, it is proposed that the MIDMPA will be utilised for material found suitable for ocean disposal in future PBPL maintenance dredging campaigns.

## 1.4 Marine Communities and Environmental Values

The loading (dredging) site is located within the lower Brisbane River.The foreshore of the lower Brisbane River is in a highly modified condition, but still retains isolated patches of mangrove forest and tidal flats. The river channel is comprised of muds and sands, and supports a locally important trawl fishery (BMT WBM 2008c).

The Port of Brisbane port facilities are located at the Brisbane River mouth on land reclaimed over a shallow sub-tidal river delta containing a series of low lying mangrove islands, collectively called the Fisherman Islands. Brisbane River and adjacent waters of Moreton Bay experiences freshwater flows and ongoing inputs of sediments and contaminants derived from human activities in its catchment. Two major sewage treatment plants also have their sewage discharges within kilometres of the Port facilities (Luggage Point and Wynnum North wastewater treatment plant).

Construction of the present-day port facilities over intertidal and subtidal areas has resulted in extensive changes to the environmental character of the Fisherman Islands area. However, significant areas of mangrove, saltmarsh and seagrass have also been retained, and form part of the Fisherman Islands wetland complex on the south eastern side of the Port of Brisbane (BMT WBM 2014). Moreton Bay Marine Park is situated to the south and east of the FPE seawall. This area contains one of the largest semi-contiguous seagrass beds in western Moreton Bay. A Ramsar listed wetland (Moreton Bay Ramsar site) is situated only kilometres to the south of the port facilities, comprising intertidal portions of the Fisherman Islands wetland complex. The seagrass and mudflats of the Ramsar site are recognised for their importance to dugong, marine turtles and migratory and resident shorebirds (BMT WBM 2008a).

MIDMPA is located between Mud Island and Fisherman Islands. Mud Island is an ancient coral reef that is no longer actively accreting coral skeletons, but still contains coral communities (Johnson and Neil 1998). MIDMPA is comprised of a mix of mud and sand substrate types, and provides habitat for a range of soft sediment benthic fauna (BMT WBM 2008b).

# 2 Methodology

## 2.1 Compliance with SAP and Guidelines

All sampling and analysis of sediments was undertaken in accordance with the NAGD (Commonwealth of Australia 2009). All sampling and analysis procedures followed the approach outlined in the sampling and analysis plan (SAP) prepared by BMT WBM on 17 October 2013. A copy of the SAP is provided in Appendix A.

## 2.2 Timing of Sampling

Sampling was undertaken from the 15th to 17th August 2018 during daytime hours.

## 2.3 Sampling Locations and Sample Numbers

### 2.3.1 Sampling Locations

A map showing the sampling locations is provided in Figure 2-1. Thirty-five locations were sampled with a Van Veen grab sampler in accordance with the SAP and NAGD requirements. This included 26 sample locations within the proposed dredging area (Zones 2, 3 and 4) and nine reference locations (Zone 1, MIDMPA and Moreton Bay reference sites).

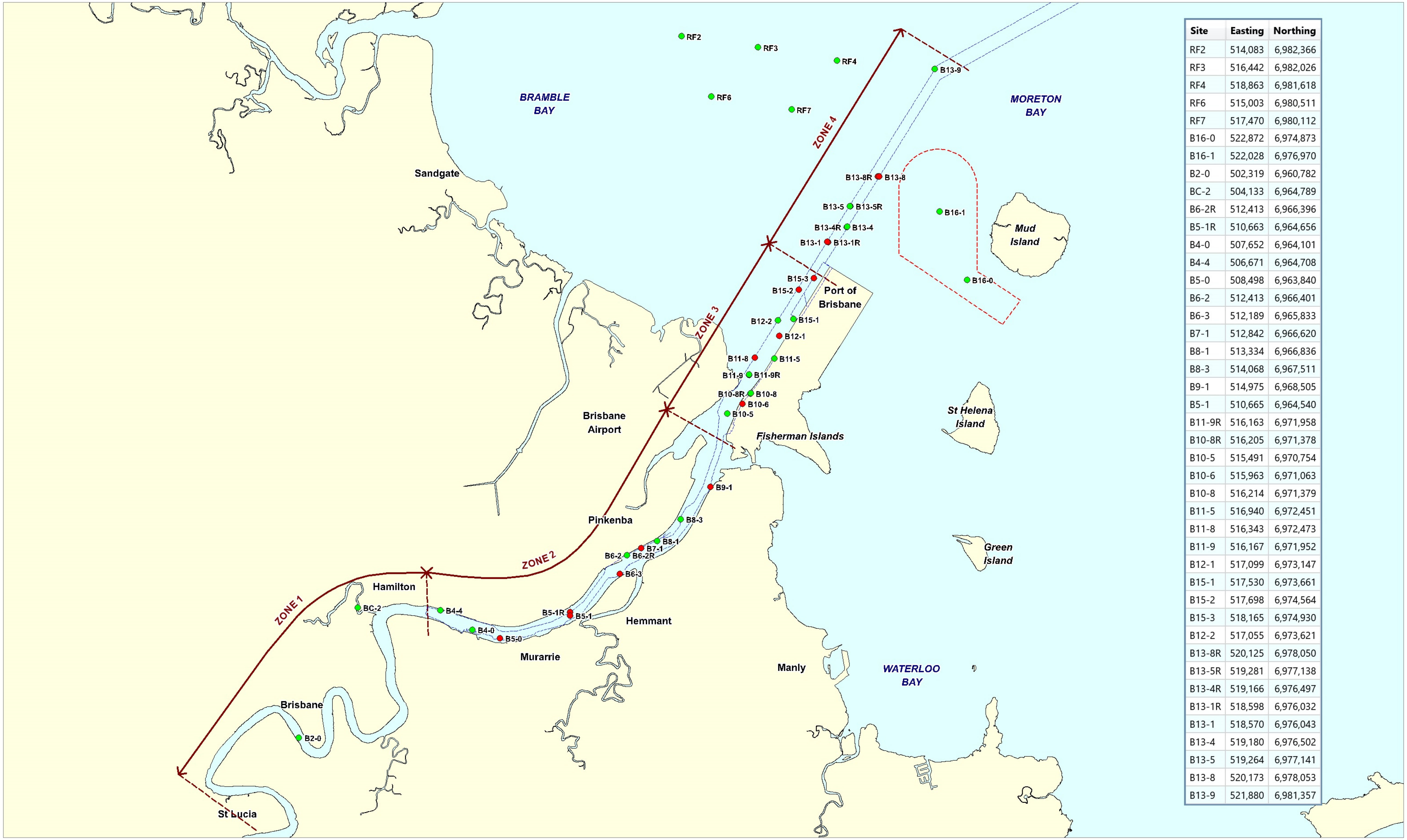
As per the SAP, all samples were analysed for a basic suite with a detailed suite analysed at selected study locations (refer to Figure 2-1 and Section 2.5).

### 2.3.2 Additional Field QA/QC Samples

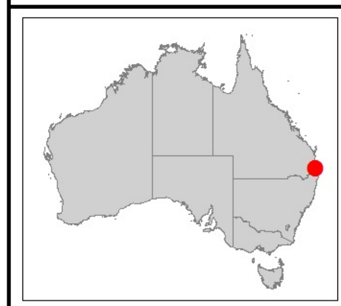
In accordance with NAGD requirements and based on the number of sample locations, the following field and laboratory quality control samples were taken:

- Three field triplicate samples at 10% of locations to determine the small scale (measured in metres) spatial variability of the sediment physical and chemical characteristics, i.e. two additional grab samples at locations 5-1 (Zone 2), 11-9 (Zone 3) and 13-4 (Zone 4);
- Two triplicate split samples (primary sample from 5% of locations thoroughly mixed and split into three sample container sets) to assess laboratory variation, with one of the three samples sent to a second (reference) laboratory for analysis. Split samples were obtained at location 6-2 (Zone 2) and 10-6 (Zone 3); and
- Three trip blank containers (one per sampling day) filled with inert material (e.g. chromatographic sand) to be analysed concurrent with the analysis of volatile organic substances such as BTEX and TPH C6-C9.

All samples were submitted to the primary and secondary laboratories in one batch so no inter-batch samples were required.




| Site | Easting | Northing |
|---|---|---|
| RF2 | 514,083 | 6,982,366 |
| RF3 | 516,442 | 6,982,026 |
| RF4 | 518,863 | 6,981,618 |
| RF6 | 515,003 | 6,980,511 |
| RF7 | 517,470 | 6,980,112 |
| B16-0 | 522,872 | 6,974,873 |
| B16-1 | 522,028 | 6,976,970 |
| B2-0 | 502,319 | 6,960,782 |
| BC-2 | 504,133 | 6,964,789 |
| B6-2R | 512,413 | 6,966,396 |
| B5-1R | 510,663 | 6,964,656 |
| B4-0 | 507,652 | 6,964,101 |
| B4-4 | 506,671 | 6,964,708 |
| B5-0 | 508,498 | 6,963,840 |
| B6-2 | 512,413 | 6,966,401 |
| B6-3 | 512,189 | 6,965,833 |
| B7-1 | 512,842 | 6,966,620 |
| B8-1 | 513,334 | 6,966,836 |
| B8-3 | 514,068 | 6,967,511 |
| B9-1 | 514,975 | 6,968,505 |
| B5-1 | 510,665 | 6,964,540 |
| B11-9R | 516,163 | 6,971,958 |
| B10-8R | 516,205 | 6,971,378 |
| B10-5 | 515,491 | 6,970,754 |
| B10-6 | 515,963 | 6,971,063 |
| B10-8 | 516,214 | 6,971,379 |
| B11-5 | 516,940 | 6,972,451 |
| B11-8 | 516,343 | 6,972,473 |
| B11-9 | 516,167 | 6,971,952 |
| B12-1 | 517,099 | 6,973,147 |
| B15-1 | 517,530 | 6,973,661 |
| B15-2 | 517,698 | 6,974,564 |
| B15-3 | 518,165 | 6,974,930 |
| B12-2 | 517,055 | 6,973,621 |
| B13-8R | 520,125 | 6,978,050 |
| B13-5R | 519,281 | 6,977,138 |
| B13-4R | 519,166 | 6,976,497 |
| B13-1R | 518,598 | 6,976,032 |
| B13-1 | 518,570 | 6,976,043 |
| B13-4 | 519,180 | 6,976,502 |
| B13-5 | 519,264 | 6,977,141 |
| B13-8 | 520,173 | 6,978,053 |
| B13-9 | 521,880 | 6,981,357 |



**LEGEND**

- Basic Suite
- Basic Suite and Detailed Suite
- Dredge Area
- Dredge Material Placement Area

Title:

**Actual Sediment Sampling Locations**

Figure: **2-1**

Rev: **A**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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### 2.3.3 Elutriate and Bioavailability Analyses

Phase III testing was undertaken for parameters which have frequently exceeded the NAGD screening levels in the past. Based on the review of historical data in the SAP this included:

- Metals and metalloids;
- Organotins (TBT); and
- Organochlorine Pesticides (DDT, DDD, DDE, chlordane).

Phase III testing for metals/metalloids (and potential other metals/metalloids) was undertaken from the primary samples collected for the sediment quality assessment and based on the initial analysis results. Analysis was performed on the samples with the highest concentrations.

Bioavailability analysis for the organic contaminants (organotins and organochlorine pesticides) required porewater testing as per NAGD. Additional samples were collected for porewater testing at the locations which have historically shown the highest percentage of screening level exceedances. To meet required holding times, elutriate and bioavailability analysis for the organic contaminants was undertaken concurrent with the analysis of the primary samples.

As per the SAP, additional samples for porewater testing were obtained from five locations in Zone 2 and six locations in Zone 3.

## 2.4 Sample Collection and Handling

### 2.4.1 Survey Vessel, Sampling Equipment and Personnel

The BMT WBM vessel *Resolution II* was used for sampling the sediments. Both handheld GPS and differential GPS (dGPS) was used on the survey vessel for position fixing and navigation to each sampling location.

All sediment sampling was undertaken by a team of three qualified marine scientists and field technicians with experience in the implementation of sediment sampling and analysis programs.

### 2.4.2 Sampling Procedure

Sediment samples were collected using a stainless steel Van Veen grab sampler (0.14 $m^2$ grab). Only samples obtained with properly closed grab jaws were processed to ensure that the fine sediment fractions were retained.

In order to overcome issues with potential high variability at sampling locations, a minimum of two grabs were collected at each sampling location and pooled as one sample. An adequate number of grabs was obtained and pooled for each sample location ensuring that sufficient sediment was collected for all analyses.

### 2.4.3 Survey Vessel and Equipment House-Keeping

The vessel was thoroughly inspected and washed down prior to the beginning of sediment sampling each day. The workspace on the vessel was washed down regularly with ambient seawater to clean all surfaces and minimize the potential for dust contamination of samples. All sample processing was undertaken away from any potential contamination sources such as engine exhausts, fuels, oils, greases, lead weights, zinc anodes, antifouling paint etc.

The grab sampler was thoroughly cleaned with De-con 90 solution prior to use and cleaned and rinsed with seawater between samples to prevent cross contamination between samples.

### 2.4.4 Sample Collection, Handling and Storage

Photographs of the grab samples were taken and grab samples were logged for its physical characteristics and variations in sediment type and texture (refer Appendix B). The grab samples from each location were carefully homogenized in a clean container prior to the filling of analytical laboratory-supplied clean sampling jars.

Nitrile gloves were worn by all field personnel handling the sediment, and gloves were disposed of after processing of each sample.

Sample bottles were labelled with a waterproof marker pen on the bottle label and lid. Sample bottles for organic analyses were filled with zero headspace to minimise volatilisation. A field trip blank sample container filled with clean chromatographic sand was placed with opened lid near the sample processing site while a sediment sample was completely processed.

All storage containers were chilled on ice immediately following sample collection. The samples were then transferred to BMT WBM office in sealed eskies at the end of each sampling day. Acid Sulfate Soil samples were frozen at the end of each sampling day to minimise potential oxidation of the sediment material.

At the end of the sampling campaign, all samples were submitted to the primary and secondary analytical laboratories. All samples were submitted to the laboratories with Chain of Custody documentation (Appendices C and D).

## 2.5 Laboratory Analysis

As per the SAP, all samples were analysed for a basic suite with a detailed suite analysed at selected study locations (refer to Figure 2-1 and Appendix A).

### 2.5.1 Analytical Tests

Primary analysis of sediment samples was conducted by Advanced Analytical Australia (AAA). Certain analyses were subcontracted by AAA to other NATA accredited laboratories such as Particle Size Distribution (Microanalysis Australia) and Total Organic Carbon (Sydney Analytical Laboratories). Australian Laboratory Services (ALS) was chosen as the secondary (reference) laboratory for inter-laboratory quality testing.

A total of 35 locations were analysed for a basic suite of parameters. Of these, 12 locations were also analysed for a detailed list of contaminants. Furthermore, elutriate and bioavailability (porewater and dilute acid extraction) testing was undertaken at selected locations as per the SAP.

**Basic List of Parameters:**

- Analysis included contaminants of (potential) concern and supplementary parameters:
  - Metals/Metalloids (As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn, Al, Fe);

  - Organotins (MBT, DBT, TBT);
  - Organochlorine pesticides (including DDT, DDD, DDE, chlordane);
  - Particle Size Distribution (PSD);
  - Moisture content; and
  - Total Organic Carbon (TOC).

**Detailed List of Parameters:**

- Analysis included 'low risk' parameters that have been detected in the past but generally in concentrations below Limit of Reporting (LOR) or NAGD screening levels:
  - Polycyclic Aromatic Hydrocarbons (PAHs);
  - Total Petroleum Hydrocarbons (TPHs);
  - Polychlorinated Biphenyls (PCBs);
  - Acid Sulfate Soils;
  - Nutrients (TP, TN, $NO_x$, TKN); and
  - Radionuclides.

**Elutriate and Bioavailability Testing:**

- Metals/Metalloids;
- Organotins (TBT); and
- Organochlorine pesticides (DDT, DDD, DDE, chlordane).

### 2.5.2 Laboratory Quality Control

Both laboratories followed laboratory Quality Control (QC) procedures in accordance with requirements outlined in Appendix F of NAGD. This included analysis of laboratory blanks, duplicates, certified surrogate materials and spiked samples.

Validation of all laboratory QC analyses was conducted in accordance with Appendix A of NAGD to confirm suitable data quality for undertaking a rigorous characterisation of the proposed dredge material.

#### *2.5.2.1 Laboratory Blanks*

The purpose of this assessment is to monitor potential laboratory contamination of samples due to potential cross-contamination of samples during laboratory preparation, extraction or analysis. Blank sample concentrations should be at or near the detection limit of the method used.

#### *2.5.2.2 Laboratory Duplicates*

This assessment refers to a randomly selected intra-laboratory split sample, which provides information regarding the method precision and sample heterogeneity. Results are presented as Relative Percent Difference (RPD) values of two sample concentrations for a specific contaminant.

NAGD recommends that duplicates should agree within a typical RPD of the method of ±35 %. This recommended RPD is typically not adopted by analytical laboratories as it does not account for the greater uncertainty for contaminant concentrations close to the method's detection limit. NAGD also notes that RPDs may not always agree within these limits where sediments are very inhomogeneous or vary greatly in grain size.

The primary laboratory AAA uses the following approach to assess duplicate RPD's:

- Result <10 times LOR – no limit to RPD; and
- Result >10 times LOR – RPD between 0% and 50%.

The secondary laboratory ALS follows this approach:

- Result <10 times LOR – no limit to RPD;
- Result between 10 and 20 times LOR – RPD between 0% and 50%; and
- Result >20 times LOR – RPD between 0% and 20%.

Refer to Appendices C and D for the acceptance criteria of subcontracted laboratories.

#### 2.5.2.3 Surrogate and Matrix Spikes

Laboratory Control Samples are either certified reference materials or a blank sample spiked with known concentrations of the analytes of interest. The purpose of this measurement is to monitor method accuracy.

Matrix spikes refer to an intra-laboratory split sample spiked with a representative set of target analytes of known concentration. Matrix spikes are assessed to monitor potential sample matrix effects on analyte recoveries.

Surrogate spikes are used for organic analytes. Surrogates are known additions to samples which mimic the compounds of interested and are not normally expected to be present in the sample.

For both surrogate and matrix spikes, a calculation of the percent recovery of the spiked amount against the returned concentration is performed indicating analytical performance in terms of extraction efficiency.

NAGD states that recovery limits of 75% - 125% are generally acceptable. Analytical laboratories typically adopt specific surrogate and matrix spike recovery limits for the various contaminant compound groups. It is also noted that ideal recovery ranges may be waived in the event of sample matrix interference.

The primary laboratory AAA adopts the following acceptable surrogate and matrix spike recovery limits:

- Trace elements: 70-130%;
- Organic analyses: 50-150%;
- SVOC & speciated phenols: 10-140%; and
- Surrogates: 10-140%.

The secondary laboratory ALS adopts specific recovery limits for individual compounds.

## 2.6 Data Analysis

### 2.6.1 Sediment Contaminants

Concentrations of chemicals measured in sediment samples were compared to screening levels listed in Table 2 of NAGD to determine whether the material is suitable for unconfined placement at sea or if further analyses, such as elutriate, bioavailability or toxicity testing, are required.

Specifically, mean concentrations of chemical parameters at the upper 95% confidence level (95% UCL) were compared against NAGD guideline levels. This involved the following steps.

**Data pre-treatment**

Analytical values below detection limit were set to one-half of the laboratory Limit of Reporting (LOR) as per NAGD recommendation to facilitate 95% UCL calculation. This was only undertaken where there was greater than 30% detections within the dredge zone. Any replacement technique is a source of bias (Croghan and Egeghy 2003). Only parameters with greater than 30% detections were subject to analysis due to the high probability of bias created by the replacement technique.

Organic contaminant results were normalised to 1% TOC where the measured value is within the range of 0.2-10%. If TOC values were outside of this range, the highest (10%) or lowest (0.2%) value was adopted as appropriate. Organic parameters with concentrations below detection limits were not normalised to 1% TOC but were included at half their LOR.

One assumption in the calculation of the 95% UCL is that the samples are statistically independent. Therefore, field triplicate samples and laboratory split samples were averaged for each location in the 95% UCL calculation.

**Selection of appropriate 95% UCL Calculation Method**

ProUCL Version 4.1.00 was used to calculate the 95% UCL (Singh *et al.* 2010). In accordance with NAGD, for normally distributed data, the arithmetic mean was calculated, and the 95% UCL was calculated using the one-tailed Student's *t* UCL test. For data that followed a log-normal distribution, the geometric mean was calculated and the 95% UCL was calculated using Chebyshev method. For data that did not follow either a normal or log-normal distribution, the 95% UCL was calculated using non-parametric techniques as per NAGD. Should 95% UCL values for all analysed parameters fall below NAGD screening levels, the sediment were considered chemically acceptable for ocean disposal.

In accordance with NAGD, ambient baseline concentrations of chemicals were determined by sampling of sediment at reference areas near the existing disposal site. The 80$^{th}$ percentile value was calculated from reference site data. The mean of the sediment concentrations at the dredge site was then compared with the 80$^{th}$ percentile of ambient baseline levels. Sediment was chemically acceptable for ocean disposal the mean concentration at the dredge site was less than or at the 80$^{th}$ percentile value.

If chemicals were found to be above ambient baseline levels and the screening level, they were considered a Contaminant of Potential Concern and Phase III testing was required.

### 2.6.2 Elutriate and Bioavailability Testing

Elutriate and bioavailability testing was undertaken as per NAGD for a range of contaminants which have regularly exceeded screening levels in the past.

**Elutriate Testing:**

The elutriate test is designed to simulate release of contaminants from sediment during dredged material disposal. Testing was carried out using the USEPA's standard seawater elutriate test which involves shaking the sediment samples with four times the volume of seawater at room temperature for 30 minutes. The sample was allowed to settle for one hour and the supernatant was centrifuged or filtered (0.45 µm) within 60 minutes, and analysed using analytical methods appropriate for determining ultra-trace levels in seawater.

Results were compared to the respective ANZECC/ARMCANZ (2000) marine water quality trigger value (for 95% protection of species).

**Bioavailability Testing:**

The Dilute Acid Extraction (DAE) method was used to provide an estimate of the bioavailable fraction of metals/metalloids. The sediment samples were extracted using a weak acid and result compared against the respective NAGD screening levels.

For organic contaminants, analysis of pore water is the recommended bioavailability test as per NAGD. Porewater is assumed to represent the major route of exposure to sediment contaminants by benthic organisms. Porewater results were compared to the respective ANZECC/ARMCANZ (2000) marine water quality trigger value (for 95% protection of species).

Should both elutriate and bioavailability tests result in values less than the respective guideline limits, the material would be considered clean and suitable for ocean disposal.

### 2.6.3 Acid Sulfate Soils

The results of the chromium-suite acid sulfate analysis were assessed against the Australian framework for Acid Sulfate Soil management in coastal systems (Ahern *et al.* 1998). The risk of acidification was determined by the acid-base accounting approach (Ahern *et al.* 2004). Net acidity was calculated from the results as a measure of the acid producing capacity of the sampled sediment upon complete oxidation.

The calculated net acidity was then compared to the QASSIT action criteria of 0.03% S or 18 mol $H^+$/tonne to assess the need for acid sulfate soil management if the dredged sediments were to be placed on land. The liming rate indicates the amount of lime that needs to be added to the soil to manage its acid generating capacity.

# 3 Results

Sediment logs of the sampled sediments are shown in Appendix B. Detailed laboratory results are provided in Appendices C and D for the primary and secondary laboratory, respectively.

## 3.1 Physical Sediment characteristics

Figure 3-1 presents sediment grain particle size distribution (PSD) results for each location.

**Zone 2 and 3**

Consistent with previous surveys, sand comprised 21% and 30% on average throughout Zones 2 and 3 in 2017 respectively. Sediments in these zones were generally characterised by a high proportion of fines (silt and clay), with most sites having greater than 80% of fine material (silts, clays and sub-clays), with the exception being sites B11-5 (64%), B12-1 (44.6%), B12-2 (49.8%), 1B5-1 (44%), B15-2 (63%) and B15-3 (63%). These results were consistent with previous years.

**Zone 4**

Sites in Zone 4 had a high proportion of fines, comprising on average 83%.

**MIDMPA and Reference/Background**

Sediments at MIDMPA had a higher sand fraction (35 and 65%) than all dredge zones. Moreton Bay reference sites were characterised by a high proportion of fine sediment (89% on average). This was consistent with results from 2017 (84%), 2016 (89.6%), 2015 (85% fines), 2014 (86%) and 2013 (89%).

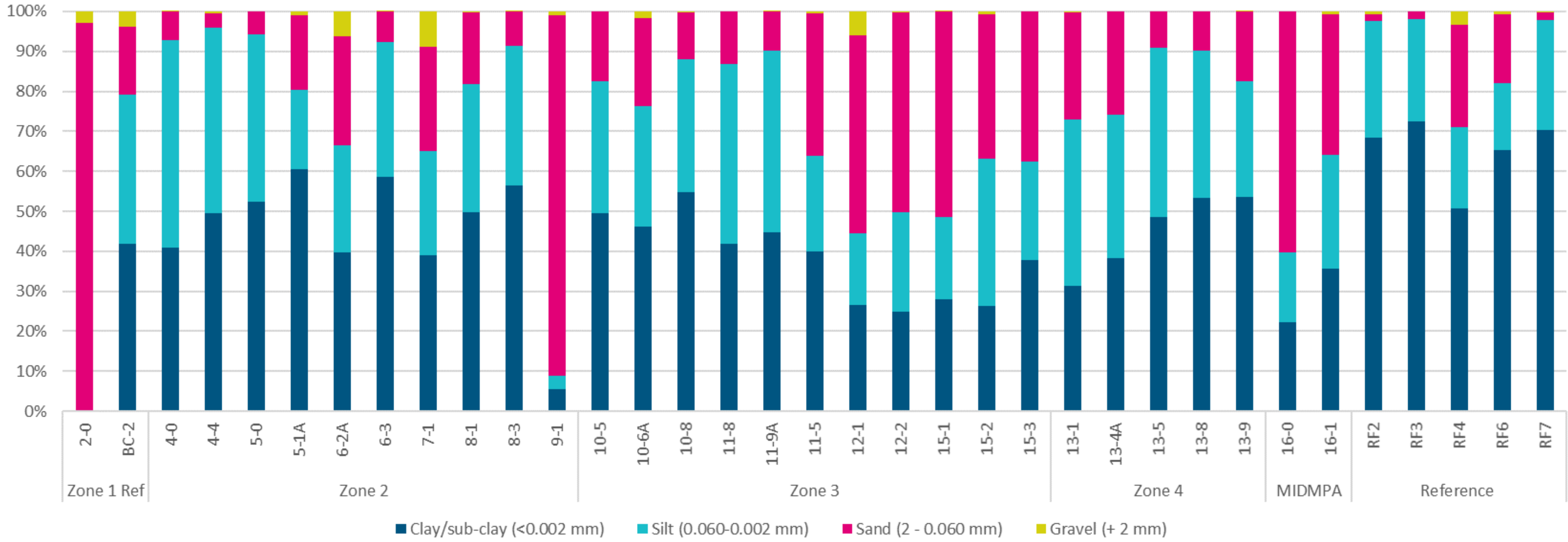


**Figure 3-1 Sediment Particle Size Distribution Analysis - 2018**

## 3.2 Analytical Results

### 3.2.1 Metals and Metalloids

#### *3.2.1.1 Bulk Sediment*

Summary data for metals and metalloids are presented in Table 3-1. Silver and cadmium had concentrations less than the detection limit (0.1 mg/kg) in several samples at Zones 2, 3 and 4, consistent with 2016 and 2017 survey results. All other metals and metalloids were detected in 100% of samples from Zones 2, 3 and 4.

Concentrations of most metals and metalloids within individual locations or dredged areas were generally below NAGD screening levels across the study area, except nickel and mercury. The trace metal and metalloid concentrations recorded at reference locations followed similar trends to those at the dredge sites, and were also consistent with trends observed in 2013, 2014, 2015 and 2016.

**Nickel**

The 95% UCL of the mean for nickel was 23.1 mg/kg within the dredged areas (Zones 2, 3 and 4), which was just over the NAGD screening level of 21 mg/kg. The 95% UCL in 2018 was similar to 2017 (21.8 mg/kg) and 2016 (22.1 mg/kg), which was less than 2015 (28.6 mg/kg) and 2014 (28.3 mg/kg) and much less than the 95% UCL recorded in 2013 (35.5 mg/kg).

At the dredge zone level:

- Zone 2 - the 95% UCL was 27.9 mg/kg, exceeding the screening level. These results are consistent with 2017 (26.4 mg/kg) and 2016 (28.3 mg/kg).
- Zone 3 - the 95% UCL was 21.4, exceeding the screening level by 0.4 mg/kg. These results are consistent with 2017 (21.1 mg/kg) and 2016 (20.2 mg/kg).
- Zone 4 - the 95% UCL was 22.2 mg/kg, which was slightly greater than the screening level. These results indicate a slight increase compared with 2017 (19.9 mg/kg) and 2016 (16.2 mg/kg).

In accordance with NAGD, nickel concentrations at the dredge site were compared to reference sites. The 80$^{th}$ percentile nickel concentration at the reference sites was 25 mg/kg, compared to the dredge site 95% UCL of 23.1 mg/kg and the median value of 21.8 mg/kg (Table 3-1). This indicates that the overall dredge site had nickel concentrations that were less than reference samples. While not required under NAGD, Phase 3 testing was conservatively undertaken to assess nickel bioavailability (Section 3.2.1.2).

**Table 3-1 Summary statistics and 95% UCLs for combined locations in Zones 2, 3, and 4 – trace metals/metalloids and nutrients. Values highlighted in orange indicate exceedance of NAGD screening level**

| Parameter | Detection Limit | # Non-Detects | Screening Level | Statistical Distribution | 95% UCL | Mean | Geometric Average |
|---|---|---|---|---|---|---|---|
| Moisture Content | 0.1 | 0 | n/a | Non-Parametric | 55.8 | 53.13 | 53.13 |
| Aluminium | 5 | 0 | n/a | Normal | 19647 | 18307 | 18307 |
| Arsenic | 0.4 | 0 | 20 | Non-Parametric | 7.6 | 7.21 | 7.22 |
| Cadmium | 0.1 | 30 | 1.5 | NC2 | NC2 | 0.45 | 0.45 |
| Chromium | 0.1 | 0 | 80 | Non-Parametric | 38.7 | 36.49 | 36.49 |
| Copper | 0.1 | 0 | 65 | Non-Parametric | 31.3 | 26.8 | 26.8 |
| Iron | 5 | 0 | n/a | Log Normal | 35179 | 33313 | 33312 |
| Lead | 0.5 | 0 | 50 | Normal | 15.7 | 14.24 | 14.24 |
| Mercury | 0.01 | 0 | 0.15 | Non-Parametric | 0.08 | 0.075 | 0.071 |
| Nickel | 0.1 | 0 | 21 | Normal | 23.1 | 21.62 | 21.62 |
| Silver | 0.1 | 15 | 1 | Non-Parametric | 0.19 | 0.12 | 0.12 |
| Zinc | 0.5 | 0 | 200 | Non-Parametric | 92.2 | 84.29 | 84.29 |
| Total Organic Carbon^ | 0.01 | 0 | n/a | Non-Parametric | 1.3 | 1.3 | 1.3 |
| Nitrate as N^ | 0.1 | 14 | n/a | NC2 | NC2 | 0.08 | 0.08 |
| Nitrite as N^ | 0.1 | 15 | n/a | NC1 | NC1 | n/a | n/a |
| Total Kjeldahl Nitrogen^ | 20 | 0 | n/a | Non-Parametric | 1014 | 904.5 | 904.5 |
| Total Nitrogen^ | 20 | 0 | n/a | Non-Parametric | 1014 | 904.5 | 904.5 |
| Total Ammonia as N^ | 0.1 | 0 | n/a | Non-Parametric | 19.16 | 14.41 | 14.41 |
| Phosphorus* | 1 | 0 | n/a | Log Normal | 753.6 | 666.9 | 666.9 |

Blue shading = parameter not detected; Orange shading = UCL95% > screening level; ND = No Data, NC1 = not calculated due to no detections; NC2 = not calculated due to >30% of values being non-detects (applicable only to parameters with screening levels); n/a = no NADG screening level

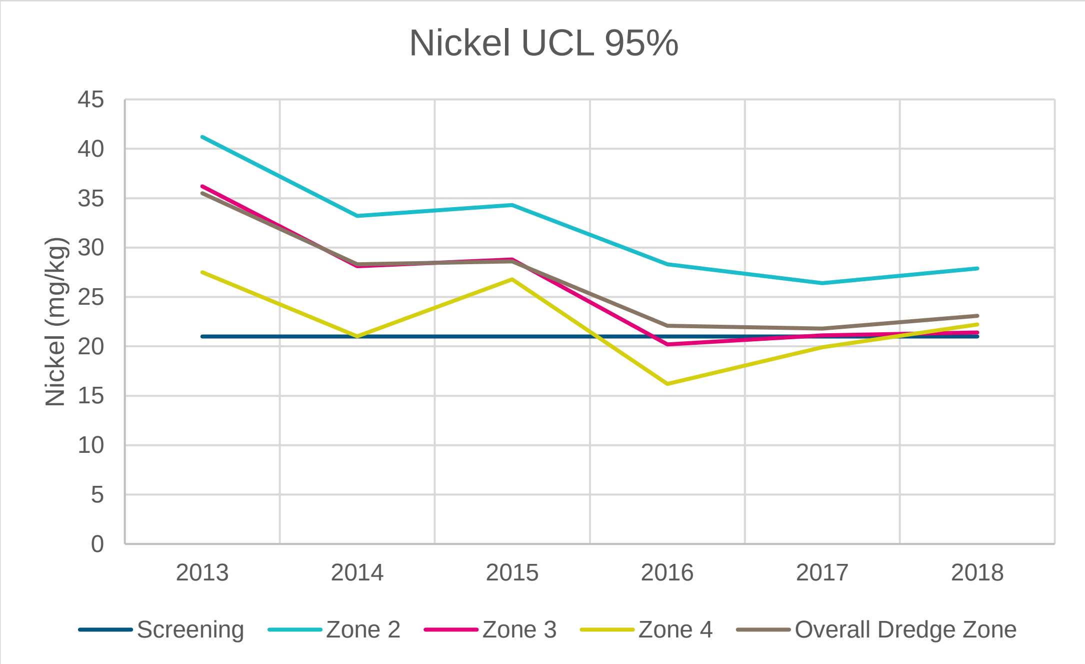


**Figure 3-2 UCL 95% Nickel (mg/l) at each dredge zone over time**

**Mercury**

Mercury concentrations exceeded the NAGD screening level of 0.15 mg/kg at one location in Zone 2 (B5-1 = 0.16 mg/kg). No sites in Zone 3 and 4 exceeded NAGD screening level. The 95% UCL across all locations within the dredge Zones 2, 3 and 4 (0.08 mg/kg) was less than the NAGD screening level (0.15 mg/kg). The 95% UCL value for Zones 2, 3 and 4 was 0.11, 0.07 and 0.07 mg/kg, respectively. By comparison, the 95% UCL value in 2017 for Zones 2, 3 and 4 was 0.12, 0.10 and 0.20 mg/kg, respectively. Phase 3 testing was conservatively undertaken to assess mercury bioavailability (Section 3.2.1.2).

### 3.2.1.2 Bioavailability Testing

Phase III dilute acid extraction (bioavailability) tests were conservatively undertaken. Samples with the highest recorded nickel concentrations were selected for analysis from dredge Zones 2 and 3. A total of 14 samples were analysed as per NAGD.

The dilute acid extraction (DAE) results were below the NAGD screening levels for all samples. The elutriate results were below the LOR and therefore below the ANZECC/ARMCANZ (2000) marine trigger limit of 7 µg/L (99% species protection). Nickel concentrations derived from DAE were consistent with levels recorded by BMT from previous years (BMT WBM 2013, 2015a, 2015c, 2016, 2017).

These results indicate that the bioavailable fraction of nickel is unlikely to result in adverse impacts to sediment biota. Based on the Phase II and Phase III testing for metals and metalloids, the sediments in dredge Zones 2, 3 and 4 are considered suitable for ocean disposal as per the NAGD guidelines.

**Table 3-2 Nickel Bioavailability Results**

| Zone | Sample | Nickel | | |
|---|---|---|---|---|
| | | Bulk sediment (mg/kg) | DAE (mg/kg) | Elutriate (µg/L) |
| **Guideline Value** | | **21*** | | **7**** |
| 3 | B11-8 | 22 | 5.4 | <1 |
| 3 | B11-9 | 22 | 5.3 | <1 |
| 3 | B10-8 | 23 | 5.2 | <1 |
| 3 | B10-6 | 25 | 6.6 | <1 |
| 3 | B10-5 | 22 | 5.6 | <1 |
| 2 | B4-4 | 26 | 6.5 | <1 |
| 2 | B4-0 | 37 | 12 | <1 |
| 2 | B5-0 | 27 | 6.8 | <1 |
| 2 | B5-1 | 23 | 7.6 | <1 |
| 2 | B6-3 | 26 | 6.8 | <1 |
| 2 | B6-2 | 26 | 6 | <1 |
| 2 | B7-1 | 21 | 5.3 | <1 |
| 2 | B8-1 | 23 | 6.4 | <1 |
| 2 | B8-3 | 24 | 6.3 | <1 |

1 - orange shading – sample exceeds screening level; NM = not measured (concentration in bulk sediment less than screening level). * NAGD Screening Level; ** ANZECC/ARMCANZ water quality guideline value (99% species protection)

2 – ANZECC/ARMCANZ (2000) guideline value for 99% protection level

### 3.2.2 Nutrients and Carbon Content

Total Nitrogen (TN) and Total Kjeldahl Nitrogen (TKN) concentrations across the dredge zones ranged between 420 and 1600 mg/kg. These values were similar to 2017 (360 and 1810 mg/kg) and 2016 (100 and 1650 mg/kg), and higher than recorded 2015 (320 and 1530 mg/kg), and 2014 (220 to 1320 mg/kg). The 80$^{th}$ percentile TN at reference sites was 1330 mg/kg (850 to 1390 mg/kg), which was greater than the 95% UCL (1014 mg/kg) concentration for the dredge zones. Consistent with previous surveys, nitrate and nitrite concentrations were below or only slightly above the LOR in all samples from dredge and reference zones.

Total Phosphorus (TP) concentrations across dredge zones ranged between 180 and 1800 mg/kg (95% UCL = 754 mg/kg), which was slightly higher than recorded at reference (80$^{th}$ percentile = 686 mg/kg). TP concentrations across dredge zones in 2018 was similar to values reported in 2017 (310 to 1600 mg/kg), 2016 (270 to 1500 mg/kg), 2015 (390 to 1200 mg/kg) and 2014 (260 - 1300 mg/kg).

Total organic carbon content ranged between 0.04 to 3.4% across the dredge zones. The TOC 95% UCL for dredge zones was 1.3%, which was less than the 80$^{th}$ percentile for reference sites value of 1.4%. TOC in 2014 -2017 were within the range recorded in 2018.

### 3.2.3 Organotins

Concentrations of organotins were either below the LOR or detected at low concentrations (Table 3-3). TBT concentrations were well below the NAGD screening level of 9 µgSn/kg in all samples. At the reference locations, organotin concentrations were below the LOR.

### 3.2.4 Total Petroleum Hydrocarbons (TPHs)

Concentrations of TPHs were at or below the LOR for the C6-C9 and C10-C14, consistent with 2017 survey results. Low-level detections of TPHs C15-C28 and C29-C36 were recorded at all locations in the dredge area and were below the NAGD screening level, of 550 mg/kg. The exception was B10-6, with concentrations of 790 mg/kg and 1600 mg/kg for C15-C28 and C29-C36 respectively. In general, these results are consistent with previous surveys undertaken by BMT (2013, 2015a, 2015c).

**Table 3-3 Summary Statistics and 95% UCLs for Combined Locations in Zones 2, 3 and 4 - Organic Compounds (Normalised to 1% TOC). Values Highlighted in Orange Indicate Exceedance of NAGD Screening Levels. Units are in µg/kg.**

| Parameter | Detection Limit | # Non-Detects | Screening Level | Distribution | 95% UCL | Mean | Geometric Average |
|---|---|---|---|---|---|---|---|
| Aldrin | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| alpha-BHC | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| beta-BHC | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| gamma-BHC (Lindane) | 1 | 36 | 0.32 | NC1 | NC1 | NC1 | NC1 |
| delta-BHC | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| cis-Chlordane | 1 | 35 | 0.5 | NC2 | NC2 | 1.5 | 1.5 |
| trans-Chlordane | 1 | 35 | NC2 | NC2 | NC2 | 1.9 | 1.9 |
| *p p'-DDD* | 1 | 35 | 2 | NC2 | NC2 | 3.0 | 3.0 |
| *p p'-DDE* | 1 | 4 | 2.2 | Log normal | 1.8 | 1.6 | 1.6 |
| *p p'-DDT* | 1 | 35 | 1.6 | NC2 | NC2 | 2.0 | 2.0 |
| Dieldrin | 1 | 36 | 280 | NC1 | NC1 | NC1 | NC1 |
| alpha-Endosulfan | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| beta-Endosulfan | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Endosulfan Sulphate | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Endrin | 1 | 36 | 10 | NC1 | NC1 | NC1 | NC1 |
| Endrin ketone | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Endrin aldehyde | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Heptachlor | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Heptachlor epoxide | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Hexachlorobenzene | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Methoxychlor | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Oxychlordane* | 1 | 36 | n/a | NC1 | NC1 | NC1 | NC1 |
| Monobutyltin as Sn | 0.5 | 26 | n/a | Non-parametric | 1.60 | 0.65 | 0.65 |

| Parameter | Detection Limit | # Non-Detects | Screening Level | Distribution | 95% UCL | Mean | Geometric Average |
|---|---|---|---|---|---|---|---|
| Dibutyltin as Sn | 0.5 | 10 | n/a | Log normal | 1.22 | 1.00 | 1.00 |
| Tributlytin as Sn | 0.5 | 27 | 9 | NC2 | NC2 | 0.58 | 0.58 |
| TPH C6-C9 | 10 | 15 | n/a | NC1 | NC1 | NC1 | |
| TPH C10-C14 | 10 | 15 | n/a | NC1 | NC1 | NC1 | |
| TPH C15-C28 | 50 | 0 | n/a | Non-parametric | 60.8 | 40.7 | 40.7 |
| TPH C29-C36 | 50 | 0 | n/a | Log normal | 80.3 | 57.7 | 57.7 |
| Total TPHs | 50 | 15 | 550 | Log normal | 137.8 | 98.4 | 98.4 |
| Naphthalene | 5 | 9 | n/a | Non-parametric | 4.66 | 3.6 | 3.6 |
| 1-Methylnaphthalene | 5 | 15 | n/a | NC1 | NC1 | NC1 | NC1 |
| 2-Methylnaphthalene | 5 | 12 | n/a | NC2 | NC2 | 4.5 | 4.5 |
| Acenaphthylene | 5 | 5 | n/a | Non-parametric | 6.9 | 5.6 | 5.6 |
| Acenaphthene | 5 | 14 | n/a | NC2 | NC2 | 8.7 | 8.7 |
| Fluorene | 5 | 9 | n/a | Non-parametric | 4.8 | 3.7 | 3.7 |
| Phenanthrene | 5 | 1 | n/a | Non-parametric | 26.5 | 20.9 | 20.9 |
| Anthracene | 5 | 1 | n/a | Non-parametric | 26.5 | 20.9 | 20.9 |
| Fluoranthene | 5 | 0 | n/a | Non-parametric | 44.7 | 37.7 | 37.7 |
| Pyrene | 5 | 0 | n/a | Non-parametric | 48.6 | 41.3 | 41.3 |
| Benz(a)anthracene | 5 | 0 | n/a | Log normal | 36.1 | 30.9 | 30.9 |
| Chrysene | 5 | 1 | n/a | Non-parametric | 38.2 | 31.7 | 31.7 |
| Benzo(b)&(k)fluoranthene | 10 | 0 | n/a | Non-parametric | 87.7 | 73.9 | 73.9 |
| Benzo(a)pyrene | 5 | 0 | n/a | Non-parametric | 45.5 | 38.3 | 38.3 |
| Indeno(1-2-3-cd)pyrene | 5 | 0 | n/a | Non-parametric | 86.4 | 73.9 | 73.9 |
| Dibenz(a-h)anthracene | 5 | 3 | n/a | Non-parametric | 11.8 | 9.6 | 9.6 |
| Benzo(g-h-i)perylene | 5 | 0 | n/a | Non-parametric | 43.4 | 37.0 | 37.0 |
| Coronene | 10 | 7 | n/a | Non-parametric | 10.1 | 8.2 | 8.2 |

 

| Parameter | Detection Limit | # Non-Detects | Screening Level | Distribution | 95% UCL | Mean | Geometric Average |
|---|---|---|---|---|---|---|---|
| Benzo(e)pyrene | 5 | 1 | n/a | Non-parametric | 38.3 | 31.9 | 31.9 |
| Perylene | 5 | 0 | n/a | Non-parametric | 122.6 | 90.5 | 90.5 |
| Total PAHs (as above) | 100 | 1 | 10000 | Log normal | 638.2 | 544.1 | 544.1 |

Blue shading = parameter not detected; Orange shading = UCL95% > screening level

ND = No Data, NC1 = not calculated due to no detections; NC2 = not calculated due to >30% of values being non-detects (applicable only to parameters with screening levels)

### 3.2.5 Polyaromatic Hydrocarbons (PAHs)

Low level detections of various PAHs were recorded at all locations within all dredge zones. Total PAHs concentrations (corrected to 1% TOC) ranged from 167 (site B9-1) to 850 µg/kg (site B5-1), and therefore well below the NAGD screening level of 10,000 µg/kg in all samples. The 95% UCL for total PAHs across all dredge zones was 638 µg/kg, which was slightly higher than in 2017 (524 µg/kg).

Based on these results, the sediments in dredge Zones 2, 3 and 4 would be considered suitable for ocean disposal as per the NAGD guidelines with respect to PAHs.

### 3.2.6 Organochlorine Pesticides (OCPs)

#### *3.2.6.1 Bulk Sediment*

There were several detections of OCPs:

- cis-Chlordane and trans-Chlordane – detected at one location (B12-2) just above the laboratory detection limit. The UCL was not calculated due to the large number of non-detects.
- *p p'-DDD* – detected at one location (B7-1) just above the laboratory detection limit. The UCL was not calculated due to the large number of non-detects.
- *p p'-DDE* – detected at 32 of 36 samples. The UCL 95% for all dredge sites was 1.8 µg/kg, which was less than the screening level of 2.2 µg/kg.
- *p p'-DDT* – detected at one location (B12-2) just above the laboratory detection limit. The UCL was not calculated due to the large number of non-detects.

The UCL 95% calculated for individual zones was also less than screening levels for all measured OCPs. Based on these results, the sediments in dredge Zones 2, 3 and 4 would be considered suitable for ocean disposal as per the NAGD guidelines with respect to OCPs.

As noted by BMT WBM (2017), no OCPs were recorded in 2017, which was flagged as a likely laboratory measurement error. The sampling results are consistent with results from 2016 (BMT WBM 2016).

#### *3.2.6.2 Elutriate and Bioavailability Testing*

Phase III elutriate and bioavailability (porewater) testing was conservatively undertaken to investigate the potential bioavailability of OCPs. As outlined in Section 2.6.2, five additional samples were analysed from Zone 2 and six samples were analysed from Zone 3. Samples were analysed for locations where OCPs had been previously detected, targeting fine sediments.

OCP concentrations were below the laboratory LOR (detection limit = 0.1 µg/L) for all elutriate and pore water samples. It is noted that no marine trigger limits are given in ANZECC/ARMCANZ (2000) for DDD, DDT, DDE, Dieldrin or Chlordane.

On the basis of Phase II and Phase III testing for OCPs, the sediments in dredge Zones 2, 3 and 4 are considered suitable for ocean disposal as per the NAGD guidelines with respect to OCPs.

### 3.2.7 Polychlorinated Biphenyls (PCBs)

Concentrations of PCBs were below the laboratory LOR at all investigated locations. No assessment of PCBs was undertaken at the reference locations.

Therefore, the sediments in the dredge zones are considered suitable for ocean disposal as per the NAGD guidelines with respect to PCBs.

### 3.2.8 Radionuclides

Gross alpha and gross beta activity ranged between 0.05 to 0.25 Bg/g and 0.31 to 0.55 Bg/g respectively. These values were within the range recorded in previous years. No assessment of radionuclides was undertaken at the reference locations.

Therefore, the NAGD screening level for the sum of gross alpha and beta (35 Bg/g) was not exceeded in any samples, and on this basis sediments in the dredge zones are considered suitable for ocean disposal as per the NAGD guidelines with respect to radionuclides.

### 3.2.9 Acid Sulfate Soils

Acid sulfate soil test results are presented in Table 3-4. The $pH_{kcl}$ results ranged from 8.4-9.2 (alkaline) and TAA was below LOR, indicating that there was no existing acidity in sediments.

Potential acid sulfate soils were present, as indicated by CRS ($S_{CR}$) exceeding the threshold of 0.03% (0.02 to 0.49% w/w).

Results from acid neutralising capacity (ANC) tests indicate that sediments have a high capacity to self-neutralise if exposed to oxygen, and liming would not be required to treat soils if placed on land.

**Table 3-4 Acid Sulfate Soil Results (Chromium Suite and SPOCAS)**

| Parameter | Units | PQL | Zone 4 | | Zone 3 | | | | | | | Zone 2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | B13-8 | B13-1 | B15-3 | B15-2 | B12-1 | B11-8 | B10-6 | B10-6BTS | B9-1 | B5-0 | B5-1 | B5-1BT | B5-1CT | B6-3 | B7-1 |
| **Actual Acidity** | | | | | | | | | | | | | | | | | |
| pHkcl TAA | pH Units | 0.1 | 8.7 | 8.6 | 8.6 | 8.7 | 8.8 | 8.7 | 8.6 | 8.7 | 9.2 | 8.5 | 8.4 | 8.5 | 8.4 | 8.5 | 8.7 |
| Acid trail Titratable Actual Acidity | mol H+/t | 2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Sulfidic - TAA equiv | % pyrite S | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| **Potential Acidity** | | | | | | | | | | | | | | | | | |
| Chromium Reducible Sulphur | % S | 0.005 | 0.2 | 0.18 | 0.26 | 0.36 | 0.14 | 0.25 | 0.26 | 0.27 | 0.023 | 0.23 | 0.33 | 0.49 | 0.47 | 0.2 | 0.23 |
| Chromium Reducible Sulfur Acidity Units | mol H+/t | 3 | 120 | 110 | 160 | 220 | 88 | 160 | 160 | 170 | 15 | 140 | 210 | 310 | 290 | 130 | 140 |
| Sulfur - KCI Extractable | % S | 0.02 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| HCI Extractable Sulfur | % S | 0.02 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Nett Acid Soluble Sulpur | % S | 0.02 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Net Acid Soluble Sulfur Acidity Units | mol H+/t | 10 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Net Acid Soluble Sulfur Equiv S% Pyrite | % S | 0.02 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| **Acid Neutralising Capacity and Acid Base Accounting** | | | | | | | | | | | | | | | | | |
| ANCE (Acid Neutralising Capacity) | % $CaCO_3$ | 0.01 | 4.3 | 3.4 | 2.7 | 3.8 | 2.5 | 3.3 | 3.2 | 3.7 | 2.2 | 2.2 | 2.5 | 2.6 | 2.6 | 2.6 | 4.1 |
| Acid Neutralising Capacity Acid (ANCbt) | mol H+/t | 2 | 850 | 690 | 530 | 770 | 490 | 660 | 650 | 730 | 430 | 450 | 490 | 520 | 510 | 530 | 820 |
| Acid Neutralising Capacity Equiv S% | % S | 0.02 | 1.4 | 1.1 | 0.85 | 1.2 | 0.79 | 1.1 | 1 | 1.2 | 0.7 | 0.72 | 0.79 | 0.84 | 0.82 | 0.84 | 1.3 |
| ANC Fineness Factor | factor | | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Net Acidity (Sulfur Units) | % S | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Net Acidity (Acidity Units) | mol H+/t | 10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Liming Rate | kg $CaCO_3$/t | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |

# 4 Data Validation

## 4.1 Laboratory QA/QC

Details of the laboratory QA/QC for the primary and secondary laboratories are provided in Appendix C and D. A summary of this assessment is provided in the following sections. Refer to Section 2.5.2 for a description of laboratory QA/QC procedures.

### 4.1.1 Limits of Reporting (LORs)

All LORs used by the primary laboratory were below relevant screening levels.

### 4.1.2 Sample Holding Times and Storage Conditions

All samples were received by the laboratories in appropriately pre-treated and preserved containers. Samples were chilled with ice whilst in the field and during delivery (ice packs). All analyses were undertaken by the laboratories within recommended holding times.

### 4.1.3 Laboratory Blanks

Results indicated that the laboratory blank assessment was within the acceptable criteria.

### 4.1.4 Laboratory Duplicates

Trace element RDP duplicate were generally within the laboratories acceptable criteria. The exceptions were PAH compounds: Phenanthrene, Anthracene, Benz(a)anthracene, Chrysene, Benzo(b)&(k)fluoranthene, Dibenz(a,h)anthracene and Coronene. These parameters are therefore flagged as suspect. In all cases concentrations were at or slightly above the laboratory detection limit. Total PAH concentrations were well below the screening level, and therefore suspect values do not alter the outcomes of this assessment.

### 4.1.5 Surrogate and Matrix Spikes

The assessment of surrogate and matrix spike recoveries was satisfactory for all samples. The exception was surrogate recovery for OCP and TBT in elutriate water and porewater due to matrix interference.

## 4.2 Field QA/QC

### 4.2.1 Field Trip Blank

No volatile Total Petroleum Hydrocarbons (TPH C6-C9) were detected in any trip blank samples, indicating that samples were not contaminated with volatile organic carbons during field sampling and processing of samples.

### 4.2.2 Field Triplicates and Splits

Analyses of field triplicate and split samples were within the ±50 % NAGD criterion for RPDs for most samples. The exceptions were copper, silver and chrysene at location B10-6 and cadmium at location B6-2. At B10-6, the greatest variability occurs within the two primary laboratory samples rather than between the primary and secondary laboratories. For B6-2, the variability occurred between the secondary and primary laboratories. The results of the PSD indicate samples were well homogenised and the source of variation is not known, noting that most other parameters at this location displayed a high degree of consistency between the primary intra-laboratory samples and the secondary inter-laboratory sample.

The exceedance of the RPD criterion is not problematic given that concentrations were well below the screening levels.

## 4.3 Summary of Data Validation

Results from the present study indicated that the survey was undertaken to a high standard providing scientific confidence that the presented results are valid to allow an assessment of sediment quality against the NAGD guidelines.

# 5 References

Ahern, C.R., Ahern, M.R., Powell, B. (1998). Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998: DEH, Brisbane.

Ahern, C.R., McElnea, A.E., Sullivan, L.A. (2004). Acid Sulfate Soils Laboratory Methods Guidelines. Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia.

ANZECC/ARMCANZ. (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Vol. 4). Canberra: Australian and New Zealand Environment and Conservation Council, and Agriculture and Resource Management Council of Australia and New Zealand.

BMT WBM (2008a). Toondah Harbour Dredge Monitoring Benthic Fauna Report. Report prepared for Redland Shire Council.

BMT WBM (2008b). Ecological character description for the Moreton Bay Ramsar Site. Report prepared for the Environmental Protection Agency.

BMT WBM (2008c). Brisbane Desalination Plant Siting Study – Ecological Review (Final Report). Report prepared for Healthy Waterways Partnership.

BMT WBM (2013). Port of Brisbane Maintenance Dredging - Sediment Quality Report 2013. Report prepared for Port of Brisbane Pty Ltd.

BMT WBM (2014). Mangrove Health Assessment: 2014 Monitoring Results. Report prepared for Port of Brisbane Pty Ltd.

BMT WBM (2015a). Port of Brisbane Maintenance Dredging - Sediment Quality Report 2014. Report prepared for Port of Brisbane Pty Ltd.

BMT WBM (2015b). Assessment of Organochlorine Pesticides in the Brisbane River Estuary. Report prepared for Port of Brisbane Pty Ltd.

BMT WBM (2015c). Port of Brisbane Maintenance Dredging – Sediment Quality Report – 2015. Report prepared for Port of Brisbane Pty Ltd.

Commonwealth of Australia (2009). National Assessment Guidelines for Dredging: Department of the Environmental, Water, Heritage and the Arts, Canberra.

Croghan C, Egeghy P (2003) 'Methods of Dealing with Values Below the Limit of Detection using SAS.' US EPA, North Carolina.

Johnson, P. R. and D. T. Neil. (1998). Susceptibility to flooding of two dominant coral taxa in Moreton Bay. Pages 597-604 in I. R. Tibbetts, N. J. Hall, and W. C. Dennison, editors. Moreton Bay and Catchment. School of Marine Science, University of Qld, Brisbane.

Singh, A., Maichle, R., Armbya, N. (2010). ProUCL Version 4.1 User Guide (Draft) Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. U.S. Environmental Protection Agency, Washington.

# Appendix A Sampling and Analysis Plan

BMT WBM

# Port of Brisbane Maintenance Dredging - Sediment Sampling and Analysis Plan 2013

Reference: R.B20259.001.02.SAP.docx
Date: October 2013
Confidential

# Port of Brisbane Maintenance Dredging - Sediment Sampling and Analysis Plan 2013

| | |
|---|---|
| Prepared for: | Port of Brisbane Pty Ltd |
| Prepared by: | BMT WBM Pty Ltd (Member of the BMT group of companies) |

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| | **Title:** | Port of Brisbane Maintenance Dredging - Sediment Sampling and Analysis Plan 2013 |
| | **Project Manager:** | Darren Richardson |
| | **Author:** | Markus Billerbeck |
| | **Client:** | Port of Brisbane Pty Ltd |
| | **Client Contact:** | Craig Wilson/Rachael Attard |
| | **Client Reference:** | |
| **Synopsis:** | **A sediment sampling and analysis plan for the assessment of physical and chemical sediment properties associated with Port of Brisbane maintenance dredging** | |

**REVISION/CHECKING HISTORY**

| Revision Number | Date | Checked by | | Issued by | |
|---|---|---|---|---|---|
| 0<br><br>1 | 27.09.13<br><br>17.10.13 | DLR | | MMB | Markus Billerbeck |

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# 1 Introduction

Port of Brisbane Pty Ltd (PBPL) is required to maintain a minimum depth of clearance below the keel of vessels calling at the port to allow for effective shipping access to the port and ensure ship safety. Channel depths are declared by the Harbour Master (Maritime Safety Queensland) and displayed on various shipping charts. PBPL undertakes an annual maintenance dredging program to ensure these minimum depths are maintained.

PBPL propose to undertake its annual 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 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 the commencement of the dredging program.

## 1.1 Sediment Sampling and Analysis Plan (SAP) Objectives

The aim of this SAP is to provide a set of procedures that will allow a statistically valid evaluation of the physical and chemical sediment properties of the sediments to be dredged. The results of this assessment will assist in determining the likely impacts of unconfined offshore disposal of the dredged sediment.

The assessment of physico-chemical sediment properties will be undertaken on the basis of the approach set out in the National Assessment Guidelines for Dredging (Commonwealth of Australia 2009; henceforth NAGD).

The specific SAP objectives are to:

- Provide a summary of proposed dredging and disposal operations for the project;
- Identify a list of contaminants based on a review of existing data and potential contaminant sources;
- Determine the number of samples required to provide an adequate characterisation of the physical and chemical sediment properties;
- Develop procedures for adequate field collection and handling of sediment samples;
- Outline adequate quality assurance and quality control (QA/QC) procedures for field sampling and laboratory analysis;
- Provide a description of statistical procedures used to determine the contaminant status of the dredged material;
- Describe procedures for validating the analytical data to assess whether the sample collection, handling and laboratory analysis was undertaken to a standard allowing assessment of sediment quality against the NAGD guidelines; and

- Outline the proposed reporting framework for the sediment quality results that will address the requirements of the Determining Authority.

## 1.2 Proposed Dredging

PBPL's area of responsibility in relation to maintenance and capital dredging within port limits can be broadly divided into two zones on the basis of the water body type, navigable depths and nature of dredged material:

- Moreton Bay zone (enclosed/open coastal waters); and
- Brisbane River zone including the Port of Brisbane (middle/lower estuary).

This SAP only considers assessment of sediments for the Brisbane River zone. The Brisbane River zone extends from Hamilton Reach to the Outer Bar Cutting. Annual maintenance dredging is required to remove sediments accumulated by natural siltation processes within the catchment and sediment loads from residential and commercial developments.

To ensure that declared depths of navigational channels are maintained at all times, PBPL undertakes 'insurance' dredging of up to -0.5 metres below the declared depth.

On average, PBPL dredges about 400,000 $m^3$ to 450,000 $m^3$ of material each year. Additional dredging needs to be undertaken following major flood events, i.e. in 2011 and 2013.

The Brisbane River zone is divided into different dredging subareas based on existing contaminant data (Figure 2-1), comprising Zone 2, Zone 3 and Zone 4. It is noted that Zone 1 is not part of the annual dredging and samples from this zone have been used to collect control samples upstream of the actual dredging areas.

The following average dredge volumes apply to the dredge subareas (Table 1-1):

**Table 1-1 Approximate Maintenance Dredge Volumes**

| Dredging Subarea | Extents | Average Dredge Volume ($m^3$) |
|---|---|---|
| Zone 2 | Colmslie to Pinkenba | 150,000 |
| Zone 3 | Within port reaches | 250,000 |
| Zone 4 | Moreton Bay entrance channel | 30,000 |

The maintenance dredging program is structured to maximise efficiencies and utilisation of PBPL's largest dredger, the trailing suction hopper dredge *TSHD Brisbane*. The *TSHD Brisbane* typically carries out the majority of the ports maintenance dredging over a two month period between January and May (actual period varies depending on other commitments of the *TSHD Brisbane* and siltation patterns). The PBPL may also utilise smaller, more manoeuvrable dredging plant, such as grab dredgers and bed levellers, to maintain more confined areas within the Port Limits.

## 1.3 Offshore Disposal

The PBPL's policy with regard to dredged material is to maximise its beneficial reuse. In general, most of the material dredged by the PBPL from within Port Limits is used in reclamation works associated with development of the port. The reuse of this dredged material provides several benefits, including:

- Reduced pressure on sea disposal sites;
- The placement of any actual or potential acid sulphate material at depth beneath the water surface; and
- The containment of any contaminated material within a designated boundary, disconnected from the marine system and monitored to ensure the immobility of identified contaminants.

In 2009, the reclamation life of the Future Port Expansion (FPE) area was estimated to be approximately 30 years, based on the current level of port development at that time. Following extreme flood events in both 2011 and 2013 and the subsequent disposal of additional material in the FPE area, the estimated life of the FPE area was reduced by 20 years to 10 years. Given the importance of the FPE as an area to dispose of material unsuitable for ocean disposal, there has been a shift in thinking around the management of the FPE area.

The current proposed management of dredged material is to, where practical, dispose at sea all dredged material deemed suitable for ocean disposal. This proposed management initiative will ensure the long term viability of the FPE area for the disposal of material deemed unsuitable for ocean disposal.

In the past, significant quantities of dredged material from the Brisbane River have been placed offshore at the Mud Island Dredge Material Placement Area (DMPA) (Figure 2-1). In recent years only smaller volumes of dredged material from boat harbours in southern Moreton Bay were placed at the Mud Island DMPA. However, it is proposed that the Mud Island DMPA will be utilised for material found suitable for ocean disposal in future PBPL maintenance dredging campaigns.

# 2 Review of Existing Information

Prior to each annual maintenance dredging campaign, PBPL undertook assessments of sediment quality at 45 sampling locations within the dredging zones 2 to 4 (Figure 2-1).

Additional samples were obtained from three locations in Zone 1 and Breakfast Creek upstream of the dredging area in order to assess potential sediment quality impacts from the upstream catchment. The sediment quality results for the annual sampling program between 2000 and 2013 are summarised in Section 2.1.

Due to major flooding in the Brisbane River catchment in early January 2011 and late January 2013, emergency dredging was required to maintain declared depths. Twelve to twenty locations were sampled within the port and three to four locations within the Mud Island DMPA for the 2011 and 2013 flood sampling campaigns, respectively. The sediment quality assessments included elutriate and bioavailability analyses for selected trace metals and organic contaminants.

Additionally, a comparison of sediment quality (organochlorine pesticides and dioxins) at 14 sampling locations at the Mud Island DMPA and seven reference sites in Moreton Bay (Sites RF1 to RF7 in Figure 2-1) was undertaken in 2013 to assess if the emergency dredging and disposal activities impacted on sediment and water quality in Moreton Bay. The sediment quality results for the 2011 and 2013 flood sampling are summarised in Section 2.2.

Conclusions based on the review of the annual and flood sampling data are provided in Section 2.3.

## 2.1 Annual Sediment Quality Data 2000 – 2013

Detailed sediment quality studies have been undertaken within the Port of Brisbane since 1998. This review considers sediment quality data collected between 2000 and 2012. This comprises the studies detailed in Table 2-1.

In addition to the routine monitoring documented in Table 2-1, further sampling was carried in 2011 and 2013 (Worley Parsons 2011b, 2013b, 2013c, 2013d) to assess the effects of floods on sediment quality. Refer to Section 2.2 for a description of these studies.

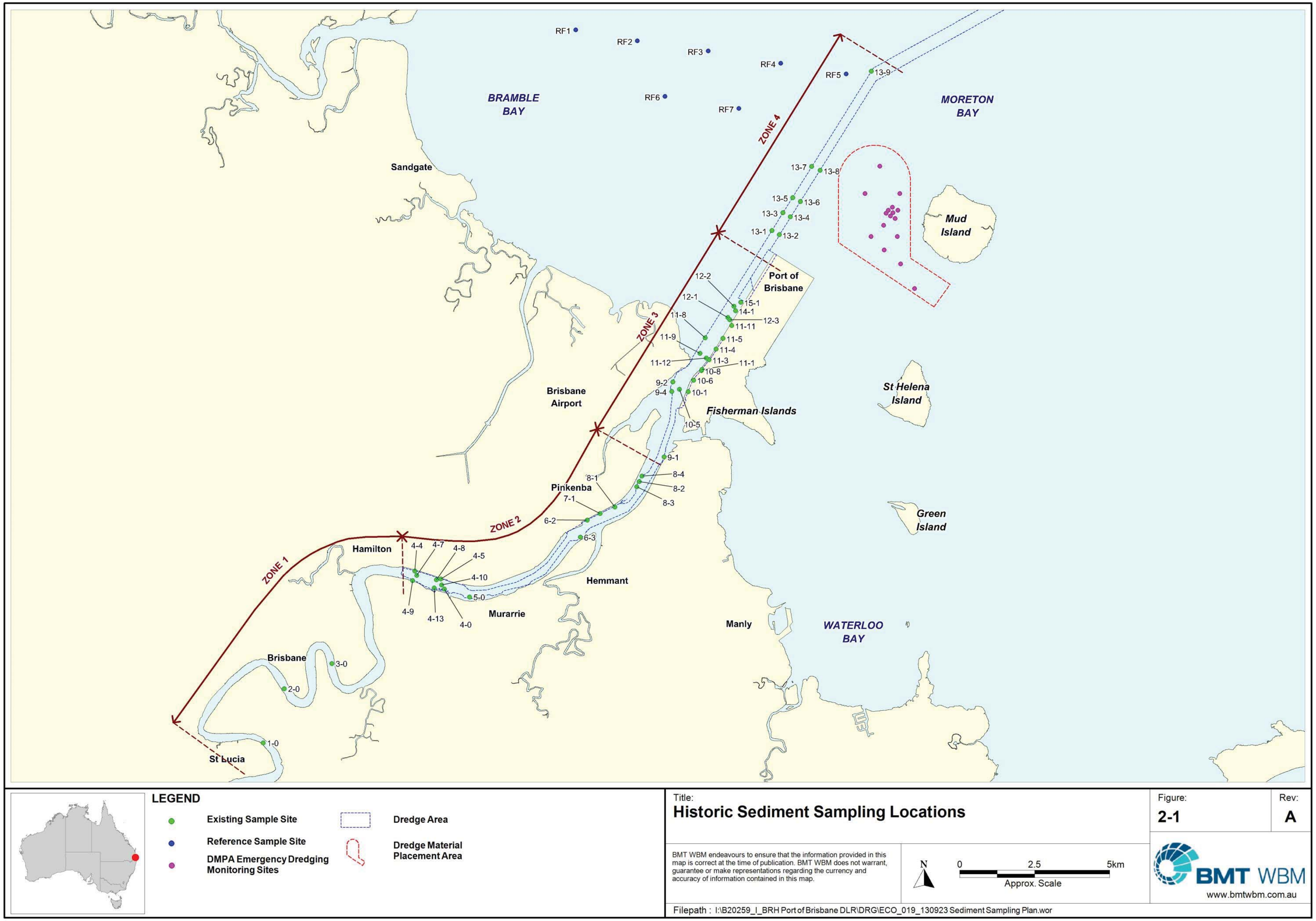
**Table 2-1 Previous Routine Annual Sediment Quality Studies**

| Reference | Sampling Date |
|---|---|
| Maunsell McIntyre (2001) | November 2000 |
| Butler Partners (2002) | November 2001 |
| Hydrobiology (2003) | November 2002 |
| Hydrobiology (2004) | November 2003 |
| SKM (2005) | November 2004 |
| SKM (2006) | January 2006 |
| SKM (2007) | February 2007 |
| Worley Parsons (2008) | January 2008 |
| Worley Parsons (2009) | February 2009 |
| GHD (2010) | January 2010 |
| Worley Parsons (2011a) | December 2010 |
| Worley Parsons (2012) | December 2011 |
| Worley Parsons (2013a) | December 2012 |

A wide range of analytical parameters have been measured between 2000 and 2012 as summarised in Table 2-2. Analysis was undertaken at a total of 45 locations within the dredge areas. Additional samples were collected from three control locations upstream of the dredging areas as well as from Breakfast Creek (these locations are not within the dredge areas).

**Table 2-2 Summary of Sediment Quality Data 2000 - 2012**

| Analytical Parameter | Measurement Events |
|---|---|
| **Inorganics** | |
| Metals & Metalloids | 2000-2012 |
| **Organics** | |
| Organotins | 2000-2012 |
| Total Petroleum Hydrocarbons (TPHs) | 2000-2012 |
| Benzene, Toluene, Ethylbenzene, Xylene (BTEX) | 2000-2012 |
| Polycyclic Aromatic Hydrocarbons (PAHs) | 2000-2012 (30% of locations) |
| Organophosphate and Organochlorine Pesticides (OPPs and OCPs) | 2000-2012 (40% of locations between 2000 and 2006) |
| Polychlorinated Biphenyls (PCBs) | 2000-2012 (30% of locations) |
| Radionuclides | 2010-2012 |
| Acid Sulfate Soils | 2000-2012 |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MORETON BAY
WATERLOO BAY
Sandgate
Brisbane Airport
Pinkenba
Hamilton
Hemmant
Murarrie
Manly
Brisbane
St Lucia
Port of Brisbane
Fisherman Islands
Mud Island
St Helena Island
Green Island
ZONE 1
ZONE 2
ZONE 3
ZONE 4
RF1
RF2
RF3
RF4
RF5
RF6
RF7
LEGEND
Existing Sample Site
Reference Sample Site
DMPA Emergency Dredging Monitoring Sites
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### 2.1.1 Metals and Metalloids

Testing for metals and metalloids has included analysis of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc between 2000 and 2012. Antimony and silver were also tested between 2001 and 2004.

The main contaminants of potential concern in terms of metals and metalloids were mercury and nickel. Mercury and nickel concentrations frequently exceeded the NAGD screening level at the 95% Upper Confidence Limit of the mean (95% UCL). Silver exceeded the NAGD screening level at the 95% UCL between 2002 and 2004. All other metals and metalloid 95% UCL concentrations were generally below the 95% UCL between 2000 and 2013.

The temporal and spatial trends observed for trace metals between 2000 and 2012 are detailed in the following sections.

#### *2.1.1.1 Mercury*

The NAGD screening level for mercury (0.15 mg/kg) was exceeded on numerous occasions in the Brisbane River dredge zones, particularly in Zone 2. Figure 2-2 shows the number of occasions when the screening level was exceeded between 2000 and 2012 and the number of sites for dredge zones 2 to 4 where exceedances were noted.

For Zone 2, mercury concentrations exceeded the screening level on 61 - 70% of occasions at 25% of locations. At a similar number of sites in Zone 2 exceedances were noted on 20 – 40% of occasions between 2000 and 2012.

Some exceedances of the mercury screening level were noted also for Zone 3 and Zone 4. However, those exceedances occurred only at a limited number of sites whilst no screening level exceedances were noted at 70 – 80% of locations in Zone 3 and Zone 4 between 2000 and 2012.

In Zone 3 most exceedances of the mercury screening level occurred at three sites (9-2, 10-6 and 11-8) occurring on 31 – 69% of occasions. In Zone 4, exceedances were only noted at two sites (13-5 and 13-6) on 8 – 23% of occasions.

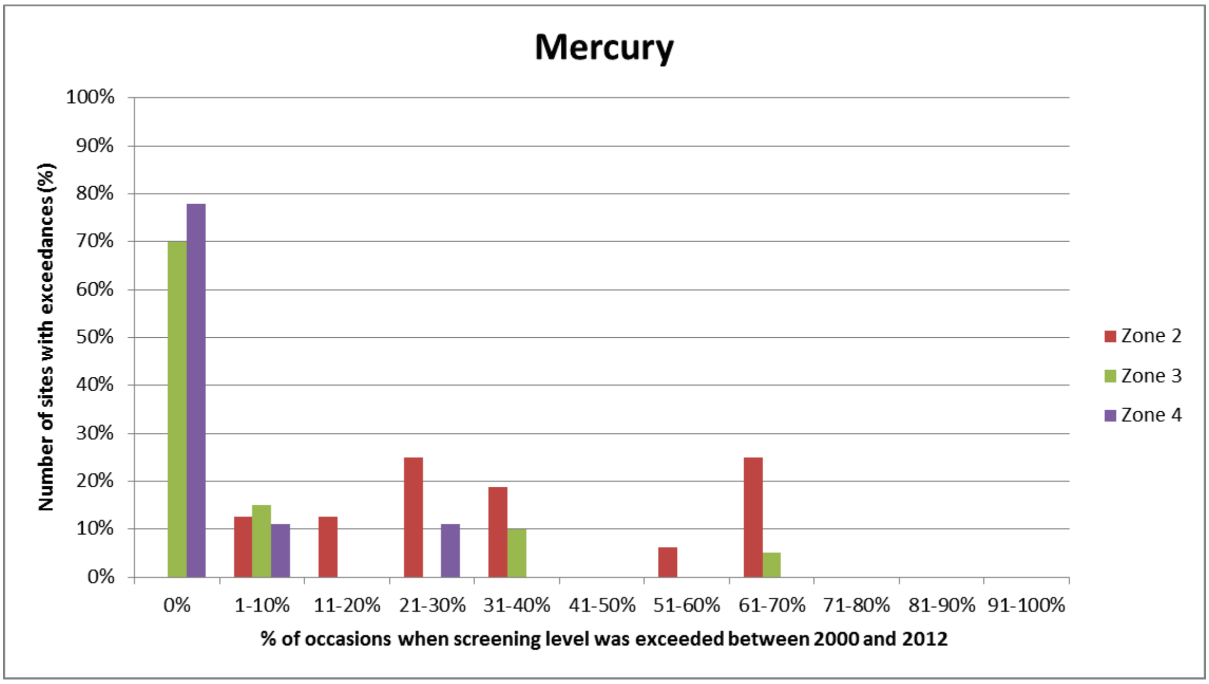



**Figure 2-2 Exceedances of the NAGD Screening Level for Mercury between 2000 and 2012 in Dredge Zones 2, 3 and 4**

### *2.1.1.2 Nickel*

Exceedances of the nickel screening level (21 mg/kg) were noted for most locations across all dredge zones (Figure 2-3). Exceedances of the screening level on more than 80% of occasions were noted at a cumulative 56% of sites in Zone 2, 20% of sites in Zone 3 and 11% of sites in Zone 4. Average Nickel concentrations were 24.2 mg/kg for Zone 2, 20.1 mg/kg for Zone 3 and 21.4 mg/kg for Zone 4, i.e. close to the nickel screening level of 21 mg/kg.

Given the widespread exceedances of the nickel screening level across all dredge zones and that exceedances were also commonly noted for the upstream control sites, it appears likely that the elevated nickel concentrations are of natural origin. It is recognised that sediments in Australia including South-East Queensland commonly have high natural levels of nickel (NAGD 2009 and Preda & Cox 2002).

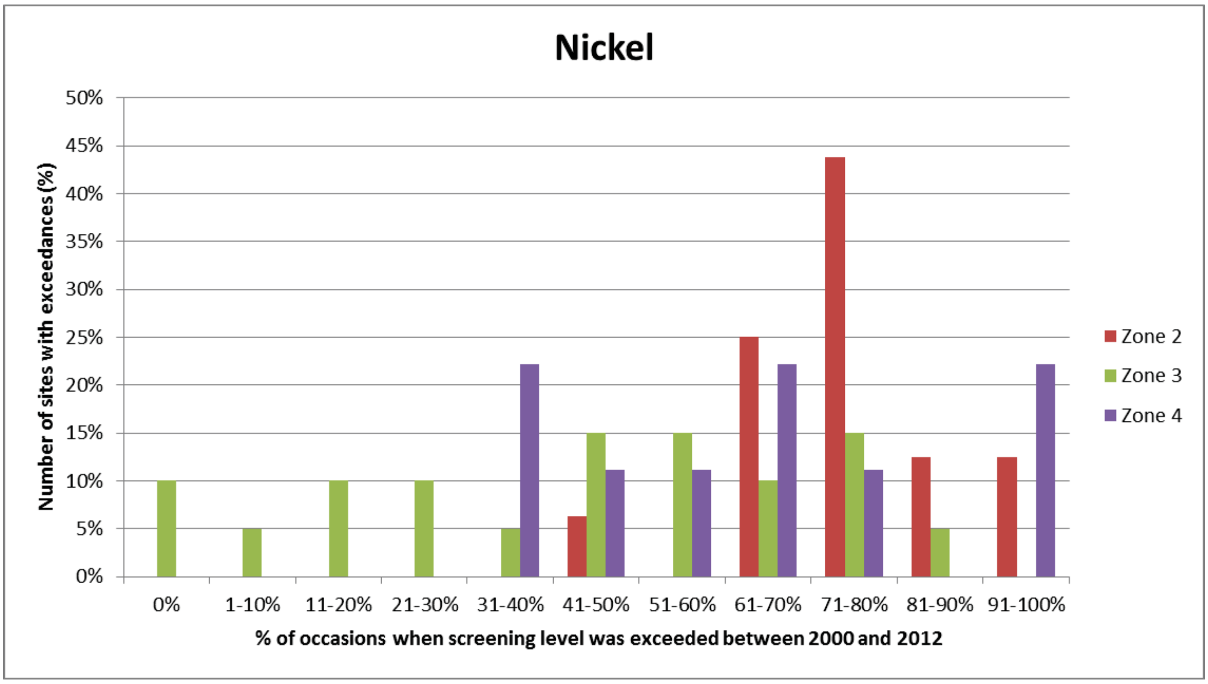



**Figure 2-3 Exceedances of the NAGD Screening Level for Nickel between 2000 and 2012 in Dredge Zones 2, 3 and 4**

#### 2.1.1.3 Arsenic

Concentrations for arsenic were below the NAGD screening level of 20 mg/kg at all locations and dredge zones between 2000 and 2012.

#### 2.1.1.4 Cadmium

Cadmium concentrations were below the NAGD screening level of 1.5 mg/kg with the exception of one site in Zone 2 (Site 6-2) where the screening level was met or exceeded between 2007 and 2009 with concentrations ranging between 1.5 – 6.3 mg/kg.

However, cadmium concentrations were below screening level at all locations between 2010 and 2012. The 95% UCL for cadmium was below the screening level between 2000 and 2013 for all dredge zones.

Average cadmium concentrations between 2000 and 2012 were 0.30 mg/kg for Zone 2, 0.20 mg/kg for Zone 3 and 0.17 mg/kg for Zone 4, i.e. well below the screening level across all dredge zones.

#### 2.1.1.5 Chromium

Chromium concentrations were mostly below the screening level of 80 mg/kg. The only exceptions were noted at site 9-1 in Zone 3 where the screening level was exceeded in 2002 and 2012 with concentrations ranging between 94 – 100 mg/kg. However, the 95% UCL remained below the screening level. Furthermore, exceedances of the chromium screening level were noted at four sites in Zone 2 in 2000 with concentrations ranging between 88.6 – 101 mg/kg.

### 2.1.1.6 Copper

Copper concentrations exceeded the NAGD screening level of 65 mg/kg on a few occasions in Zone 2 and Zone 3. No exceedances of the copper screening level were noted for Zone 4 (Figure 2-4).

In Zone 2 exceedances were noted at five out of sixteen locations, with only one to two detections noted at four of these locations between 2000 and 2012. At site 6-2 in Zone 2 exceedances of the screening level occurred on 46% of occasions. However, in 2011 and 2012 copper concentrations were below the screening level at this site.

The only exceedances of the copper screening level in Zone 3 were noted for site 9-1 in 2000 and 2008.

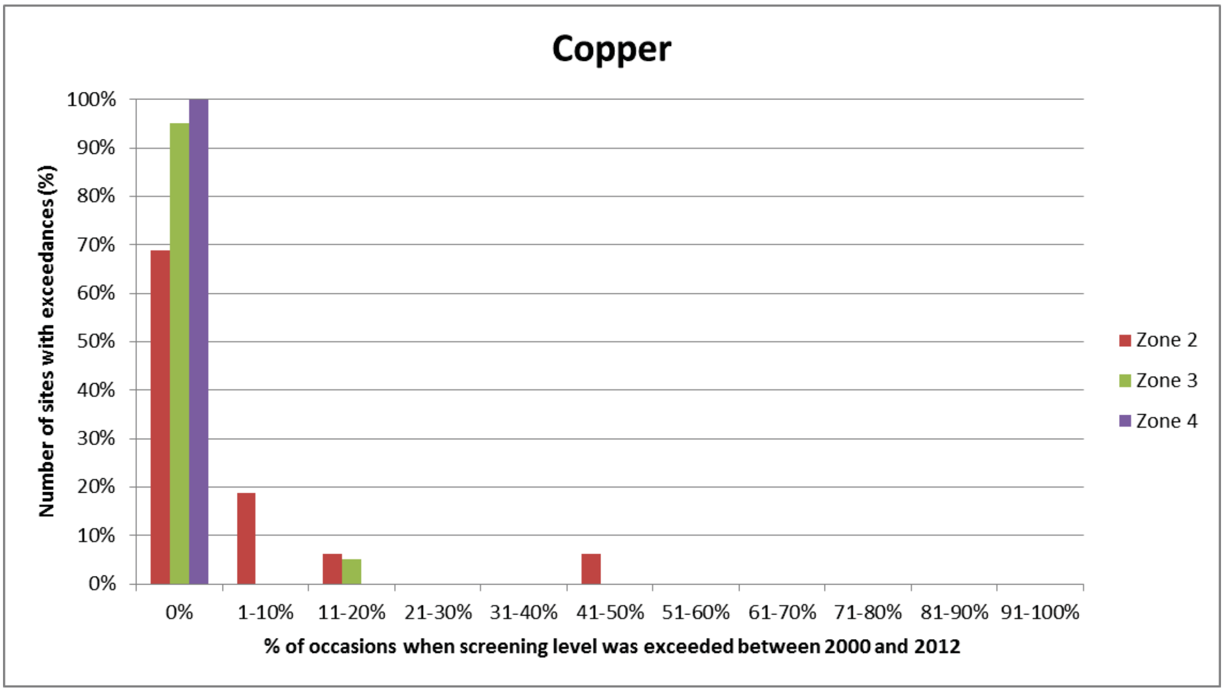



**Figure 2-4 Exceedances of the NAGD Screening Level for Copper between 2000 and 2012 in Dredge Zones 2, 3 and 4**

### 2.1.1.7 Lead

Some individual exceedances of the lead screening level (50 mg/kg) were noted, in particular in Zone 2 where exceedances were noted at seven locations (Figure 2-5). Since 2001 there were only single detections of lead above the screening level noted per annual sampling event. The 95% UCL for lead was below the NAGD screening level since 2001.

Exceedances on individual sites were noted on less than 20% of occasions, i.e. only once or twice between 2000 and 2012 in Zone 2. In Zone 3 and Zone 4, the only exceedances of the lead screening level were noted at single sites (9-1 in Zone 3 and 13-4 in Zone 4) and only on one or two occasions between 2000 and 2012.

The last screening level exceedance was noted in 2009 for Zone 2, in 2000 for Zone 3 and in 2010 for Zone 4. The average concentrations of lead between 2000 and 2012 were 26.9 mg/kg for Zone

2, 13.7 mg/kg for Zone 3 and 12.3 mg/kg for Zone 4, i.e. well below the screening level across all dredge zones.

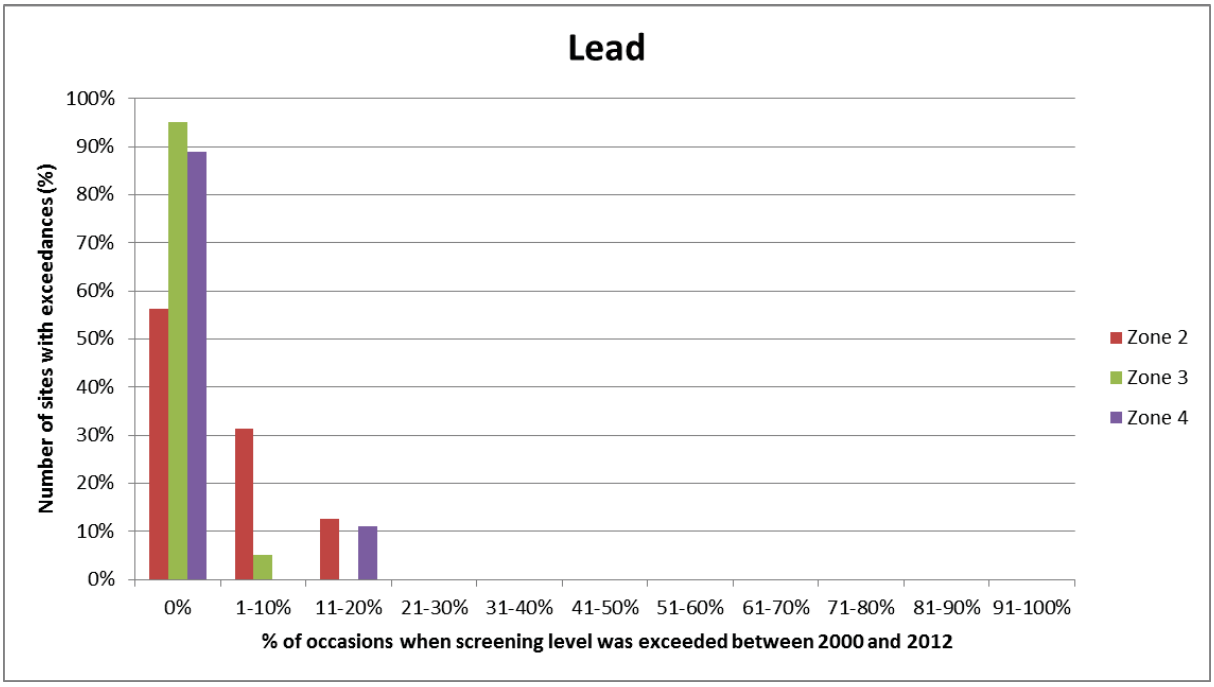



**Figure 2-5 Exceedances of the NAGD Screening Level for Lead between 2000 and 2012 in Dredge Zones 2, 3 and 4**

### *2.1.1.8 Zinc*

Individual exceedances of the zinc screening level (200 mg/kg) were noted at eight locations in Zone 2. However, most of these exceedances occurred only once or twice (<15% occurrence) between 2000 and 2012 (Figure 2-6). Only at location 6-2 exceedances occurred on more than 30% of occasions (four times between 2000 and 2012). It is noted that the last exceedance of the zinc screening level in Zone 2 occurred in 2010.

In Zone 3 only a single exceedances was noted at location 9-1 in 2000. No exceedances of the zinc screening level were noted in Zone 4.

The average zinc concentration between 2000 and 2012 was 130.3 mg/kg for Zone 2, 74.0 mg/kg for Zone 3 and 57.1 mg/kg for Zone 4, i.e. well below the NAGD screening level across all dredge zones.

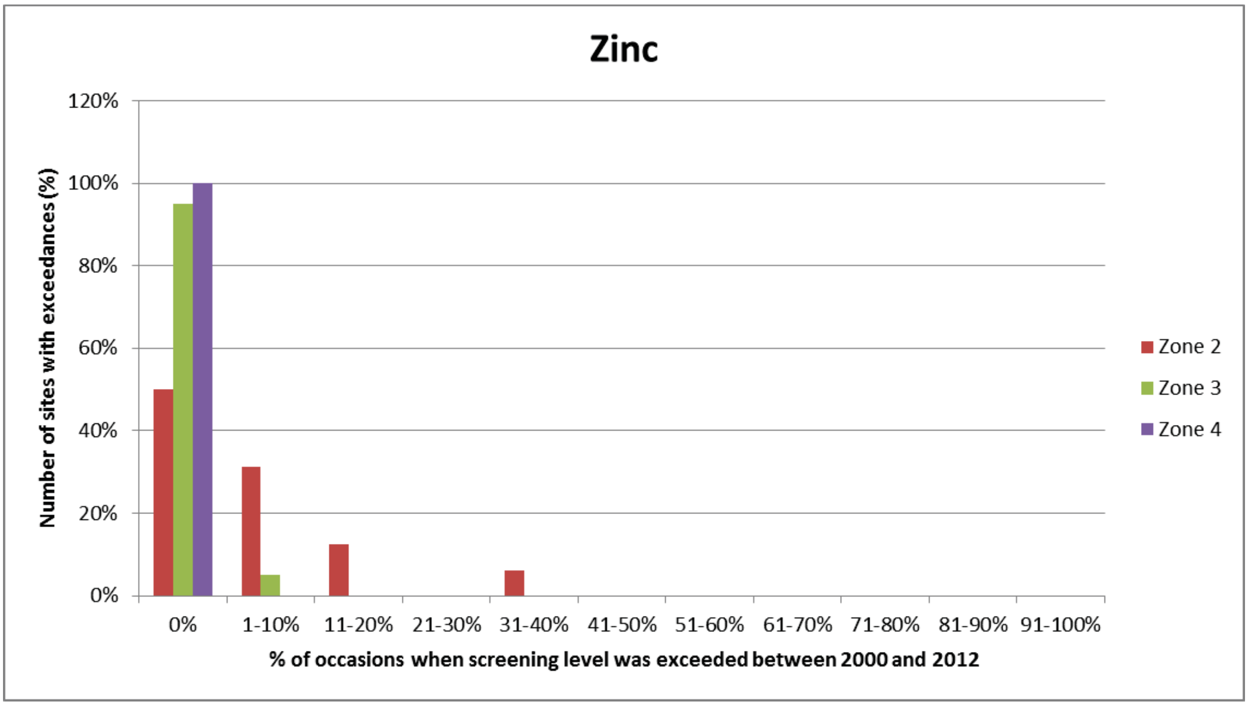



**Figure 2-6 Exceedances of the NAGD Screening Level for Zinc between 2000 and 2012 in Dredge Zones 2, 3 and 4**

#### 2.1.1.9 Antimony and Silver

In addition to the metals and metalloids outlined above, antimony and silver were tested between 2001 and 2004. While antimony concentrations remained below the Limit of Reporting (LOR) for all sampling events, silver was detected at several locations and concentrations exceeded the screening level at one site in Zone 3 (11-8) between 2002 and 2004.

### 2.1.2 Organotins

Concentrations of TBT at the 95% UCL frequently exceeded the NAGD screening level (9 µg Sn/kg) between 2000 and 2012, particularly in dredge zones 2 and 3.

Exceedances of the TBT screening level were noted predominantly in Zone 2, including several exceedances of the NAGD high level of 70 µg Sn/kg (Figure 2-7). At sampling site 4-4 in Zone 2, the screening level was exceeded during all sampling events except in 2001, including six exceedances of the NAGD high level. At several other locations in Zone 2, screening level exceedances were noted between 20 to 70% of occasions.

In Zone 3, exceedances of the TBT screening level were typically only noted once or twice between 2000 and 2013, corresponding to 8% and 15% of occasions in Figure 2-7. The only exception was site 9-1, where exceedances of the screening level were noted on 69% of occasions. This included five sampling events where the NAGD high level was exceeded. This corresponds to a generally higher occurrence of metal/metalloid exceedances at this site as outlined in Section 1.1.1. It is noted that site 9-1 is the site located closest to Zone 2.

Only a single exceedance of the TBT screening level was noted at site 13-1 in Zone 4 in 2006.

The average normalised TBT concentration between 2000 and 2012 was 28.8 µg Sn/kg for Zone 2, 21.8 µg Sn/kg for Zone 3 and 0.7 µg Sn/kg for Zone 4. If site 9-1 is excluded from Zone 3, the average concentration is 4.4 µg Sn/kg, i.e. less than the NAGD screening level.

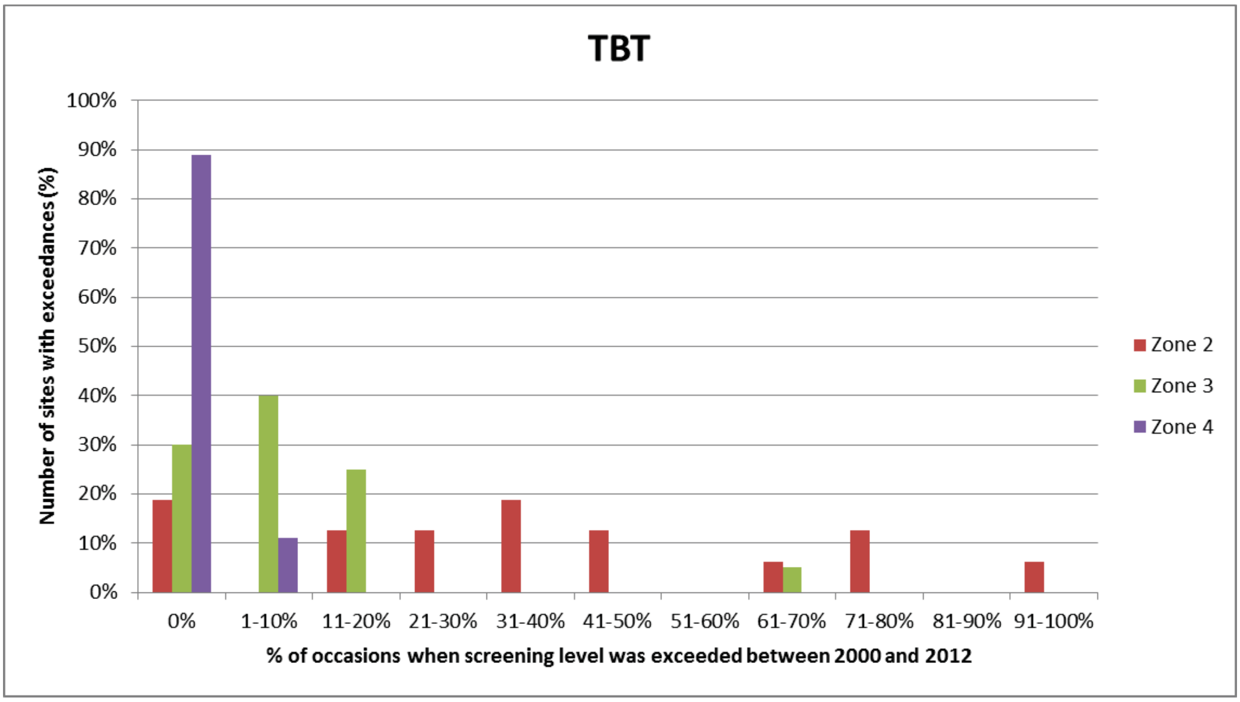



**Figure 2-7 Exceedances of the NAGD Screening Level for TBT between 2000 and 2012 in Dredge Zones 2, 3 and 4**

### 2.1.3 Benzene, Toluene, Ethylbenzene and Xylene (BTEX)

BTEX concentrations were below LOR in all samples and all zones between 2000 and 2012.

### 2.1.4 Total Petroleum Hydrocarbons (TPHs)

While TPHs were detected on several occasions across all dredge zones, the total TPH concentration was below the NAGD screening level of 550 mg/kg at all sampling locations between 2000 and 2012. Most detections of TPHs were noted in Zone 2, with less detections noted for Zone 3 and only some isolated detections recorded in Zone 4.

### 2.1.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Total PAHs concentrations were mostly below the NAGD screening level of 10,000 µg/kg except for two individual detections above screening level in Zone 2 and Zone 3 in 2001. The 95% UCL for PAHs exceeded the screening level in 2011. However, since 2001, the total PAHs concentrations remained well below the screening level for all dredge zones.

### 2.1.6 Polychlorinated Biphenyls (PCBs)

Total PCBs concentrations were mostly well below the NAGD screening level of 23 µg/kg or below LOR. The only exceptions were site 10-6 in Zone 3 where detections above the screening level were noted in 2001 and 2012 and site 13-1 in Zone 4, where a detection above screening level was noted in 2011.

### 2.1.7 Organochlorine Pesticides (OCPs)

The 95% UCL concentrations of the OCPs dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethane (DDD) and Dichlordiphenyldichloroethylene (DDE) frequently exceeded the NAGD screening level between 2000 and 2013. In some cases the 95% UCL concentrations of chlordane also exceeded the NAGD screening level.

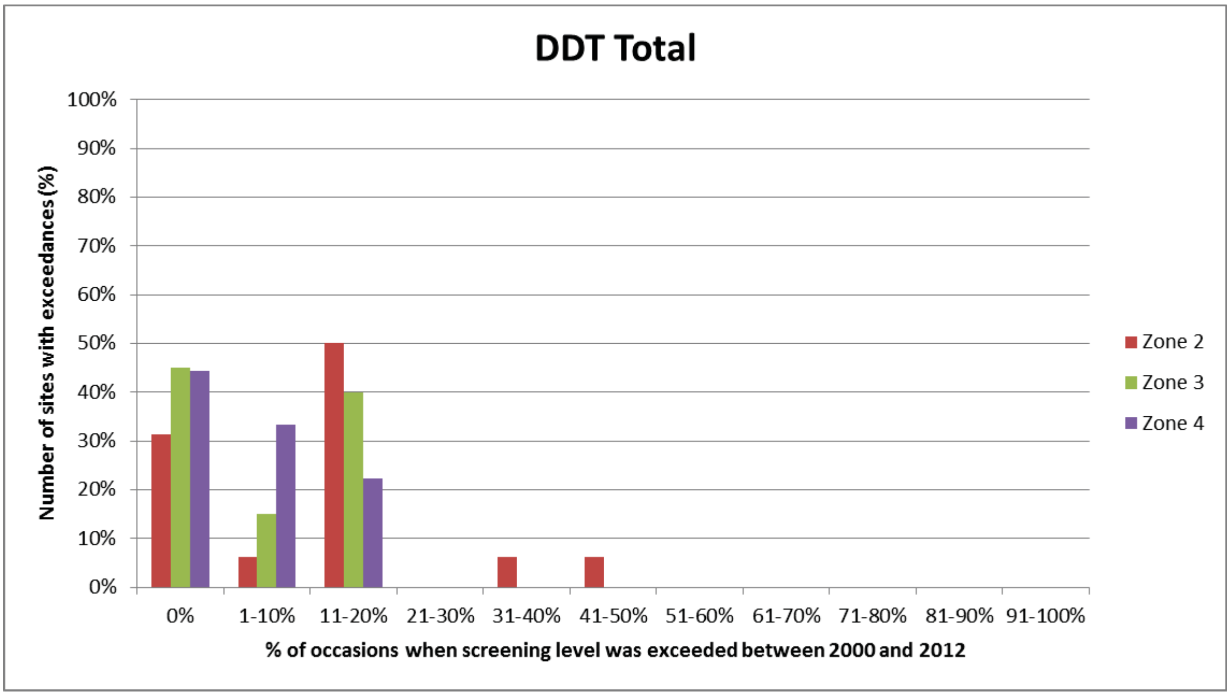
Total DDT concentrations and its metabolites DDD and DDE exceeded their respective screening levels (1.6, 2 and 2.2 µg/kg for DDT, DDD and DDE, respectively) on numerous occasions across all dredge zones (). This includes some exceedances of the NAGD high levels for DDT (46 µg/kg) and DDD (20 µg/kg), but DDE concentrations did not exceed the NADG high level of 27 µg/kg.

Most of these screening level exceedances for DDT, DDD and DDE were recorded at Zone 2, occasional exceedances of all three parameters were also recorded in Zone 3 and 4 between 2000 and 2012. The DDT breakdown product DDE was generally detected more frequently than DDT and DDD (Figure 2-8).

The presence of DDT and its metabolites across all dredge zones and consistent detections over the last decade demonstrates the long term environmental persistence of DDT and its metabolites.

Furthermore, several exceedances of the chlordane NAGD screening level of 0.5 µg/kg and the NAGD high level of 6 µg/kg were noted between 2000 and 2012.

In 2002, chlordane concentrations exceeded the screening level at all tested sampling locations in Zone 2, 3 and 4. Whilst no screening level exceedances were noted between 2003 and 2007, one to three locations in Zone 2 had concentrations higher than the screening level in 2008, 2009 and 2011 (sites 4-0, 4-4, 4-5, 4-7 and 4-8). One exceedance of the chlordane screening level was also noted in 2011 in Zone 3 (site 11-8).



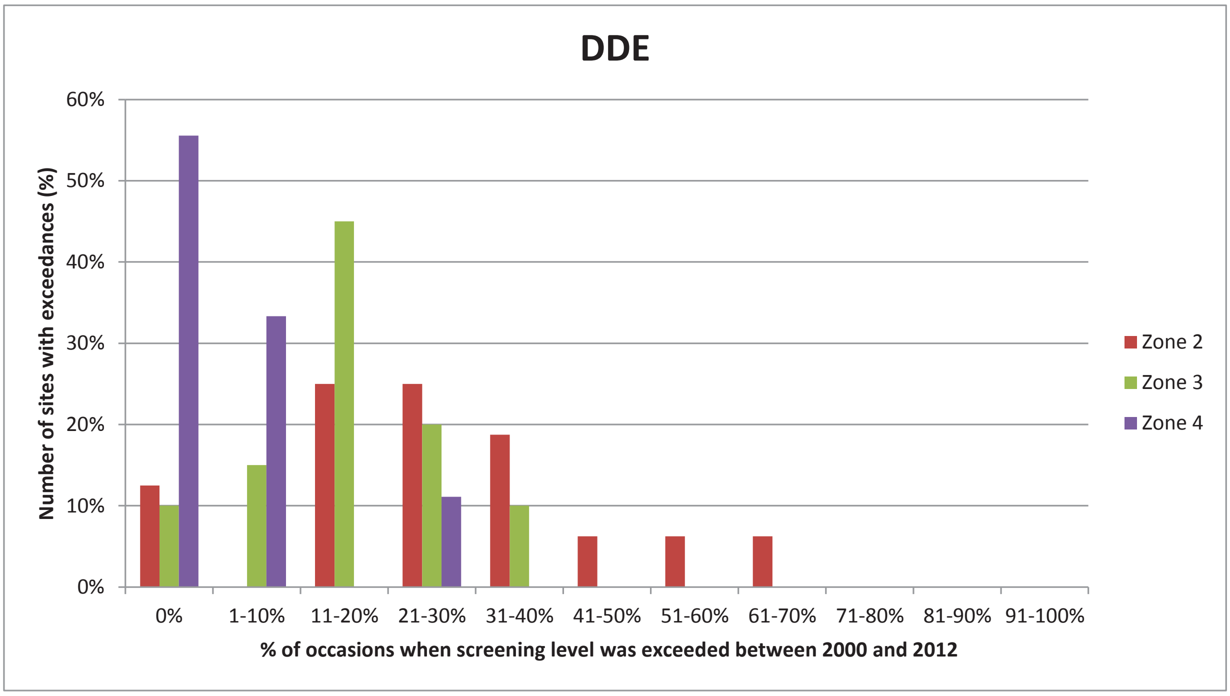




**Figure 2-8 Exceedances of the NAGD Screening Level for total DDT (upper plot) and DDE (lower plot) between 2000 and 2012 in Dredge Zones 2, 3 and 4. Similar Trends for DDD.**

### 2.1.9 Organophosphorus Pesticides (OPPs)

Concentrations of OPPs were below LOR for all sampled locations between 2000 and 2012.

### 2.1.10 Radionuclides

Radionuclides (gross alpha and beta) were analysed at eight sites across all dredge zones between 2010 and 2012.

Concentrations of radionuclides were detected in the January 2010 sampling but in concentrations well below the NAGD screening level of 35 Bq/g (maximum concentration 0.97 Bq/g). Radionuclide concentrations were below the LOR at all sites in all following sampling campaigns.

### 2.1.11 Acid Sulfate Potential

Acid sulfate soil testing indicates that the sediments in the dredge zone have no actual acidity but are generally considered to be Potential Acid Sulfate Soils (PASS). Assessments of the buffer capacity indicate that the sediments in all dredge zones have sufficient acid neutralizing capacity to buffer any acid potentially generated through onshore disposal.

Acid Sulfate Soil test results were generally consistent between 2000 and 2012.

## 2.2 Flood Sampling 2011 and 2013

The review of flood sampling sediment quality results included Worley Parsons (2011b, 2013b, 2013c, 2013d).

The 2011 and 2013 sampling campaigns (Worley Parsons 2011b and 2013b) included all parameters as per Table 1 of the NAGD. Additionally, porewater ammonium concentrations were measured and acid sulfate soils assessed in 2011. For both studies elutriate and bioavailability testing for nickel and mercury was undertaken.

Further testing for DDT, DDD, DDE and dioxins/furans was undertaken in 2013 including a comparison of 14 sampling locations at the Mud Island DMPA against seven Moreton Bay reference locations to assess whether the emergency dredging and disposal has affected sediment quality in Moreton Bay (Worley Parsons 2013c and 2013d).

### 2.2.1 Metals and Metalloids

In 2011, nickel (9 of 15 locations), mercury (3 of 15 locations) and lead (1 location) were the only metals to exceed their respective NAGD screening levels. In 2013, nickel was the only metal to exceed screening levels at 18 of the 24 locations sampled. All other metals/metalloids were below their respective screening levels.

Elutriate and bioavailability testing was undertaken for nickel and mercury in 2011 and 2013. For both sampling events, the elutriate concentrations for mercury were below LOR and nickel elutriate concentrations were well below the ANZECC/AMRCANZ (2000) 95% species protection level of 70 µg/L or below LOR. Furthermore, dilute acid extraction results for mercury and nickel indicated low bioavailability of these metals with concentrations below their respective NAGD screening level in all samples in 2011 and 2013.

These results indicated low likelihood for adverse water quality and sediment quality impacts during dredging and disposal for mercury and nickel.

#### 2.2.1.1 Comparison to Annual Sampling

Consistent with the annual sampling undertaken between 2000 and 2012, nickel and mercury concentrations were the main contaminants of concern within the dredge areas with concentrations similar to the annual sampling events. Lead was detected above the screening level on some occasions during the annual sampling. Similar to the flood sampling, detections were noted only at single locations per annual event and 95% UCL concentrations were below the NAGD screening level.

### 2.2.2 Organochlorine Pesticides (OCPs)

DDT and its metabolites were detected in 2011 with DDE detected in nine of 15 locations. Whilst normalised DDD and DDE concentrations remained below their respective screening levels, normalised DDT concentrations exceeded the NAGD screening level at two locations. All other OCPs were below LOR at all locations in 2011.

In 2013, DDD was detected in one sample with a concentration exceeding the NAGD screening level. DDE exceeded the NAGD screening level of 2.2 µg/kg in all samples with a 95% UCL of 5.25 µg/kg.

#### 2.2.2.1 Comparison to Annual Sampling

Similar to the annual sampling events, DDT and its metabolites were detected above the NAGD screening level in the flood sampling. Concentrations were similar to those detected in the annual sampling.

#### 2.2.2.2 Comparison to Background Concentrations (2013)

Total DDT concentrations were below the LOR at all locations, including those at Mud Island DMPA and reference locations.

Sampling carried out prior to the 2013 emergency dredged material disposal event detected DDE at all 20 sampling locations within the dredged area, and one of the four locations within the DMPA. DDD was above the LOR in one sample within the dredged area (10µg/kg normalised to % TOC), and was also above the NAGD Screening level of 2 µg/kg.

Further more detailed sampling was carried out to compare contaminant concentrations at 14 locations in the DMPA and seven reference locations, following the 2013 emergency dredged material disposal event. The results of this sampling indicated that:

- DDT was again below the LOR at all locations, including those at Mud Island DMPA and reference locations.
- DDE was detected at all sampling locations with 95% UCL concentrations exceeding the NAGD screening level at both the DMPA and reference locations. This indicates that DDE was widespread throughout the study area.
- A comparison of the 80$^{th}$ percentile DDE of the reference locations was higher than historical levels of DDE in the Brisbane River. This indicates that the Brisbane River flood plume in

January 2013 impacted on the Brisbane River, Bramble Bay and the wider Moreton Bay region and the maintenance dredging operations undertaken by PBPL were not likely to have caused or spread this contamination.

- Additional elutriate and pore water analyses for OCPs indicated that DDD and DDE are likely adsorbed to the clay fraction of the sediment and thus not bioavailable.

### 2.2.3 Dioxins

Dioxins and furans were detected in the 2011 and 2013 flood sampling events. A toxic effect factor is allocated to each compounds which allows the total toxicity of combined dioxins and furans to be determined using the toxic equivalence (TEQ).

In 2011, the WHO-TEQ$_{(0.5\ LOR)}$ value (concentrations below LOR are assigned a concentration equal to half the LOR) was elevated at one location in Zone 3 with a concentration of 25.36 pg/g. All other sampling locations, including at the DMPA had concentrations between 6.02 and 10.89 pg/g WHO-TEQ.

In 2013, the WHO-TEQ concentrations were generally lower ranging between 0.5 pg/g to 5.3 pg/g.

There are no sediment quality guideline values for comparison that would apply to Australian sediments.

#### *2.2.3.1 Comparison to Background Concentrations (2013)*

The WHO-TEQ concentrations at the Mud Island DMPA sites ranged between 4.24 to 4.94 pg/g. The WHO-TEQ concentrations were higher at the reference site in comparison ranging between 7.87 to 7.97 pg/g. Approximately 99% of the sediment concentrations at all sampling locations comprised of 99% dioxins and 1% furans.

Pore water WHO-TEQs ranged between 0.5 and 7.3 pg/g at the DMPA and between 3.1 and 8.0 pg/g at the reference sites. Mean values and 95% UCL concentrations were lower than the 80$^{th}$ percentile of dioxins/furans at the reference area.

A comparison with historical data (Hermanussen et al. 2004; Mueller et al. 2004) shows that dioxins/furans have been historically present within Moreton Bay in elevated concentrations and that their concentrations are not directly related to dredging activities.

### 2.2.4 Organotins

Organotin concentrations were below the NAGD screening level or below LOR in 2011 and 2013.

#### *2.2.4.1 Comparison to Annual Sampling*

The relatively low concentrations of organotins in the flood sampling of 2011 and 2013 appear to be different to the pattern observed in the annual sampling campaigns. However, it should be noted that TBT was only detected at three locations above the NAGD screening for the annual 2010 and 2012 sampling events.

The overall low organotin concentrations across the dredge area after the 2011 and 2013 floods may be due to burial and mixing with sediments from the catchment.

### 2.2.5 Polychlorinated Biphenyls (PCBs)

PCB concentrations were below LOR at all sampling locations in 2011. In 2013, one location in Zone 3 had a normalised total PCB concentration (38.9 µg/kg) exceeding the NAGD screening level of 23 µg/kg. PCB concentrations were below LOR at all other locations in 2013.

#### *2.2.5.1 Comparison to Annual Sampling*

Similar to the annual sampling events, PCBs exceeded the NAGD screening level at only one location or were not detected.

### 2.2.6 Other Organic Contaminants

Concentrations of BTEX, TPHs, PAHs, OPPs, Phenols, Chlorobenzenes, halogenated compounds and non-organochlorine pesticides were either below LOR or below their respective screening levels in 2011 and 2013.

#### *2.2.6.1 Comparison to Annual Sampling*

The pattern observed for BTEX, TPHs, PAHs, OPPs were similar to the those observed in the annual sampling events, i.e. BTEX and OPPs were below their laboratory LORs whereas TPHs and PAHs were typically detected but at concentrations well below the respective NAGD screening levels.

### 2.2.7 Porewater Ammonia

Sediments at all locations had porewater concentrations below the literature derived guideline level of 11 mg/L (Batley and Simpson 2009). The only exception was one site in Zone 2 where the guideline level was marginally exceeded (16.6 mg/L).

### 2.2.8 Acid Sulfate Soil

Acid sulfate soils were tested in the 2011 flood sampling. Actual acidity was below the laboratory LOR for all samples, but potential acidity exceeded the QASSIT guideline limit identifying the samples as potential acid sulfate soils (PASS).

The acid neutralising capacity was sufficient in all samples resulting in a net acidity less than the LOR indicating that no liming would be required if the material would be placed on land.

#### *2.2.8.1 Comparison to Annual Sampling*

Results for the flood sampling were consistent with the annual maintenance dredge sampling.

## 2.3 Summary of Annual and Flood Sampling Data

Consistent across the annual and flood sampling events, the main contaminants of concern in the Brisbane River dredge area were the metals nickel and mercury, and DDT metabolites. TBT was also found above screening levels during routine annual monitoring, but was below screening levels in the 2011 and 2013 post-flood sampling episodes. This could suggest that the flood events had dispersed, diluted or buried TBT contaminated material.

Exceedances of the NAGD screening level for mercury, organochlorine pesticides and organotins were most frequently detected upstream of the Port area, i.e. in Zone 2 with a lower occurrence of screening level exceedances in the Port area (Zone 3) and the Entrance Channel area (Zone 4).

The similar spatial patterns of contaminant distribution observed between the regular annual sampling and the flood sampling indicates that catchment runoff from the urbanised and industrialised area upstream of the Port and not the Port of Brisbane is likely the main contributor of contaminants in the dredge area.

Organochlorine pesticides may be present due to broad non-point catchment sources or as legacy material. TBT is mainly originating from local marine industry sources and ships. Mercury may be introduced to the system via sewage treatment plant discharges (including trade waste) or other industrial point sources along the river.

The wide distribution of high nickel concentrations across the entire dredge area and upstream reference locations indicates that nickel is of natural origin (due to local mineralogy) across the broader catchment.

# 3 Sampling and Analysis

## 3.1 Sampling Rationale

### 3.1.1 Number of Sampling Locations

As per NAGD, the number of sample locations for medium sized projects (up to 500,000 $m^3$) should be divided into distinct sites based on their chemical characteristics. Based on the review of historical data (Section 2) and consistent with previous sampling campaigns, the dredge area was divided into three zones (Table 3-1).

Table 6 of NAGD was used to determine the number of sampling locations for each dredging subarea. Given that current, good quality data were available to support the classification, the number of sampling locations was halved and rounded up as per NAGD. Table 3-1 also shows the required number of sampling locations for Phase III testing (elutriate and bioavailability).

In addition to the required samples to be obtained from the dredge areas, samples will be collected also from upstream and downstream 'reference' areas. This includes two locations from Zone 1 which were sampled in previous sampling campaigns and five locations from Moreton Bay which were sampled as part of additional sediment sampling following the 2011 and 2013 flooding. Furthermore, two samples will be collected from the Mud Island DMPA.

**Table 3-1 Number of Sampling Locations as per NAGD**

| Dredging Subarea | Classification | Dredge Volume ($m^3$) | # Locations – Phase II | # Locations – Phase III |
|---|---|---|---|---|
| Zone 2 | Probably contaminated | 150,000 | 10 | 5 + 1 replicate |
| Zone 3 | Probably clean | 250,000 | 11 | 6 + 2 replicates |
| Zone 4 | Probably clean | 30,000 | 5 | 3 + 1 replicate |
| **Additional Samples** | | | | |
| Zone 1 | Upstream Reference | N/A | 2 | N/A |
| Moreton Bay | Downstream Reference | N/A | 5 | N/A |
| Mud Island | DMPA | N/A | 2 | N/A |

### 3.1.2 QA/QC Samples

In accordance with NAGD requirements, the following field and laboratory quality control samples will be obtained:

- Field triplicate samples (two additional grab samples at 10% of sample locations) to determine the small scale variability of the sediment physical and chemical characteristics. Based on a total of 26 primary locations in dredged areas (Zones 2, 3 and 4), field triplicate samples would be required at three locations. Two additional samples would therefore be collected at location 5-1 (Zone 2), 11-9 (Zone 3) and 13-4 (Zone 4).
- Triplicate split samples (primary sample from 5% of locations thoroughly mixed and split into three sample container sets) to assess laboratory variation, with one of the three samples sent to a second (reference) laboratory for analysis. Based on a total of 26 primary locations in dredged areas (Zones 2, 3 and 4), field split samples would be required at two locations. Split samples would be undertaken at location 6-2 (Zone 2) and 10-6 (Zone 3).

- One trip blank container per sampling day filled with inert material (e.g. chromatographic sand) to be analysed concurrent with the analysis of volatile organic substances such as; and
- One inter-batch sample from a previous batch of samples if more than one batch is submitted to the laboratory, to determine the analytical variation between batches. However, it is anticipated that all samples will be submitted in one batch.

Table 3-2 provides a summary of QA/QC samples to be obtained for the three dredging subareas.

**Table 3-2 Number of Primary and QA/QC Samples**

| Dredging Subarea | Primary Samples | Field Triplicate Samples | Triplicate Split Samples | Trip blanks |
|---|---|---|---|---|
| Zone 2 | 10 | 2 | 2 | 1 per sampling day |
| Zone 3 | 11 | 2 | 2 | |
| Zone 4 | 5 | 2 | | |

### 3.1.3 Sampling for Elutriate and Bioavailability Testing

The sediment sampling will include additional sediment samples for Phase III testing (elutriate and bioavailability). Phase III testing will be undertaken for parameters which have frequently exceeded the NAGD screening levels in the past. Based on the review of historical data (Section 2) this will include:

- Metals and metalloids (nickel and mercury);
- Organotins (TBT); and
- Organochlorine Pesticides (DDT, DDD, DDE, chlordane).

Exceedances of NAGD screening levels were predominantly detected in Zone 2 and Zone 3. In accordance with Table 7 of NAGD, five locations would need to be sampled for Zone 2 and six locations for Zone 3 (Table 3-1).

In order to allow elutriate analysis, 20 L of seawater will be collected from the Mud Island DMPA.

Phase III testing for nickel and mercury (and potential other metals/metalloids) can be undertaken from the primary samples collected for the sediment quality assessment. The bioavailability analysis for nickel and mercury will involve dilute acid extraction as per NAGD. Analysis will be performed on the samples with the highest concentrations.

Bioavailability analysis for the organic contaminants (organotins and organochlorine pesticides) will require porewater testing as per NAGD. Additional samples will be collected for porewater testing at the locations which have historically shown the highest percentage of screening level exceedances. The proposed sampling locations for this testing are provided in Section 3.2.1. In order to meet required holding times, elutriate and bioavailability analysis for the organic contaminants will be undertaken concurrent with the analysis of the primary samples.

## 3.2 Sampling Locations

A map with the proposed sampling locations is provided in Figure 3-1. In order to provide consistency with previous sampling and to facilitate comparisons with historical data, most of the proposed sampling locations were selected from the set of historical sampling locations, and to also focus on areas that are most frequently dredged. Additionally, sampling locations were added to close spatial gaps in sediment quality data. These include sampling locations 5-1 in Zone 2 as well as locations 9-5 and 9-6 in Zone 3 (Figure 3-1).

As outlined in more detail in Section 3.5, samples from all locations will be analysed for a basic suite of parameters. A selection of these sites will also be analysed for a detailed suite in addition to the basic suite including 'low risk' parameters that have been detected in the past but were typically below their respective NAGD screening levels.

### 3.2.1 Sampling Locations for Porewater Testing

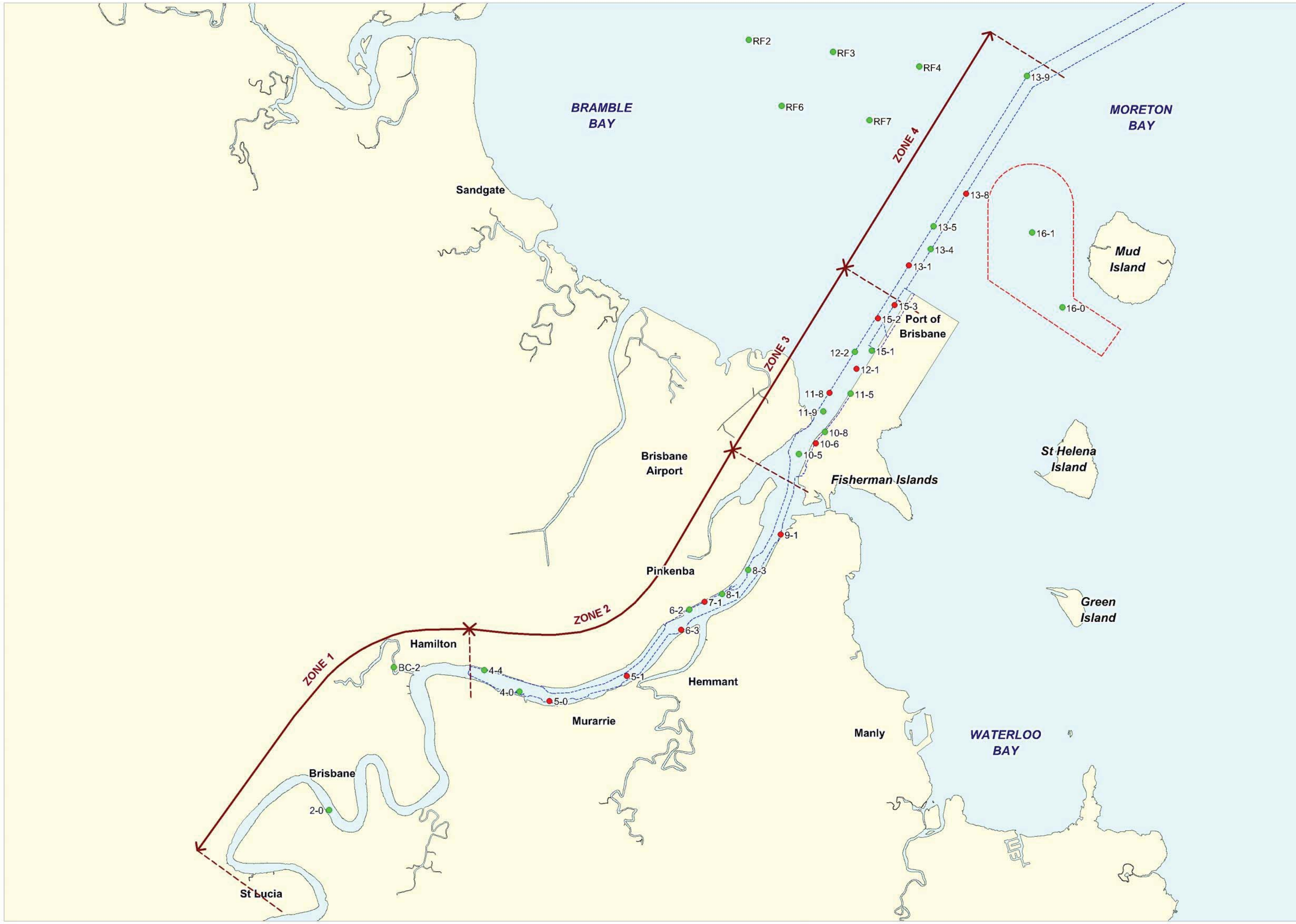
Additional sediment samples will be collected at selected locations for pore water testing of organic contaminants as part of the Phase III elutriate and bioavailability assessments (refer to Section 3.1.3).

Exceedances of NAGD screening levels were predominantly detected in Zone 2 and Zone 3. Five additional pore water samples (plus one replicate) and six samples (plus two replicates) will be collected from zones 2 and 3, respectively (see also Table 3-1). Four samples will be collected from Zone 4 however based on the historical data samples will only be analysed if contaminants exceed screening levels during Phase II sampling.

Based on the review of historical data, sample locations with the highest percentage of screening level exceedances between 2000 and 2012 were chosen for the additional pore water testing:

Zone 2: Locations 4-0, 5-0, 6-2, 7-1 and 8-3.

Zone 3: Locations 10-5, 10-6, 10-8, 11-8, 11-9 and 12-1.




| Location | Easting | Northing |
|---|---|---|
| BC-2 | 504,134.0 | 6,964,789.5 |
| 4-0 | 507,652.5 | 6,964,101.7 |
| 4-4 | 506,672.0 | 6,964,709.0 |
| 5-0 | 508,498.5 | 6,963,840.7 |
| 5-1 | 510,665.0 | 6,964,541.0 |
| 6-2 | 512,413.5 | 6,966,401.7 |
| 6-3 | 512,189.5 | 6,965,833.7 |
| 7-1 | 512,842.5 | 6,966,620.7 |
| 8-1 | 513,334.5 | 6,966,836.7 |
| 8-3 | 514,068.4 | 6,967,511.7 |
| 9-1 | 514,975.4 | 6,968,505.7 |
| 10-5 | 515,491.4 | 6,970,754.7 |
| 10-6 | 515,963.4 | 6,971,063.7 |
| 10-8 | 516,214.4 | 6,971,379.7 |
| 11-5 | 516,940.4 | 6,972,451.7 |
| 11-8 | 516,343.4 | 6,972,473.7 |
| 11-9 | 516,167.4 | 6,971,952.7 |
| 12-1 | 517,099.4 | 6,973,147.7 |
| 12-2 | 517,055.6 | 6,973,620.8 |
| 15-1 | 517,530.4 | 6,973,661.7 |
| 15-2 | 517,699.1 | 6,974,565.4 |
| 15-3 | 518,165.2 | 6,974,930.6 |
| 13-1 | 518,570.4 | 6,976,043.7 |
| 13-4 | 519,180.4 | 6,976,502.7 |
| 13-5 | 519,264.4 | 6,977,141.7 |
| 13-8 | 520,173.4 | 6,978,053.7 |
| 13-9 | 521,880.4 | 6,981,356.6 |
| 16-0 | 522,872.0 | 6,974,873.0 |
| 16-1 | 522,028.0 | 6,976,971.0 |
| RF2 | 514,084.0 | 6,982,366.0 |
| RF3 | 516,443.0 | 6,982,027.0 |
| RF4 | 518,864.0 | 6,981,619.0 |
| RF6 | 515,003.0 | 6,980,511.0 |
| RF7 | 517,470.0 | 6,980,112.0 |

**LEGEND**

- Basic Suite
- Basic Suite and Detailed Suite
- Dredge Area
- Dredge Material Placement Area

Title:
**Proposed Sampling Locations**

Figure: **3-1**

Rev: **A**

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

N

0 2.5 5km
Approx. Scale

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www.bmtwbm.com.au

Filepath : I:\B20259_I_BRH Port of Brisbane DLR\DRG\ECO_020_130924 Proposed Sediment Sampling Plan.wor

## 3.3 Sample Collection Methodology

### 3.3.1 Survey Vessel and Positioning

A suitable sampling vessel will be used to undertake sediment sampling. Navigation to the sampling locations will be undertaken using a differentially corrected global positioning system (GPS) with an accuracy of approximately ±1 m.

### 3.3.2 Sediment Grab Sampling

NAGD Appendix D states that:

'*grab samplers may be used, i.e., for maintenance dredging surveys in frequently dredged areas with substantial shipping traffic. Here, because the sediments are mixed continually, samples taken with a grab sampler can be representative as long as the grab is designed to retain the entire sample.*'

It is also noted that the one metre long sediment cores obtained in all previous sampling campaigns were always composited to single samples. Furthermore, highest contamination levels are typically expected in the top sediment layer, which would be sampled using a grab sampler. It is therefore proposed that a grab sampler will be used to obtain representative sediment samples.

All sediment sampling will be undertaken by experienced personnel. A Van Veen grab sampler (0.14 $m^2$ gape) will be used to collect surface sediments from all sample locations. Only samples obtained with properly closed grab jaws will be processed to ensure that the fine sediment fractions are retained.

The grab sampler will be thoroughly cleaned with De-con 90 solution prior to use and cleaned and rinsed with seawater to prevent cross contamination between samples.

In order to overcome issues with potential high variability at sampling locations, a minimum of two grabs will be collected at each sampling location and pooled as one sample. An adequate number of grabs will be obtained and pooled for each sample location to ensure that sufficient sediment is collected for all analyses.

### 3.3.3 Sample Handling

#### *3.3.3.1 Sample Processing*

Sample management procedures on the sampling vessel will include the careful processing of sediment samples following the recovery of the sediment grab sample from the seabed.

Photographs of the grab samples will be taken and field personnel will log each sample for its physical characteristics and variations in sediment type and texture. The grab samples from each location will be carefully homogenized in a clean container prior to the filling of analytical laboratory-supplied clean sampling jars.

Sample bottles will be labelled with a waterproof marker pen on the bottle label and lid. Sample bottles for organic analyses will be filled with zero headspace to prevent volatilisation. QA/QC samples will be blind-labelled to ensure that the laboratories cannot relate the QA sample back to the primary sample.

### 3.3.3.2 Sample Log

All sediment samples will be geotechnically logged upon collection on a standardised pro-forma. The following information will be recorded:

- Project name and number;
- The name of the sample collector;
- Date and Time of sampling;
- Type of grab sampler used;
- Field sample number;
- Northing and Easting of sample location (from onboard DGPS);
- Sediment colour;
- Sediment odour;
- Field texture (fine sand, silt, clay, sand, clayey sand);
- Tidal predictions and water depth at sample location (derived from onboard depth sounder);
- Weather and sea state conditions at the time of sampling; and
- General comments pertaining to the sample (e.g. presence of organic matter or benthic organisms, etc.

### 3.3.3.3 Sample Processing QA/QC

All sample handling and processing will be performed to minimise contamination and sample mix-ups. All sample equipment will be cleaned prior to sample collection using a scrub with decontamination solution followed by a rinse with seawater.

The workspace on the vessel will be washed down regularly with ambient seawater to clean all surfaces and minimize the potential for dust contamination of samples. All sample processing will be undertaken away from any potential contamination sources such as engine exhausts, fuels, oils, greases, lead weights, zinc anodes, antifouling paint etc.

Nitrile gloves will be worn by all field personnel handling the sediment, and gloves will be disposed of after processing of each sample.

Utmost care will be maintained in ensuring that cross-contamination between samples is not possible. Samples collected from each location will be placed into appropriately cleaned and preserved containers (labelled prior to filling) provided by the analytical laboratories.

Following sample processing and filling of sample containers, all samples will be immediately chilled on ice following sample collection. All acid sulfate soil samples will be transferred to a freezer at the end of each sampling day to minimise potential oxidation of the samples.

#### 3.3.3.4 Sample Submission and Chain of Custody

All samples will be traced using Chain of Custody (COC) documentation submitted to the laboratory. This will ensure that sample possession and processing can be traced from sample collection to reporting of results.

The COC record may include, but is not limited to, the following information:

- Project name and number;
- Name(s) of sampler(s);
- Sample type, identification number and location;
- Date of collection;
- Number and types of containers;
- Required analyses;
- Preservatives (if any) and storage conditions; and
- Signatures documenting change of sample custody.

At the conclusion of the sampling program the sediment samples will be submitted to the analytical laboratories for processing and analysis in a single batch within prescribed holding times.

## 3.4 Health & Safety and Contingency Plan

### 3.4.1 Health and Safety

The vessel skipper will keep in close contact with Brisbane VTS/Harbour Control during sampling. Grab sampling can be completed at each location in around 20 minutes with logging and processing undertaken in locations out of the path of large vessels (as necessary and dependent upon shipping movements).

A single anchor may be used to anchor the vessel. The anchor would be placed upstream and upwind of the vessel. A marker buoy may be placed on the anchor if required.

The sampling vessel will display appropriate flags (R over Y) for the work being carried out at all times. Interactions with other vessel traffic will be minimised by being mindful of approaching vessels.

### 3.4.2 Adverse Weather

The planning of field sampling will involve regular checking of available weather forecast services for the study area. There are no unusual hazards in operating the grab sampler in wet weather.

In case of adverse weather conditions that would make sampling unacceptable due to strong winds and high waves, the sampling team and vessel operator would remain on stand-by until weather conditions improve to allow rigorous and safe collection of sediment samples.

### 3.4.3 Equipment Failure

The grab sampler and lifting arrangement is sufficiently robust and no failure of the equipment is expected to occur during the sampling. Prior to sampling, all equipment will be thoroughly checked and repaired if necessary.

In the unlikely event of equipment failure during sampling, repairs to any equipment would be undertaken as soon as possible to minimise delays as far as practical.

## 3.5 Contaminants List

### 3.5.1 Rationale for Selection of Sampling Parameters

In accordance with NAGD, the contaminants to be investigated should include:

- Toxic substances known, from previous investigations, to occur in dredge area sediments at levels greater than one-tenth of the screening levels; or
- Based on the historical review, substances potentially present at such levels in the sediments to be dredged.

Based on the review of existing sediment quality data (Section 2), samples will be analysed as follows:

**Basic List of Parameters:**

- Analysis undertaken at all sampling locations;
- Analysis includes contaminants of (potential) concern and supplementary parameters:
  - Metals/Metalloids (As, Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn, Al, Fe);
  - Organotins (MBT, DBT, TBT);
  - Organochlorine Pesticides (including DDT, DDD, DDE, chlordane);
  - Particle size distribution;
  - Moisture content; and
  - Total Organic Carbon.

**Detailed List of Parameters:**

- Analysis undertaken at 30% of sampling locations and new sampling locations (i.e. 5-1, 9-5 and 9-6).
- Analysis includes ‘low risk’ parameters that have been detected in the past but generally in concentrations below LOR or NAGD screening levels:
  - Polycyclic Aromatic Hydrocarbons (PAHs);
  - Total Petroleum Hydrocarbons (TPHs);
  - Polychlorinated Biphenyls (PCBs);
  - Acid Sulfate Soils;
  - Nutrients (TP, TN, NOx, TKN); and

    ○ Radionuclides.

**Elutriate and Bioavailability Testing:**

- Metals/Metalloids (Hg and Ni);
- Organotins (TBT); and
- Organochlorine Pesticides (DDT, DDD, DDE, chlordane).

## 3.6 Laboratory Analysis

### 3.6.1 Analytical Laboratories

Primary analysis of the sediment samples will be conducted by Advanced Analytical Australia Pty Ltd (AAA). Australian Laboratory Services (ALS) will be used as the secondary (reference) laboratory for inter-laboratory quality testing.

Both analytical laboratories are fully accredited by the National Association of Testing Authorities (NATA). AAA will subcontract some of the analyses to specialised NATA accredited laboratories, i.e. Sydney Analytical Laboratories (ammonia, Total Organic Carbon) and Microanalysis (Particle Size Distribution).

### 3.6.2 Analytical Tests

The primary laboratory Advanced Analytical Australia will perform all analyses in accordance with NAGD and will meet or provide better practical quantitation limits (PQL) than the target PQL's (Table 3-3).

**Table 3-3 Analytical Parameters and Practical Quantitation Limits**

| Parameter | Target Practical Quantitation Limit (required) | Practical Quantitation Limit (Advanced Analytical Australia) |
|---|---|---|
| Moisture Content | 0.1% | 0.1% |
| Particle Size (sieve and sedigraph) | Size distribution (sieve + hydrometer or equivalent) and rates of settlement after 50% and 90% of settlement in seawater if possible. | 10 to 0.001mm<br>Settling velocities in m/s for all particle size fractions |
| Total Organic Carbon | 0.1% | 0.01% |
| Total Petroleum Hydrocarbons | 100 mg/kg | 10-50 mg/kg |
| Polychlorinated Biphenyls | 5 µg/kg | 5 µg/kg |
| PAHs (naphthalene, acenaphthalene, acenapthene, fluorene, phenanthene, anthracene, total fluoranthene, benzo [a]anthracene, benzo [a] pyrene, chrysene, dibenz[a,h] anthracene, pyrene, 2-methylnapthalene) | Individual - 5 µg/kg; Sum of PAHs - 100 µg/kg | Individual - 5 µg/kg; Sum of PAHs - 100 µg/kg |

| Parameter | Target Practical Quantitation Limit (required) | Practical Quantitation Limit (Advanced Analytical Australia) |
|---|---|---|
| Trace Metals and Metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc) | 0.1 – 100 mg/kg, Hg- 0.01 mg/kg | 0.1 – 5 mg/kg, Hg – 0.01 mg/kg |
| Organotins (MBT, DBT, TBT) | 1 µg Sn/kg | 0.5 µg Sn/kg |
| OCP Pesticides | 1 µg/kg | OCP-1 µg/kg |
| | | |
| Total Nitrogen<br>Total Kjeldahl Nitrogen<br>Nitrate & Nitrite as N<br>Total Phosphorus | N/A<br>N/A<br>0.1 mg/kg<br>N/A | 20 mg/kg<br>20 mg/kg<br>0.1 mg/kg<br>1 mg/kg |
| Acid Sulfate Soils | N/A | 2 mole $H^+$/tonne |
| Radionuclides | N/A | 35 Bq/g |

### 3.6.3 Sample Containers

Based on the proposed analyses, the following sample containers would be required per sample:

- 2 x 250 mL glass jar – organic/inorganic chemical analysis;
- 1 x 125 mL glass jar – nutrient analyses;
- 1 x medium plastic clipseal bag (50-100 g) – particle size distribution; and
- 1 x small clipseal bag (200 g) – acid sulfate soil.

### 3.6.4 Quality Control – Laboratory Analysis

Both laboratories will follow laboratory QC procedures in accordance with requirements outlined in Appendix F of NAGD. This includes analysis of laboratory blanks, duplicates, certified reference materials and spiked samples.

#### *3.6.4.1 Laboratory Blanks*

The purpose of this assessment is to monitor a potential laboratory contamination of samples due to potential cross-contamination of samples during laboratory preparation, extraction or analysis. Blank sample concentrations should be at or near the detection limit of the method used.

#### *3.6.4.2 Laboratory Duplicates*

This assessment refers to a randomly selected intra-laboratory split sample, which provides information regarding the method precision and sample heterogeneity. Results are presented as Relative Percent Difference (RPD) values of two sample concentrations for a specific contaminant.

NAGD recommends that duplicates should agree within a typical RPD of the method of ±35 %. This recommended RPD is typically not adopted by analytical laboratories as it does not account for the greater uncertainty for contaminant concentrations close to the method's detection limit.

The primary laboratory AAA uses the following approach to assess duplicate RPD's:

- Result <10 times LOR – no limit to RPD; and
- Result >10 times LOR – RPD between 0% and 50%.

The secondary laboratory ALS adopts specific RPDs for individual compounds.

#### *3.6.4.3 Surrogate and Matrix Spikes*

Laboratory Control Samples are either certified reference materials or a blank sample spiked with known concentrations of the analytes of interest. The purpose of this measurement is to monitor method accuracy.

Matrix spikes refer to an intra-laboratory split sample spiked with a representative set of target analytes of known concentration. Matrix spikes are assessed to monitor potential sample matrix effects on analyte recoveries.

Surrogate spikes are used for organic analytes. Surrogates are known additions to samples which mimic the compounds of interest and are not normally expected to be present in the sample.

For both surrogate and matrix spikes, a calculation of the percent recovery of the spiked amount against the returned concentration is performed indicating analytical performance in terms of extraction efficiency.

NAGD states that recovery limits of 75% - 125% are generally acceptable. Analytical laboratories typically adopt specific surrogate and matrix spike recovery limits for the various contaminant compound groups. It is also noted that ideal recovery ranges may be waived in the event of sample matrix interference.

The primary laboratory AAA adopts the following acceptable surrogate and matrix spike recovery limits:

- Trace elements: 70-130%;
- Organic analyses: 50-150%;
- SVOC & speciated phenols: 10-140%; and
- Surrogates: 10-140%.

The secondary laboratory ALS adopts specific recovery limits for individual compounds.

## 3.7 Data Analysis

### 3.7.1 Sediment Contaminants

Concentrations of chemicals measured in sediment samples at each dredging sub-area (or reference area) will be compared to screening levels listed in Table 2 of NAGD. This will provide a basis for determining whether dredged material is suitable for unconfined placement at sea or if further analyses, such as elutriate, bioavailability or toxicity testing, are required.

For each dredging sub-area, the mean concentrations of chemical parameters at the upper 95% confidence level (95% UCL) will be calculated and compared against NAGD guideline levels. This involves the following steps.

**Data pre-treatment**

Analytical values below detection limit will be set to one-half of the laboratory Limit of Reporting (LOR) as per NAGD recommendation to facilitate 95% UCL calculation. Organic contaminant results will be normalised to 1% Total Organic Carbon (TOC) where the measured value is within the range of 0.2-10%. If TOC values are outside of this range, the highest (10%) or lowest (0.2%) value will be adopted as appropriate. Organic parameters with concentrations below detection limits will not be normalised to 1% TOC but included at half their LOR.

One assumption in the calculation of the 95% UCL is that the samples are statistically independent. Therefore, field triplicate samples and laboratory split samples will not be included in the 95% UCL calculation.

**Outliers**

Outliers will be treated in accordance with the procedure in NAGD. In summary this will involve:

(a) Outliers (for all parameters) will be identified as any data points greater than two standard deviations.

(b) For TBT, where outliers are detected, the stored portion of the sample will be analysed in triplicate.

(c) If the original result is not confirmed through the re-analysis, it will be discarded in favour of the mean of the three triplicate samples.

NAGD does not provided guidance on treatment of outliers for other parameters. Outliers for other parameters will be noted in the report but included in calculation of the 95% UCL.

**Selection of appropriate 95% UCL Calculation Method**

The methodology for calculating the 95% UCL follows the approach recommended in Appendix A of NAGD. A Shapiro-Wilk test will be used to determine whether data followed a normal distribution. The ProUCL (Version 4.1.00) software package will be used for these calculations (Singh et al. 2010).

**Calculation of 95% UCL and Comparison to Screening Levels**

ProUCL Version 4.1.00 will be used to calculate the 95% UCL. For normally distributed data, the arithmetic mean and standard deviation will be calculated, and the 95% UCL calculated using the one-tailed Student's *t* UCL test. For data that follows a log-normal (or other) distribution, the geomean will be calculated, and the 95% UCL analysed using non-parametric Jack-Knife analysis as per NAGD recommendation.

In cases where an insufficient number of discrete values in the dataset would not allow calculation of the 95% UCL (e.g. most values below LOR), the maximum recorded value of the dataset will be conservatively used instead for comparison against NAGD trigger levels.

Should 95% UCL values for all analysed parameters fall below NAGD screening levels, the sediment would be considered clean and suitable for unconfined disposal at sea.

### 3.7.2 Baseline Concentrations

NAGD states that ambient baseline concentrations can be determined by sampling of sediment at reference areas in the vicinity of an existing disposal site. Similar to the approach followed in Worley Parsons (2013c, d), the data collected from the five reference locations in Moreton Bay would be used to derive ambient baseline concentrations if required (RF2, 3, 4, 6 and 7 in Figure 3-1).

## 3.8 Elutriate and Bioavailability Testing

As outlined on Section 3.1.3, elutriate and bioavailability testing will be undertaken as per NAGD for a range of contaminants which have regularly exceeded screening levels in the past.

**Elutriate Testing:**

The elutriate test is designed to simulate release of contaminants from sediment during dredged material disposal. Testing will be carried out using the USEPA's standard seawater elutriate test which involves shaking the sediment samples with four times the volume of seawater at room temperature for 30 minutes. The sample will be allowed to settle for one hour and the supernatant centrifuged or filtered (0.45 µm) within sixty minutes, and analysed using analytical methods appropriate for determining ultra-trace levels in seawater.

Results will be compared to the respective ANZECC/ARMCANZ (2000) marine water quality trigger value (for 95% or 99% protection of species, as appropriate).

**Bioavailability Testing:**

The Dilute Acid Extraction (DAE) method will be used to provide an estimate of the bioavailable fraction of the contaminant of concern in case of metal/metalloid analysis. The sediment samples will be extracted using a weak acid and the results compared against the respective NAGD screening levels.

Porewater analysis would be undertaken for organic contaminants such as TBT. Porewater is assumed to represent the major route of exposure to sediment contaminants by benthic organisms and is the recommended bioavailability test for organic contaminants as per NAGD. Porewater results would be compared to the respective ANZECC/ARMCANZ (2000) marine water quality trigger value (for 95% protection of species).

Should both elutriate and bioavailability tests result in values less than the respective guideline limits, the material would be considered clean and suitable for ocean disposal.

### 3.8.1 Acid Sulfate Soils

The results of the chromium-suite acid sulfate analysis will be assessed against the Australian framework for Acid Sulfate Soil management in coastal systems (Ahern et al. 1998). The risk of acidification will be determined by the acid-base accounting approach (Ahern et al. 2004). Net acidity will be calculated from the results as a measure of the acid producing capacity of the sampled sediment upon complete oxidation.

The calculated net acidity will then be compared to the QASSIT action criteria of 0.03% S or 18 mol $H^+$/tonne to assess the need for acid sulfate soil management if the dredged sediments were to be placed on land.

The liming rate will indicate the amount of lime that needs to be added to the soil to manage its acid generating capacity.

## 3.9 Data Validation

All laboratory analyses will be validated in accordance with Appendix A of NAGD to confirm suitable data quality for undertaking a rigorous characterisation of the proposed dredge material.

Data Validation will involve assessment of the following:

- Sample holding times and storage conditions;
- Laboratory blanks, duplicates and surrogate/matrix spikes; and
- Field triplicates samples, triplicate sample splits and trip blank.

The proposed data quality objectives for data validation are outlined in Table 3-4.

**Table 3-4 Data Quality Objectives for Data Validation**

| Parameter | Data Quality Objective |
|---|---|
| Holding Time | Samples received within specified holding time (NAGD Appendix H) |
| Field Triplicate Samples | Relative Standard Deviation <50% |
| Triplicate Split Samples, including inter-laboratory samples | Relative Standard Deviation <50% |
| Laboratory Blanks | At or near the Limit of Reporting (LOR) |
| Laboratory Duplicate Samples | Relative Percent Difference (RPD) <35% or as per laboratory requirements |
| Laboratory Matrix Spikes | Recovery as per laboratory requirements |
| Surrogate Spikes | Recovery as per laboratory requirements |

## 3.10 Reporting

The reporting of sediment quality results will be undertaken in a SAP Implementation Report in accordance with NAGD including the following components:

- Summary of the SAP, or SAP appended to the report;
- Outline of potential problems encountered and deviations from the SAP, including justification;
- Description of the sampling carried out, along with the actual sampling locations, sample numbers (including replicates and QA samples), completed COC forms, field logs and description of sediments;
- Comparison of the 95% UCL of mean chemical concentrations of sediments in the dredge subareas;
- Assessment of QA/QC procedures for both field and laboratory data;

- Data validation including comparison to data quality objectives;
- Appendices including all laboratory and field data; and
- Conclusions as to the acceptability or otherwise of the dredge material for unconfined ocean disposal and recommendations as to further work required.

# 4 References

Ahern, C.R., Ahern, M.R., Powell, B. (1998). Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998: DEH, Brisbane.

Ahern, C.R., McElnea, A.E., Sullivan, L.A. (2004) Acid Sulfate Soils Laboratory Methods Guidelines. Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia.

ANZECC/ARMCANZ. (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Vol. 4). Canberra: Australian and New Zealand Environment and Conservation Council, and Agriculture and Resource Management Council of Australia and New Zealand.

Batley, G.E. & Simpson, S.L. (2009) Development of guidelines for ammonia in estuarine and marine water systems. Marine Pollution Bulletin 58, 1472-1476.

Butler Partners (2002) Sediment Sampling & Analysis Plan Brisbane River & Outer Bar, Moreton Bay (November 2001). Report prepared for Port of Brisbane Corporation.

Commonwealth of Australia (2009) National Assessment Guidelines for Dredging: Department of the Environmental, Water, Heritage and the Arts, Canberra.

GHD (2010) Report for Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay, Revision 1 (May 2010). Report prepared for Port of Brisbane Corporation.

Hydrobiology (2003) Sediment Sampling and Analysis Plan for the Brisbane River and Outer Bar (November 2002). Report prepared for Port of Brisbane Corporation.

Hydrobiology (2004) Sediment Sampling and Analysis Plan for the Brisbane River and Outer Bar (November 2003). Report prepared for Port of Brisbane Corporation.

Maunsell McIntyre (2001) Sediment Sampling and Analysis Plan (SAP) in the Brisbane River and Outer Bar (November 2000). Report prepared for Port of Brisbane Corporation.

SKM (2005) Sediment Sampling and Analysis Plan (SAP) for Brisbane River and Moreton Bay (November 2004). Report prepared for Port of Brisbane Corporation.

SKM (2006) Sediment Sampling and Analysis Plan (SAP) for Brisbane River and Moreton Bay (January 2006). Report prepared for Port of Brisbane Corporation.

SKM (2007) Sediment Sampling and Analysis Plan (SAP) for Brisbane River and Moreton Bay 2007. Report prepared for Port of Brisbane Corporation.

Preda, M. & Cox, M.E. (2002) Trace metal occurrence and distribution in sediments and mangroves, Pumicestone region, southeast Queensland, Australia. Environment International 28, 433-449.

Singh, A., Maichle, R., Armbya, N. (2010) ProUCL Version 4.1 User Guide (Draft) Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. U.S. Environmental Protection Agency, Washington.

Worley Parsons (2008) Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay (January 2008). Report prepared for Port of Brisbane Corporation.

Worley Parsons (2009) Sediment Sampling and Analysis Plan – Brisbane River and Moreton Bay (February 2009). Report prepared for Port of Brisbane Corporation.

Worley Parsons (2011a) Brisbane River and Moreton Bay – Annual Sediment Characterisation Report 2011. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2011b) Emergency Dredging Sediment Sampling Results 2011. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2012) Brisbane River and Moreton Bay – Annual Sediment Characterisation Report 2012. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2013a) Brisbane River and Moreton Bay – Annual Sediment Characterisation Report 2013. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2013b) Emergency Dredging Sediment Sampling Results 2013. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2013c) Emergency Dredging Sediment Sampling – Round 2 Organochlorine Pesticides Results. Report prepared for Port of Brisbane Pty Ltd.

Worley Parsons (2013d) Emergency Dredging Sediment Sampling – Round 2 Dioxin Results. Report prepared for Port of Brisbane Pty Ltd.

| | |
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# Appendix B Sediment Sampling Log

| Site | Time | Date | Depth | Sediment | | | | Comment - Presence of organic matter or benthic flora/fauna, etc |
|---|---|---|---|---|---|---|---|---|
| | | | | Colour | Odour | texture | Palasticity | |
| RF2 | 8:35 | 14/08/2018 | 7.7 | Brown/grey | Nil | Mud | Mod | fine layer of brown mud over grey mud |
| RF3 | 9:05 | 14/08/2018 | 8 | Brown/grey | Nil | Mud | Mod | 1% shell grit, polychaeta |
| RF4 | 9:35 | 14/08/2018 | 9.6 | Brown/grey | Nil | Mud | Mod | Slight gritty layer of sand/shell on the surface, brown mud layer over grey mud |
| RF6 | 10:00 | 14/08/2018 | 7.6 | Brown/grey | Nil | Mud | M-high | 5% shell grit, fine layer of brown mud over grey mud |
| RF7 | 10:30 | 14/08/2014 | 8.1 | Brown/grey | Nil | Mud | Mod | 1% shell grit, fine layer of brown mud over grey mud |
| B13-9 | 11:50 | 14/08/2018 | 13.3 | Brown/grey | Nil | Mud | Low | Fine layer of brown mud over grey mud, later has ~1% shell grit |
| B16-1 | 11:22 | 14/08/2018 | 9 | Brown/grey | Nil | Mud | Low | Lumpy mud, fine layer of brown mud over grey mud and shelly grit on surface. Polychaeta and tube worms |
| B16-0 | 11:49 | 14/08/2018 | 9.2 | Brown/grey | Nil | Md and fine sand | Low | As above with 20% fine sand |
| B13-8 | 12:26 | 14/08/2018 | 15.5 | Grey | Nil | Mud | Low | Fine layer of brown mud over grey |
| B13-5 | 13:13 | 14/08/2018 | 15.5 | Grey | Nil | Mud | Low | Fine layer of brown mud over grey, sticky mud with low plasticity |
| B13-4 | 13:33 | 14/08/2018 | 15.5 | Grey | Nil | Mud, with fine sand | Mod | Fine layer of brown mud over grey, sticky mud with mod plasticity |
| B13-4b | 13:33 | 14/08/2018 | 15.5 | Grey | Nil | Mud, with fine sand | Mod | Fine layer of brown mud over grey, sticky mud with mod plasticity |
| B13-4c | 13:44 | 14/08/2018 | 15.5 | Gey | Nil | Mud, with fine sand | Mod | Fine layer of brown mud over grey, sticky mud with mod plasticity |
| B13-1 | 14:30 | 14/08/2018 | 15.4 | Grey | Nil | Mud | Nil-low | 5% sand |
| B15-3 | 15:00 | 14/08/2018 | 16 | Grey | Nil | Mud/sand | Mod-high | 20% sand/shell |
| B15-2 | 8:17 | 15/08/2018 | 15.4 | Grey | Nil | Mud/sand | Low | OM and shell grit, upper layer of fines over fines/sand |
| B15-1 | 8:30 | 15/08/2018 | 14.8 | Grey | Nil | Mud/sand | Low | Sand over mud with small woods debris and lumps of sand |
| B12-2 | 9:01 | 15/08/2015 | 15.2 | Grey | Nil | Mud/sand | Low | Sand over mud with small woods debris and lumps of sand |
| B12-1 | 9:25 | 15/08/2018 | 15.3 | Grey | Nil | Mud/sand | Low | 5% large shells |
| B11-5 | 9:55 | 15/08/2018 | 14.8 | Grey | Nil | Mud/sand | Low | Surface layer of sand over grey mud |
| B11-8 | 10:30 | 15/08/2018 | 15.8 | Grey | Nil | Mud/sand | Low | Fine grained sand |
| B11-9 | 11:10 | 15/08/2018 | 15.6 | Grey | Nil | Mud/sand | Low | Surface layer of sand over grey mud |
| B11-9b | 11:10 | 15/08/2018 | 15.6 | Grey | Nil | Mud/sand | Low | Surface layer of sand over grey mud |

| Site | Time | Date | Depth | Sediment | | | | Comment - Presence of organic matter or benthic flora/fauna, etc |
|---|---|---|---|---|---|---|---|---|
| | | | | Colour | Odour | texture | Palasticity | |
| B11-9c | 11:10 | 15/08/2018 | 15.6 | Grey | Nil | Mud/sand | Low | Surface layer of sand over grey mud |
| B10-8 | 11:40 | 15/08/2018 | 15.7 | Grey | Nil | Mud/sand | Low | Fine layer of sand over grey mud |
| B10-6 | 12:06 | 15/08/2018 | 16.1 | Grey | Nil | Mud/sand | Low | Fine layer of sand over grey mud |
| B10-5 | 12:51 | 15/08/2001 | 15.8 | Grey | Nil | Mud | Low | Fine layer of sand over grey mud |
| B9-1 | 7:44 | 17/08/2018 | 10.1 | Brown | Nil | Sandy/mud | Low | 70% silt. |
| B2-0 | 9:09 | 17/08/2018 | 11.3 | Yellow | Nil | Sand | Nil | Sand with 1% pebbles |
| BC-2 | 9:45 | 17/08/2018 | 2.2 | Black | Strong anoxic | Mud | Nil | Soft, mud with heaps of organic matter (leaves) |
| B4-4 | 10:16 | 17/08/2018 | 9.4 | Grey | Nil | Mud | Low | Some shell grit and rock |
| B4-0 | 10:39 | 17/08/2018 | 9.4 | Grey | Nil | Mud | Mod-high | Very sticky mud |
| B5-0 | 11:07 | 17/08/2018 | 9 | Grey | Nil | Mud | Mod | |
| B5-1 | 11:51 | 17/08/2018 | 7.1 | Grey | Nil | Mud | Mod | Plasticity is patchy |
| B5-1b | 11:51 | 17/08/2018 | 7.1 | Grey | Nil | Mud | Mod | |
| B5-1c | 11:51 | 17/08/2018 | 7.1 | Grey | Nil | Mud | Mod | |
| B6-3 | 12:35 | 17/08/2018 | 12.4 | Grey | Nil | Mud | Low | |
| B6-2 | 12:58 | 17/08/2018 | 11.8 | Grey | Nil | Mud | Low | Rubbish, shell grit and pebbles on surface |
| B7-1 | 13:32 | 17/08/2018 | 13.3 | Grey | Nil | Mud | Low | Brown mud over grey mud with shell grit on surface |
| B8-1 | | 17/08/2018 | | Grey | Nil | Mud | Low | |
| B8-3 | 14:15 | 17/08/2018 | 11.7 | Grey | Nil | Mud | Low | |

# Appendix C Sediment Quality Results – Primary Laboratory

# CERTIFICATE OF ANALYSIS

**CERTIFICATE NO.:** **B701793-A** **REVISION NO.:** **01** 
**ISSUE DATE:** 20/09/18 This certificate supersedes any previous revisions

**CLIENT DETAILS:** Grace Bourke
BMT Eastern Australia Pty Ltd
Level 8 200 Creek Street
Brisbane QLD 4000

**DATE RECEIVED:** 17/08/2018
**CLIENT JOBREF:**
**ORDER NO:** B20259
**TEST DATE:** Sample tested between date received and reported.

**SAMPLE INFORMATION:**

**Received Condition (°C):** Chilled ( 0 ~ 5 °C) **Storage Condition:** Refrigerated

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-A/1 | 14/08/2018 08:30 | RF2 | Sediment |
| B701793-A/2 | 14/08/2018 09:05 | RF3 | Sediment |
| B701793-A/3 | 14/08/2018 09:30 | RF4 | Sediment |
| B701793-A/4 | 14/08/2018 10:00 | RF6 | Sediment |
| B701793-A/5 | 14/08/2018 10:30 | RF7 | Sediment |
| B701793-A/6 | 14/08/2018 10:55 | B13-9 | Sediment |
| B701793-A/7 | 14/08/2018 11:20 | B16-1 | Sediment |
| B701793-A/8 | 14/08/2018 11:50 | B16-0 | Sediment |
| B701793-A/9 | 14/08/2018 12:25 | B13-8 | Sediment |
| B701793-A/10 | 14/08/2018 13:10 | B13-5 | Sediment |
| B701793-A/11 | 14/08/2018 13:45 | B13-4 | Sediment |



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- Sydney: 2 Sirius Rd, Lane Cove West NSW 2066
- Wagga Wagga: Unit 5, 10-12 Kooringal Rd, Wagga Wagga NSW 2650

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-A/12 | 14/08/2018 13:45 | B13-4B | Sediment |
| B701793-A/13 | 14/08/2018 13:45 | B13-4C | Sediment |
| B701793-A/14 | 14/08/2018 14:30 | B13-1 | Sediment |
| B701793-A/15 | 14/08/2018 15:00 | B15-3 | Sediment |
| B701793-A/16 | 15/08/2018 08:10 | B15-2 | Sediment |
| B701793-A/17 | 15/08/2018 08:30 | B15-1 | Sediment |
| B701793-A/18 | 15/08/2018 08:55 | B12-2 | Sediment |
| B701793-A/19 | 15/08/2018 09:20 | B12-1 | Sediment |
| B701793-A/20 | 15/08/2018 09:50 | B11-5 | Sediment |
| B701793-A/21 | 15/08/2018 10:30 | B11-8 | Sediment |
| B701793-A/22 | 15/08/2018 10:30 | B11-8B | Sediment |
| B701793-A/23 | 15/08/2018 11:00 | B11-9 | Sediment |
| B701793-A/24 | 15/08/2018 11:02 | B11-9B | Sediment |
| B701793-A/25 | 15/08/2018 11:05 | B11-9C | Sediment |
| B701793-A/26 | 15/08/2018 11:40 | B10-8 | Sediment |
| B701793-A/27 | 15/08/2018 12:05 | B10-6 | Sediment |
| B701793-A/28 | 15/08/2018 12:05 | B10-6B | Sediment |
| B701793-A/29 | 15/08/2018 12:45 | B10-5 | Sediment |
| B701793-A/30 | 15/08/2018 12:45 | B10-5B | Sediment |
| B701793-A/31 | 17/08/2018 07:44 | B9-1 | Sediment |
| B701793-A/32 | 17/08/2018 08:53 | B2-0 | Sediment |
| B701793-A/33 | 17/08/2018 09:38 | BC-2 | Sediment |
| B701793-A/34 | 17/08/2018 10:06 | B4-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-A/35 | 17/08/2018 10:30 | B4-0 | Sediment |
| B701793-A/36 | 17/08/2018 11:07 | B5-0 | Sediment |
| B701793-A/37 | 17/08/2018 11:07 | B5-0B | Sediment |
| B701793-A/38 | 17/08/2018 11:41 | B5-1 | Sediment |
| B701793-A/39 | 17/08/2018 11:44 | B5-1B | Sediment |
| B701793-A/40 | 17/08/2018 11:48 | B5-1C | Sediment |
| B701793-A/41 | 17/08/2018 12:24 | B6-3 | Sediment |
| B701793-A/42 | 17/08/2018 12:48 | B6-2 | Sediment |
| B701793-A/43 | 17/08/2018 12:48 | B6-2B | Sediment |
| B701793-A/44 | 17/08/2018 13:25 | B7-1 | Sediment |
| B701793-A/45 | 17/08/2018 13:49 | B8-1 | Sediment |
| B701793-A/46 | 17/08/2018 14:11 | B8-3 | Sediment |
| B701793-A/47 | 14/08/2018 | Trip 1 | Sediment |
| B701793-A/48 | 15/08/2018 | Trip 2 | Sediment |
| B701793-A/49 | 17/08/2018 | Trip 3 | Sediment |

## RESULTS OF ANALYSIS:

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.1 | 1.3 | 1.4 | 0.97 | 1.4 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | - | - | - | - | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | - | - | - | - | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | - | - | - | - | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | - | - | - | - | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | - | - | - | - | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 61 | 62 | 55 | 57 | 58 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 6.3 | 7.0 | 6.7 | 7.7 | 7.0 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 40 | 43 | 34 | 40 | 45 |
| Copper | 04-001 | 0.1 | mg/kg | 17 | 21 | 15 | 18 | 28 |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Lead | 04-001 | 0.5 | mg/kg | 14 | 15 | 12 | 14 | 19 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.073 | 0.076 | 0.056 | 0.065 | 0.088 |
| Nickel | 04-001 | 0.1 | mg/kg | 20 | 24 | 18 | 21 | 28 |
| Zinc | 04-001 | 0.5 | mg/kg | 73 | 86 | 60 | 74 | 92 |
| Silver | ENV015 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.12 |
| Aluminium | 04-009 | 5 | mg/kg | 21,000 | 24,000 | 17,000 | 20,000 | 27,000 |
| Iron | 04-001 | 5 | mg/kg | 35,000 | 38,000 | 30,000 | 36,000 | 45,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 510 | 580 | 470 | 550 | 650 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 43 | 54 | 42 | 54 | 47 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | <1 | 1.6 | 1.7 | 1.0 | 4.1 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 89 | 99.5 | 120 | 96 | 104 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | - | - | - | - | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | - | - | - | - | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | - | - | - | - | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Surrogate Recovery | 04-020 | | % | - | - | - | - | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Acenaphthene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Fluorene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Phenanthrene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Anthracene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Fluoranthene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Pyrene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Chrysene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | - | - | - | - | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Coronene | 04-022 | 10 | µg/kg | - | - | - | - | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Perylene | 04-022 | 5 | µg/kg | - | - | - | - | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-022 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-022 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-022 | - | % | - | - | - | - | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | - | - | - | - | - |
| PCB # 101 | | | µg/kg | - | - | - | - | - |
| PCB # 105 | | | µg/kg | - | - | - | - | - |
| PCB # 118 | | | µg/kg | - | - | - | - | - |
| PCB # 126 | | | µg/kg | - | - | - | - | - |
| PCB # 128 | | | µg/kg | - | - | - | - | - |
| PCB # 138 | | | µg/kg | - | - | - | - | - |
| PCB # 153 | | | µg/kg | - | - | - | - | - |
| PCB # 169 | | | µg/kg | - | - | - | - | - |
| PCB # 170 | | | µg/kg | - | - | - | - | - |
| PCB # 180 | | | µg/kg | - | - | - | - | - |
| PCB # 187 | | | µg/kg | - | - | - | - | - |
| PCB # 195 | | | µg/kg | - | - | - | - | - |
| PCB # 206 | | | µg/kg | - | - | - | - | - |
| PCB # 209 | | | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | - | - | - | - | - |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | - | - | - | - | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | - | - | - | - | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | - | - | - | - | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | - | - | - | - | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | - | - | - | - | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | - | - | - | - | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | - | - | - | - | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | - | - | - | - | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | - | - | - | - | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | - | - | - | - | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | - | - | - | - | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | - | - | - | - | - |
| ANC Fineness Factor | ENV274 | | factor | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | - | - | - | - | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | - | - | - | - | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | - | - | - | - | - |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/1 | B701793-A/2 | B701793-A/3 | B701793-A/4 | B701793-A/5 |
|---|---|---|---|---|---|---|---|---|
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.1 | 0.96 | 1.2 | 1.2 | 1.3 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | - | - | - | 1,300 | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | - | - | - | 1,300 | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | - | - | - | 0.1 | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | - | - | - | <0.1 | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | - | - | - | 29 | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| Moisture Content | 04-004 | 0.1 | % | 62 | 49 | 48 | 60 | 60 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 8.0 | 6.9 | 6.0 | 8.7 | 8.7 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | 0.52 | <0.1 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 35 | 28 | 30 | 42 | 36 |
| Copper | 04-001 | 0.1 | mg/kg | 14 | 17 | 19 | 22 | 18 |
| Lead | 04-001 | 0.5 | mg/kg | 10 | 10 | 12 | 15 | 13 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.041 | 0.051 | 0.058 | 0.073 | 0.069 |
| Nickel | 04-001 | 0.1 | mg/kg | 18 | 17 | 18 | 24 | 20 |
| Zinc | 04-001 | 0.5 | mg/kg | 56 | 61 | 72 | 79 | 69 |
| Silver | ENV015 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aluminium | 04-009 | 5 | mg/kg | 19,000 | 13,000 | 14,000 | 23,000 | 18,000 |
| Iron | 04-001 | 5 | mg/kg | 34,000 | 27,000 | 28,000 | 39,000 | 33,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 490 | 480 | 510 | 640 | 560 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | 0.55 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 49 | 42 | 46 | 46 | 44 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | <1 | 1.5 | 1.3 | 1.7 | 2.1 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| Surrogate Recovery | 04-024 | - | % | 139 | 111 | 93 | 96 | 120 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | - | - | - | <10 | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | - | - | - | <10 | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | - | - | - | <50 | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | - | - | - | <50 | - |
| Surrogate Recovery | 04-020 | | % | - | - | - | 109 | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| Acenaphthene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| Fluorene | 04-022 | 5 | µg/kg | - | - | - | <5 | - |
| Phenanthrene | 04-022 | 5 | µg/kg | - | - | - | 14 | - |
| Anthracene | 04-022 | 5 | µg/kg | - | - | - | 14 | - |
| Fluoranthene | 04-022 | 5 | µg/kg | - | - | - | 29 | - |
| Pyrene | 04-022 | 5 | µg/kg | - | - | - | 31 | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | - | - | - | 24 | - |
| Chrysene | 04-022 | 5 | µg/kg | - | - | - | 23 | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | - | - | - | 56 | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | - | - | - | 29 | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | - | - | - | 66 | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | - | - | - | 10 | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | - | - | - | 30 | - |
| Coronene | 04-022 | 10 | µg/kg | - | - | - | <10 | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | - | - | - | 24 | - |
| Perylene | 04-022 | 5 | µg/kg | - | - | - | 59 | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | - | - | - | 410 | - |
| Surrogate 1 Recovery | 04-022 | - | % | - | - | - | 100 | - |
| Surrogate 2 Recovery | 04-022 | - | % | - | - | - | 75 | - |
| Surrogate 3 Recovery | 04-022 | - | % | - | - | - | 54 | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | - | - | - | <1 | - |
| PCB # 101 | | | µg/kg | - | - | - | <1 | - |
| PCB # 105 | | | µg/kg | - | - | - | <1 | - |
| PCB # 118 | | | µg/kg | - | - | - | <1 | - |
| PCB # 126 | | | µg/kg | - | - | - | <1 | - |
| PCB # 128 | | | µg/kg | - | - | - | <1 | - |
| PCB # 138 | | | µg/kg | - | - | - | <1 | - |
| PCB # 153 | | | µg/kg | - | - | - | <1 | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| PCB # 169 | | | µg/kg | - | - | - | <1 | - |
| PCB # 170 | | | µg/kg | - | - | - | <1 | - |
| PCB # 180 | | | µg/kg | - | - | - | <1 | - |
| PCB # 187 | | | µg/kg | - | - | - | <1 | - |
| PCB # 195 | | | µg/kg | - | - | - | <1 | - |
| PCB # 206 | | | µg/kg | - | - | - | <1 | - |
| PCB # 209 | | | µg/kg | - | - | - | <1 | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | - | - | - | 8.7 | - |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | - | - | - | <2.00 | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | - | - | - | <0.02 | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | - | - | - | 0.200 | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | - | - | - | 120.00 | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | - | - | - | n/a | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | - | - | - | n/a | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | - | - | - | n/a | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | - | - | - | n/a | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | - | - | - | n/a | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | - | - | - | 4.30 | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | - | - | - | 850.00 | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | - | - | - | 1.40 | - |
| ANC Fineness Factor | ENV274 | | factor | - | - | - | 1.50 | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | - | - | - | <0.02 | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | - | - | - | <10.00 | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | - | - | - | <1.00 | - |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/6 | B701793-A/7 | B701793-A/8 | B701793-A/9 | B701793-A/10 |
|---|---|---|---|---|---|---|---|---|
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.0 | 1.3 | 1.2 | 0.98 | 0.89 |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | - | - | - | 970 | 760 |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | - | - | - | 970 | 760 |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | - | - | - | <0.1 | <0.1 |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | - | - | - | <0.1 | <0.1 |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | - | - | - | 30 | 7.9 |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 55 | 56 | 59 | 55 | 43 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 8.2 | 9.0 | 9.0 | 7.3 | 6.9 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 38 | 41 | 42 | 36 | 28 |
| Copper | 04-001 | 0.1 | mg/kg | 20 | 24 | 23 | 18 | 18 |
| Lead | 04-001 | 0.5 | mg/kg | 14 | 15 | 15 | 13 | 13 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.071 | 0.082 | 0.078 | 0.060 | 0.065 |
| Nickel | 04-001 | 0.1 | mg/kg | 21 | 25 | 25 | 20 | 17 |
| Zinc | 04-001 | 0.5 | mg/kg | 75 | 82 | 81 | 70 | 67 |
| Silver | ENV015 | 0.1 | mg/kg | <0.1 | 0.11 | 0.10 | <0.1 | <0.1 |
| Aluminium | 04-009 | 5 | mg/kg | 20,000 | 22,000 | 23,000 | 20,000 | 13,000 |
| Iron | 04-001 | 5 | mg/kg | 36,000 | 39,000 | 39,000 | 34,000 | 27,000 |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Phosphorus* | 04-001 | 1 | mg/kg | 590 | 690 | 650 | 550 | 570 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | 0.60 | 0.51 | <0.5 | 0.92 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 50 | 50 | 47 | 49 | 33 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | 1.5 | 2.6 | 2.5 | 1.8 | 2.5 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 101 | 96 | 93 | 123 | 99 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | - | - | - | <10 | <10 |
| TPH C10-C14 | 04-020 | 10 | mg/kg | - | - | - | <10 | <10 |
| TPH C15-C28 | 04-020 | 50 | mg/kg | - | - | - | <50 | <50 |
| TPH C29-C36 | 04-020 | 50 | mg/kg | - | - | - | <50 | <50 |
| Surrogate Recovery | 04-020 | | % | - | - | - | 95 | 97 |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| Acenaphthylene | 04-022 | 5 | µg/kg | - | - | - | <5 | 7.3 |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| Fluorene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| Phenanthrene | 04-022 | 5 | µg/kg | - | - | - | 11 | 22 |
| Anthracene | 04-022 | 5 | µg/kg | - | - | - | 11 | 22 |
| Fluoranthene | 04-022 | 5 | µg/kg | - | - | - | 35 | 51 |
| Pyrene | 04-022 | 5 | µg/kg | - | - | - | 40 | 57 |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | - | - | - | 24 | 34 |
| Chrysene | 04-022 | 5 | µg/kg | - | - | - | 23 | 39 |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | - | - | - | 56 | 65 |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | - | - | - | 27 | 42 |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | - | - | - | 62 | 46 |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | - | - | - | <5 | <5 |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | - | - | - | 30 | 30 |
| Coronene | 04-022 | 10 | µg/kg | - | - | - | <10 | <10 |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | - | - | - | 25 | 27 |
| Perylene | 04-022 | 5 | µg/kg | - | - | - | 52 | 83 |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | - | - | - | 400 | 520 |
| Surrogate 1 Recovery | 04-022 | - | % | - | - | - | 92 | 105 |
| Surrogate 2 Recovery | 04-022 | - | % | - | - | - | 72 | 83 |
| Surrogate 3 Recovery | 04-022 | - | % | - | - | - | 63 | 63 |
| **PCB Congeners** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| PCB # 077 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 101 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 105 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 118 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 126 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 128 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 138 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 153 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 169 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 170 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 180 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 187 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 195 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 206 | | | µg/kg | - | - | - | <1 | <1 |
| PCB # 209 | | | µg/kg | - | - | - | <1 | <1 |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | - | - | - | 8.6 | 8.6 |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | - | - | - | <2.00 | <2.00 |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | - | - | - | <0.02 | <0.02 |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | - | - | - | 0.180 | 0.260 |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | - | - | - | 110.00 | 160.00 |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | - | - | - | n/a | n/a |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | - | - | - | n/a | n/a |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | - | - | - | n/a | n/a |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | - | - | - | n/a | n/a |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | - | - | - | n/a | n/a |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | - | - | - | 3.40 | 2.70 |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | - | - | - | 690.00 | 530.00 |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | - | - | - | 1.10 | 0.85 |
| ANC Fineness Factor | ENV274 | | factor | - | - | - | 1.50 | 1.50 |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | - | - | - | <0.02 | <0.02 |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | - | - | - | <10.00 | <10.00 |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | - | - | - | <1.00 | <1.00 |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/11 | B701793-A/12 | B701793-A/13 | B701793-A/14 | B701793-A/15 |
|---|---|---|---|---|---|---|---|---|
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.6 | 0.74 | 0.81 | 0.78 | 1.1 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | 1,000 | - | - | 720 | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | 1,000 | - | - | 720 | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | <0.1 | - | - | <0.1 | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | <0.1 | - | - | <0.1 | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | 8.6 | - | - | 6.0 | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 43 | 46 | 40 | 44 | 55 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 7.3 | 5.7 | 5.9 | 5.3 | 6.9 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 31 | 26 | 27 | 28 | 34 |
| Copper | 04-001 | 0.1 | mg/kg | 22 | 13 | 13 | 16 | 20 |
| Lead | 04-001 | 0.5 | mg/kg | 16 | 8.1 | 9.1 | 9.7 | 12 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.095 | 0.043 | 0.044 | 0.047 | 0.059 |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Nickel | 04-001 | 0.1 | mg/kg | 20 | 14 | 15 | 18 | 19 |
| Zinc | 04-001 | 0.5 | mg/kg | 81 | 53 | 54 | 57 | 78 |
| Silver | ENV015 | 0.1 | mg/kg | 0.20 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aluminium | 04-009 | 5 | mg/kg | 14,000 | 13,000 | 12,000 | 14,000 | 18,000 |
| Iron | 04-001 | 5 | mg/kg | 28,000 | 23,000 | 25,000 | 26,000 | 31,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 640 | 410 | 470 | 490 | 550 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 1.6 | <0.5 | <0.5 | <0.5 | <0.5 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 38 | 44 | 28 | 37 | 41 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | 1.2 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | 1.5 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | 3.7 | 1.1 | <1 | 1.5 | 1.7 |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | 1.6 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 107 | 101 | 92 | 92 | 114 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | <10 | - | - | <10 | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | <10 | - | - | <10 | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | <50 | - | - | <50 | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | 53 | - | - | <50 | - |
| Surrogate Recovery | 04-020 | | % | 93 | - | - | 92 | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | 04-022 | 5 | µg/kg | 7.4 | - | - | <5 | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | 13 | - | - | <5 | - |
| Acenaphthene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| Fluorene | 04-022 | 5 | µg/kg | 7.7 | - | - | <5 | - |
| Phenanthrene | 04-022 | 5 | µg/kg | 38 | - | - | 25 | - |
| Anthracene | 04-022 | 5 | µg/kg | 38 | - | - | 25 | - |
| Fluoranthene | 04-022 | 5 | µg/kg | 94 | - | - | 30 | - |
| Pyrene | 04-022 | 5 | µg/kg | 99 | - | - | 32 | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | 61 | - | - | 30 | - |
| Chrysene | 04-022 | 5 | µg/kg | 61 | - | - | 26 | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | 150 | - | - | 59 | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | 81 | - | - | 33 | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | 150 | - | - | 73 | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | 19 | - | - | 11 | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | 87 | - | - | 37 | - |
| Coronene | 04-022 | 10 | µg/kg | 18 | - | - | <10 | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | 64 | - | - | 26 | - |
| Perylene | 04-022 | 5 | µg/kg | 130 | - | - | 58 | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | 1,100 | - | - | 470 | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Surrogate 1 Recovery | 04-022 | - | % | 97 | - | - | 120 | - |
| Surrogate 2 Recovery | 04-022 | - | % | 80 | - | - | 70 | - |
| Surrogate 3 Recovery | 04-022 | - | % | 55 | - | - | 50 | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 101 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 105 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 118 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 126 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 128 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 138 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 153 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 169 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 170 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 180 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 187 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 195 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 206 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 209 | | | µg/kg | <1 | - | - | <1 | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | 8.7 | - | - | 8.8 | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | <2.00 | - | - | <2.00 | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | <0.02 | - | - | <0.02 | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | 0.360 | - | - | 0.140 | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | 220.00 | - | - | 88.00 | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | n/a | - | - | n/a | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | 3.80 | - | - | 2.50 | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | 770.00 | - | - | 490.00 | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | 1.20 | - | - | 0.79 | - |
| ANC Fineness Factor | ENV274 | | factor | 1.50 | - | - | 1.50 | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | <0.02 | - | - | <0.02 | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | <10.00 | - | - | <10.00 | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | <1.00 | - | - | <1.00 | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/16 | B701793-A/17 | B701793-A/18 | B701793-A/19 | B701793-A/20 |
|---|---|---|---|---|---|---|---|---|
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.2 | - | 1.2 | 1.2 | 1.4 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | 1,100 | - | - | - | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | 1,100 | - | - | - | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | <0.1 | - | - | - | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | <0.1 | - | - | - | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | 28 | - | - | - | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 55 | - | 56 | 50 | 58 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 8.0 | - | 7.9 | 7.7 | 8.2 |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 38 | - | 38 | 34 | 40 |
| Copper | 04-001 | 0.1 | mg/kg | 23 | - | 22 | 20 | 25 |
| Lead | 04-001 | 0.5 | mg/kg | 13 | - | 13 | 12 | 14 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.070 | - | 0.071 | 0.065 | 0.083 |
| Nickel | 04-001 | 0.1 | mg/kg | 22 | - | 22 | 19 | 23 |
| Zinc | 04-001 | 0.5 | mg/kg | 79 | - | 79 | 74 | 86 |
| Silver | ENV015 | 0.1 | mg/kg | 0.16 | - | 0.12 | <0.1 | 0.15 |
| Aluminium | 04-009 | 5 | mg/kg | 19,000 | - | 19,000 | 16,000 | 20,000 |
| Iron | 04-001 | 5 | mg/kg | 36,000 | - | 35,000 | 32,000 | 35,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 650 | - | 620 | 580 | 670 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | - | <0.5 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.93 | - | 0.57 | 0.85 | 0.61 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | - | <0.5 | <0.5 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 48 | - | 40 | 41 | 43 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | 1.2 | - | 1.8 | 1.7 | <1 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 92 | - | 104 | 108 | 106 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | <10 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| TPH C10-C14 | 04-020 | 10 | mg/kg | <10 | - | - | - | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | <50 | - | - | - | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | <50 | - | - | - | - |
| Surrogate Recovery | 04-020 | | % | 94 | - | - | - | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | 8.3 | - | - | - | - |
| Acenaphthene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Fluorene | 04-022 | 5 | µg/kg | 5.0 | - | - | - | - |
| Phenanthrene | 04-022 | 5 | µg/kg | 33 | - | - | - | - |
| Anthracene | 04-022 | 5 | µg/kg | 33 | - | - | - | - |
| Fluoranthene | 04-022 | 5 | µg/kg | 53 | - | - | - | - |
| Pyrene | 04-022 | 5 | µg/kg | 51 | - | - | - | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | 59 | - | - | - | - |
| Chrysene | 04-022 | 5 | µg/kg | 52 | - | - | - | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | 110 | - | - | - | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | 59 | - | - | - | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | 120 | - | - | - | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | 19 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | 58 | - | - | - | - |
| Coronene | 04-022 | 10 | µg/kg | 13 | - | - | - | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | 47 | - | - | - | - |
| Perylene | 04-022 | 5 | µg/kg | 110 | - | - | - | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | 830 | - | - | - | - |
| Surrogate 1 Recovery | 04-022 | - | % | 112 | - | - | - | - |
| Surrogate 2 Recovery | 04-022 | - | % | 67 | - | - | - | - |
| Surrogate 3 Recovery | 04-022 | - | % | 45 | - | - | - | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | <1 | - | - | - | - |
| PCB # 101 | | | µg/kg | <1 | - | - | - | - |
| PCB # 105 | | | µg/kg | <1 | - | - | - | - |
| PCB # 118 | | | µg/kg | <1 | - | - | - | - |
| PCB # 126 | | | µg/kg | <1 | - | - | - | - |
| PCB # 128 | | | µg/kg | <1 | - | - | - | - |
| PCB # 138 | | | µg/kg | <1 | - | - | - | - |
| PCB # 153 | | | µg/kg | <1 | - | - | - | - |
| PCB # 169 | | | µg/kg | <1 | - | - | - | - |
| PCB # 170 | | | µg/kg | <1 | - | - | - | - |
| PCB # 180 | | | µg/kg | <1 | - | - | - | - |
| PCB # 187 | | | µg/kg | <1 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| PCB # 195 | | | µg/kg | <1 | - | - | - | - |
| PCB # 206 | | | µg/kg | <1 | - | - | - | - |
| PCB # 209 | | | µg/kg | <1 | - | - | - | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | 8.7 | - | - | - | - |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | <2.00 | - | - | - | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | <0.02 | - | - | - | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | 0.250 | - | - | - | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | 160.00 | - | - | - | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | n/a | - | - | - | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | 3.30 | - | - | - | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | 660.00 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | 1.10 | - | - | - | - |
| ANC Fineness Factor | ENV274 | | factor | 1.50 | - | - | - | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | <0.02 | - | - | - | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | <10.00 | - | - | - | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | <1.00 | - | - | - | - |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/21 | B701793-A/22 | B701793-A/23 | B701793-A/24 | B701793-A/25 |
|---|---|---|---|---|---|---|---|---|
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.4 | 1.3 | 1.1 | 1.4 | - |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | - | 1,100 | 910 | - | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | - | 1,100 | 910 | - | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | - | <0.1 | <0.1 | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | - | <0.1 | <0.1 | - | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | - | 10 | 9.0 | - | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 61 | 46 | 45 | 61 | - |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 8.4 | 7.0 | 6.3 | 7.0 | - |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | - |
| Chromium | 04-001 | 0.1 | mg/kg | 41 | 38 | 33 | 38 | - |
| Copper | 04-001 | 0.1 | mg/kg | 26 | 26 | 120 | 27 | - |
| Lead | 04-001 | 0.5 | mg/kg | 15 | 12 | 12 | 15 | - |
| Mercury | 04-002 | 0.01 | mg/kg | 0.077 | 0.066 | 0.063 | 0.074 | - |
| Nickel | 04-001 | 0.1 | mg/kg | 23 | 25 | 23 | 22 | - |
| Zinc | 04-001 | 0.5 | mg/kg | 90 | 84 | 84 | 87 | - |
| Silver | ENV015 | 0.1 | mg/kg | 0.11 | 0.11 | <0.1 | 0.12 | - |
| Aluminium | 04-009 | 5 | mg/kg | 20,000 | 19,000 | 16,000 | 19,000 | - |
| Iron | 04-001 | 5 | mg/kg | 35,000 | 35,000 | 30,000 | 34,000 | - |
| Phosphorus* | 04-001 | 1 | mg/kg | 670 | 640 | 560 | 620 | - |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | 2.0 | <0.5 | - |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.52 | 0.62 | 2.3 | 0.90 | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | <0.5 | <0.5 | - |
| Surrogate Recovery | 04-026 | | % | 43 | 42 | 38 | 45 | - |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| p,p'-DDE | 04-024 | 1 | µg/kg | 2.1 | 3.0 | 2.0 | 2.4 | - |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | - |
| Surrogate Recovery | 04-024 | - | % | 125 | 91 | 107 | 104 | - |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | - | <10 | <10 | - | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | - | <10 | <10 | - | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | - | 190 | <50 | - | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | - | 390 | 52 | - | - |
| Surrogate Recovery | 04-020 | | % | - | 90 | 114 | - | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | - | <5 | <5 | - | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | - | <5 | <5 | - | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | - | <5 | <5 | - | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | - | <5 | 5.8 | - | - |
| Acenaphthene | 04-022 | 5 | µg/kg | - | <5 | <5 | - | - |
| Fluorene | 04-022 | 5 | µg/kg | - | <5 | <5 | - | - |
| Phenanthrene | 04-022 | 5 | µg/kg | - | 20 | 13 | - | - |
| Anthracene | 04-022 | 5 | µg/kg | - | 20 | 13 | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Fluoranthene | 04-022 | 5 | µg/kg | - | 22 | 28 | - | - |
| Pyrene | 04-022 | 5 | µg/kg | - | 36 | 32 | - | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | - | 27 | 27 | - | - |
| Chrysene | 04-022 | 5 | µg/kg | - | 100 | 26 | - | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | - | 86 | 73 | - | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | - | 32 | 39 | - | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | - | 56 | 89 | - | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | - | 7.5 | 14 | - | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | - | 25 | 41 | - | - |
| Coronene | 04-022 | 10 | µg/kg | - | <10 | <10 | - | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | - | 64 | 30 | - | - |
| Perylene | 04-022 | 5 | µg/kg | - | 150 | 85 | - | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | - | 650 | 510 | - | - |
| Surrogate 1 Recovery | 04-022 | - | % | - | 99 | 114 | - | - |
| Surrogate 2 Recovery | 04-022 | - | % | - | 82 | 95 | - | - |
| Surrogate 3 Recovery | 04-022 | - | % | - | 51 | 55 | - | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 101 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 105 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 118 | | | µg/kg | - | <1 | <1 | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| PCB # 126 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 128 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 138 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 153 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 169 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 170 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 180 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 187 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 195 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 206 | | | µg/kg | - | <1 | <1 | - | - |
| PCB # 209 | | | µg/kg | - | <1 | <1 | - | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | - | 8.6 | 8.7 | - | - |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | - | <2.00 | <2.00 | - | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | - | <0.02 | <0.02 | - | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | - | 0.260 | 0.270 | - | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | - | 160.00 | 170.00 | - | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | - | n/a | n/a | - | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | - | n/a | n/a | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | - | n/a | n/a | - | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | - | n/a | n/a | - | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | - | n/a | n/a | - | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | - | 3.20 | 3.70 | - | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | - | 650.00 | 730.00 | - | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | - | 1.00 | 1.20 | - | - |
| ANC Fineness Factor | ENV274 | | factor | - | 1.50 | 1.50 | - | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | - | <0.02 | <0.02 | - | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | - | <10.00 | <10.00 | - | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | - | <1.00 | <1.00 | - | - |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/26 | B701793-A/27 | B701793-A/28 | B701793-A/29 | B701793-A/30 |
|---|---|---|---|---|---|---|---|---|
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 0.30 | 0.040 | 3.4 | 1.9 | 1.6 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | 420 | - | - | - | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | 420 | - | - | - | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | <0.1 | - | - | - | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | <0.1 | - | - | - | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | 3.6 | - | - | - | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 28 | 18 | 66 | 61 | 56 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 4.9 | 1.7 | 8.4 | 8.2 | 5.9 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | <0.1 | 0.12 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 23 | 8.1 | 36 | 44 | 47 |
| Copper | 04-001 | 0.1 | mg/kg | 16 | 2.4 | 45 | 47 | 34 |
| Lead | 04-001 | 0.5 | mg/kg | 5.4 | 2.0 | 33 | 22 | 14 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.032 | <0.01 | 0.11 | 0.13 | 0.066 |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Nickel | 04-001 | 0.1 | mg/kg | 17 | 6.3 | 21 | 26 | 37 |
| Zinc | 04-001 | 0.5 | mg/kg | 48 | 15 | 170 | 140 | 100 |
| Silver | ENV015 | 0.1 | mg/kg | <0.1 | <0.1 | 0.28 | 0.21 | 0.12 |
| Aluminium | 04-009 | 5 | mg/kg | 8,100 | 2,800 | 20,000 | 22,000 | 22,000 |
| Iron | 04-001 | 5 | mg/kg | 21,000 | 9,200 | 34,000 | 40,000 | 44,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 370 | 180 | 710 | 900 | 960 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | 1.7 | <0.5 | 0.63 | 1.2 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 3.1 | <0.5 | 2.3 | 2.0 | 0.70 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | <0.5 | <0.5 | 1.3 | 2.0 | <0.5 |
| Surrogate Recovery | 04-026 | | % | 53 | 62 | 44 | 40 | 31 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | <1 | <1 | 3.3 | 1.7 | 2.4 |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 108 | 104 | 92 | 96 | 50 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | <10 | - | - | - | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | <10 | - | - | - | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | <50 | - | - | - | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | <50 | - | - | - | - |
| Surrogate Recovery | 04-020 | | % | 124 | - | - | - | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Acenaphthene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Fluorene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Phenanthrene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Anthracene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Fluoranthene | 04-022 | 5 | µg/kg | 5.1 | - | - | - | - |
| Pyrene | 04-022 | 5 | µg/kg | 5.4 | - | - | - | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | 5.3 | - | - | - | - |
| Chrysene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | 10 | - | - | - | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | 5.1 | - | - | - | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | 10 | - | - | - | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | 5.3 | - | - | - | - |
| Coronene | 04-022 | 10 | µg/kg | <10 | - | - | - | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | <5 | - | - | - | - |
| Perylene | 04-022 | 5 | µg/kg | 16 | - | - | - | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | <100 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Surrogate 1 Recovery | 04-022 | - | % | 128 | - | - | - | - |
| Surrogate 2 Recovery | 04-022 | - | % | 108 | - | - | - | - |
| Surrogate 3 Recovery | 04-022 | - | % | 62 | - | - | - | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | <1 | - | - | - | - |
| PCB # 101 | | | µg/kg | <1 | - | - | - | - |
| PCB # 105 | | | µg/kg | <1 | - | - | - | - |
| PCB # 118 | | | µg/kg | <1 | - | - | - | - |
| PCB # 126 | | | µg/kg | <1 | - | - | - | - |
| PCB # 128 | | | µg/kg | <1 | - | - | - | - |
| PCB # 138 | | | µg/kg | <1 | - | - | - | - |
| PCB # 153 | | | µg/kg | <1 | - | - | - | - |
| PCB # 169 | | | µg/kg | <1 | - | - | - | - |
| PCB # 170 | | | µg/kg | <1 | - | - | - | - |
| PCB # 180 | | | µg/kg | <1 | - | - | - | - |
| PCB # 187 | | | µg/kg | <1 | - | - | - | - |
| PCB # 195 | | | µg/kg | <1 | - | - | - | - |
| PCB # 206 | | | µg/kg | <1 | - | - | - | - |
| PCB # 209 | | | µg/kg | <1 | - | - | - | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | 9.2 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | <2.00 | - | - | - | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | <0.02 | - | - | - | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | 0.023 | - | - | - | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | 15.00 | - | - | - | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | n/a | - | - | - | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | n/a | - | - | - | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | 2.20 | - | - | - | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | 430.00 | - | - | - | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | 0.70 | - | - | - | - |
| ANC Fineness Factor | ENV274 | | factor | 1.50 | - | - | - | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | <0.02 | - | - | - | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | <10.00 | - | - | - | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | <1.00 | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/31 | B701793-A/32 | B701793-A/33 | B701793-A/34 | B701793-A/35 |
|---|---|---|---|---|---|---|---|---|
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.5 | - | 1.6 | 1.4 | 1.5 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | 1,300 | - | 1,200 | 1,000 | 1,100 |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | 1,300 | - | 1,200 | 1,000 | 1,100 |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | 24 | - | 11 | 8.4 | 5.9 |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 58 | - | 56 | 54 | 54 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 7.4 | - | 7.6 | 7.7 | 7.6 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | - | 0.12 | 0.26 | 0.35 |
| Chromium | 04-001 | 0.1 | mg/kg | 46 | - | 43 | 43 | 46 |
| Copper | 04-001 | 0.1 | mg/kg | 42 | - | 32 | 32 | 37 |
| Lead | 04-001 | 0.5 | mg/kg | 21 | - | 20 | 24 | 27 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.10 | - | 0.16 | 0.13 | 0.16 |
| Nickel | 04-001 | 0.1 | mg/kg | 27 | - | 23 | 21 | 22 |
| Zinc | 04-001 | 0.5 | mg/kg | 130 | - | 99 | 110 | 110 |
| Silver | ENV015 | 0.1 | mg/kg | 0.19 | - | 0.31 | 0.39 | 0.62 |
| Aluminium | 04-009 | 5 | mg/kg | 23,000 | - | 23,000 | 20,000 | 22,000 |
| Iron | 04-001 | 5 | mg/kg | 40,000 | - | 37,000 | 34,000 | 37,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 850 | - | 680 | 810 | 860 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.82 | - | <0.5 | 4.2 | 6.7 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 1.6 | - | 0.75 | 4.8 | 6.6 |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | 0.90 | - | <0.5 | 0.58 | 1.2 |
| Surrogate Recovery | 04-026 | | % | 42 | - | 40 | 44 | 48 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | 2.5 | - | 2.6 | 3.8 | 4.8 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | - | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 109 | - | 107 | 97 | 105 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | <10 | - | <10 | <10 | <10 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| TPH C10-C14 | 04-020 | 10 | mg/kg | <10 | - | <10 | <10 | <10 |
| TPH C15-C28 | 04-020 | 50 | mg/kg | <50 | - | 84 | 73 | 94 |
| TPH C29-C36 | 04-020 | 50 | mg/kg | 59 | - | 79 | 76 | 98 |
| Surrogate Recovery | 04-020 | | % | 94 | - | 89 | 95 | 98 |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | 6.1 | - | 11 | 8.9 | 7.2 |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | <5 | <5 | <5 |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | 5.4 | 6.1 | 8.0 |
| Acenaphthylene | 04-022 | 5 | µg/kg | 7.4 | - | 9.3 | 10 | 8.7 |
| Acenaphthene | 04-022 | 5 | µg/kg | <5 | - | <5 | 13 | <5 |
| Fluorene | 04-022 | 5 | µg/kg | <5 | - | 6.4 | 11 | 7.4 |
| Phenanthrene | 04-022 | 5 | µg/kg | 29 | - | 23 | 48 | 26 |
| Anthracene | 04-022 | 5 | µg/kg | 29 | - | 23 | 48 | 26 |
| Fluoranthene | 04-022 | 5 | µg/kg | 64 | - | 50 | 79 | 44 |
| Pyrene | 04-022 | 5 | µg/kg | 73 | - | 84 | 99 | 64 |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | 56 | - | 47 | 84 | 50 |
| Chrysene | 04-022 | 5 | µg/kg | 51 | - | 46 | 84 | 51 |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | 120 | - | 120 | 170 | 130 |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | 59 | - | 60 | 100 | 66 |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | 120 | - | 120 | 190 | 140 |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | 16 | - | 13 | 24 | 16 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | 61 | - | 58 | 99 | 68 |
| Coronene | 04-022 | 10 | µg/kg | 14 | - | 11 | 20 | 15 |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | 52 | - | 49 | 78 | 58 |
| Perylene | 04-022 | 5 | µg/kg | 160 | - | 460 | 290 | 370 |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | 920 | - | 1,200 | 1,500 | 1,200 |
| Surrogate 1 Recovery | 04-022 | - | % | 124 | - | 106 | 112 | 112 |
| Surrogate 2 Recovery | 04-022 | - | % | 95 | - | 87 | 85 | 92 |
| Surrogate 3 Recovery | 04-022 | - | % | 58 | - | 58 | 54 | 49 |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 101 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 105 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 118 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 126 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 128 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 138 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 153 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 169 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 170 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 180 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 187 | | | µg/kg | <1 | - | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| PCB # 195 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 206 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| PCB # 209 | | | µg/kg | <1 | - | <1 | <1 | <1 |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | 8.5 | - | 8.4 | 8.5 | 8.4 |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | <2.00 | - | <2.00 | <2.00 | <2.00 |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | <0.02 | - | <0.02 | <0.02 | <0.02 |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | 0.230 | - | 0.330 | 0.490 | 0.470 |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | 140.00 | - | 210.00 | 310.00 | 290.00 |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | n/a | - | n/a | n/a | n/a |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | n/a | - | n/a | n/a | n/a |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | n/a | - | n/a | n/a | n/a |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | n/a | - | n/a | n/a | n/a |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | n/a | - | n/a | n/a | n/a |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | 2.20 | - | 2.50 | 2.60 | 2.60 |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | 450.00 | - | 490.00 | 520.00 | 510.00 |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | 0.72 | - | 0.79 | 0.84 | 0.82 |
| ANC Fineness Factor | ENV274 | | factor | 1.50 | - | 1.50 | 1.50 | 1.50 |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | <0.02 | - | <0.02 | <0.02 | <0.02 |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | <10.00 | - | <10.00 | <10.00 | <10.00 |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | <1.00 | - | <1.00 | <1.00 | <1.00 |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/36 | B701793-A/37 | B701793-A/38 | B701793-A/39 | B701793-A/40 |
|---|---|---|---|---|---|---|---|---|
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.6 | 1.4 | 1.5 | 1.6 | 1.5 |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | 1,600 | - | - | 1,000 | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | 1,600 | - | - | 1,000 | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | <0.1 | - | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | <0.1 | - | - | <0.1 | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | 41 | - | - | 9.8 | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - | - |
| **Moisture Content** | | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 64 | 56 | 52 | 52 | 59 |
| **Trace Elements** | | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 8.4 | 6.9 | 7.4 | 6.7 | 7.7 |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | 0.38 | 0.71 | <0.1 | <0.1 |
| Chromium | 04-001 | 0.1 | mg/kg | 46 | 40 | 40 | 36 | 41 |
| Copper | 04-001 | 0.1 | mg/kg | 39 | 42 | 43 | 29 | 31 |
| Lead | 04-001 | 0.5 | mg/kg | 18 | 32 | 14 | 16 | 15 |
| Mercury | 04-002 | 0.01 | mg/kg | 0.095 | 0.079 | 0.083 | 0.088 | 0.091 |
| Nickel | 04-001 | 0.1 | mg/kg | 26 | 26 | 25 | 21 | 23 |
| Zinc | 04-001 | 0.5 | mg/kg | 120 | 140 | 120 | 90 | 97 |
| Silver | ENV015 | 0.1 | mg/kg | 0.16 | 0.13 | 0.14 | 0.19 | 0.13 |
| Aluminium | 04-009 | 5 | mg/kg | 24,000 | 22,000 | 21,000 | 18,000 | 22,000 |
| Iron | 04-001 | 5 | mg/kg | 41,000 | 35,000 | 34,000 | 36,000 | 37,000 |
| Phosphorus* | 04-001 | 1 | mg/kg | 800 | 1,700 | 1,800 | 640 | 710 |
| **Organotins** | | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.82 | 0.62 | 0.75 | <0.5 | <0.5 |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.96 | 0.88 | 1.9 | 1.0 | 0.94 |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | 0.89 | 0.59 | <0.5 | 0.72 | 0.76 |
| Surrogate Recovery | 04-026 | | % | 54 | 53 | 49 | 38 | 44 |
| **Organochlorine Pesticides** | | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | <1 | <1 | 4.8 | <1 |
| p,p'-DDE | 04-024 | 1 | µg/kg | 1.5 | 3.6 | 4.6 | 2.6 | 2.1 |
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | <1 | <1 | <1 | <1 |
| Surrogate Recovery | 04-024 | - | % | 73 | 103 | 94 | 129 | 94 |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | <10 | - | - | <10 | - |
| TPH C10-C14 | 04-020 | 10 | mg/kg | <10 | - | - | <10 | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | <50 | - | - | <50 | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | 55 | - | - | 51 | - |
| Surrogate Recovery | 04-020 | | % | 74 | - | - | 111 | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 04-022 | 5 | µg/kg | <5 | - | - | 7.4 | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | 5.5 | - | - | 15 | - |
| Acenaphthene | 04-022 | 5 | µg/kg | <5 | - | - | <5 | - |
| Fluorene | 04-022 | 5 | µg/kg | 10 | - | - | <5 | - |
| Phenanthrene | 04-022 | 5 | µg/kg | 74 | - | - | 18 | - |
| Anthracene | 04-022 | 5 | µg/kg | 74 | - | - | 18 | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Fluoranthene | 04-022 | 5 | µg/kg | 79 | - | - | 44 | - |
| Pyrene | 04-022 | 5 | µg/kg | 66 | - | - | 50 | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | 39 | - | - | 35 | - |
| Chrysene | 04-022 | 5 | µg/kg | 33 | - | - | 39 | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | 74 | - | - | 210 | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | 36 | - | - | 99 | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | 81 | - | - | 170 | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | 9.4 | - | - | 23 | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | 37 | - | - | 75 | - |
| Coronene | 04-022 | 10 | µg/kg | 13 | - | - | 11 | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | 29 | - | - | 86 | - |
| Perylene | 04-022 | 5 | µg/kg | 100 | - | - | 120 | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | 760 | - | - | 1,000 | - |
| Surrogate 1 Recovery | 04-022 | - | % | 91 | - | - | 134 | - |
| Surrogate 2 Recovery | 04-022 | - | % | 68 | - | - | 113 | - |
| Surrogate 3 Recovery | 04-022 | - | % | 40 | - | - | 68 | - |
| **PCB Congeners** | | | | | | | | |
| PCB # 077 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 101 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 105 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 118 | | | µg/kg | <1 | - | - | <1 | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| PCB # 126 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 128 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 138 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 153 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 169 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 170 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 180 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 187 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 195 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 206 | | | µg/kg | <1 | - | - | <1 | - |
| PCB # 209 | | | µg/kg | <1 | - | - | <1 | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | 8.5 | - | - | 8.7 | - |
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | <2.00 | - | - | <2.00 | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | <0.02 | - | - | <0.02 | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | 0.200 | - | - | 0.230 | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | 130.00 | - | - | 140.00 | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | n/a | - | - | n/a | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | n/a | - | - | n/a | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | 2.60 | - | - | 4.10 | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | 530.00 | - | - | 820.00 | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | 0.84 | - | - | 1.30 | - |
| ANC Fineness Factor | ENV274 | | factor | 1.50 | - | - | 1.50 | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | <0.02 | - | - | <0.02 | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | <10.00 | - | - | <10.00 | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | <1.00 | - | - | <1.00 | - |
| **BTEX** | | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | | |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/41 | B701793-A/42 | B701793-A/43 | B701793-A/44 | B701793-A/45 |
|---|---|---|---|---|---|---|---|---|
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - | - |
| **ENV104.X Herbicide in Soil** | | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| **Subcontract Analysis** | | | | | | | |
| Particle Size Distribution by Sedigraph^ | S007.00 | see attached | - | - | - | - | - |
| Particle Size Distribution by Sieve^ | S007.01 | see attached | - | - | - | - | - |
| Total Organic Carbon^ | S004.01 | 0.01 | % | 1.6 | - | - | - |
| Cyanide - Total^ | S004.02 | 0.1 | mg/kg | - | - | - | - |
| Total Nitrogen^ | S004.03 | 20 | mg/kg | - | - | - | - |
| Total Kjeldahl Nitrogen^ | S004.04 | 20 | mg/kg | - | - | - | - |
| Nitrate as N^ | S004.05 | 0.1 | mg/kg | - | - | - | - |
| Nitrite as N^ | S004.06 | 0.1 | mg/kg | - | - | - | - |
| Total Ammonia as N^ | S004.07 | 0.1 | mg/kg | - | - | - | - |
| Dioxins and Furans^ | S005.01 | | - | - | - | - | - |
| **Moisture Content** | | | | | | | |
| Moisture Content | 04-004 | 0.1 | % | 61 | - | - | - |
| **Trace Elements** | | | | | | | |
| Arsenic | 04-009 | 0.4 | mg/kg | 7.6 | - | - | - |
| Cadmium | 04-001 | 0.1 | mg/kg | <0.1 | - | - | - |
| Chromium | 04-001 | 0.1 | mg/kg | 42 | - | - | - |
| Copper | 04-001 | 0.1 | mg/kg | 31 | - | - | - |
| Lead | 04-001 | 0.5 | mg/kg | 16 | - | - | - |
| Mercury | 04-002 | 0.01 | mg/kg | 0.11 | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Nickel | 04-001 | 0.1 | mg/kg | 24 | - | - | - |
| Zinc | 04-001 | 0.5 | mg/kg | 100 | - | - | - |
| Silver | ENV015 | 0.1 | mg/kg | 0.19 | - | - | - |
| Aluminium | 04-009 | 5 | mg/kg | 23,000 | - | - | - |
| Iron | 04-001 | 5 | mg/kg | 38,000 | - | - | - |
| Phosphorus* | 04-001 | 1 | mg/kg | 710 | - | - | - |
| **Organotins** | | | | | | | |
| Monobutyltin as Sn | 04-026 | 0.5 | µg/kg | 3.1 | - | - | - |
| Dibutyltin as Sn | 04-026 | 0.5 | µg/kg | 0.73 | - | - | - |
| Tributlytin as Sn | 04-026 | 0.5 | µg/kg | 0.75 | - | - | - |
| Surrogate Recovery | 04-026 | | % | 45 | - | - | - |
| **Organochlorine Pesticides** | | | | | | | |
| Aldrin | 04-024 | 1 | µg/kg | <1 | - | - | - |
| alpha-BHC | 04-024 | 1 | µg/kg | <1 | - | - | - |
| beta-BHC | 04-024 | 1 | µg/kg | <1 | - | - | - |
| gamma-BHC (Lindane) | 04-024 | 1 | µg/kg | <1 | - | - | - |
| delta-BHC | 04-024 | 1 | µg/kg | <1 | - | - | - |
| cis-Chlordane | 04-024 | 1 | µg/kg | <1 | - | - | - |
| trans-Chlordane | 04-024 | 1 | µg/kg | <1 | - | - | - |
| p,p'-DDD | 04-024 | 1 | µg/kg | <1 | - | - | - |
| p,p'-DDE | 04-024 | 1 | µg/kg | 2.8 | - | - | - |


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| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| p,p'-DDT | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Dieldrin | 04-024 | 1 | µg/kg | <1 | - | - | - |
| alpha-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | - | - |
| beta-Endosulfan | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Endosulfan Sulphate | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Endrin | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Endrin ketone | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Endrin aldehyde | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Heptachlor | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Heptachlor epoxide | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Hexachlorobenzene | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Methoxychlor | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Oxychlordane* | 04-024 | 1 | µg/kg | <1 | - | - | - |
| Surrogate Recovery | 04-024 | - | % | 103 | - | - | - |
| **Total Petroleum Hydrocarbons** | | | | | | | |
| TPH C6-C9 | 04-021 | 10 | mg/kg | - | <10 | <10 | <10 |
| TPH C10-C14 | 04-020 | 10 | mg/kg | - | - | - | - |
| TPH C15-C28 | 04-020 | 50 | mg/kg | - | - | - | - |
| TPH C29-C36 | 04-020 | 50 | mg/kg | - | - | - | - |
| Surrogate Recovery | 04-020 | | % | - | - | - | - |
| **Poly Aromatic Hydrocarbons** | | | | | | | |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Naphthalene | 04-022 | 5 | µg/kg | - | - | - | - |
| 1-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | - |
| 2-Methylnaphthalene | 04-022 | 5 | µg/kg | - | - | - | - |
| Acenaphthylene | 04-022 | 5 | µg/kg | - | - | - | - |
| Acenaphthene | 04-022 | 5 | µg/kg | - | - | - | - |
| Fluorene | 04-022 | 5 | µg/kg | - | - | - | - |
| Phenanthrene | 04-022 | 5 | µg/kg | - | - | - | - |
| Anthracene | 04-022 | 5 | µg/kg | - | - | - | - |
| Fluoranthene | 04-022 | 5 | µg/kg | - | - | - | - |
| Pyrene | 04-022 | 5 | µg/kg | - | - | - | - |
| Benz(a)anthracene | 04-022 | 5 | µg/kg | - | - | - | - |
| Chrysene | 04-022 | 5 | µg/kg | - | - | - | - |
| Benzo(b)&(k)fluoranthene | 04-022 | 10 | µg/kg | - | - | - | - |
| Benzo(a)pyrene | 04-022 | 5 | µg/kg | - | - | - | - |
| Indeno(1,2,3-cd)pyrene | 04-022 | 5 | µg/kg | - | - | - | - |
| Dibenz(a,h)anthracene | 04-022 | 5 | µg/kg | - | - | - | - |
| Benzo(g,h,i)perylene | 04-022 | 5 | µg/kg | - | - | - | - |
| Coronene | 04-022 | 10 | µg/kg | - | - | - | - |
| Benzo(e)pyrene | 04-022 | 5 | µg/kg | - | - | - | - |
| Perylene | 04-022 | 5 | µg/kg | - | - | - | - |
| Total PAHs (as above) | 04-022 | 100 | µg/kg | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Surrogate 1 Recovery | 04-022 | - | % | - | - | - | - |
| Surrogate 2 Recovery | 04-022 | - | % | - | - | - | - |
| Surrogate 3 Recovery | 04-022 | - | % | - | - | - | - |
| **PCB Congeners** | | | | | | | |
| PCB # 077 | | | µg/kg | - | - | - | - |
| PCB # 101 | | | µg/kg | - | - | - | - |
| PCB # 105 | | | µg/kg | - | - | - | - |
| PCB # 118 | | | µg/kg | - | - | - | - |
| PCB # 126 | | | µg/kg | - | - | - | - |
| PCB # 128 | | | µg/kg | - | - | - | - |
| PCB # 138 | | | µg/kg | - | - | - | - |
| PCB # 153 | | | µg/kg | - | - | - | - |
| PCB # 169 | | | µg/kg | - | - | - | - |
| PCB # 170 | | | µg/kg | - | - | - | - |
| PCB # 180 | | | µg/kg | - | - | - | - |
| PCB # 187 | | | µg/kg | - | - | - | - |
| PCB # 195 | | | µg/kg | - | - | - | - |
| PCB # 206 | | | µg/kg | - | - | - | - |
| PCB # 209 | | | µg/kg | - | - | - | - |
| **Acid Sulphate Soil - Cr Reduci** | | | | | | | |
| pHkcl TAA | ENV274 | 0.1 | pH Units | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Acid trail Titratable Actual Acidity | ENV274 | 2 | mol H+/t | - | - | - | - |
| Sulfidic - TAA equiv | ENV274 | 0.02 | % pyrite S | - | - | - | - |
| Chromium Reducible Sulphur | ENV274 | 0.005 | % S | - | - | - | - |
| Chromium Reducible Sulfur Acidity Units | ENV274 | 3 | mol H+/t | - | - | - | - |
| Sulfur - KCl Extractable | ENV274 | 0.02 | % S | - | - | - | - |
| HCl Extractable Sulfur | ENV274 | 0.02 | % S | - | - | - | - |
| Nett Acid Soluble Sulpur | ENV274 | 0.02 | % S | - | - | - | - |
| Net Acid Soluble Sulfur Acidity Units | ENV274 | 10 | mol H+/t | - | - | - | - |
| Net Acid Soluble Sulfur Equiv S% Pyrite | ENV274 | 0.02 | % S | - | - | - | - |
| ANCE (Acid Neutralising Capacity) | ENV274 | 0.01 | % CaCO3 | - | - | - | - |
| Acid Neutralising Capacity Acid (ANCbt) | ENV274 | 2 | mol H+/t | - | - | - | - |
| Acid Neutralising Capacity Equiv S% | ENV274 | 0.02 | % S | - | - | - | - |
| ANC Fineness Factor | ENV274 | | factor | - | - | - | - |
| Net Acidity (Sulfur Units) | ENV274 | 0.02 | % S | - | - | - | - |
| Net Acidity (Acidity Units) | ENV274 | 10 | mol H+/t | - | - | - | - |
| Liming Rate | ENV274 | 1 | kg CaCO3/t | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| **BTEX** | | | | | | | |
| Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - |
| Toluene | 04-021 | 0.2 | mg/kg | - | - | - | - |
| Ethyl Benzene | 04-021 | 0.2 | mg/kg | - | - | - | - |
| m+p xylenes | 04-021 | 0.4 | mg/kg | - | - | - | - |
| o-xylene | 04-021 | 0.2 | mg/kg | - | - | - | - |
| Total BTEX | 04-021 | 1.2 | mg/kg | - | - | - | - |
| Surrogate 1 Recovery | 04-021 | - | % | - | - | - | - |
| Surrogate 2 Recovery | 04-021 | - | % | - | - | - | - |
| Surrogate 3 Recovery | 04-021 | - | % | - | - | - | - |
| **Multiresidue Pesticide Screen** | | | | | | | |
| 2,4,5-T | 04-101 | 1 | µg/kg | - | - | - | - |
| 2,4,6-T | 04-101 | 1 | µg/kg | - | - | - | - |
| 2,4,5-TP | 04-101 | 1 | µg/kg | - | - | - | - |
| 2,4-D | 04-101 | 1 | µg/kg | - | - | - | - |
| 2,6-D | 04-101 | 1 | µg/kg | - | - | - | - |
| 2,4-DB | 04-101 | 1 | µg/kg | - | - | - | - |
| Aldicarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Ametryn | 04-101 | 1 | µg/kg | - | - | - | - |
| Atrazine | 04-101 | 1 | µg/kg | - | - | - | - |
| Atrazine Desethyl | 04-101 | 1 | µg/kg | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Atrazine Desisopropyl | 04-101 | 1 | µg/kg | - | - | - | - |
| Bendiocarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Carbaryl | 04-101 | 1 | µg/kg | - | - | - | - |
| Carbofuran | 04-101 | 1 | µg/kg | - | - | - | - |
| Clopyralid | 04-101 | 5 | µg/kg | - | - | - | - |
| Dicamba | 04-101 | 1 | µg/kg | - | - | - | - |
| Dichlorprop | 04-101 | 1 | µg/kg | - | - | - | - |
| Diuron | 04-101 | 1 | µg/kg | - | - | - | - |
| Fenoxycarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Fluroxypyr | 04-101 | 1 | µg/kg | - | - | - | - |
| Hexazinone | 04-101 | 1 | µg/kg | - | - | - | - |
| Indoxacarb | 04-101 | 1 | µg/kg | - | - | - | - |
| MCPA | 04-101 | 1 | µg/kg | - | - | - | - |
| MCPB | 04-101 | 1 | µg/kg | - | - | - | - |
| MCPP | 04-101 | 1 | µg/kg | - | - | - | - |
| Methiocarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Methomyl | 04-101 | 1 | µg/kg | - | - | - | - |
| Methomyl Oxime | 04-101 | 5 | µg/kg | - | - | - | - |
| Oxamyl | 04-101 | 1 | µg/kg | - | - | - | - |
| Picloram | 04-101 | 5 | µg/kg | - | - | - | - |
| Pirimicarb | 04-101 | 1 | µg/kg | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| Prometryn | 04-101 | 1 | µg/kg | - | - | - | - |
| Propamocarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Propoxur | 04-101 | 1 | µg/kg | - | - | - | - |
| Simazine | 04-101 | 1 | µg/kg | - | - | - | - |
| Thiodicarb | 04-101 | 1 | µg/kg | - | - | - | - |
| Triclopyr | 04-101 | 1 | µg/kg | - | - | - | - |
| **Extended PFAS Suite** | | | | | | | |
| PFBA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFPeA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFHxA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFHpA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFOA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFNA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFUnDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFDoDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFTrDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFTeDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFHxDA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFODA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFBS* | 04-068 | 0.5 | µg/kg | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| PFPeS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFHxS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFHpS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFOS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFNS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFDS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| 4:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| 6:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| 8:2 FTS* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| 6:2 FTA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| FOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| EtFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| MeFOSA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| EtFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| MeFOSE* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| EtFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| MeFOSAA* | 04-068 | 0.5 | µg/kg | - | - | - | - |
| PFNA-13C5 Surrogate Recovery | 04-068 | | % | - | - | - | - |
| **ENV104 OC,OP in Enviro Soil** | | | | | | | |
| Mirex | ENV104 | 0.1 | mg/kg | - | - | - | - |

| | Test Method | LOR | Units | B701793-A/46 | B701793-A/47 | B701793-A/48 | B701793-A/49 |
|---|---|---|---|---|---|---|---|
| **ENV104.X Herbicide in Soil** | | | | | | | |
| Toxaphene | ENV104 | 0.1 | mg/kg | - | - | - | - |

Please note: TOC, Total Nitrogen, TKN, Nitrate, Nitrite and Ammonia Testing performed by an external subcontracted NATA certified Laboratory.
Accreditation No.: 1884 Report No: SAL26890

Please note: Chromium suite testing performed by an external subcontracted NATA certified Laboratory.
Accreditation No.: 1261 Report No: 613647-S

TBT surrogate recovery are low due to matrix interferences.

Chunhai Yu, Senior Laboratory Technician
Chemistry (Sydney)

# CERTIFICATE OF ANALYSIS

**CERTIFICATE NO.:** B701793-B **REVISION NO.:** 00 
**ISSUE DATE:** 28/09/18 {Interim Report Date} This certificate supersedes any previous revisions

**CLIENT DETAILS:** Grace Bourke
BMT Eastern Australia Pty Ltd
Level 8 200 Creek Street
Brisbane QLD 4000

**DATE RECEIVED:** 17/08/2018
**CLIENT JOBREF:**
**ORDER NO:** B20259
**TEST DATE:** Sample tested between date received and reported.

## SAMPLE INFORMATION:

**Received Condition (°C):** Chilled ( 0 ~ 5 °C) **Storage Condition:** Refrigerated

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-B/1 | 14/08/2018 08:30 | RF2 | Sediment |
| B701793-B/2 | 14/08/2018 09:05 | RF3 | Sediment |
| B701793-B/3 | 14/08/2018 09:30 | RF4 | Sediment |
| B701793-B/4 | 14/08/2018 10:00 | RF6 | Sediment |
| B701793-B/5 | 14/08/2018 10:30 | RF7 | Sediment |
| B701793-B/6 | 14/08/2018 10:55 | B13-9 | Sediment |
| B701793-B/7 | 14/08/2018 11:20 | B16-1 | Sediment |
| B701793-B/8 | 14/08/2018 11:50 | B16-0 | Sediment |
| B701793-B/9 | 14/08/2018 12:25 | B13-8 | Sediment |
| B701793-B/10 | 14/08/2018 13:10 | B13-5 | Sediment |
| B701793-B/11 | 14/08/2018 13:45 | B13-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-B/12 | 14/08/2018 13:45 | B13-4B | Sediment |
| B701793-B/13 | 14/08/2018 13:45 | B13-4C | Sediment |
| B701793-B/14 | 14/08/2018 14:30 | B13-1 | Sediment |
| B701793-B/15 | 14/08/2018 15:00 | B15-3 | Sediment |
| B701793-B/16 | 15/08/2018 08:10 | B15-2 | Sediment |
| B701793-B/17 | 15/08/2018 08:30 | B15-1 | Sediment |
| B701793-B/18 | 15/08/2018 08:55 | B12-2 | Sediment |
| B701793-B/19 | 15/08/2018 09:20 | B12-1 | Sediment |
| B701793-B/20 | 15/08/2018 09:50 | B11-5 | Sediment |
| B701793-B/21 | 15/08/2018 10:30 | B11-8 | Sediment |
| B701793-B/22 | 15/08/2018 10:30 | B11-8B | Sediment |
| B701793-B/23 | 15/08/2018 11:00 | B11-9 | Sediment |
| B701793-B/24 | 15/08/2018 11:02 | B11-9B | Sediment |
| B701793-B/25 | 15/08/2018 11:05 | B11-9C | Sediment |
| B701793-B/26 | 15/08/2018 11:40 | B10-8 | Sediment |
| B701793-B/27 | 15/08/2018 12:05 | B10-6 | Sediment |
| B701793-B/28 | 15/08/2018 12:05 | B10-6B | Sediment |
| B701793-B/29 | 15/08/2018 12:45 | B10-5 | Sediment |
| B701793-B/30 | 15/08/2018 12:45 | B10-5B | Sediment |
| B701793-B/31 | 17/08/2018 07:44 | B9-1 | Sediment |
| B701793-B/32 | 17/08/2018 08:53 | B2-0 | Sediment |
| B701793-B/33 | 17/08/2018 09:38 | BC-2 | Sediment |
| B701793-B/34 | 17/08/2018 10:06 | B4-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-B/35 | 17/08/2018 10:30 | B4-0 | Sediment |
| B701793-B/36 | 17/08/2018 11:07 | B5-0 | Sediment |
| B701793-B/37 | 17/08/2018 11:07 | B5-0B | Sediment |
| B701793-B/38 | 17/08/2018 11:41 | B5-1 | Sediment |
| B701793-B/39 | 17/08/2018 11:44 | B5-1B | Sediment |
| B701793-B/40 | 17/08/2018 11:48 | B5-1C | Sediment |
| B701793-B/41 | 17/08/2018 12:24 | B6-3 | Sediment |
| B701793-B/42 | 17/08/2018 12:48 | B6-2 | Sediment |
| B701793-B/43 | 17/08/2018 12:48 | B6-2B | Sediment |
| B701793-B/44 | 17/08/2018 13:25 | B7-1 | Sediment |
| B701793-B/45 | 17/08/2018 13:49 | B8-1 | Sediment |
| B701793-B/46 | 17/08/2018 14:11 | B8-3 | Sediment |
| B701793-B/47 | 14/08/2018 | Trip 1 | Sediment |
| B701793-B/48 | 15/08/2018 | Trip 2 | Sediment |
| B701793-B/49 | 17/08/2018 | Trip 3 | Sediment |

## RESULTS OF ANALYSIS:

| | Test Method | LOR | Units | B701793-B/1 | B701793-B/2 | B701793-B/3 | B701793-B/4 | B701793-B/5 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | - | - | - | - | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-B/6 | B701793-B/7 | B701793-B/8 | B701793-B/9 | B701793-B/10 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | - | - | - | 0.20±0.09 | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | - | - | - | 0.48±0.15 | - |

| | Test Method | LOR | Units | B701793-B/11 | B701793-B/12 | B701793-B/13 | B701793-B/14 | B701793-B/15 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | - | - | - | 0.11±0.08 | 0.12±0.07 |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | - | - | - | 0.40±0.16 | 0.37±0.16 |

| | Test Method | LOR | Units | B701793-B/16 | B701793-B/17 | B701793-B/18 | B701793-B/19 | B701793-B/20 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | 0.17±0.08 | - | - | 0.12±0.08 | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | 0.51±0.17 | - | - | 0.53±0.15 | - |

| | Test Method | LOR | Units | B701793-B/21 | B701793-B/22 | B701793-B/23 | B701793-B/24 | B701793-B/25 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | 0.08±0.07 | - | - | - | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | 0.43±0.15 | - | - | - | - |

| | Test Method | LOR | Units | B701793-B/26 | B701793-B/27 | B701793-B/28 | B701793-B/29 | B701793-B/30 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | - | <0.10 | 0.15±0.08 | - | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | - | 0.50±0.16 | 0.46±0.17 | - | - |

| | Test Method | LOR | Units | B701793-B/31 | B701793-B/32 | B701793-B/33 | B701793-B/34 | B701793-B/35 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | 0.19±0.09 | - | - | - | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | 0.34±0.15 | - | - | - | - |

| | Test Method | LOR | Units | B701793-B/36 | B701793-B/37 | B701793-B/38 | B701793-B/39 | B701793-B/40 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | 0.08±0.07 | - | 0.14±0.08 | 0.25±0.09 | 0.18±0.09 |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | 0.46±0.15 | - | 0.51±0.16 | 0.49±0.17 | 0.55±0.15 |

| | Test Method | LOR | Units | B701793-B/41 | B701793-B/42 | B701793-B/43 | B701793-B/44 | B701793-B/45 |
|---|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | 0.08±0.07 | - | - | 0.17±0.09 | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | 0.31±0.15 | - | - | 0.37±0.16 | - |

| | Test Method | LOR | Units | B701793-B/46 | B701793-B/47 | B701793-B/48 | B701793-B/49 |
|---|---|---|---|---|---|---|---|
| **Radiation Analysis*** | | | | | | | |
| Gross Alpha* (including K-40 correction) | S014.00 | 0.08 | Bq/g | - | - | - | - |
| Gross Beta* (including K-40 correction) | S014.00 | 0.25 | Bq/g | - | - | - | - |


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▪ Sydney: 2 Sirius Rd, Lane Cove West NSW 2066
▪ Wagga Wagga: Unit 5, 10-12 Kooringal Rd, Wagga Wagga NSW 2650

Please note: Testing performed by an external subcontracted Laboratory.
Report No: ME307995 R0

Feng Shi, Senior Laboratory Technician
Chemistry (Sydney)

# CERTIFICATE OF ANALYSIS

**CERTIFICATE NO.:** **B701793-D** **REVISION NO.:** **01** 
**ISSUE DATE:** 17/10/18 This certificate supersedes any previous revisions

**CLIENT DETAILS:** Brad Hiles
BMT Eastern Australia Pty Ltd
Level 8 200 Creek Street
Brisbane QLD 4000

**DATE RECEIVED:** 20/08/2018
**CLIENT JOBREF:**
**ORDER NO:**
**TEST DATE:** Sample tested between date received and reported.

## SAMPLE INFORMATION:

**Received Condition (°C):** Chilled ( 0 ~ 5 °C) **Storage Condition:** Refrigerated

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-D/1 | | RF2 | Sediment |
| B701793-D/2 | | RF3 | Sediment |
| B701793-D/3 | | RF4 | Sediment |
| B701793-D/4 | | RF6 | Sediment |
| B701793-D/5 | | RF7 | Sediment |
| B701793-D/6 | | B13-9 | Sediment |
| B701793-D/7 | | B16-1 | Sediment |
| B701793-D/8 | | B16-0 | Sediment |
| B701793-D/9 | | B13-8 | Sediment |
| B701793-D/10 | | B13-5 | Sediment |
| B701793-D/11 | | B13-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-D/12 | | B13-4B | Sediment |
| B701793-D/13 | | B13-4C | Sediment |
| B701793-D/14 | | B13-1 | Sediment |
| B701793-D/15 | | B15-3 | Sediment |
| B701793-D/16 | | B15-2 | Sediment |
| B701793-D/17 | | B15-1 | Sediment |
| B701793-D/18 | | B12-2 | Sediment |
| B701793-D/19 | | B12-1 | Sediment |
| B701793-D/20 | | B11-5 | Sediment |
| B701793-D/21 | | B11-8 | Sediment |
| B701793-D/22 | | B11-8B | Sediment |
| B701793-D/23 | | B11-9 | Sediment |
| B701793-D/24 | | B11-9B | Sediment |
| B701793-D/25 | | B11-9C | Sediment |
| B701793-D/26 | | B10-8 | Sediment |
| B701793-D/27 | | B10-6 | Sediment |
| B701793-D/28 | | B10-6B | Sediment |
| B701793-D/29 | | B10-5 | Sediment |
| B701793-D/30 | | B10-5B | Sediment |
| B701793-D/31 | | B9-1 | Sediment |
| B701793-D/32 | | B2-0 | Sediment |
| B701793-D/33 | | BC-2 | Sediment |
| B701793-D/34 | | B4-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-D/35 | | B4-0 | Sediment |
| B701793-D/36 | | B5-0 | Sediment |
| B701793-D/37 | | B5-0B | Sediment |
| B701793-D/38 | | B5-1 | Sediment |
| B701793-D/39 | | B5-1B | Sediment |
| B701793-D/40 | | B5-1C | Sediment |
| B701793-D/41 | | B6-3 | Sediment |
| B701793-D/42 | | B6-2 | Sediment |
| B701793-D/43 | | B6-2B | Sediment |
| B701793-D/44 | | B7-1 | Sediment |
| B701793-D/45 | | B8-1 | Sediment |
| B701793-D/46 | | B8-3 | Sediment |
| B701793-D/47 | | Trip 1 | Sediment |
| B701793-D/48 | | Trip 2 | Sediment |
| B701793-D/49 | | Trip 3 | Sediment |

## RESULTS OF ANALYSIS:

| | Test Method | LOR | Units | B701793-D/1 | B701793-D/2 | B701793-D/3 | B701793-D/4 | B701793-D/5 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/1 | B701793-D/2 | B701793-D/3 | B701793-D/4 | B701793-D/5 |
|---|---|---|---|---|---|---|---|---|
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/1 | B701793-D/2 | B701793-D/3 | B701793-D/4 | B701793-D/5 |
|---|---|---|---|---|---|---|---|---|
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/6 | B701793-D/7 | B701793-D/8 | B701793-D/9 | B701793-D/10 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/6 | B701793-D/7 | B701793-D/8 | B701793-D/9 | B701793-D/10 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/6 | B701793-D/7 | B701793-D/8 | B701793-D/9 | B701793-D/10 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/11 | B701793-D/12 | B701793-D/13 | B701793-D/14 | B701793-D/15 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/11 | B701793-D/12 | B701793-D/13 | B701793-D/14 | B701793-D/15 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/11 | B701793-D/12 | B701793-D/13 | B701793-D/14 | B701793-D/15 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/16 | B701793-D/17 | B701793-D/18 | B701793-D/19 | B701793-D/20 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | <0.0050 | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | 57 | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | 204 | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/16 | B701793-D/17 | B701793-D/18 | B701793-D/19 | B701793-D/20 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | <0.0050 | - |
| Surrogate Recovery | 04-061 | | % | - | - | - | 84 | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Surrogate Recovery | 04-072 | - | % | - | - | - | 114 | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/16 | B701793-D/17 | B701793-D/18 | B701793-D/19 | B701793-D/20 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/21 | B701793-D/22 | B701793-D/23 | B701793-D/24 | B701793-D/25 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | - | <0.0050 | - | - |
| Surrogate Recovery | 04-061 | | % | 35 | - | 43 | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Surrogate Recovery | 04-072 | - | % | 188 | - | 178 | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |

| | Test Method | LOR | Units | B701793-D/21 | B701793-D/22 | B701793-D/23 | B701793-D/24 | B701793-D/25 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | - | <0.1 | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | <0.0050 | <0.0050 | - | - |
| Surrogate Recovery | 04-061 | | % | 71 | 104 | 58 | - | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Surrogate Recovery | 04-072 | - | % | 120 | 139 | 120 | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |

| | Test Method | LOR | Units | B701793-D/21 | B701793-D/22 | B701793-D/23 | B701793-D/24 | B701793-D/25 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | <0.1 | - | - |

| | Test Method | LOR | Units | B701793-D/26 | B701793-D/27 | B701793-D/28 | B701793-D/29 | B701793-D/30 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | <0.0050 | - | <0.0050 | - |
| Surrogate Recovery | 04-061 | | % | 62 | 63 | - | 42 | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Surrogate Recovery | 04-072 | - | % | 174 | 228 | - | 158 | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/26 | B701793-D/27 | B701793-D/28 | B701793-D/29 | B701793-D/30 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | <0.0050 | - | <0.0050 | <0.0050 |
| Surrogate Recovery | 04-061 | | % | 105 | 98 | - | 72 | 82 |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Surrogate Recovery | 04-072 | - | % | 128 | 123 | - | 145 | 134 |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |

| | Test Method | LOR | Units | B701793-D/26 | B701793-D/27 | B701793-D/28 | B701793-D/29 | B701793-D/30 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | <0.1 | <0.1 |

| | Test Method | LOR | Units | B701793-D/31 | B701793-D/32 | B701793-D/33 | B701793-D/34 | B701793-D/35 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | <0.0050 |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | 78 |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | 179 |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |

| | Test Method | LOR | Units | B701793-D/31 | B701793-D/32 | B701793-D/33 | B701793-D/34 | B701793-D/35 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | - | - | - | <0.0050 |
| Surrogate Recovery | 04-061 | | % | - | - | - | - | 104 |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Surrogate Recovery | 04-072 | - | % | - | - | - | - | 87 |
| Aldrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| beta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |

| | Test Method | LOR | Units | B701793-D/31 | B701793-D/32 | B701793-D/33 | B701793-D/34 | B701793-D/35 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Dieldrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endrin | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Heptachlor | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |
| Mirex | 04-072 | 0.1 | µg/L | - | - | - | - | <0.1 |

| | Test Method | LOR | Units | B701793-D/36 | B701793-D/37 | B701793-D/38 | B701793-D/39 | B701793-D/40 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | - | - | - | - |
| Surrogate Recovery | 04-061 | | % | 56 | - | - | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Surrogate Recovery | 04-072 | - | % | 169 | - | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |

| | Test Method | LOR | Units | B701793-D/36 | B701793-D/37 | B701793-D/38 | B701793-D/39 | B701793-D/40 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | - | - | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | <0.0050 | - | - | - |
| Surrogate Recovery | 04-061 | | % | 83 | 61 | - | - | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Surrogate Recovery | 04-072 | - | % | 112 | 104 | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |

| | Test Method | LOR | Units | B701793-D/36 | B701793-D/37 | B701793-D/38 | B701793-D/39 | B701793-D/40 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | <0.1 | - | - | - |

| | Test Method | LOR | Units | B701793-D/41 | B701793-D/42 | B701793-D/43 | B701793-D/44 | B701793-D/45 |
|---|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | <0.0050 | - | <0.0050 | - |
| Surrogate Recovery | 04-061 | | % | - | 52 | - | 93 | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Surrogate Recovery | 04-072 | - | % | - | 176 | - | 186 | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| delta-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/41 | B701793-D/42 | B701793-D/43 | B701793-D/44 | B701793-D/45 |
|---|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Mirex | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| **SE061_0C TBT in Porewater** | | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | - | <0.0050 | - | <0.0050 | - |
| Surrogate Recovery | 04-061 | | % | - | 85 | - | 58 | - |
| **SE072_0C OC in Porewater** | | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Surrogate Recovery | 04-072 | - | % | - | 86 | - | 124 | - |
| Aldrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| beta-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/41 | B701793-D/42 | B701793-D/43 | B701793-D/44 | B701793-D/45 |
|---|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Dieldrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endrin | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Heptachlor | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |
| Mirex | 04-072 | 0.1 | µg/L | - | <0.1 | - | <0.1 | - |

| | Test Method | LOR | Units | B701793-D/46 | B701793-D/47 | B701793-D/48 | B701793-D/49 |
|---|---|---|---|---|---|---|---|
| **SE061_0B TBT Elutriate Water** | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | - | - | - |
| Surrogate Recovery | 04-061 | | % | 91 | - | - | - |
| **SE072_0B OC in Elutriate Water** | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Surrogate Recovery | 04-072 | - | % | 158 | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |

| | Test Method | LOR | Units | B701793-D/46 | B701793-D/47 | B701793-D/48 | B701793-D/49 |
|---|---|---|---|---|---|---|---|
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| **SE061_0C TBT in Porewater** | | | | | | | |
| Tributyltin | 04-061 | 0.005 | µgSn/L | <0.0050 | - | - | - |
| Surrogate Recovery | 04-061 | | % | 129 | - | - | - |
| **SE072_0C OC in Porewater** | | | | | | | |
| cis-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| trans-Chlordane | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDD | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDE | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| p,p'-DDT | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Surrogate Recovery | 04-072 | - | % | 104 | - | - | - |
| Aldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| alpha-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| beta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| gamma-BHC (Lindane) | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |

| | Test Method | LOR | Units | B701793-D/46 | B701793-D/47 | B701793-D/48 | B701793-D/49 |
|---|---|---|---|---|---|---|---|
| delta-BHC | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Dieldrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| alpha-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| beta-Endosulfan | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endosulfan Sulphate | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endrin | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endrin ketone | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Endrin aldehyde | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Heptachlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Heptachlor epoxide | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Hexachlorobenzene | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Methoxychlor | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |
| Mirex | 04-072 | 0.1 | µg/L | <0.1 | - | - | - |

Surrogate recovery for OC test in elutriate water is high due to sample matrix interference.

Surrogate recovery for TBT test in elutriate water is low due to sample matrix interference.

Some OC compound recovery is high in LCS. As the samples are negative, the results are accepted.

Yeh

Chunhai Yu, Senior Laboratory Technician
Chemistry (Sydney)

# CERTIFICATE OF ANALYSIS

**CERTIFICATE NO.:** **B701793-E** **REVISION NO.:** **00** 
**ISSUE DATE:** 17/10/18 This certificate supersedes any previous revisions

Symbio LABORATORIES Proudly AUSTRALIAN

**CLIENT DETAILS:** Brad Hiles
BMT Eastern Australia Pty Ltd
Level 8 200 Creek Street
Brisbane QLD 4000

**DATE RECEIVED:** 17/08/2018
**CLIENT JOBREF:**
**ORDER NO:**
**TEST DATE:** Sample tested between date received and reported.

## SAMPLE INFORMATION:

**Received Condition (°C):** Chilled ( 0 ~ 5 °C) **Storage Condition:** Refrigerated

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-E/1 | 17/08/2018 08:30 | RF2 | Sediment |
| B701793-E/2 | 14/08/2018 09:05 | RF3 | Sediment |
| B701793-E/3 | 14/08/2018 09:30 | RF4 | Sediment |
| B701793-E/4 | 14/08/2018 10:00 | RF6 | Sediment |
| B701793-E/5 | 14/08/2018 10:30 | RF7 | Sediment |
| B701793-E/6 | 14/08/2018 10:55 | B13-9 | Sediment |
| B701793-E/7 | 14/08/2018 11:20 | B16-1 | Sediment |
| B701793-E/8 | 14/08/2018 11:50 | B16-0 | Sediment |
| B701793-E/9 | 14/08/2018 12:25 | B13-8 | Sediment |
| B701793-E/10 | 14/08/2018 13:10 | B13-5 | Sediment |
| B701793-E/11 | 14/08/2018 13:45 | B13-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-E/12 | 14/08/2018 13:45 | B13-4B | Sediment |
| B701793-E/13 | 14/08/2018 13:45 | B13-4C | Sediment |
| B701793-E/14 | 14/08/2018 14:30 | B13-1 | Sediment |
| B701793-E/15 | 14/08/2018 15:00 | B15-3 | Sediment |
| B701793-E/16 | 15/08/2018 08:10 | B15-2 | Sediment |
| B701793-E/17 | 15/08/2018 08:30 | B15-1 | Sediment |
| B701793-E/18 | 15/08/2018 08:55 | B12-2 | Sediment |
| B701793-E/19 | 15/08/2018 09:20 | B12-1 | Sediment |
| B701793-E/20 | 15/08/2018 09:50 | B11-5 | Sediment |
| B701793-E/21 | 15/08/2018 10:30 | B11-8 | Sediment |
| B701793-E/22 | 15/08/2018 10:30 | B11-8B | Sediment |
| B701793-E/23 | 15/08/2018 11:00 | B11-9 | Sediment |
| B701793-E/24 | 15/08/2018 11:02 | B11-9B | Sediment |
| B701793-E/25 | 15/08/2018 11:05 | B11-9C | Sediment |
| B701793-E/26 | 15/08/2018 11:40 | B10-8 | Sediment |
| B701793-E/27 | 15/08/2018 12:05 | B10-6 | Sediment |
| B701793-E/28 | 15/08/2018 12:05 | B10-6B | Sediment |
| B701793-E/29 | 15/08/2018 12:45 | B10-5 | Sediment |
| B701793-E/30 | 15/08/2018 12:45 | B10-5B | Sediment |
| B701793-E/31 | 17/08/2018 07:44 | B9-1 | Sediment |
| B701793-E/32 | 17/08/2018 08:53 | B2-0 | Sediment |
| B701793-E/33 | 17/08/2018 09:38 | BC-2 | Sediment |
| B701793-E/34 | 17/08/2018 10:06 | B4-4 | Sediment |

| Sample No. | Sample Date/Time | Sample Description | Sample Matrix |
|---|---|---|---|
| B701793-E/35 | 17/08/2018 10:30 | B4-0 | Sediment |
| B701793-E/36 | 17/08/2018 11:07 | B5-0 | Sediment |
| B701793-E/37 | 17/08/2018 11:07 | B5-0B | Sediment |
| B701793-E/38 | 17/08/2018 11:41 | B5-1 | Sediment |
| B701793-E/39 | 17/08/2018 11:44 | B5-1B | Sediment |
| B701793-E/40 | 17/08/2018 11:48 | B5-1C | Sediment |
| B701793-E/41 | 17/08/2018 12:24 | B6-3 | Sediment |
| B701793-E/42 | 17/08/2018 12:48 | B6-2 | Sediment |
| B701793-E/43 | 17/08/2018 12:48 | B6-2B | Sediment |
| B701793-E/44 | 17/08/2018 13:25 | B7-1 | Sediment |
| B701793-E/45 | 17/08/2018 13:49 | B8-1 | Sediment |
| B701793-E/46 | 17/08/2018 14:11 | B8-3 | Sediment |
| B701793-E/47 | 14/08/2018 | Trip 1 | Sediment |
| B701793-E/48 | 15/08/2018 | Trip 2 | Sediment |
| B701793-E/49 | 17/08/2018 | Trip 3 | Sediment |
| B701793-E/50 | | Elutriate Blank | Sediment |

## RESULTS OF ANALYSIS:

| | Test Method | LOR | Units | B701793-E/1 | B701793-E/2 | B701793-E/3 | B701793-E/4 | B701793-E/5 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | - | - | - | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | - | - | - | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/6 | B701793-E/7 | B701793-E/8 | B701793-E/9 | B701793-E/10 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | - | - | - | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | - | - | - | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/11 | B701793-E/12 | B701793-E/13 | B701793-E/14 | B701793-E/15 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | - | - | - | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | - | - | - | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/16 | B701793-E/17 | B701793-E/18 | B701793-E/19 | B701793-E/20 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | - | - | - | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | - | - | - | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/21 | B701793-E/22 | B701793-E/23 | B701793-E/24 | B701793-E/25 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | 5.4 | - | 5.3 | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | <1.0 | - | <1.0 | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/26 | B701793-E/27 | B701793-E/28 | B701793-E/29 | B701793-E/30 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | 5.2 | 6.6 | - | 5.6 | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | <1.0 | <1.0 | - | <1.0 | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/31 | B701793-E/32 | B701793-E/33 | B701793-E/34 | B701793-E/35 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | - | - | - | 6.5 | 12 |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | - | - | - | <1.0 | <1.0 |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/36 | B701793-E/37 | B701793-E/38 | B701793-E/39 | B701793-E/40 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | <0.01 | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | 6.8 | - | 7.6 | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | <1.0 | - | <1.0 | - | - |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | <0.10 | - | - |

| | Test Method | LOR | Units | B701793-E/41 | B701793-E/42 | B701793-E/43 | B701793-E/44 | B701793-E/45 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | 6.8 | 6.0 | - | 5.3 | 6.4 |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | <1.0 | <1.0 | - | <1.0 | <1.0 |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | - |

| | Test Method | LOR | Units | B701793-E/46 | B701793-E/47 | B701793-E/48 | B701793-E/49 | B701793-E/50 |
|---|---|---|---|---|---|---|---|---|
| **Dilute Acid Extraction - Metal** | | | | | | | | |
| Mercury | 04-002 | 0.01 | mg/kg | - | - | - | - | - |
| Nickel | 04-001 | 0.1 | mg/kg | 6.3 | - | - | - | - |
| **Elutriate - Trace Elements** | | | | | | | | |
| Nickel | 04-015 | 1 | µg/L | <1.0 | - | - | - | <1.0 |
| **Elutriate Analysis - Mercury** | | | | | | | | |
| Mercury - Dissolved | 04-009 | 0.1 | µg/L | - | - | - | - | <0.10 |


Symbio Laboratories Pty Ltd
ABN 82 079 645 015
- Tel: 1300 703 166 - Fax: +61 7 3219 0333

- Brisbane: 52 Brandl Street, Eight Mile Plains QLD 4113
- Melbourne: Unit 36, 640-680 Geelong Rd, Brooklyn VIC 3025
- Sydney: 2 Sirius Rd, Lane Cove West NSW 2066
- Wagga Wagga: Unit 5, 10-12 Kooringal Rd, Wagga Wagga NSW 2650

Yeh

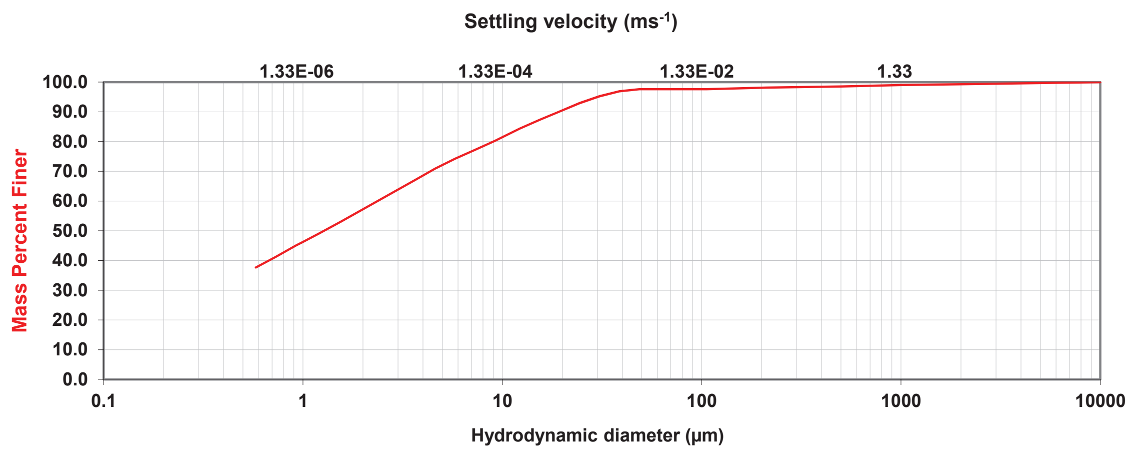
Chunhai Yu, Senior Laboratory Technician
Chemistry (Sydney)

37 Kensington Street
East Perth
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-1 RF2 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_01 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.37 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.8 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.4 | 1.03E-01 |
| Fine sand (125 - 250µm) | 0.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 1.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 2.3 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.6 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.4 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 29.2 | 2.08E-04 |
| Total clay (0 - 4µm) | 68.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 19.19 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.913 |
| D50 (µm) | 1.28 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 203.907 |
| D10 (µm) | 0.15 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 14168.200 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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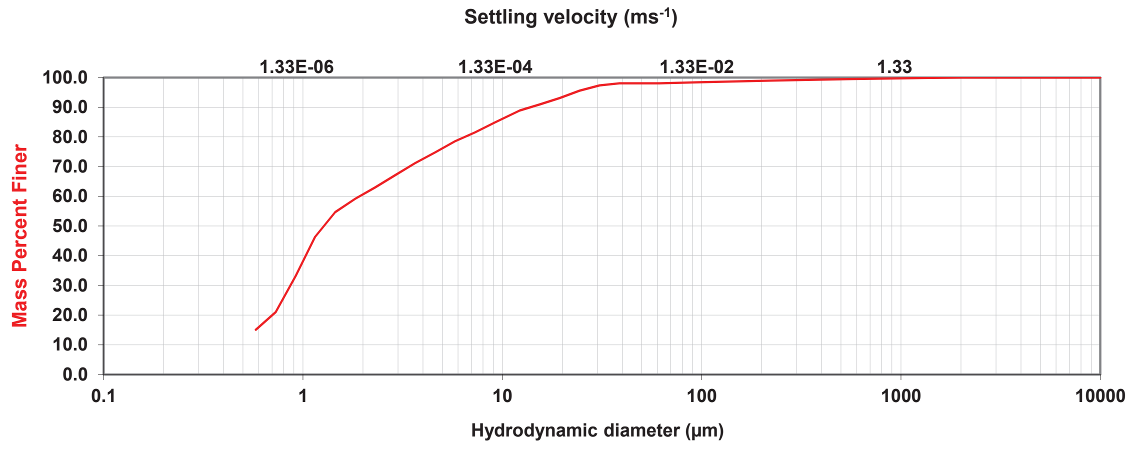
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-2 RF3 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_02 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 0.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 1.9 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.7 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.1 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 25.6 | 2.08E-04 |
| Total clay (0 - 4µm) | 72.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 13.97 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 1.722 |
| D50 (µm) | 1.28 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 204.453 |
| D10 (µm) | 0.38 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2271.031 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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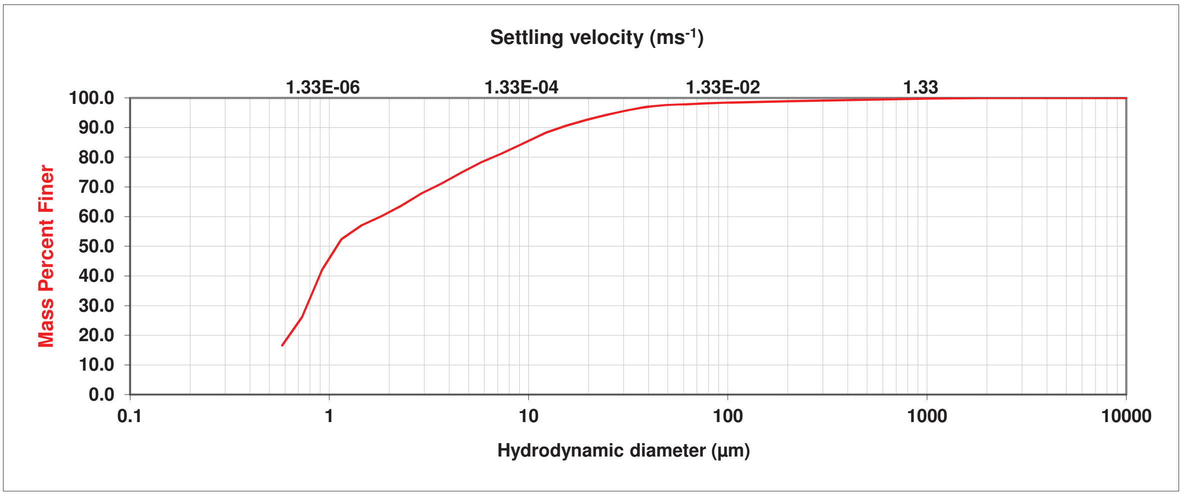
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-2 RF3 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_02Q |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 0.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 2.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 2.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 4.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.6 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 25.4 | 2.08E-04 |
| Total clay (0 - 4µm) | 72.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 14.57 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 1.585 |
| D50 (µm) | 1.10 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 279.642 |
| D10 (µm) | 0.35 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2748.443 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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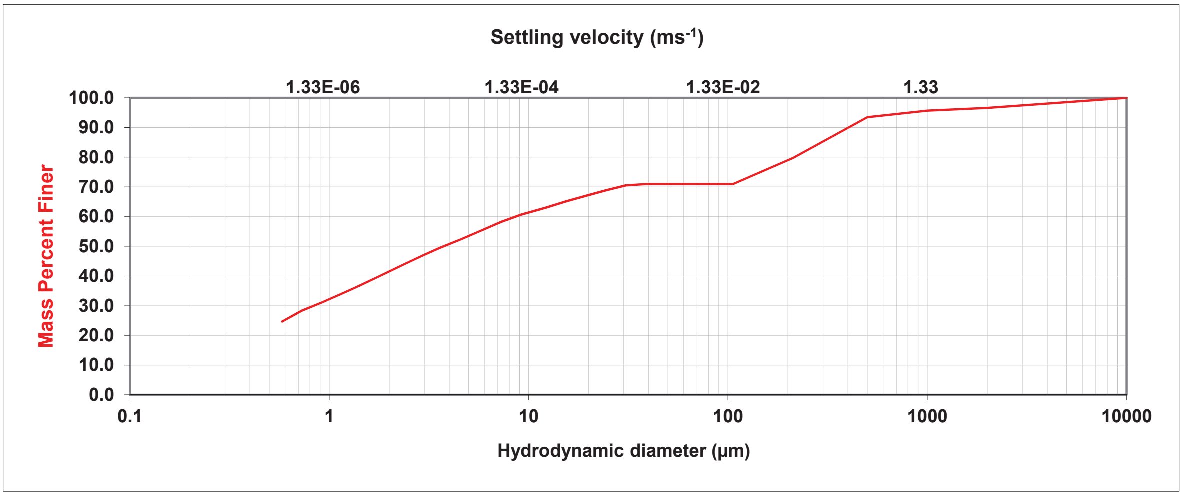
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-3 RF4 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_03 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 3.4 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.9 | 1.65E+00 |
| Coarse sand (500-1000µm) | 2.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 13.8 | 1.03E-01 |
| Fine sand (125 - 250µm) | 8.8 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 25.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 5.1 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 6.3 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 8.5 | 2.64E-05 |
| Total Silt % (4-63µm) | 20.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 50.7 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 336.44 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.09 |
| Time for 10% of particles to settle over 1m (hours) | 0.003 |
| D50 (µm) | 3.77 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 23.644 |
| D10 (µm) | 0.23 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6089.325 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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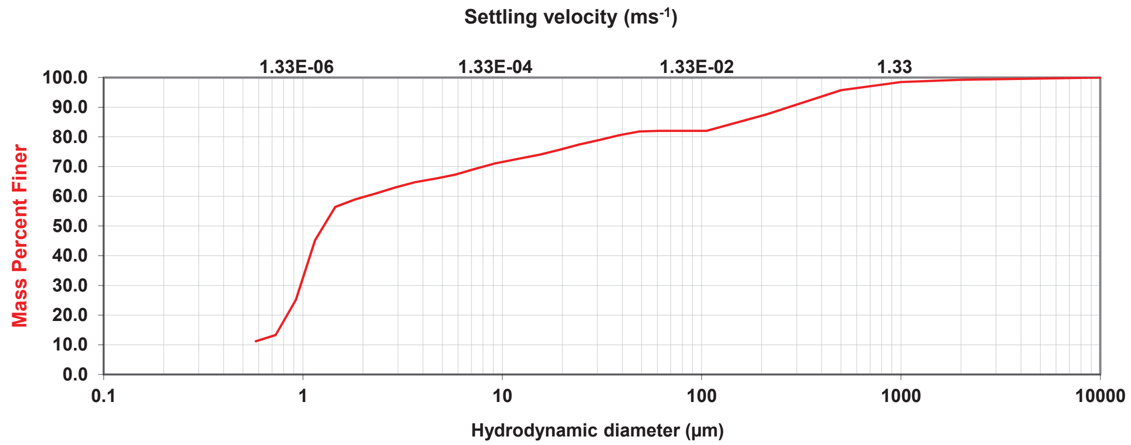
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-4 RF6 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_04 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.8 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.8 | 1.65E+00 |
| Coarse sand (500-1000µm) | 2.7 | 4.13E-01 |
| Medium sand (250 - 500µm) | 8.2 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.2 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.0 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 4.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 4.4 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 4.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 16.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 65.2 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 297.25 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.07 |
| Time for 10% of particles to settle over 1m (hours) | 0.004 |
| D50 (µm) | 1.28 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 205.544 |
| D10 (µm) | 0.52 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1256.168 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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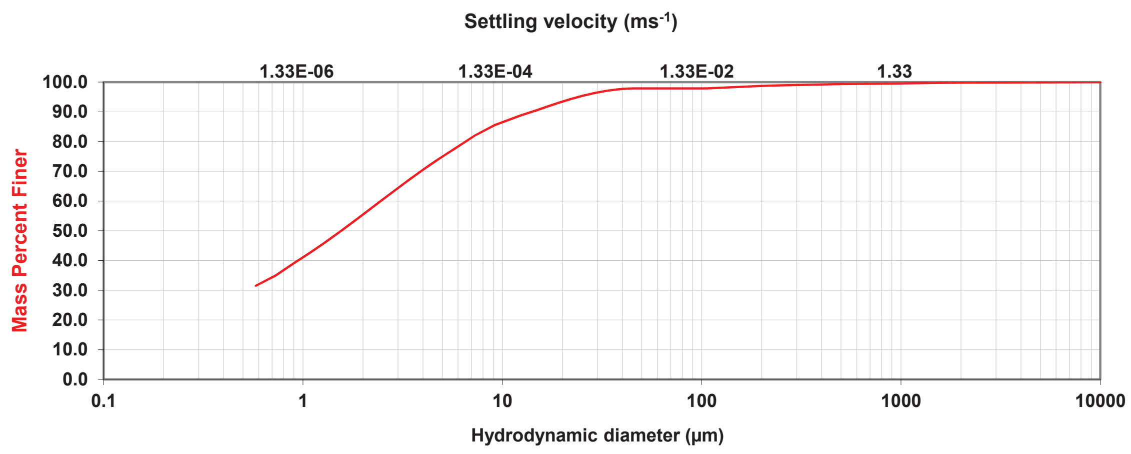
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-5 RF7
**Job No:** 18_1377
**Laboratory ID:** 18_1377_05

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.2 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 0.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 1.9 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 1.3 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 5.4 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 7.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 13.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 27.5 | 2.08E-04 |
| Total clay (0 - 4µm) | 70.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 14.15 |
| Minimum settling velocity of 10% of particles ($mm\ s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 1.680 |
| D50 (µm) | 1.56 |
| Minimum settling velocity of 50% of particles ($mm\ s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 137.993 |
| D10 (µm) | 0.18 |
| Minimum settling velocity of 90% of particles ($mm\ s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 9924.439 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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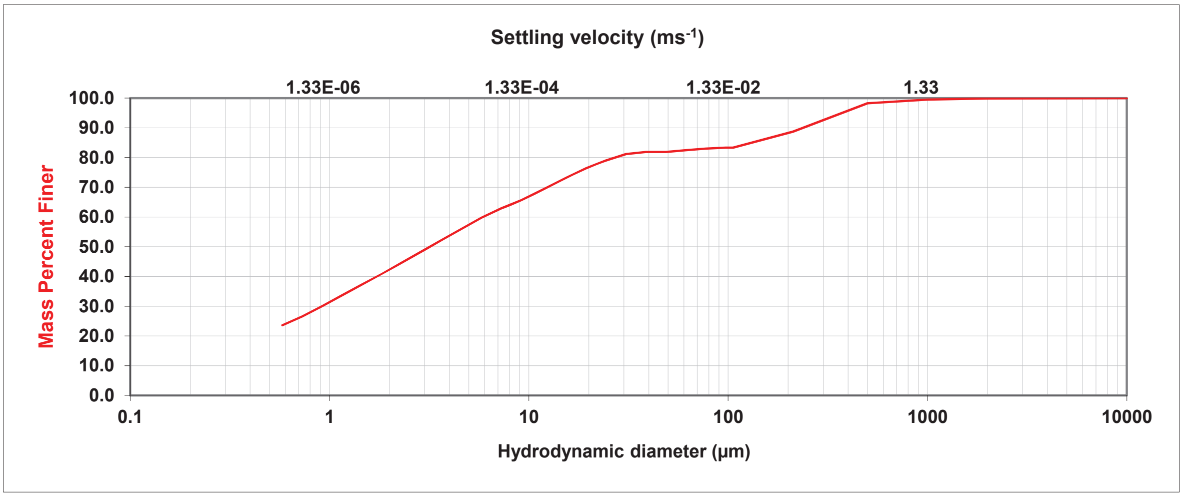
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-6 B13-9 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_06 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter**: | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.3 | 4.13E-01 |
| Medium sand (250 - 500µm) | 9.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.9 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.3 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 1.3 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.5 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.7 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 28.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 53.6 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 250.76 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.05 |
| Time for 10% of particles to settle over 1m (hours) | 0.005 |
| D50 (µm) | 3.20 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 32.754 |
| D10 (µm) | 0.25 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5557.118 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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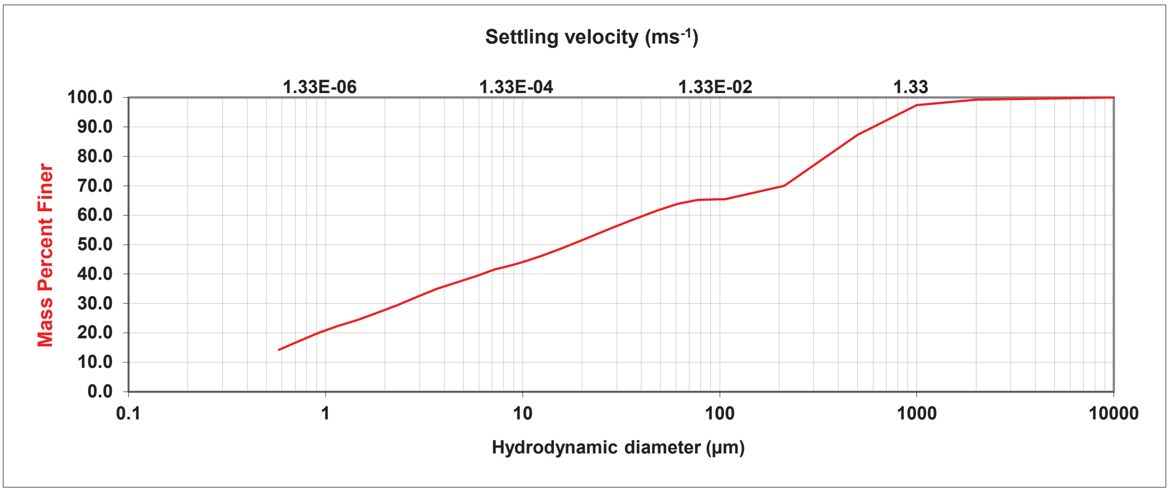
**Client:** Symbio Alliance
**Client ID:** B701793-7 B16-1
**Job No:** 18_1377
**Laboratory ID:** 18_1377_07

**Analysis:** X-ray sedimentation by Sedigraph 5100 **Analysis temp.:** 35.7ºC
**Dispersant:** Water **Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate **Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$ **Critical diameter** 54.35 µm
**Liquid viscosity:** 0.724 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.7 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 1.8 | 1.65E+00 |
| Coarse sand (500-1000µm) | 10.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 17.3 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 35.3 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 7.3 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 6.6 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 6.6 | 2.64E-05 |
| Total Silt % (4-63µm) | 28.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 35.8 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 633.24 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.33 |
| Time for 10% of particles to settle over 1m (hours) | 0.001 |
| D50 (µm) | 17.68 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.26 |
| Time for 50% of particles to settle over 1m (hours) | 1.076 |
| D10 (µm) | 0.41 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2035.630 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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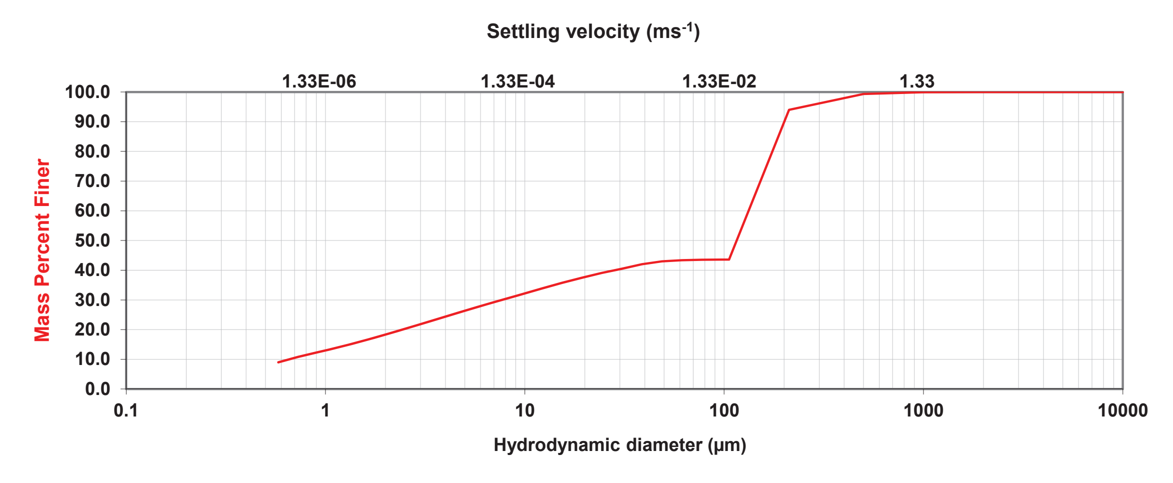
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-8 B16-0 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_08 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm³ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm³ | **Critical diameter:** | 54.33 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms⁻¹) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.6 | 4.13E-01 |
| Medium sand (250 - 500µm) | 5.3 | 1.03E-01 |
| Fine sand (125 - 250µm) | 50.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.2 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 56.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 2.8 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 4.5 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 5.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 5.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 19.0 | 2.08E-04 |
| Total clay (0 - 4µm) | 24.3 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 203.57 |
| Minimum settling velocity of 10% of particles (mm s⁻¹) | 0.03 |
| Time for 10% of particles to settle over 1m (hours) | 0.008 |
| D50 (µm) | 119.53 |
| Minimum settling velocity of 50% of particles (mm s⁻¹) | 11.80 |
| Time for 50% of particles to settle over 1m (hours) | 0.024 |
| D10 (µm) | 0.66 |
| Minimum settling velocity of 90% of particles (mm s⁻¹) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 767.743 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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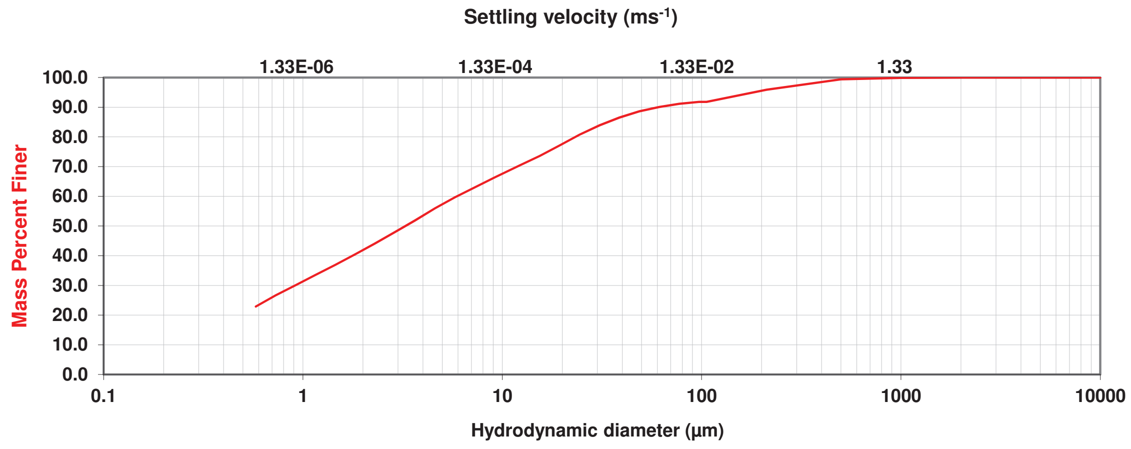
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-9 B13-8 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_09 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 3.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.1 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 9.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 6.2 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 9.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 36.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 53.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 60.95 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.091 |
| D50 (µm) | 3.29 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 31.159 |
| D10 (µm) | 0.25 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5229.121 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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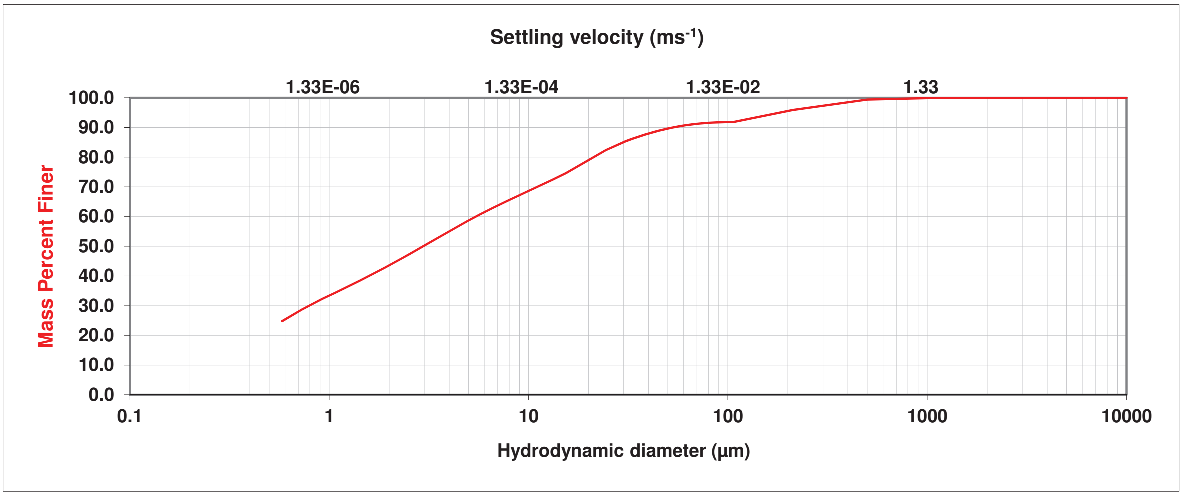
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-9 B13-8 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_09Q |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 3.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.1 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.9 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 9.2 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 10.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.5 | 2.64E-05 |
| Total Silt % (4-63µm) | 35.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 54.9 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 53.83 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.116 |
| D50 (µm) | 2.97 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 38.213 |
| D10 (µm) | 0.23 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6140.428 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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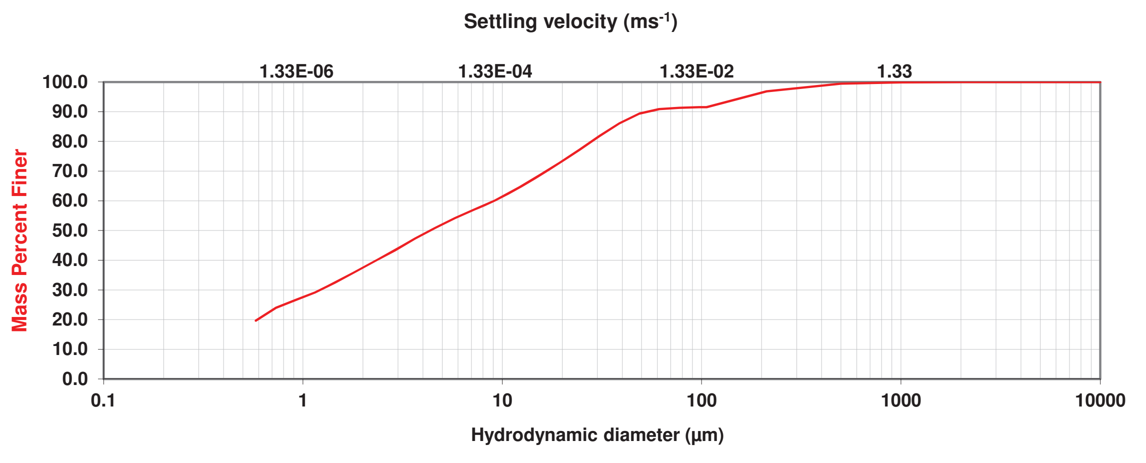
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-10 B13-5
**Job No:** 18_1377
**Laboratory ID:** 18_1377_10

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.36 µm
**Liquid viscosity:** 0.725 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 9.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 8.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 12.7 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 11.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 42.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 48.6 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 54.13 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.115 |
| D50 (µm) | 4.38 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.02 |
| Time for 50% of particles to settle over 1m (hours) | 17.535 |
| D10 (µm) | 0.30 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3855.800 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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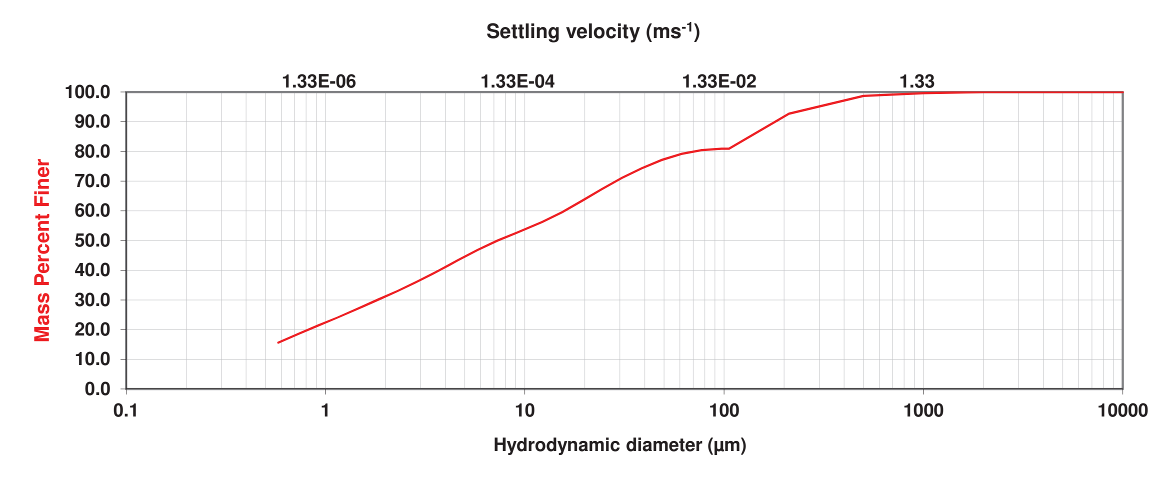
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-11 B13-4 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_11 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.9 | 4.13E-01 |
| Medium sand (250 - 500µm) | 6.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 11.8 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 20.7 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 8.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 11.1 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.1 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 38.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 41.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 465.48 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.18 |
| Time for 10% of particles to settle over 1m (hours) | 0.002 |
| D50 (µm) | 7.35 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.04 |
| Time for 50% of particles to settle over 1m (hours) | 6.222 |
| D10 (µm) | 0.37 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2439.479 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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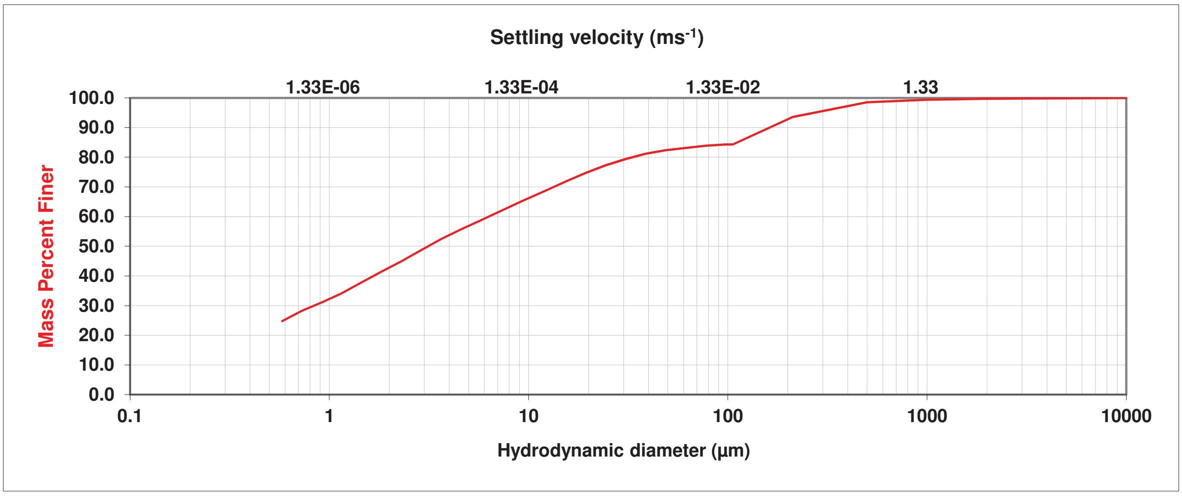
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-12 B13-4B |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_12 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.9 | 4.13E-01 |
| Medium sand (250 - 500µm) | 5.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 9.2 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.1 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 16.5 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.7 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.2 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.4 | 2.64E-05 |
| Total Silt % (4-63µm) | 29.5 | 2.08E-04 |
| Total clay (0 - 4µm) | 53.7 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 171.35 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.011 |
| D50 (µm) | 3.15 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 33.855 |
| D10 (µm) | 0.23 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6147.153 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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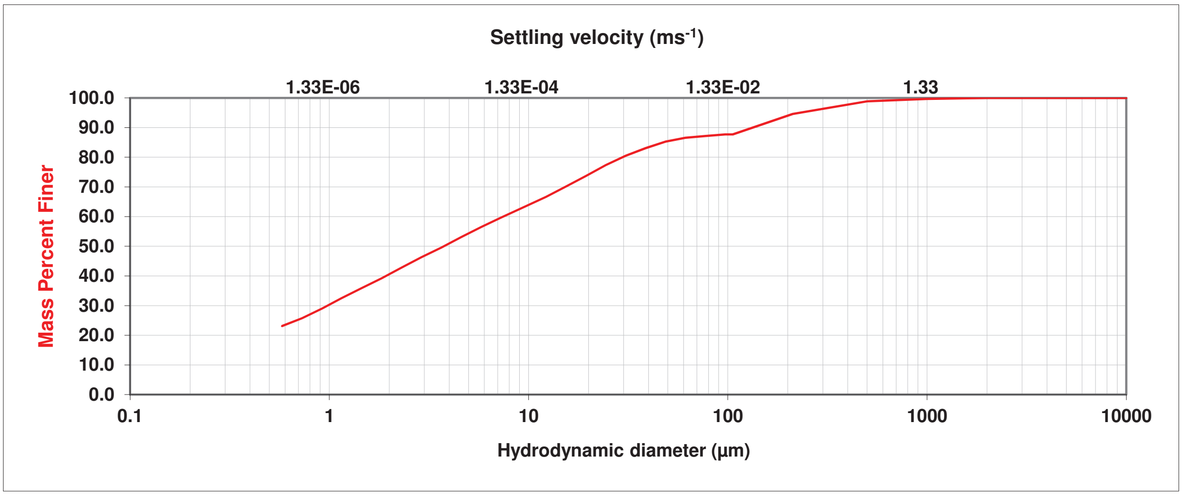
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-13 B13-4C |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_13 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.8 | 4.13E-01 |
| Medium sand (250 - 500µm) | 4.3 | 1.03E-01 |
| Fine sand (125 - 250µm) | 6.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.1 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 13.3 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 6.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 9.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 35.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 50.8 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 141.61 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.017 |
| D50 (µm) | 3.77 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 23.604 |
| D10 (µm) | 0.25 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5341.106 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes:

Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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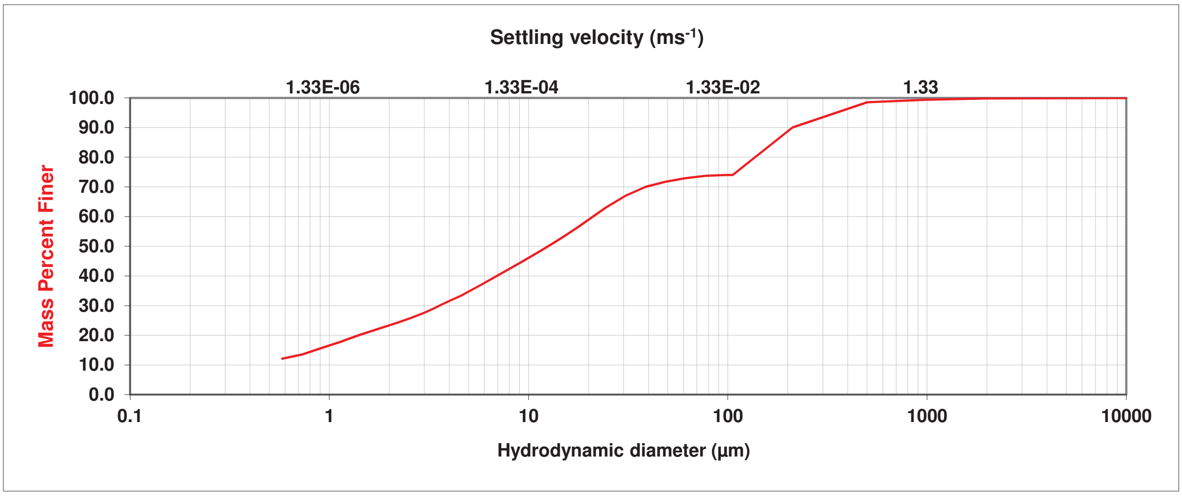
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-14 B13-1
**Job No:** 18_1377
**Laboratory ID:** 18_1377_14

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.35 µm
**Liquid viscosity:** 0.725 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.2 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.8 | 4.13E-01 |
| Medium sand (250 - 500µm) | 8.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 16.0 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 26.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 12.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 12.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.8 | 2.64E-05 |
| Total Silt % (4-63µm) | 41.6 | 2.08E-04 |
| Total clay (0 - 4µm) | 31.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 211.60 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.04 |
| Time for 10% of particles to settle over 1m (hours) | 0.008 |
| D50 (µm) | 12.54 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.13 |
| Time for 50% of particles to settle over 1m (hours) | 2.139 |
| D10 (µm) | 0.48 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1465.070 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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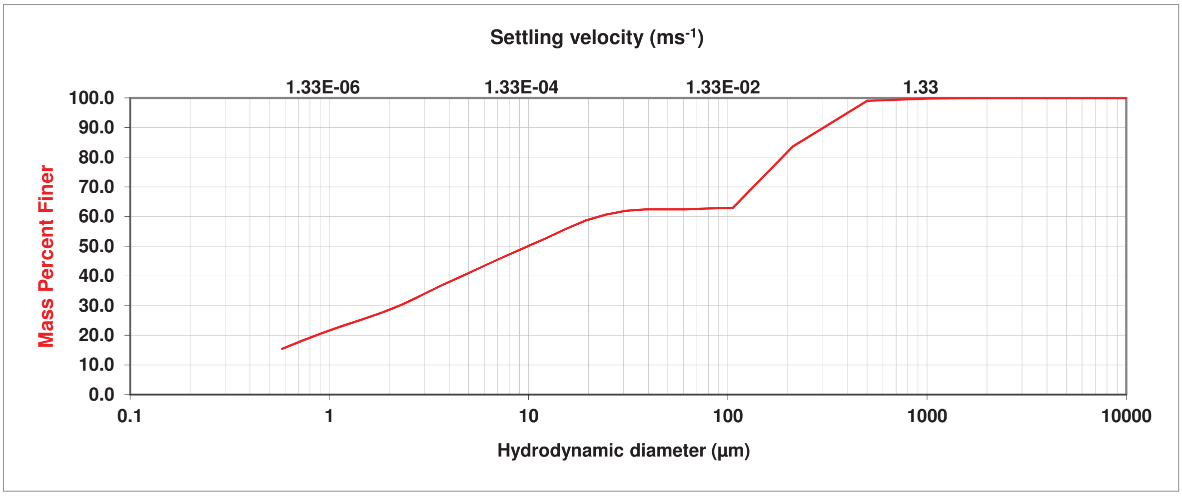
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-15 B15-3
**Job No:** 18_1377
**Laboratory ID:** 18_1377_15

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.8 | 4.13E-01 |
| Medium sand (250 - 500µm) | 15.4 | 1.03E-01 |
| Fine sand (125 - 250µm) | 20.7 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 37.5 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.5 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 5.7 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.2 | 2.64E-05 |
| Total Silt % (4-63µm) | 24.6 | 2.08E-04 |
| Total clay (0 - 4µm) | 37.9 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 331.68 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.09 |
| Time for 10% of particles to settle over 1m (hours) | 0.003 |
| D50 (µm) | 10.04 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.08 |
| Time for 50% of particles to settle over 1m (hours) | 3.338 |
| D10 (µm) | 0.38 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2368.858 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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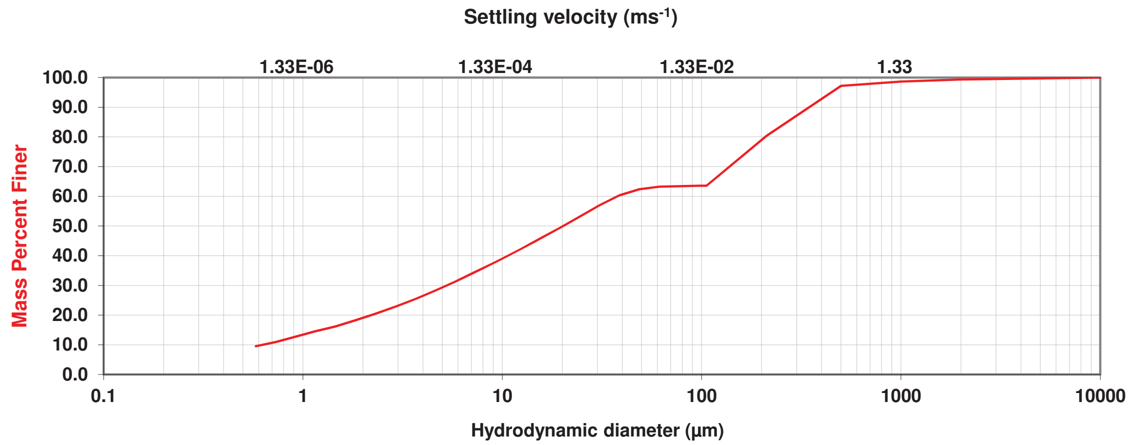
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-16 B15-2 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_16 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.7 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.7 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 16.8 | 1.03E-01 |
| Fine sand (125 - 250µm) | 16.8 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.3 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 36.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 6.2 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 10.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 36.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 26.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 376.90 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.12 |
| Time for 10% of particles to settle over 1m (hours) | 0.002 |
| D50 (µm) | 20.28 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.34 |
| Time for 50% of particles to settle over 1m (hours) | 0.818 |
| D10 (µm) | 0.63 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 847.275 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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WA 6004

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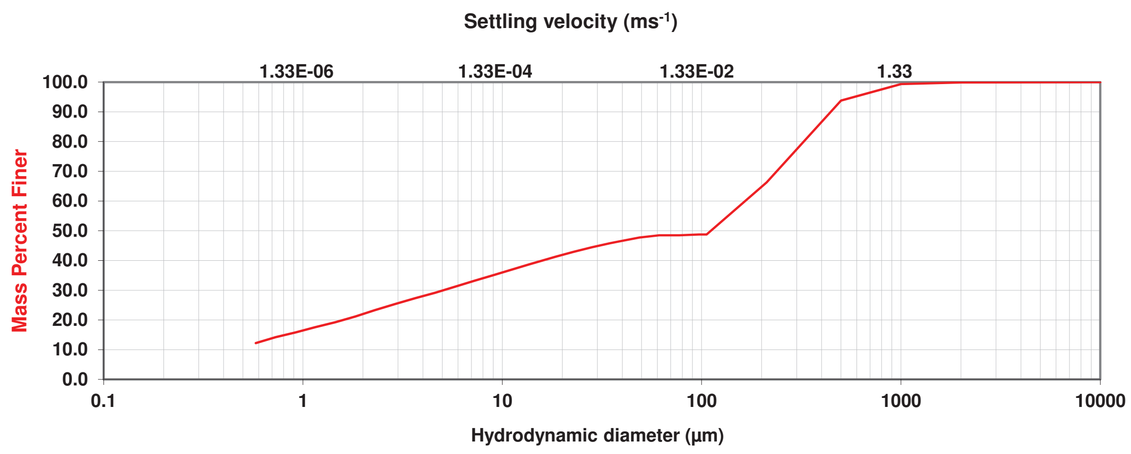
**Client:** Symbio Alliance
**Client ID:** B701793-17 B15-1
**Job No:** 18_1377
**Laboratory ID:** 18_1377_17

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.35 µm
**Liquid viscosity:** 0.724 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.5 | 1.65E+00 |
| Coarse sand (500-1000µm) | 5.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 27.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 17.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.3 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 51.4 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 5.0 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 6.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 6.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 20.5 | 2.08E-04 |
| Total clay (0 - 4µm) | 28.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 460.31 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.18 |
| Time for 10% of particles to settle over 1m (hours) | 0.002 |
| D50 (µm) | 113.55 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 10.65 |
| Time for 50% of particles to settle over 1m (hours) | 0.026 |
| D10 (µm) | 0.48 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1488.073 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

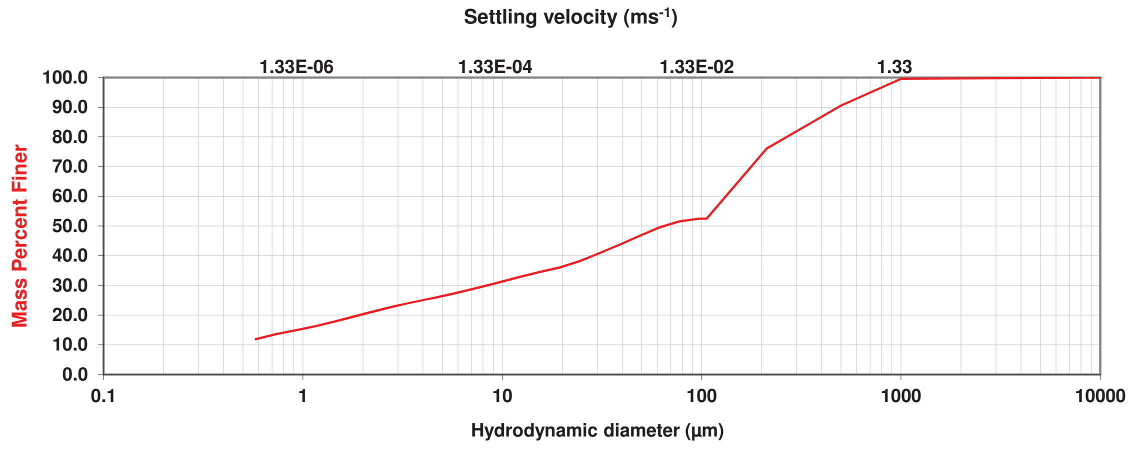
Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
East Perth
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-18 B12-2
**Job No:** 18_1377
**Laboratory ID:** 18_1377_18

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Dispersant:** Water
**Additives:** 10 mL sodium hexametaphosphate
**Analysis temp.:** 35.7ºC
**Sonication:** 10 min
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Liquid viscosity:** 0.724 cp
**Critical diameter:** 54.34 µm




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 9.0 | 4.13E-01 |
| Medium sand (250 - 500µm) | 14.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 23.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 2.8 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 50.0 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 8.7 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.2 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 5.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 4.6 | 2.64E-05 |
| Total Silt % (4-63µm) | 24.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 25.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 489.47 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.20 |
| Time for 10% of particles to settle over 1m (hours) | 0.001 |
| D50 (µm) | 65.20 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 3.51 |
| Time for 50% of particles to settle over 1m (hours) | 0.079 |
| D10 (µm) | 0.49 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1421.148 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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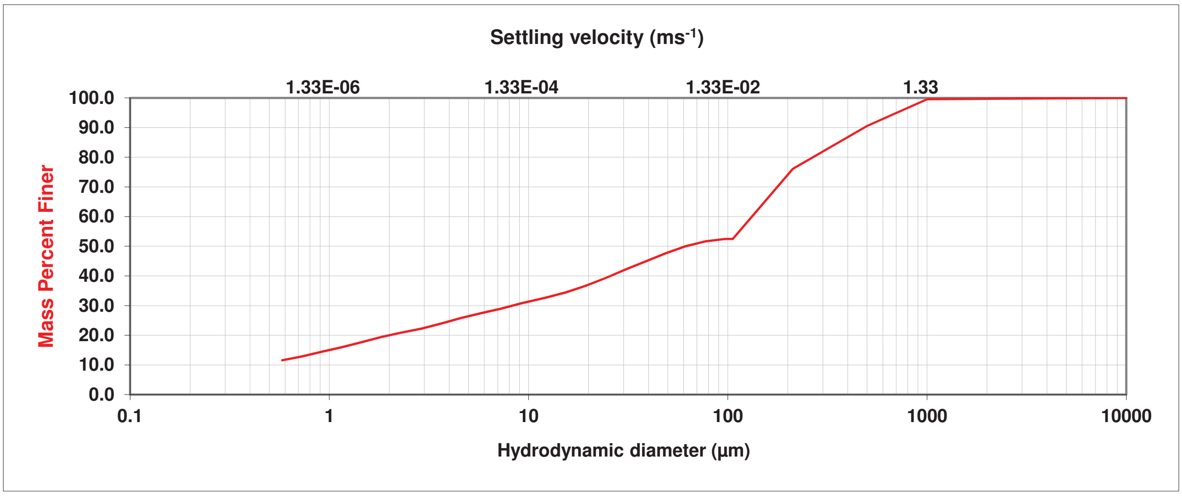
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-18 B12-2 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_18Q |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.33 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 9.0 | 4.13E-01 |
| Medium sand (250 - 500µm) | 14.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 23.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 2.3 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 49.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 7.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.4 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 5.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 5.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 25.5 | 2.08E-04 |
| Total clay (0 - 4µm) | 24.7 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 489.47 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.20 |
| Time for 10% of particles to settle over 1m (hours) | 0.001 |
| D50 (µm) | 61.61 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 3.14 |
| Time for 50% of particles to settle over 1m (hours) | 0.089 |
| D10 (µm) | 0.50 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1337.681 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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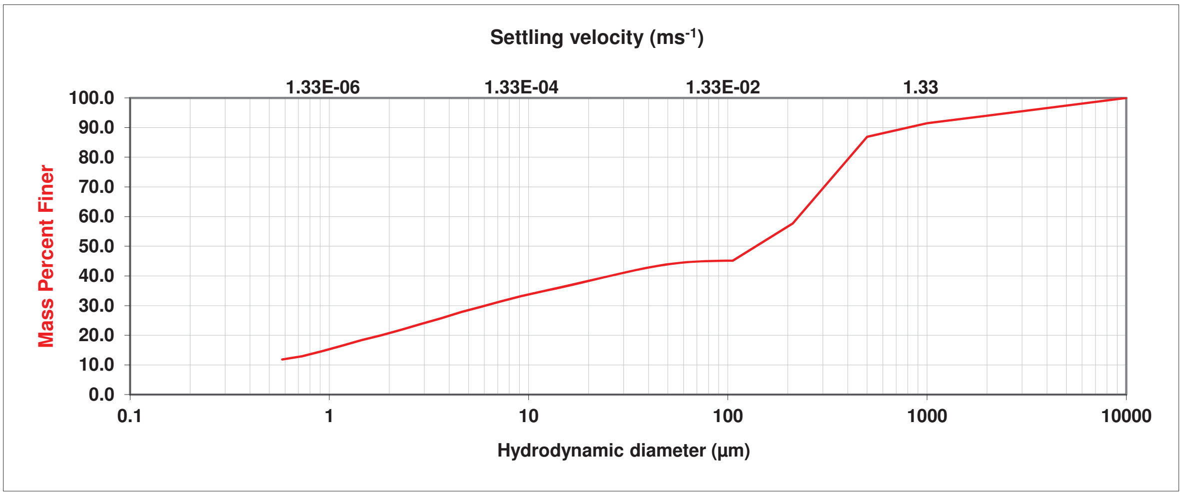
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-19 B12-1
**Job No:** 18_1377
**Laboratory ID:** 18_1377_19

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.35 µm
**Liquid viscosity:** 0.724 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 6.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 2.5 | 1.65E+00 |
| Coarse sand (500-1000µm) | 4.6 | 4.13E-01 |
| Medium sand (250 - 500µm) | 29.2 | 1.03E-01 |
| Fine sand (125 - 250µm) | 12.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.5 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 49.4 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 4.4 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 4.7 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 5.6 | 2.64E-05 |
| Total Silt % (4-63µm) | 18.1 | 2.08E-04 |
| Total clay (0 - 4µm) | 26.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 841.16 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.58 |
| Time for 10% of particles to settle over 1m (hours) | 0.000 |
| D50 (µm) | 147.05 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 17.86 |
| Time for 50% of particles to settle over 1m (hours) | 0.016 |
| D10 (µm) | 0.49 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1399.454 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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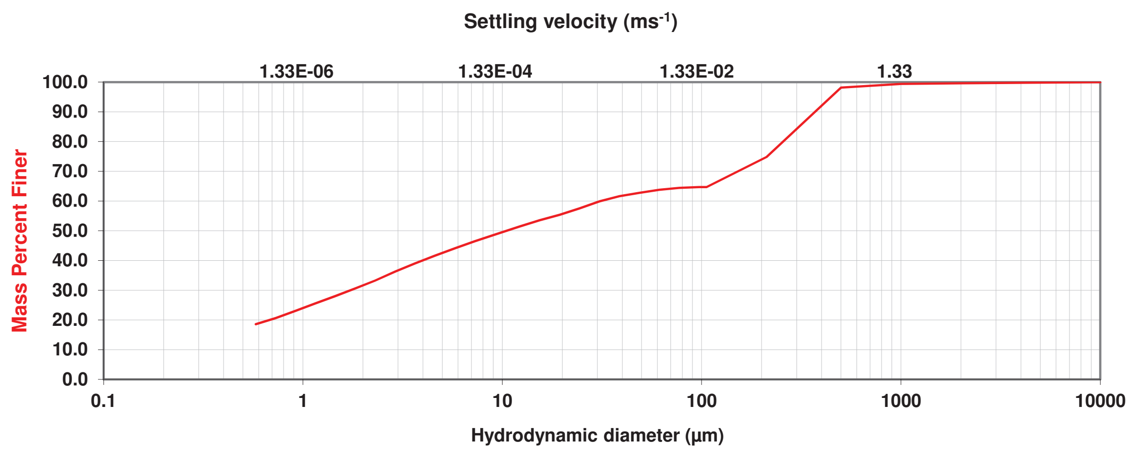
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-20 B11-5 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_20 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.4 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 23.3 | 1.03E-01 |
| Fine sand (125 - 250µm) | 10.2 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.8 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 35.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.1 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 6.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 7.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 23.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 40.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 399.33 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.13 |
| Time for 10% of particles to settle over 1m (hours) | 0.002 |
| D50 (µm) | 10.62 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.09 |
| Time for 50% of particles to settle over 1m (hours) | 2.983 |
| D10 (µm) | 0.31 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3454.284 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

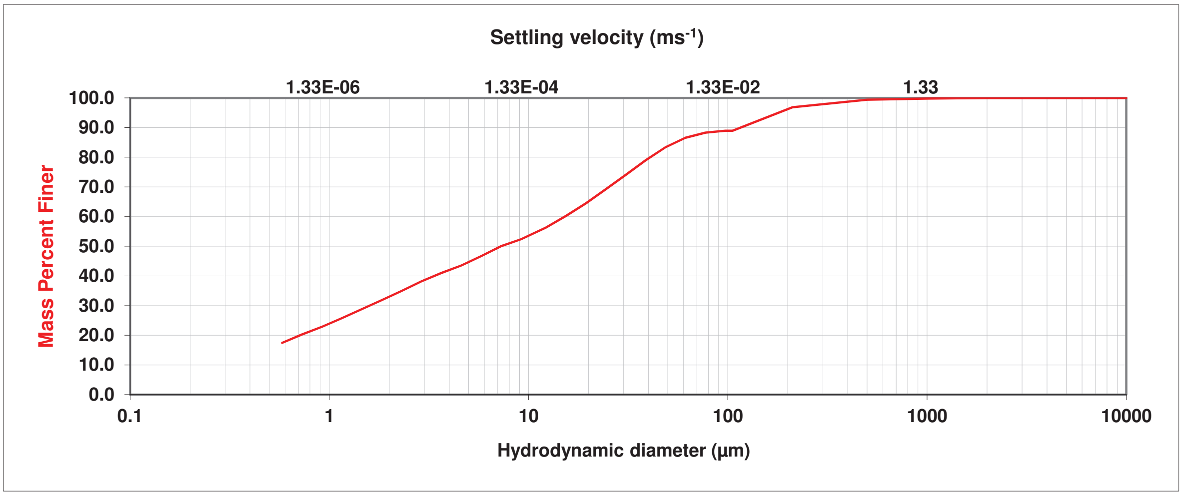
Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
East Perth
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-21 B11-8
**Job No:** 18_1377
**Laboratory ID:** 18_1377_21

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.34 µm
**Liquid viscosity:** 0.724 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 7.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 2.2 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 13.2 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 12.5 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 13.4 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 44.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 41.9 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 120.47 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.01 |
| Time for 10% of particles to settle over 1m (hours) | 0.023 |
| D50 (µm) | 7.28 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.04 |
| Time for 50% of particles to settle over 1m (hours) | 6.346 |
| D10 (µm) | 0.33 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3046.768 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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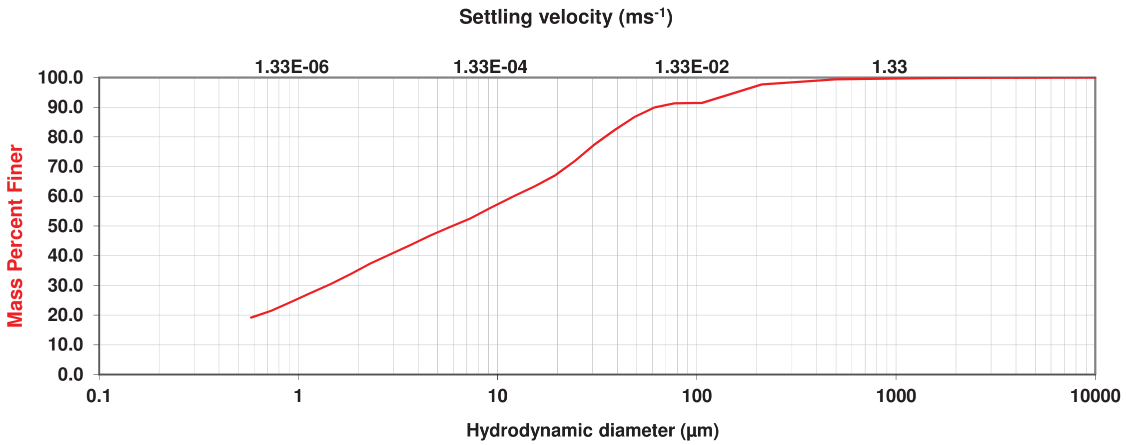
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-23 B11-9 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_22 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.33 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.3 | 4.13E-01 |
| Medium sand (250 - 500µm) | 1.7 | 1.03E-01 |
| Fine sand (125 - 250µm) | 6.2 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 9.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 12.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 13.7 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.1 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.1 | 2.64E-05 |
| Total Silt % (4-63µm) | 45.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 44.8 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 62.30 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.087 |
| D50 (µm) | 5.95 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.03 |
| Time for 50% of particles to settle over 1m (hours) | 9.500 |
| D10 (µm) | 0.30 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3671.881 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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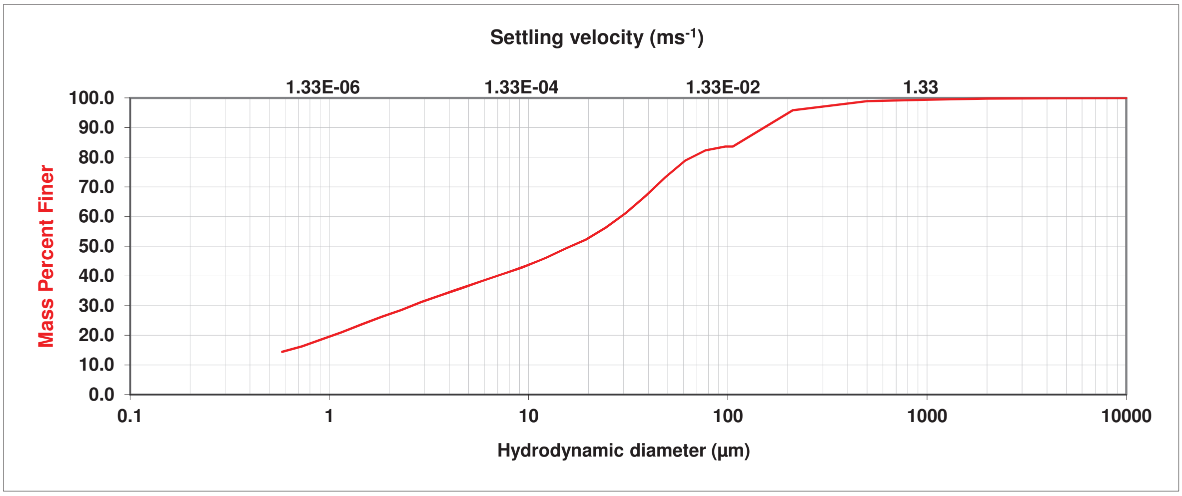
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-24 B11-9B |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_23 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.34 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 3.1 | 1.03E-01 |
| Fine sand (125 - 250µm) | 12.2 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 4.3 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 20.5 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 17.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 11.7 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.4 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 6.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 44.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 34.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 161.64 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.013 |
| D50 (µm) | 16.38 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.22 |
| Time for 50% of particles to settle over 1m (hours) | 1.253 |
| D10 (µm) | 0.40 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2085.587 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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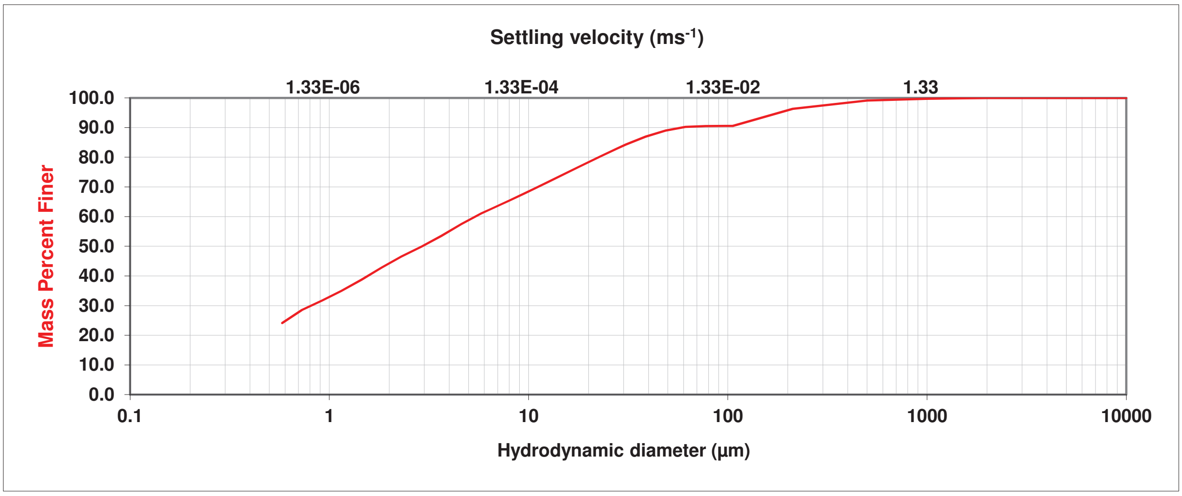
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-25 B11-9C |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_24 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.6 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.8 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.7 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.3 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 9.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 9.2 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 35.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 55.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 59.21 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.096 |
| D50 (µm) | 2.93 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 39.275 |
| D10 (µm) | 0.24 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5807.110 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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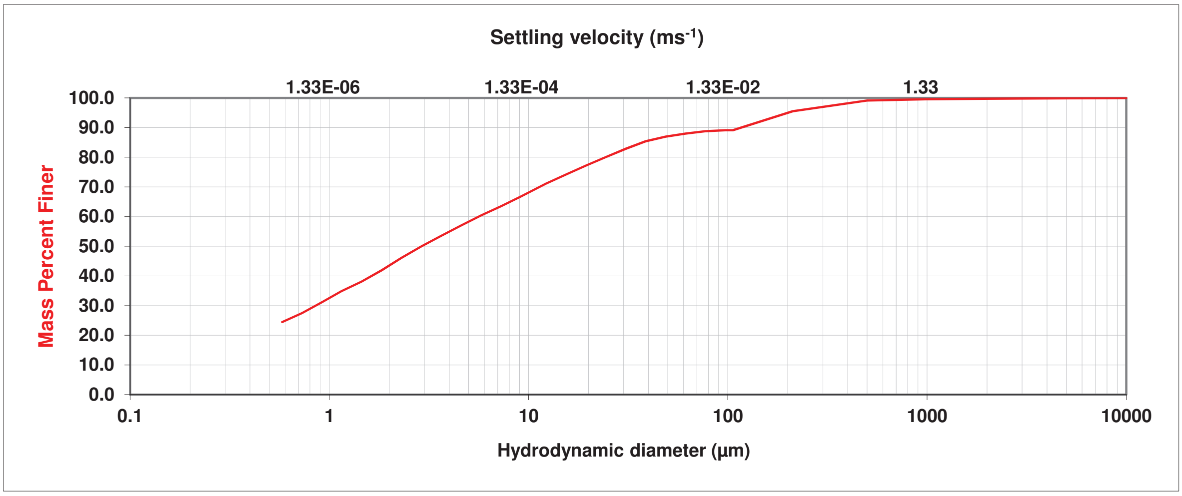
37 Kensington Street
East Perth
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-26 B10-8
**Job No:** 18_1377
**Laboratory ID:** 18_1377_25

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Dispersant:** Water
**Additives:** 10 mL sodium hexametaphosphate
**Analysis temp.:** 35.7ºC
**Sonication:** 10 min
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Liquid viscosity:** 0.725 cp
**Critical diameter:** 54.35 µm




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 3.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 6.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.1 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 11.7 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 33.2 | 2.08E-04 |
| Total clay (0 - 4µm) | 54.8 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 120.67 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.01 |
| Time for 10% of particles to settle over 1m (hours) | 0.023 |
| D50 (µm) | 2.91 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 39.835 |
| D10 (µm) | 0.24 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5975.430 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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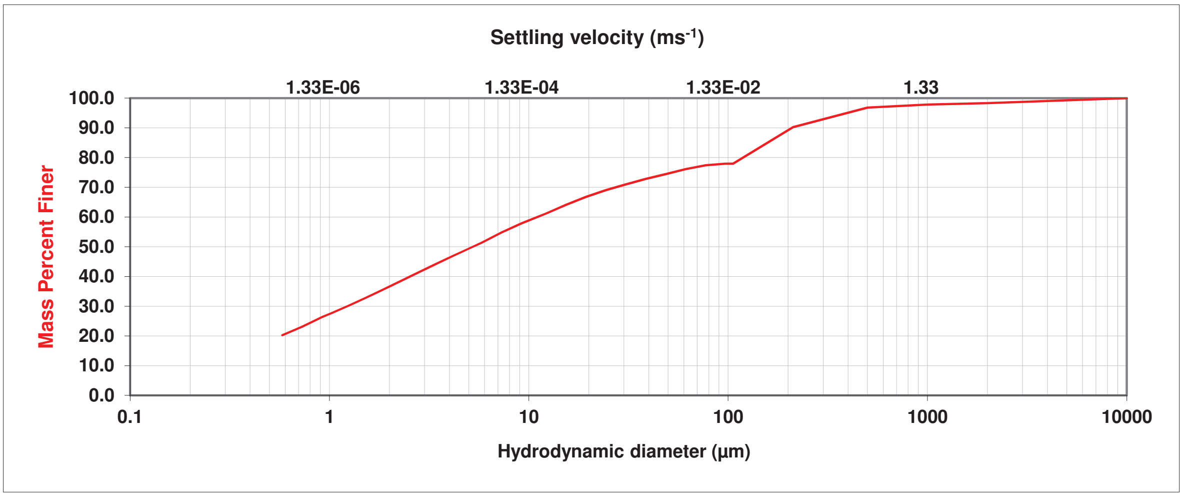
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-27 B10-6 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_26 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 1.7 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.5 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.0 | 4.13E-01 |
| Medium sand (250 - 500µm) | 6.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 12.3 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.7 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 22.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.2 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.5 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.6 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 30.0 | 2.08E-04 |
| Total clay (0 - 4µm) | 46.2 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 210.11 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.04 |
| Time for 10% of particles to settle over 1m (hours) | 0.008 |
| D50 (µm) | 5.28 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.02 |
| Time for 50% of particles to settle over 1m (hours) | 12.079 |
| D10 (µm) | 0.29 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 4108.895 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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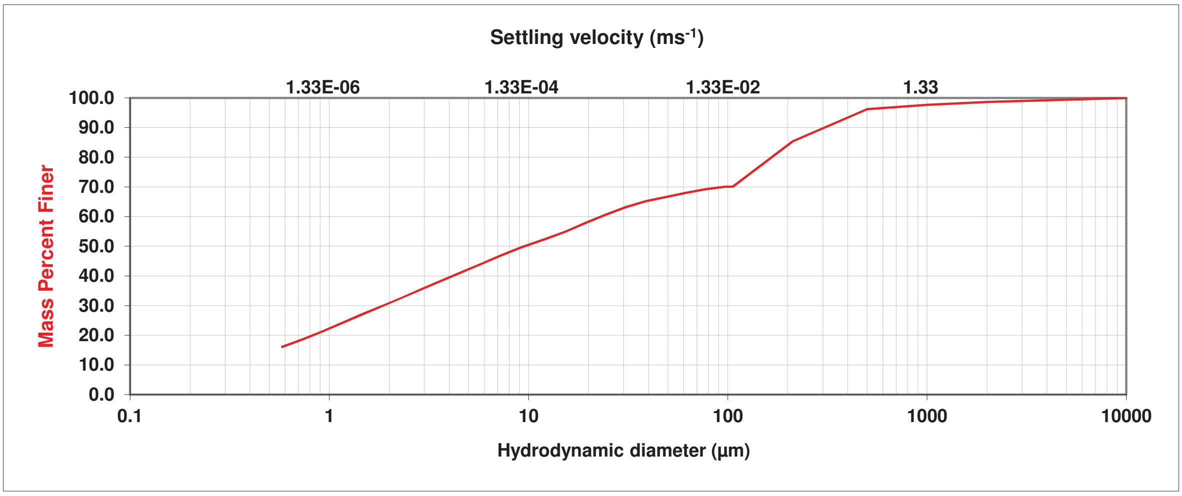
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-28 B10-6B
**Job No:** 18_1377
**Laboratory ID:** 18_1377_27

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 1.4 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.9 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 10.8 | 1.03E-01 |
| Fine sand (125 - 250µm) | 15.3 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 2.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 30.5 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 4.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 7.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 8.5 | 2.64E-05 |
| Total Silt % (4-63µm) | 28.6 | 2.08E-04 |
| Total clay (0 - 4µm) | 39.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 334.74 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.09 |
| Time for 10% of particles to settle over 1m (hours) | 0.003 |
| D50 (µm) | 9.56 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.08 |
| Time for 50% of particles to settle over 1m (hours) | 3.678 |
| D10 (µm) | 0.36 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2592.064 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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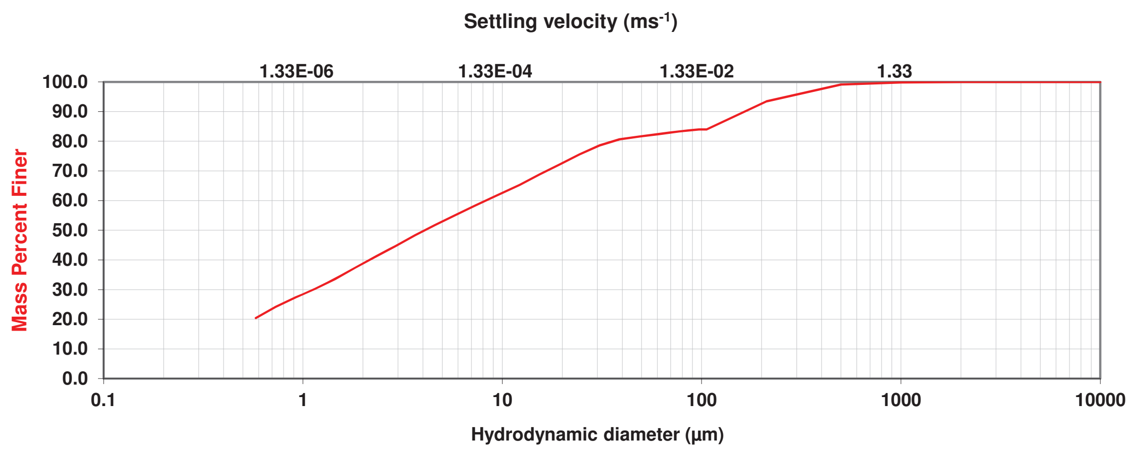
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-29 B10-5 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_28 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.33 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.7 | 4.13E-01 |
| Medium sand (250 - 500µm) | 5.7 | 1.03E-01 |
| Fine sand (125 - 250µm) | 9.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.5 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.5 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.8 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 9.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 32.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 49.6 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 173.44 |
| Minimum settling velocity of 10% of particles ($mm\ s^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.011 |
| D50 (µm) | 4.11 |
| Minimum settling velocity of 50% of particles ($mm\ s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 19.892 |
| D10 (µm) | 0.28 |
| Minimum settling velocity of 90% of particles ($mm\ s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 4162.979 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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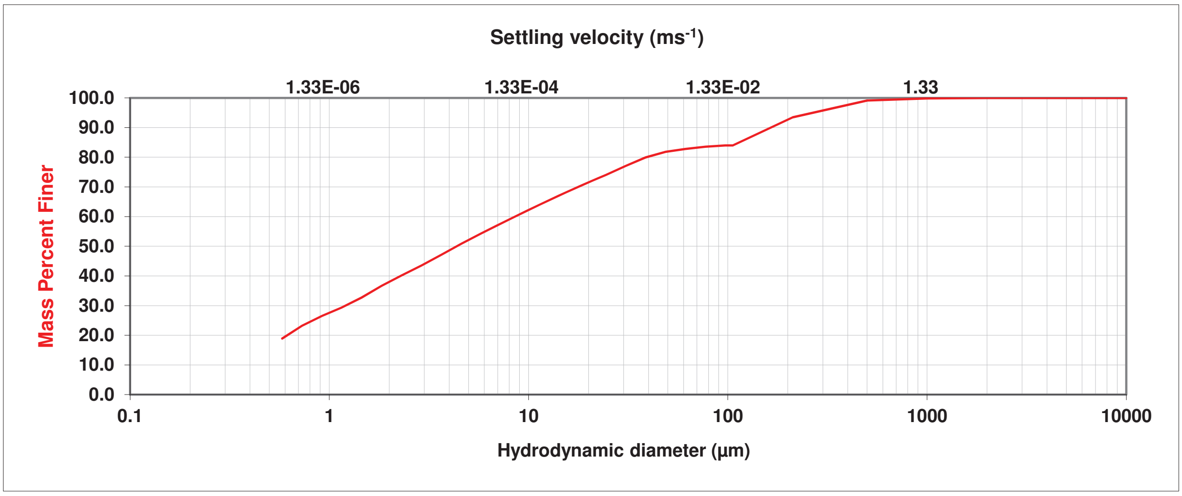
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-29 B10-5
**Job No:** 18_1377
**Laboratory ID:** 18_1377_28Q

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.33 µm
**Liquid viscosity:** 0.724 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.7 | 4.13E-01 |
| Medium sand (250 - 500µm) | 5.7 | 1.03E-01 |
| Fine sand (125 - 250µm) | 9.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.1 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.7 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.5 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.7 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.4 | 2.64E-05 |
| Total Silt % (4-63µm) | 34.4 | 2.08E-04 |
| Total clay (0 - 4µm) | 48.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 173.44 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.011 |
| D50 (µm) | 4.38 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.02 |
| Time for 50% of particles to settle over 1m (hours) | 17.543 |
| D10 (µm) | 0.31 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3581.092 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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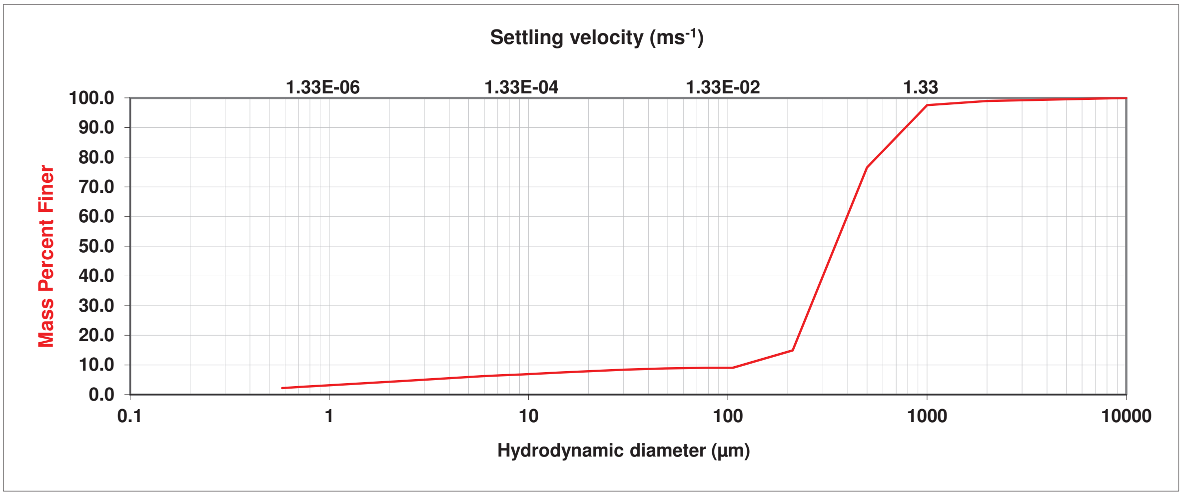
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-31 B9-1 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_29 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 1.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 1.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 20.9 | 4.13E-01 |
| Medium sand (250 - 500µm) | 61.7 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.1 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 90.0 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.5 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 0.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 1.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 1.1 | 2.64E-05 |
| Total Silt % (4-63µm) | 3.4 | 2.08E-04 |
| Total clay (0 - 4µm) | 5.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 820.16 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.56 |
| Time for 10% of particles to settle over 1m (hours) | 0.000 |
| D50 (µm) | 375.87 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 116.71 |
| Time for 50% of particles to settle over 1m (hours) | 0.002 |
| D10 (µm) | 3.27 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.009 |
| Time for 90% of particles to settle over 1m (hours) | 31.522 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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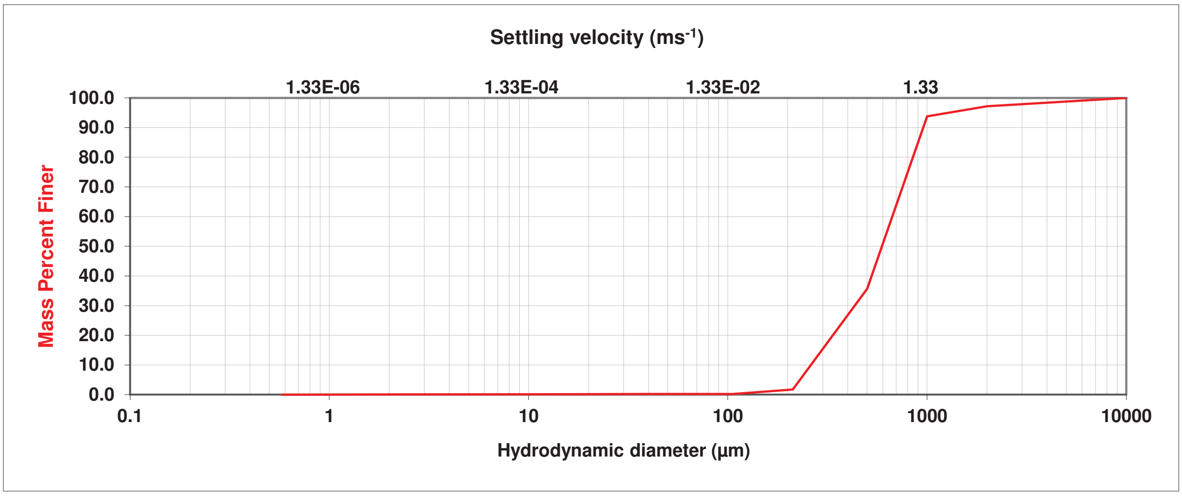
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-32 B2-0 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_30 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 2.8 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 3.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 58.1 | 4.13E-01 |
| Medium sand (250 - 500µm) | 33.9 | 1.03E-01 |
| Fine sand (125 - 250µm) | 1.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 97.0 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.0 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 0.0 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 0.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 0.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 0.1 | 2.08E-04 |
| Total clay (0 - 4µm) | 0.1 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 967.40 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.77 |
| Time for 10% of particles to settle over 1m (hours) | 0.000 |
| D50 (µm) | 623.42 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 321.06 |
| Time for 50% of particles to settle over 1m (hours) | 0.001 |
| D10 (µm) | 282.33 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 65.845 |
| Time for 90% of particles to settle over 1m (hours) | 0.004 |

| | |
|---|---|
| **Analyst:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Reported:** | Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology) |
| **Approved:** | Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience) |

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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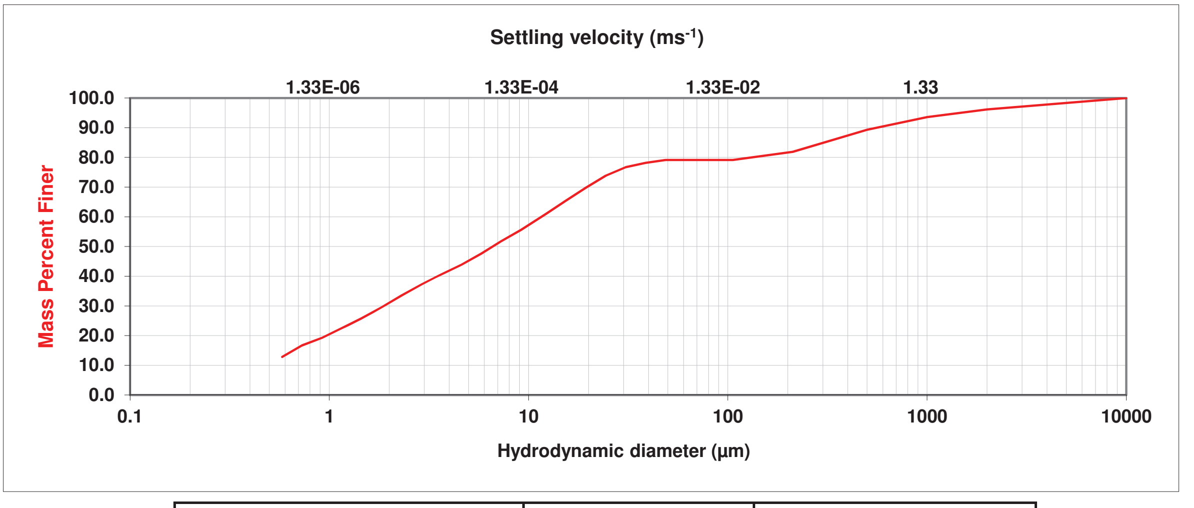
**Client:** Symbio Alliance
**Client ID:** B701793-33 BC-2
**Job No:** 18_1377
**Laboratory ID:** 18_1377_31

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Dispersant:** Water
**Additives:** 10 mL sodium hexametaphosphate
**Analysis temp.:** 35.7ºC
**Sonication:** 10 min
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Liquid viscosity:** 0.725 cp
**Critical diameter:** 54.35 µm




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 3.8 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 2.6 | 1.65E+00 |
| Coarse sand (500-1000µm) | 4.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 7.5 | 1.03E-01 |
| Fine sand (125 - 250µm) | 2.7 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 2.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 10.7 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 12.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 11.4 | 2.64E-05 |
| Total Silt % (4-63µm) | 37.3 | 2.08E-04 |
| Total clay (0 - 4µm) | 41.8 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 582.08 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.28 |
| Time for 10% of particles to settle over 1m (hours) | 0.001 |
| D50 (µm) | 6.66 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.04 |
| Time for 50% of particles to settle over 1m (hours) | 7.587 |
| D10 (µm) | 0.45 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 1637.355 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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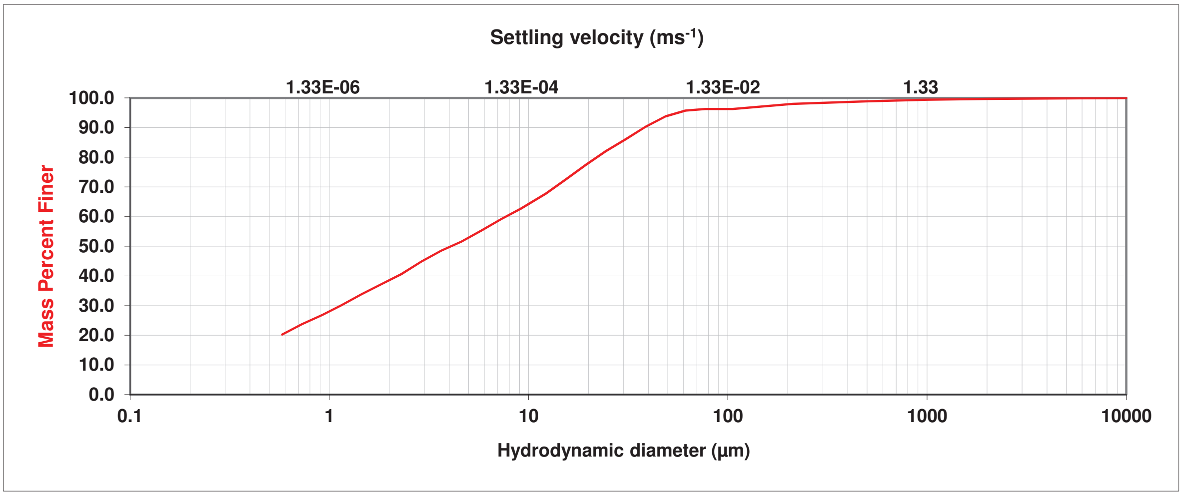
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-34 B4-4 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_32 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.4 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.9 | 1.03E-01 |
| Fine sand (125 - 250µm) | 1.8 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 3.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 9.6 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 12.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 12.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 46.2 | 2.08E-04 |
| Total clay (0 - 4µm) | 49.6 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 38.18 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.231 |
| D50 (µm) | 4.12 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 19.830 |
| D10 (µm) | 0.29 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 4096.409 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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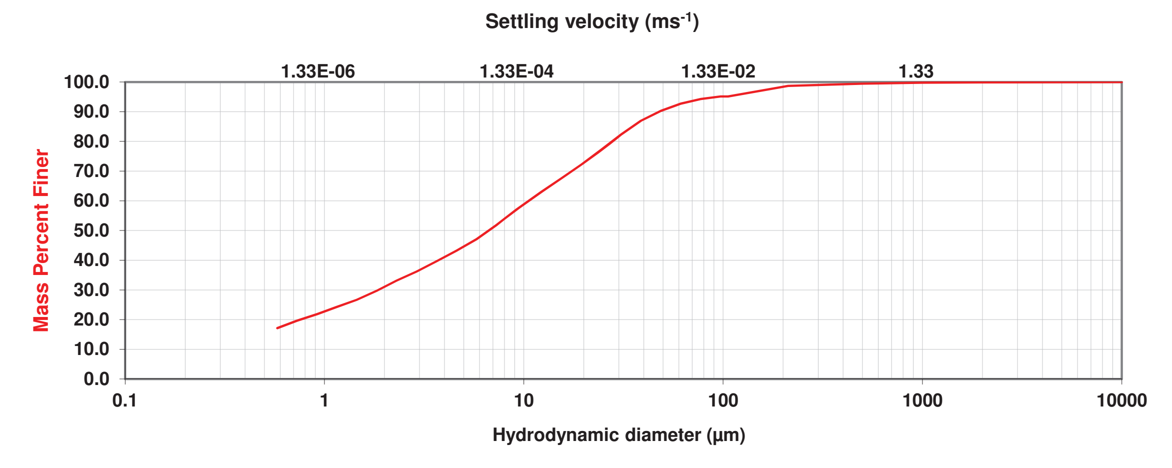
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-35 B4-0 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_33 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.3 | 4.13E-01 |
| Medium sand (250 - 500µm) | 0.7 | 1.03E-01 |
| Fine sand (125 - 250µm) | 3.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 2.2 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 7.0 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 10.4 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 14.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 14.4 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 12.8 | 2.64E-05 |
| Total Silt % (4-63µm) | 51.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 41.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 47.82 |
| Minimum settling velocity of 10% of particles ($mm\ s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.147 |
| D50 (µm) | 6.72 |
| Minimum settling velocity of 50% of particles ($mm\ s^{-1}$) | 0.04 |
| Time for 50% of particles to settle over 1m (hours) | 7.445 |
| D10 (µm) | 0.34 |
| Minimum settling velocity of 90% of particles ($mm\ s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2934.909 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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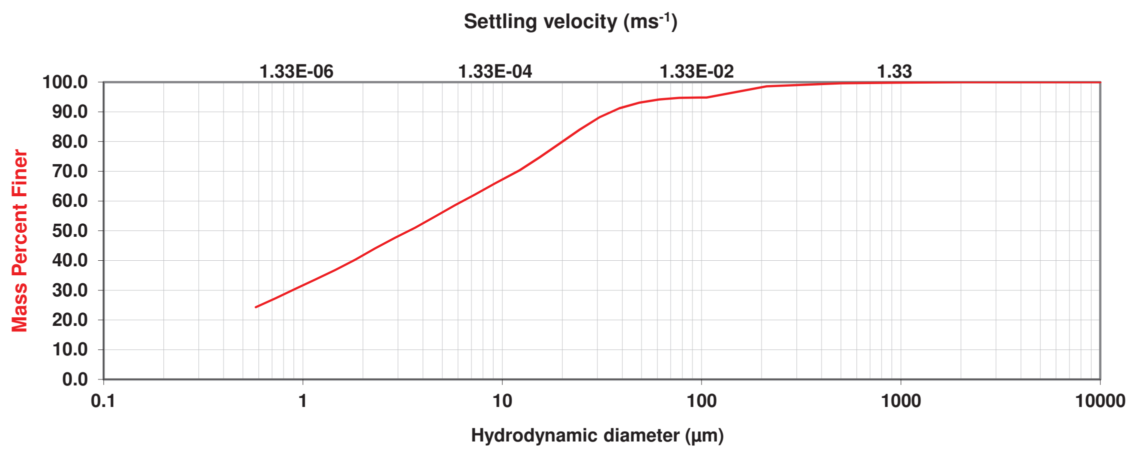
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-36 B5-0 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_34 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.37 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.0 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 1.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 3.8 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 5.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.9 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 12.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 11.8 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 11.2 | 2.64E-05 |
| Total Silt % (4-63µm) | 41.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 52.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 35.56 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.266 |
| D50 (µm) | 3.42 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 28.677 |
| D10 (µm) | 0.24 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 5886.417 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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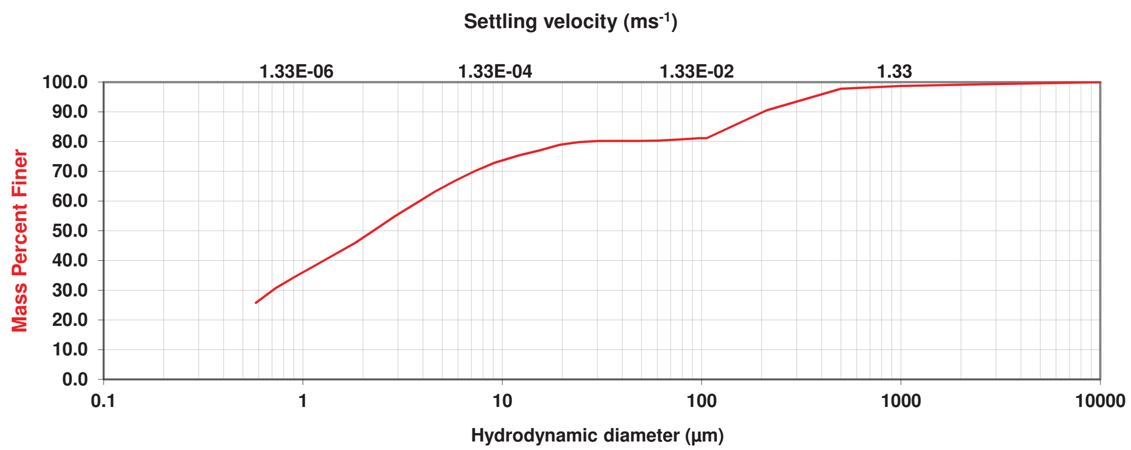
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-38 B5-1 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_35 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.9 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.4 | 1.65E+00 |
| Coarse sand (500-1000µm) | 1.0 | 4.13E-01 |
| Medium sand (250 - 500µm) | 7.3 | 1.03E-01 |
| Fine sand (125 - 250µm) | 9.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.8 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 18.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 0.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 2.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 6.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.6 | 2.64E-05 |
| Total Silt % (4-63µm) | 19.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 60.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 206.57 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.04 |
| Time for 10% of particles to settle over 1m (hours) | 0.008 |
| D50 (µm) | 2.26 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 65.601 |
| D10 (µm) | 0.23 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6620.678 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

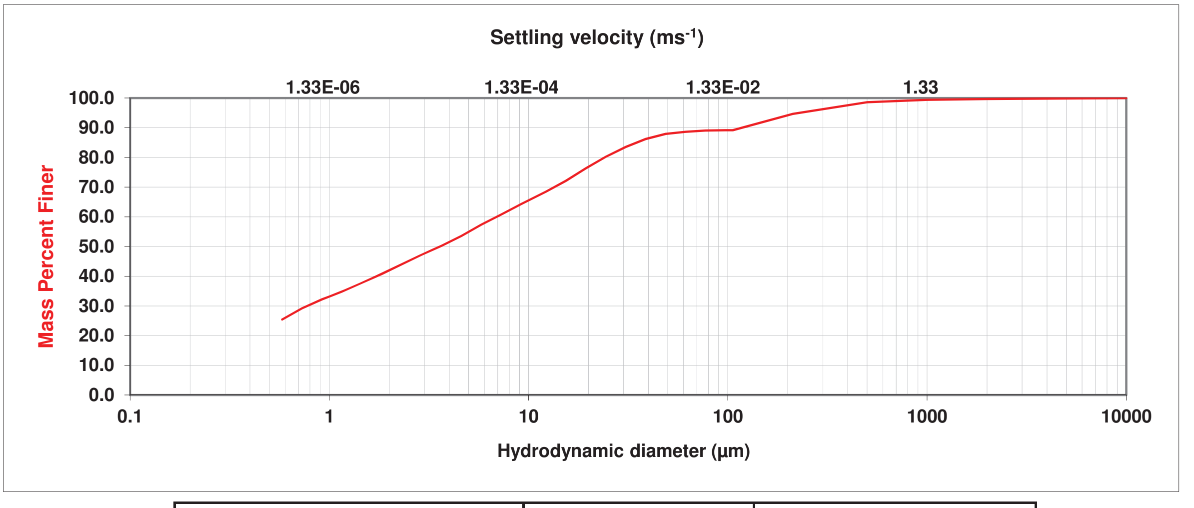
Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
East Perth
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-39 B5-1B
**Job No:** 18_1377
**Laboratory ID:** 18_1377_36

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.36 µm
**Liquid viscosity:** 0.725 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.3 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.8 | 4.13E-01 |
| Medium sand (250 - 500µm) | 3.9 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.5 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 11.0 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.1 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 10.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.7 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 37.2 | 2.08E-04 |
| Total clay (0 - 4µm) | 51.4 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 122.42 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.01 |
| Time for 10% of particles to settle over 1m (hours) | 0.022 |
| D50 (µm) | 3.60 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 26.013 |
| D10 (µm) | 0.23 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6459.542 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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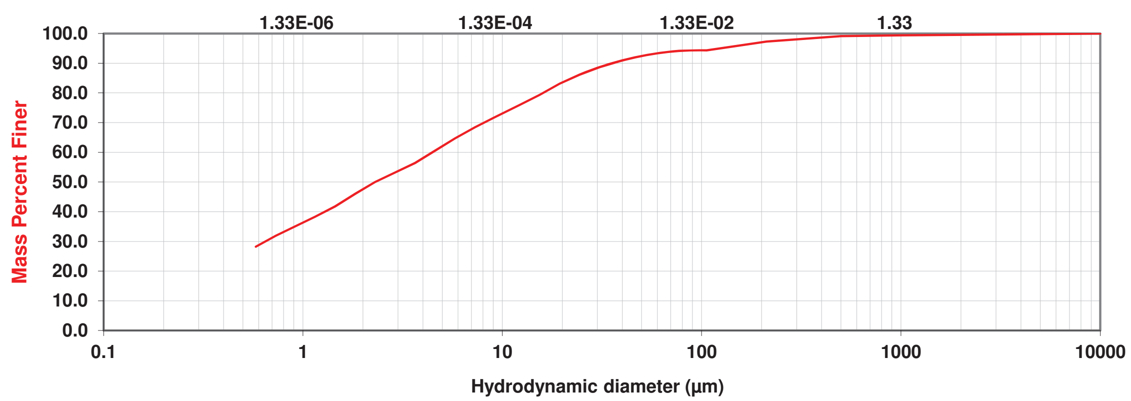
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-40 B5-1C |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_37 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.5 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.3 | 4.13E-01 |
| Medium sand (250 - 500µm) | 1.8 | 1.03E-01 |
| Fine sand (125 - 250µm) | 2.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.9 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 6.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 4.7 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.8 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.2 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 11.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 35.5 | 2.08E-04 |
| Total clay (0 - 4µm) | 57.9 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 36.06 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.259 |
| D50 (µm) | 2.30 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 63.517 |
| D10 (µm) | 0.21 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 7951.867 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

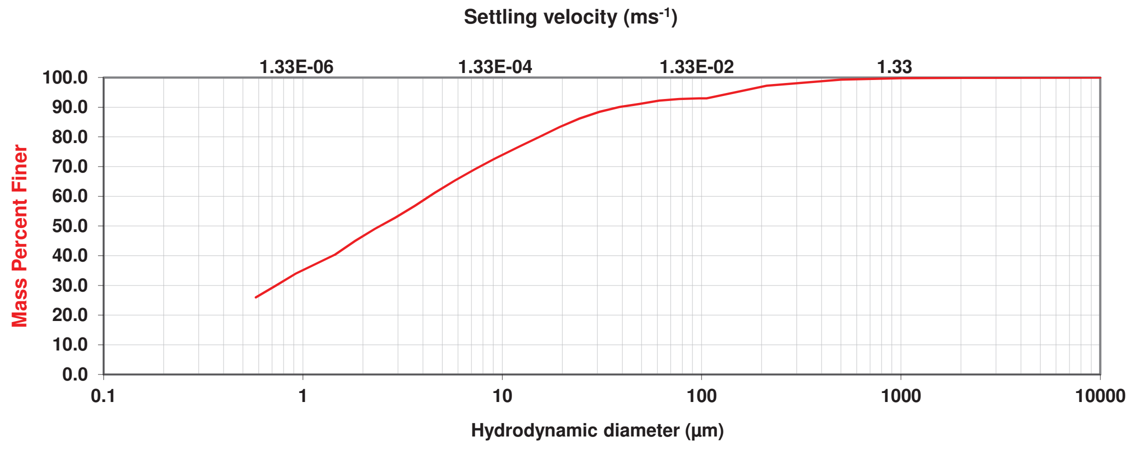
Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
East Perth
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-41 B6-3
**Job No:** 18_1377
**Laboratory ID:** 18_1377_38

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.35 µm
**Liquid viscosity:** 0.725 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.3 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.7 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 7.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.8 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.0 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 10.1 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 12.0 | 2.64E-05 |
| Total Silt % (4-63µm) | 33.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 58.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 38.47 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.227 |
| D50 (µm) | 2.45 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 56.016 |
| D10 (µm) | 0.22 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 6734.030 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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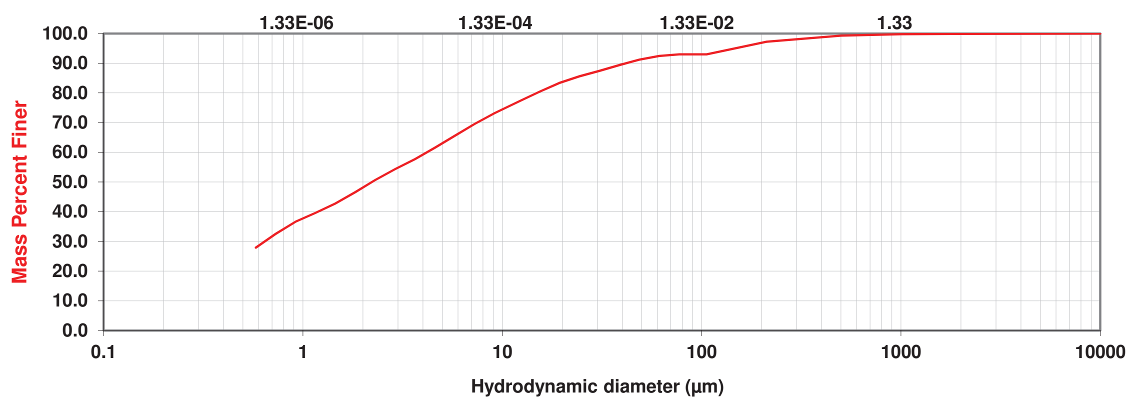
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-41 B6-3 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_38Q |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.725 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.5 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.3 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.5 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 7.4 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.0 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.6 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.9 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 11.9 | 2.64E-05 |
| Total Silt % (4-63µm) | 33.4 | 2.08E-04 |
| Total clay (0 - 4µm) | 59.1 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 42.13 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 0.189 |
| D50 (µm) | 2.23 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 67.877 |
| D10 (µm) | 0.21 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 7785.743 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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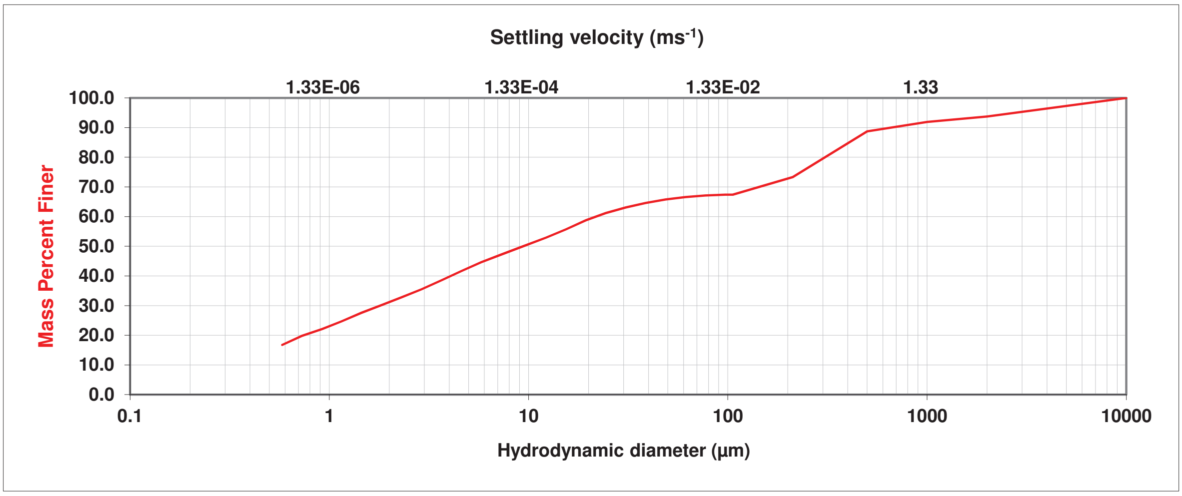
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-42 B6-2 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_39 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 6.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 1.8 | 1.65E+00 |
| Coarse sand (500-1000µm) | 3.2 | 4.13E-01 |
| Medium sand (250 - 500µm) | 15.4 | 1.03E-01 |
| Fine sand (125 - 250µm) | 5.9 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.8 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 27.1 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 3.5 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 6.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.0 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 8.4 | 2.64E-05 |
| Total Silt % (4-63µm) | 26.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 39.7 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 702.97 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.41 |
| Time for 10% of particles to settle over 1m (hours) | 0.001 |
| D50 (µm) | 9.44 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.07 |
| Time for 50% of particles to settle over 1m (hours) | 3.772 |
| D10 (µm) | 0.35 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2812.788 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
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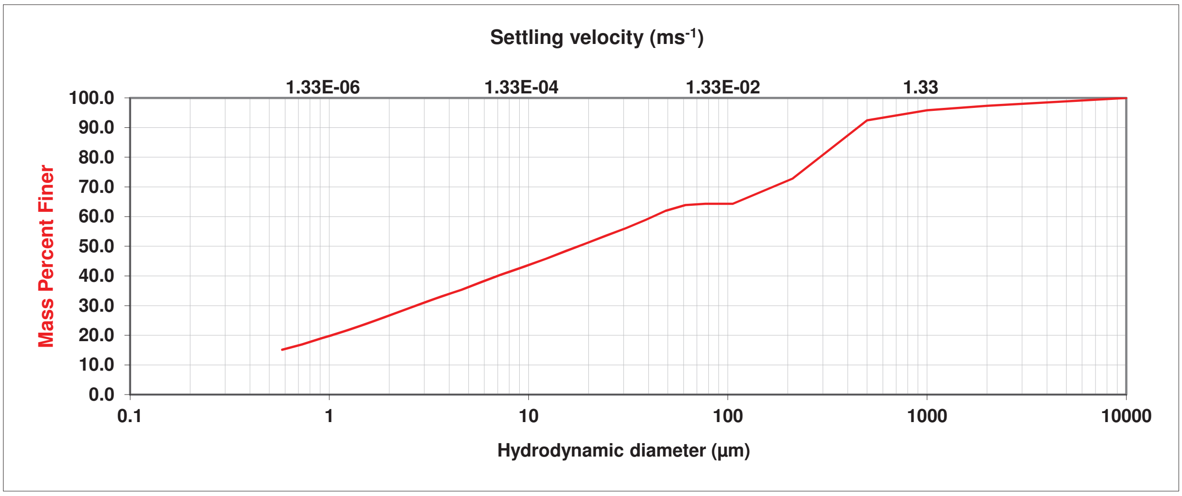
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-43 B6-2B |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_40 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | g/cm$^3$ (assumed) | | |
| **Liquid density:** | 0.994 | g/cm$^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 2.7 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 1.5 | 1.65E+00 |
| Coarse sand (500-1000µm) | 3.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 19.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 8.5 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.4 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 33.4 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 7.8 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 7.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 7.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 7.4 | 2.64E-05 |
| Total Silt % (4-63µm) | 30.0 | 2.08E-04 |
| Total clay (0 - 4µm) | 33.9 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 464.51 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 0.18 |
| Time for 10% of particles to settle over 1m (hours) | 0.002 |
| D50 (µm) | 17.95 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.27 |
| Time for 50% of particles to settle over 1m (hours) | 1.044 |
| D10 (µm) | 0.38 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 2282.495 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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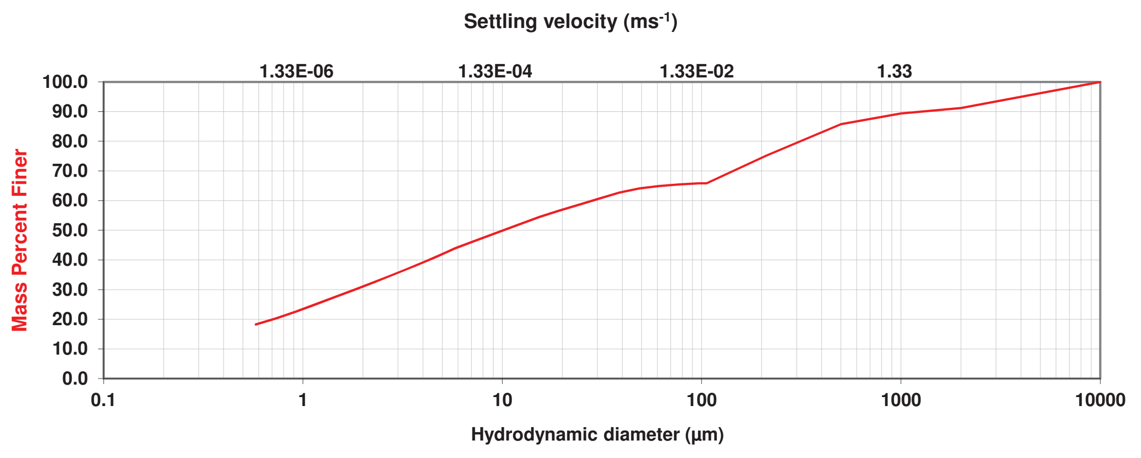
WA 6004

**Client:** Symbio Alliance
**Client ID:** B701793-44 B7-1
**Job No:** 18_1377
**Laboratory ID:** 18_1377_41

**Analysis:** X-ray sedimentation by Sedigraph 5100
**Analysis temp.:** 35.7ºC
**Dispersant:** Water
**Sonication:** 10 min
**Additives:** 10 mL sodium hexametaphosphate
**Concentration:** ~5 % w/w

**Sample density:** 2.650 g/cm$^3$ (assumed)
**Liquid density:** 0.994 g/cm$^3$
**Critical diameter:** 54.35 µm
**Liquid viscosity:** 0.725 cp




| Category (size) | Percent in category (size) interval | Settling velocity (ms$^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 8.8 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 1.8 | 1.65E+00 |
| Coarse sand (500-1000µm) | 3.6 | 4.13E-01 |
| Medium sand (250 - 500µm) | 10.6 | 1.03E-01 |
| Fine sand (125 - 250µm) | 9.4 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 0.9 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 26.2 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 4.2 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 5.9 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 7.5 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 8.3 | 2.64E-05 |
| Total Silt % (4-63µm) | 25.9 | 2.08E-04 |
| Total clay (0 - 4µm) | 39.0 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 1357.51 |
| Minimum settling velocity of 10% of particles (mm s$^{-1}$) | 1.52 |
| Time for 10% of particles to settle over 1m (hours) | 0.000 |
| D50 (µm) | 10.23 |
| Minimum settling velocity of 50% of particles (mm s$^{-1}$) | 0.09 |
| Time for 50% of particles to settle over 1m (hours) | 3.215 |
| D10 (µm) | 0.32 |
| Minimum settling velocity of 90% of particles (mm s$^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 3335.595 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

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37 Kensington Street
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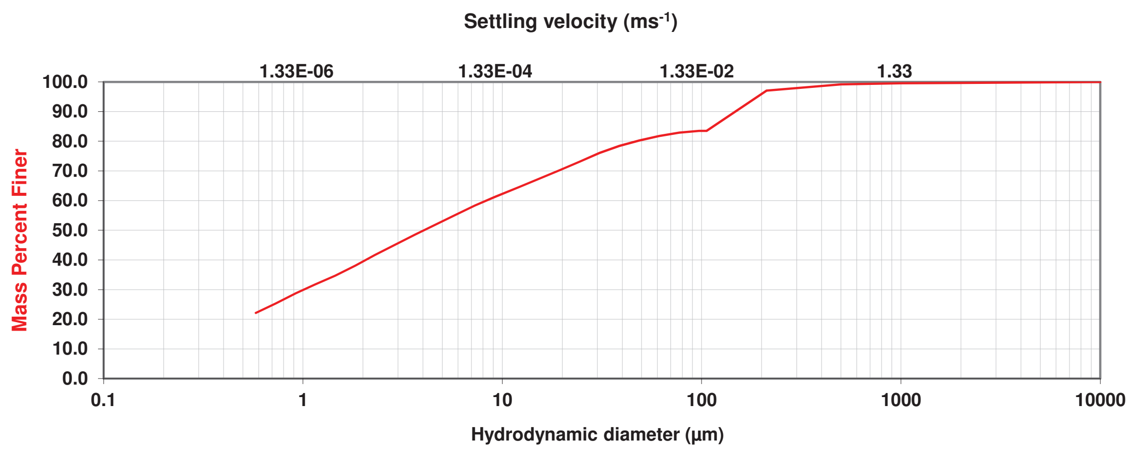
| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-45 B8-1 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_42 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.3 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.1 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.4 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.1 | 1.03E-01 |
| Fine sand (125 - 250µm) | 13.6 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.6 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 17.8 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 5.8 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 8.4 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 9.7 | 2.64E-05 |
| Total Silt % (4-63µm) | 32.2 | 2.08E-04 |
| Total clay (0 - 4µm) | 49.7 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | 156.87 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.02 |
| Time for 10% of particles to settle over 1m (hours) | 0.014 |
| D50 (µm) | 4.08 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.01 |
| Time for 50% of particles to settle over 1m (hours) | 20.249 |
| D10 (µm) | 0.26 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 4887.154 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

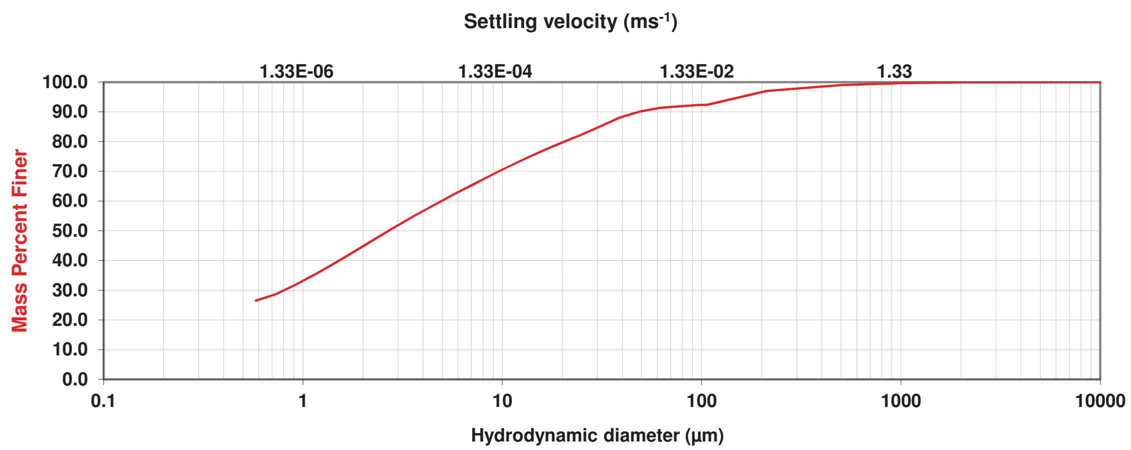
Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

37 Kensington Street
East Perth
WA 6004

| | |
|---|---|
| **Client:** | Symbio Alliance |
| **Client ID:** | B701793-46 B8-3 |
| **Job No:** | 18_1377 |
| **Laboratory ID:** | 18_1377_43 |

| | | | |
|---|---|---|---|
| **Analysis:** | X-ray sedimentation by Sedigraph 5100 | **Analysis temp.:** | 35.7ºC |
| **Dispersant:** | Water | **Sonication:** | 10 min |
| **Additives:** | 10 mL sodium hexametaphosphate | **Concentration:** | ~5 % w/w |

| | | | | |
|---|---|---|---|---|
| **Sample density:** | 2.650 | $g/cm^3$ (assumed) | | |
| **Liquid density:** | 0.994 | $g/cm^3$ | **Critical diameter:** | 54.35 µm |
| **Liquid viscosity:** | 0.724 | cp | | |




| Category (size) | Percent in category (size) interval | Settling velocity ($ms^{-1}$) |
|---|---|---|
| Total gravel (>2000µm) | 0.1 | 1.65E+01 |
| Very coarse sand (1000-2000µm) | 0.2 | 1.65E+00 |
| Coarse sand (500-1000µm) | 0.7 | 4.13E-01 |
| Medium sand (250 - 500µm) | 2.0 | 1.03E-01 |
| Fine sand (125 - 250µm) | 4.7 | 2.58E-02 |
| Very fine sand (63 - 125 µm) | 1.0 | 6.51E-03 |
| Total sand (63 - 2000 µm) | 8.6 | 1.04E-01 |
| Coarse silt (31 - 63 µm) | 6.3 | 1.61E-03 |
| Medium silt (16 - 31 µm) | 8.3 | 4.10E-04 |
| Fine silt (8 - 16 µm) | 9.7 | 1.06E-04 |
| Very fine silt (4 - 8 µm) | 10.6 | 2.64E-05 |
| Total Silt % (4-63µm) | 34.8 | 2.08E-04 |
| Total clay (0 - 4µm) | 56.5 | 3.30E-07 |

| | |
|---|---|
| D90 (µm) | -1.96 |
| Minimum settling velocity of 10% of particles (mm $s^{-1}$) | 0.00 |
| Time for 10% of particles to settle over 1m (hours) | 87.478 |
| D50 (µm) | 2.33 |
| Minimum settling velocity of 50% of particles (mm $s^{-1}$) | 0.00 |
| Time for 50% of particles to settle over 1m (hours) | 61.773 |
| D10 (µm) | 0.22 |
| Minimum settling velocity of 90% of particles (mm $s^{-1}$) | 0.000 |
| Time for 90% of particles to settle over 1m (hours) | 7021.409 |

**Analyst:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Reported:** Sumudu Ariyawansa, B.Sc.(Agriculture)(Hons), Dip.(Laboratory Technology)
**Approved:** Dan Cukierski, B.Sc.(Geology), M.Sc.(Geoscience)

Notes: Data from 106 µm to 10,000 µm by wet screening , from 0.3µm to 106 µm by Sedimentation.
Please note that the Wentworth scale requested was slightly modified to match standard sieve sizes.
* based on the mean of the size interval and on the the calculations and variables in the 'settling velocity worksheet

# Appendix D Sediment Quality Results – Secondary Laboratory

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EB1820011** | Page | : 1 of 8 |
| Client | : **BMT EASTERN AUSTRALIA PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : Mr BRAD HILES | Contact | : Customer Services EB |
| Address | : PO BOX 203 SPRING HILL<br>BRISBANE QLD 4004 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : ---- | Telephone | : +61-7-3243 7222 |
| Project | : B20259 Port of Brisbane - Sediment Quality | Date Samples Received | : 17-Aug-2018 15:50 |
| Order number | : | Date Analysis Commenced | : 19-Aug-2018 |
| C-O-C number | : ---- | Issue Date | : 13-Sep-2018 14:59 |
| Sampler | : BRAD HILES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ben Felgendrejeris | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |
| Greg Vogel | Laboratory Manager | Brisbane External Subcontracting, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Matt Frost | Senior Organic Chemist | Brisbane Inorganics, Stafford, QLD |
| Matt Frost | Senior Organic Chemist | Brisbane Organics, Stafford, QLD |
| Satishkumar Trivedi | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |

## 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **"EP131B" and "EP131A" analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. $$ . NATA and CAI accreditations' are both recognised under ILAC.

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | B10 - 6C | B6 - 2C | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 15-Aug-2018 12:05 | 17-Aug-2018 12:48 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1820011-001 | EB1820011-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA033-A: Actual Acidity** | | | | | | | | |
| pH KCl (23A) | ---- | 0.1 | pH Unit | 8.5 | ---- | ---- | ---- | ---- |
| Titratable Actual Acidity (23F) | ---- | 2 | mole H+ / t | <2 | ---- | ---- | ---- | ---- |
| sulfidic - Titratable Actual Acidity (s-23F) | ---- | 0.02 | % pyrite S | <0.02 | ---- | ---- | ---- | ---- |
| **EA033-B: Potential Acidity** | | | | | | | | |
| Chromium Reducible Sulfur (22B) | ---- | 0.005 | % S | 0.291 | ---- | ---- | ---- | ---- |
| acidity - Chromium Reducible Sulfur (a-22B) | ---- | 10 | mole H+ / t | 182 | ---- | ---- | ---- | ---- |
| **EA033-C: Acid Neutralising Capacity** | | | | | | | | |
| Acid Neutralising Capacity (19A2) | ---- | 0.01 | % CaCO3 | 3.40 | ---- | ---- | ---- | ---- |
| acidity - Acid Neutralising Capacity (a-19A2) | ---- | 10 | mole H+ / t | 679 | ---- | ---- | ---- | ---- |
| sulfidic - Acid Neutralising Capacity (s-19A2) | ---- | 0.01 | % pyrite S | 1.09 | ---- | ---- | ---- | ---- |
| **EA033-E: Acid Base Accounting** | | | | | | | | |
| ANC Fineness Factor | ---- | 0.5 | - | 1.5 | ---- | ---- | ---- | ---- |
| Net Acidity (sulfur units) | ---- | 0.02 | % S | <0.02 | ---- | ---- | ---- | ---- |
| Net Acidity (acidity units) | ---- | 10 | mole H+ / t | <10 | ---- | ---- | ---- | ---- |
| Liming Rate | ---- | 1 | kg CaCO3/t | <1 | ---- | ---- | ---- | ---- |
| Net Acidity excluding ANC (sulfur units) | ---- | 0.02 | % S | 0.29 | ---- | ---- | ---- | ---- |
| Net Acidity excluding ANC (acidity units) | ---- | 10 | mole H+ / t | 182 | ---- | ---- | ---- | ---- |
| Liming Rate excluding ANC | ---- | 1 | kg CaCO3/t | 14 | ---- | ---- | ---- | ---- |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | |
| Moisture Content | ---- | 0.1 | % | ---- | 59.3 | ---- | ---- | ---- |
| Moisture Content | ---- | 1.0 | % | 49.3 | ---- | ---- | ---- | ---- |
| **EA150: Particle Sizing** | | | | | | | | |
| +75µm | ---- | 1 | % | 28 | 24 | ---- | ---- | ---- |
| +150µm | ---- | 1 | % | 18 | 21 | ---- | ---- | ---- |
| +300µm | ---- | 1 | % | 7 | 11 | ---- | ---- | ---- |
| +425µm | ---- | 1 | % | 4 | 6 | ---- | ---- | ---- |
| +600µm | ---- | 1 | % | 3 | 4 | ---- | ---- | ---- |
| +1180µm | ---- | 1 | % | 1 | 2 | ---- | ---- | ---- |
| +2.36mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| +4.75mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| +9.5mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | B10 - 6C | B6 - 2C | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 15-Aug-2018 12:05 | 17-Aug-2018 12:48 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1820011-001 | EB1820011-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EA150: Particle Sizing - Continued** | | | | | | | | |
| +19.0mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| +37.5mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| +75.0mm | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| **EA150: Soil Classification based on Particle Size** | | | | | | | | |
| Clay (<2 µm) | ---- | 1 | % | 32 | 36 | ---- | ---- | ---- |
| Silt (2-60 µm) | ---- | 1 | % | 39 | 39 | ---- | ---- | ---- |
| Sand (0.06-2.00 mm) | ---- | 1 | % | 29 | 24 | ---- | ---- | ---- |
| Gravel (>2mm) | ---- | 1 | % | <1 | 1 | ---- | ---- | ---- |
| Cobbles (>6cm) | ---- | 1 | % | <1 | <1 | ---- | ---- | ---- |
| **EA152: Soil Particle Density** | | | | | | | | |
| Soil Particle Density (Clay/Silt/Sand) | ---- | 0.01 | g/cm3 | 2.30 | 2.49 | ---- | ---- | ---- |
| **EG005-SD: Total Metals in Sediments by ICP-AES** | | | | | | | | |
| Aluminium | 7429-90-5 | 50 | mg/kg | 15500 | 21300 | ---- | ---- | ---- |
| Iron | 7439-89-6 | 50 | mg/kg | 32600 | 39200 | ---- | ---- | ---- |
| **EG020-SD: Total Metals in Sediments by ICPMS** | | | | | | | | |
| Arsenic | 7440-38-2 | 1.00 | mg/kg | 8.72 | 6.88 | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 0.1 | mg/kg | <0.1 | <0.1 | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 1.0 | mg/kg | 33.4 | 41.3 | ---- | ---- | ---- |
| Copper | 7440-50-8 | 1.0 | mg/kg | 22.8 | 32.1 | ---- | ---- | ---- |
| Lead | 7439-92-1 | 1.0 | mg/kg | 13.6 | 16.8 | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 1.0 | mg/kg | 25.5 | 32.3 | ---- | ---- | ---- |
| Silver | 7440-22-4 | 0.1 | mg/kg | 0.2 | 0.2 | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 1.0 | mg/kg | 86.8 | 103 | ---- | ---- | ---- |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| Mercury | 7439-97-6 | 0.01 | mg/kg | 0.06 | 0.07 | ---- | ---- | ---- |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | |
| Nitrite + Nitrate as N (Sol.) | ---- | 0.1 | mg/kg | 0.3 | ---- | ---- | ---- | ---- |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 20 | mg/kg | 1060 | ---- | ---- | ---- | ---- |
| **EK062: Total Nitrogen as N (TKN + NOx)** | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 20 | mg/kg | 1060 | ---- | ---- | ---- | ---- |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | |
| Total Phosphorus as P | ---- | 2 | mg/kg | 782 | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | B10 - 6C | B6 - 2C | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 15-Aug-2018 12:05 | 17-Aug-2018 12:48 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1820011-001 | EB1820011-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EP003: Total Organic Carbon (TOC) in Soil** | | | | | | | | |
| Total Organic Carbon | ---- | 0.02 | % | **1.14** | **1.18** | ---- | ---- | ---- |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | |
| C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | ---- | ---- | ---- | ---- |
| C10 - C14 Fraction | ---- | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| C15 - C28 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| ^ C10 - C36 Fraction (sum) | ---- | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | ---- | ---- | ---- | ---- |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 10 | mg/kg | <10 | ---- | ---- | ---- | ---- |
| >C10 - C16 Fraction | ---- | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| >C16 - C34 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| ^ >C10 - C40 Fraction (sum) | ---- | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| ^ >C10 - C16 Fraction minus Naphthalene (F2) | ---- | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| **EP080: BTEXN** | | | | | | | | |
| Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- |
| Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| ^ Sum of BTEX | ---- | 0.2 | mg/kg | <0.2 | ---- | ---- | ---- | ---- |
| ^ Total Xylenes | ---- | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Naphthalene | 91-20-3 | 1 | mg/kg | <1 | ---- | ---- | ---- | ---- |
| **EP131A: Organochlorine Pesticides** | | | | | | | | |
| 4.4`-DDD | 72-54-8 | 0.50 | µg/kg | <0.50 | <0.50 | ---- | ---- | ---- |
| 4.4`-DDE | 72-55-9 | 0.50 | µg/kg | <0.50 | <0.50 | ---- | ---- | ---- |
| 4.4`-DDT | 50-29-3 | 0.50 | µg/kg | <0.50 | <0.50 | ---- | ---- | ---- |
| ^ Sum of DDD + DDE + DDT | 72-54-8/72-55-9/50-2 | 0.50 | µg/kg | <0.50 | <0.50 | ---- | ---- | ---- |
| **EP131B: Polychlorinated Biphenyls (as Aroclors)** | | | | | | | | |
| ^ Total Polychlorinated biphenyls | ---- | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | B10 - 6C | B6 - 2C | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 15-Aug-2018 12:05 | 17-Aug-2018 12:48 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1820011-001 | EB1820011-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EP131B: Polychlorinated Biphenyls (as Aroclors) - Continued** | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1221 | 11104-28-2 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1232 | 11141-16-5 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1242 | 53469-21-9 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1248 | 12672-29-6 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1254 | 11097-69-1 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| Aroclor 1260 | 11096-82-5 | 5.0 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| **EP132B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 91-20-3 | 5 | µg/kg | <5 | ---- | ---- | ---- | ---- |
| 2-Methylnaphthalene | 91-57-6 | 5 | µg/kg | <5 | ---- | ---- | ---- | ---- |
| Acenaphthylene | 208-96-8 | 4 | µg/kg | **10** | ---- | ---- | ---- | ---- |
| Acenaphthene | 83-32-9 | 4 | µg/kg | <4 | ---- | ---- | ---- | ---- |
| Fluorene | 86-73-7 | 4 | µg/kg | <4 | ---- | ---- | ---- | ---- |
| Phenanthrene | 85-01-8 | 4 | µg/kg | **14** | ---- | ---- | ---- | ---- |
| Anthracene | 120-12-7 | 4 | µg/kg | **8** | ---- | ---- | ---- | ---- |
| Fluoranthene | 206-44-0 | 4 | µg/kg | **44** | ---- | ---- | ---- | ---- |
| Pyrene | 129-00-0 | 4 | µg/kg | **50** | ---- | ---- | ---- | ---- |
| Benz(a)anthracene | 56-55-3 | 4 | µg/kg | **34** | ---- | ---- | ---- | ---- |
| Chrysene | 218-01-9 | 4 | µg/kg | **24** | ---- | ---- | ---- | ---- |
| Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 4 | µg/kg | **42** | ---- | ---- | ---- | ---- |
| Benzo(k)fluoranthene | 207-08-9 | 4 | µg/kg | **17** | ---- | ---- | ---- | ---- |
| Benzo(e)pyrene | 192-97-2 | 4 | µg/kg | **28** | ---- | ---- | ---- | ---- |
| Benzo(a)pyrene | 50-32-8 | 4 | µg/kg | **42** | ---- | ---- | ---- | ---- |
| Perylene | 198-55-0 | 4 | µg/kg | **47** | ---- | ---- | ---- | ---- |
| Benzo(g.h.i)perylene | 191-24-2 | 4 | µg/kg | **36** | ---- | ---- | ---- | ---- |
| Dibenz(a.h)anthracene | 53-70-3 | 4 | µg/kg | **8** | ---- | ---- | ---- | ---- |
| Indeno(1.2.3.cd)pyrene | 193-39-5 | 4 | µg/kg | **28** | ---- | ---- | ---- | ---- |
| Coronene | 191-07-1 | 5 | µg/kg | **9** | ---- | ---- | ---- | ---- |
| ^ Sum of PAHs | ---- | 4 | µg/kg | **441** | ---- | ---- | ---- | ---- |
| **Radionuclides / Activity** | | | | | | | | |
| Gross alpha | ---- | 500 | Bq/kg DW | <500 | ---- | ---- | ---- | ---- |
| Gross beta | ---- | 500 | Bq/kg DW | <500 | ---- | ---- | ---- | ---- |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | |
| 1.2-Dichloroethane-D4 | 17060-07-0 | 0.2 | % | **83.8** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | B10 - 6C | B6 - 2C | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 15-Aug-2018 12:05 | 17-Aug-2018 12:48 | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | EB1820011-001 | EB1820011-002 | -------- | -------- | -------- |
| | | | | Result | Result | ---- | ---- | ---- |
| **EP080S: TPH(V)/BTEX Surrogates - Continued** | | | | | | | | |
| Toluene-D8 | 2037-26-5 | 0.2 | % | 76.1 | ---- | ---- | ---- | ---- |
| 4-Bromofluorobenzene | 460-00-4 | 0.2 | % | 85.8 | ---- | ---- | ---- | ---- |
| **EP131S: OC Pesticide Surrogate** | | | | | | | | |
| Dibromo-DDE | 21655-73-2 | 0.50 | % | 60.5 | 46.1 | ---- | ---- | ---- |
| **EP131T: PCB Surrogate** | | | | | | | | |
| Decachlorobiphenyl | 2051-24-3 | 0.5 | % | 93.9 | ---- | ---- | ---- | ---- |
| **EP132T: Base/Neutral Extractable Surrogates** | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 10 | % | 104 | ---- | ---- | ---- | ---- |
| Anthracene-d10 | 1719-06-8 | 10 | % | 112 | ---- | ---- | ---- | ---- |
| 4-Terphenyl-d14 | 1718-51-0 | 10 | % | 108 | ---- | ---- | ---- | ---- |

## Surrogate Control Limits

Sub-Matrix: **SOIL**

| Compound | CAS Number | Recovery Limits (%) Low | Recovery Limits (%) High |
|---|---|---|---|
| **EP080S: TPH(V)/BTEX Surrogates** | | | |
| **1.2-Dichloroethane-D4** | 17060-07-0 | 53 | 134 |
| **Toluene-D8** | 2037-26-5 | 60 | 131 |
| **4-Bromofluorobenzene** | 460-00-4 | 59 | 127 |
| **EP131S: OC Pesticide Surrogate** | | | |
| **Dibromo-DDE** | 21655-73-2 | 10 | 119 |
| **EP131T: PCB Surrogate** | | | |
| **Decachlorobiphenyl** | 2051-24-3 | 10 | 106 |
| **EP132T: Base/Neutral Extractable Surrogates** | | | |
| **2-Fluorobiphenyl** | 321-60-8 | 55 | 135 |
| **Anthracene-d10** | 1719-06-8 | 70 | 136 |
| **4-Terphenyl-d14** | 1718-51-0 | 57 | 127 |

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| Work Order | : **EB1820011** | Page | : 1 of 10 |
| Client | : **BMT EASTERN AUSTRALIA PTY LTD** | Laboratory | : Environmental Division Brisbane |
| Contact | : Mr BRAD HILES | Contact | : Customer Services EB |
| Address | : PO BOX 203 SPRING HILL<br>BRISBANE QLD 4004 | Address | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone | : ---- | Telephone | : +61-7-3243 7222 |
| Project | : B20259 Port of Brisbane - Sediment Quality | Date Samples Received | : 17-Aug-2018 |
| Order number | : | Date Analysis Commenced | : 19-Aug-2018 |
| C-O-C number | : ---- | Issue Date | : 13-Sep-2018 |
| Sampler | : BRAD HILES | | |
| Site | : ---- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

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

## *Signatories*

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

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ben Felgendrejeris | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |
| Greg Vogel | Laboratory Manager | Brisbane External Subcontracting, Stafford, QLD |
| Kim McCabe | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |
| Matt Frost | Senior Organic Chemist | Brisbane Inorganics, Stafford, QLD |
| Matt Frost | Senior Organic Chemist | Brisbane Organics, Stafford, QLD |
| Satishkumar Trivedi | Senior Acid Sulfate Soil Chemist | Brisbane Acid Sulphate Soils, Stafford, QLD |

## 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

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

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | LOR | Unit | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |
| **EA033-A: Actual Acidity (QC Lot: 1884317)** | | | | | | | | | |
| EB1819556-001 | Anonymous | EA033: sulfidic - Titratable Actual Acidity (s-23F) | ---- | 0.02 | % pyrite S | 0.03 | 0.03 | 0.00 | No Limit |
| | | EA033: Titratable Actual Acidity (23F) | ---- | 2 | mole H+ / t | 21 | 20 | 5.06 | 0% - 50% |
| | | EA033: pH KCl (23A) | ---- | 0.1 | pH Unit | 4.9 | 5.0 | 2.02 | 0% - 20% |
| EM1813051-003 | Anonymous | EA033: sulfidic - Titratable Actual Acidity (s-23F) | ---- | 0.02 | % pyrite S | <0.02 | <0.02 | 0.00 | No Limit |
| | | EA033: Titratable Actual Acidity (23F) | ---- | 2 | mole H+ / t | 7 | 7 | 0.00 | No Limit |
| | | EA033: pH KCl (23A) | ---- | 0.1 | pH Unit | 5.4 | 5.4 | 0.00 | 0% - 20% |
| **EA033-B: Potential Acidity (QC Lot: 1884317)** | | | | | | | | | |
| EB1819556-001 | Anonymous | EA033: Chromium Reducible Sulfur (22B) | ---- | 0.005 | % S | 0.023 | 0.023 | 0.00 | No Limit |
| | | EA033: acidity - Chromium Reducible Sulfur (a-22B) | ---- | 10 | mole H+ / t | 14 | 15 | 0.00 | No Limit |
| EM1813051-003 | Anonymous | EA033: Chromium Reducible Sulfur (22B) | ---- | 0.005 | % S | <0.005 | <0.005 | 0.00 | No Limit |
| | | EA033: acidity - Chromium Reducible Sulfur (a-22B) | ---- | 10 | mole H+ / t | <10 | <10 | 0.00 | No Limit |
| **EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1882977)** | | | | | | | | | |
| EB1819974-001 | Anonymous | EA055: Moisture Content | ---- | 0.1 | % | <0.1 | <0.1 | 0.00 | No Limit |
| EB1820004-004 | Anonymous | EA055: Moisture Content | ---- | 0.1 | % | 9.8 | 10.0 | 1.78 | No Limit |
| **EG005-SD: Total Metals in Sediments by ICP-AES (QC Lot: 1882971)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EG005-SD: Aluminium | 7429-90-5 | 50 | mg/kg | 15500 | 14900 | 4.28 | 0% - 20% |
| | | EG005-SD: Iron | 7439-89-6 | 50 | mg/kg | 32600 | 30800 | 5.81 | 0% - 20% |
| **EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1882970)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EG020-SD: Cadmium | 7440-43-9 | 0.1 | mg/kg | <0.1 | <0.1 | 0.00 | No Limit |
| | | EG020-SD: Silver | 7440-22-4 | 0.1 | mg/kg | 0.2 | 0.1 | 0.00 | No Limit |
| | | EG020-SD: Arsenic | 7440-38-2 | 1 | mg/kg | 8.72 | 6.89 | 23.4 | No Limit |
| | | EG020-SD: Chromium | 7440-47-3 | 1 | mg/kg | 33.4 | 35.1 | 4.88 | 0% - 20% |

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | LOR | Unit | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Laboratory Duplicate (DUP) Report | | | | | |
| **EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 1882970) - continued** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EG020-SD: Copper | 7440-50-8 | 1 | mg/kg | 22.8 | 21.4 | 6.06 | 0% - 20% |
| | | EG020-SD: Lead | 7439-92-1 | 1 | mg/kg | 13.6 | 13.4 | 1.72 | 0% - 50% |
| | | EG020-SD: Nickel | 7440-02-0 | 1 | mg/kg | 25.5 | 24.3 | 4.93 | 0% - 20% |
| | | EG020-SD: Zinc | 7440-66-6 | 1 | mg/kg | 86.8 | 82.7 | 4.89 | 0% - 20% |
| **EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1882969)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EG035T-LL: Mercury | 7439-97-6 | 0.01 | mg/kg | 0.06 | 0.06 | 0.00 | 0% - 20% |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1882965)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EK059G: Nitrite + Nitrate as N (Sol.) | ---- | 0.1 | mg/kg | 0.3 | 0.3 | 0.00 | No Limit |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1882975)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EK061G: Total Kjeldahl Nitrogen as N | ---- | 20 | mg/kg | 1060 | 1040 | 1.19 | 0% - 20% |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1882976)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EK067G: Total Phosphorus as P | ---- | 2 | mg/kg | 782 | 781 | 0.214 | 0% - 20% |
| **EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 1889174)** | | | | | | | | | |
| EB1819963-001 | Anonymous | EP003: Total Organic Carbon | ---- | 0.02 | % | 32.0 | 31.6 | 1.34 | 0% - 20% |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1882972)** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| EB1820004-011 | Anonymous | EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1882973)** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP071: C15 - C28 Fraction | ---- | 100 | mg/kg | 1630 | 1010 | 47.2 | 0% - 50% |
| | | EP071: C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | ---- | 50 | mg/kg | 570 | 350 | 48.4 | 0% - 50% |
| EB1820004-011 | Anonymous | EP071: C15 - C28 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | ---- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1882972)** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| EB1820004-011 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1882973)** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP071: >C16 - C34 Fraction | ---- | 100 | mg/kg | 1160 | 720 | 46.1 | 0% - 50% |
| | | EP071: >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C10 - C16 Fraction | ---- | 50 | mg/kg | 1040 | # 640 | 48.3 | 0% - 20% |
| EB1820004-011 | Anonymous | EP071: >C16 - C34 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C10 - C16 Fraction | ---- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| **EP080: BTEXN (QC Lot: 1882972)** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |

Sub-Matrix: **SOIL**

Laboratory Duplicate (DUP) Report

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | LOR | Unit | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |
|---|---|---|---|---|---|---|---|---|---|
| **EP080: BTEXN (QC Lot: 1882972) - continued** | | | | | | | | | |
| EB1820004-001 | Anonymous | EP080: meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| EB1820004-011 | Anonymous | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| **EP131A: Organochlorine Pesticides (QC Lot: 1889288)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EP131A: 4.4`-DDD | 72-54-8 | 0.5 | µg/kg | <0.50 | <0.50 | 0.00 | No Limit |
| | | EP131A: 4.4`-DDE | 72-55-9 | 0.5 | µg/kg | <0.50 | <0.50 | 0.00 | No Limit |
| | | EP131A: 4.4`-DDT | 50-29-3 | 0.5 | µg/kg | <0.50 | <0.50 | 0.00 | No Limit |
| | | EP131A: Sum of DDD + DDE + DDT | 72-54-8/72-55-9/50-2 | 0.5 | µg/kg | <0.50 | <0.50 | 0.00 | No Limit |
| **EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 1889289)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EP131B: Total Polychlorinated biphenyls | ---- | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1016 | 12674-11-2 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1221 | 11104-28-2 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1232 | 11141-16-5 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1242 | 53469-21-9 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1248 | 12672-29-6 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1254 | 11097-69-1 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| | | EP131B: Aroclor 1260 | 11096-82-5 | 5 | µg/kg | <5.0 | <5.0 | 0.00 | No Limit |
| **EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1889290)** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EP132B-SD: Acenaphthylene | 208-96-8 | 4 | µg/kg | 10 | 9 | 0.00 | No Limit |
| | | EP132B-SD: Acenaphthene | 83-32-9 | 4 | µg/kg | <4 | <4 | 0.00 | No Limit |
| | | EP132B-SD: Fluorene | 86-73-7 | 4 | µg/kg | <4 | <4 | 0.00 | No Limit |
| | | EP132B-SD: Phenanthrene | 85-01-8 | 4 | µg/kg | 14 | 11 | 23.6 | No Limit |
| | | EP132B-SD: Anthracene | 120-12-7 | 4 | µg/kg | 8 | 7 | 23.3 | No Limit |
| | | EP132B-SD: Fluoranthene | 206-44-0 | 4 | µg/kg | 44 | 43 | 2.59 | 0% - 50% |
| | | EP132B-SD: Pyrene | 129-00-0 | 4 | µg/kg | 50 | 49 | 2.40 | 0% - 50% |
| | | EP132B-SD: Benz(a)anthracene | 56-55-3 | 4 | µg/kg | 34 | 30 | 9.64 | No Limit |
| | | EP132B-SD: Chrysene | 218-01-9 | 4 | µg/kg | 24 | 22 | 10.2 | No Limit |
| | | EP132B-SD: Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 4 | µg/kg | 42 | 45 | 6.82 | 0% - 50% |
| | | EP132B-SD: Benzo(k)fluoranthene | 207-08-9 | 4 | µg/kg | 17 | 22 | 25.0 | No Limit |
| | | EP132B-SD: Benzo(e)pyrene | 192-97-2 | 4 | µg/kg | 28 | 30 | 8.28 | No Limit |

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | LOR | Unit | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Laboratory Duplicate (DUP) Report | | | | | |
| **EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1889290) - continued** | | | | | | | | | |
| EB1820011-001 | B10 - 6C | EP132B-SD: Benzo(a)pyrene | 50-32-8 | 4 | µg/kg | 42 | 46 | 7.87 | 0% - 50% |
| | | EP132B-SD: Perylene | 198-55-0 | 4 | µg/kg | 47 | 39 | 20.3 | 0% - 50% |
| | | EP132B-SD: Benzo(g.h.i)perylene | 191-24-2 | 4 | µg/kg | 36 | 40 | 10.9 | No Limit |
| | | EP132B-SD: Dibenz(a.h)anthracene | 53-70-3 | 4 | µg/kg | 8 | 8 | 0.00 | No Limit |
| | | EP132B-SD: Indeno(1.2.3.cd)pyrene | 193-39-5 | 4 | µg/kg | 28 | 30 | 6.29 | No Limit |
| | | EP132B-SD: Sum of PAHs | ---- | 4 | µg/kg | 441 | 441 | 0.00 | 0% - 20% |
| | | EP132B-SD: Naphthalene | 91-20-3 | 5 | µg/kg | <5 | <5 | 0.00 | No Limit |
| | | EP132B-SD: 2-Methylnaphthalene | 91-57-6 | 5 | µg/kg | <5 | <5 | 0.00 | No Limit |
| | | EP132B-SD: Coronene | 191-07-1 | 5 | µg/kg | 9 | 10 | 0.00 | 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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

| | | | | *Method Blank (MB) Report* | *Laboratory Control Spike (LCS) Report* | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *Spike* | *Spike Recovery (%)* | *Recovery Limits (%)* | |
| *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Result* | *Concentration* | *LCS* | *Low* | *High* |
| **EA033-A: Actual Acidity (QCLot: 1884317)** | | | | | | | | |
| EA033: pH KCl (23A) | ---- | ---- | pH Unit | ---- | 4.6 pH Unit | 106 | 70 | 130 |
| EA033: Titratable Actual Acidity (23F) | ---- | 2 | mole H+ / t | <2 | 17.7 mole H+ / t | 85.9 | 70 | 130 |
| EA033: sulfidic - Titratable Actual Acidity (s-23F) | ---- | 0.02 | % pyrite S | <0.02 | ---- | ---- | ---- | ---- |
| **EA033-B: Potential Acidity (QCLot: 1884317)** | | | | | | | | |
| EA033: Chromium Reducible Sulfur (22B) | ---- | 0.005 | % S | <0.005 | 0.25483 % S | 81.3 | 70 | 130 |
| EA033: acidity - Chromium Reducible Sulfur (a-22B) | ---- | 10 | mole H+ / t | <10 | ---- | ---- | ---- | ---- |
| **EA033-C: Acid Neutralising Capacity (QCLot: 1884317)** | | | | | | | | |
| EA033: Acid Neutralising Capacity (19A2) | ---- | 0.01 | % CaCO3 | <0.01 | 10 % CaCO3 | 100 | 70 | 130 |
| EA033: acidity - Acid Neutralising Capacity (a-19A2) | ---- | 10 | mole H+ / t | <10 | ---- | ---- | ---- | ---- |
| EA033: sulfidic - Acid Neutralising Capacity (s-19A2) | ---- | 0.01 | % pyrite S | <0.01 | ---- | ---- | ---- | ---- |
| **EG005-SD: Total Metals in Sediments by ICP-AES (QCLot: 1882971)** | | | | | | | | |
| EG005-SD: Aluminium | 7429-90-5 | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| EG005-SD: Iron | 7439-89-6 | 50 | mg/kg | <50 | ---- | ---- | ---- | ---- |
| **EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1882970)** | | | | | | | | |
| EG020-SD: Arsenic | 7440-38-2 | 1 | mg/kg | <1.00 | 116.3 mg/kg | 99.1 | 80 | 124 |
| EG020-SD: Cadmium | 7440-43-9 | 0.1 | mg/kg | <0.1 | 1.43 mg/kg | 98.4 | 87 | 122 |
| EG020-SD: Chromium | 7440-47-3 | 1 | mg/kg | <1.0 | 20.5 mg/kg | 96.3 | 79 | 129 |
| EG020-SD: Copper | 7440-50-8 | 1 | mg/kg | <1.0 | 52.9 mg/kg | 95.0 | 85 | 118 |
| EG020-SD: Lead | 7439-92-1 | 1 | mg/kg | <1.0 | 66.3 mg/kg | 101 | 86 | 119 |
| EG020-SD: Nickel | 7440-02-0 | 1 | mg/kg | <1.0 | 14.72 mg/kg | 100 | 77 | 123 |
| EG020-SD: Silver | 7440-22-4 | 0.1 | mg/kg | <0.1 | ---- | ---- | ---- | ---- |
| EG020-SD: Zinc | 7440-66-6 | 1 | mg/kg | <1.0 | 182.3 mg/kg | 101 | 71 | 127 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 1882969)** | | | | | | | | |
| EG035T-LL: Mercury | 7439-97-6 | 0.01 | mg/kg | <0.01 | 0.0555 mg/kg | 108 | 70 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1882965)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N (Sol.) | ---- | 0.1 | mg/kg | <0.1 | 2.5 mg/kg | 99.7 | 89 | 155 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1882975)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 20 | mg/kg | <20 | 877 mg/kg | 96.5 | 70 | 110 |
| | | | | <20 | 3644 mg/kg | 87.5 | 70 | 110 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1882976)** | | | | | | | | |
| EK067G: Total Phosphorus as P | ---- | 2 | mg/kg | <2 | 766 mg/kg | 85.5 | 70 | 110 |
| | | | | <2 | 1200 mg/kg | 95.8 | 70 | 110 |
| **EP003: Total Organic Carbon (TOC) in Soil (QCLot: 1889174)** | | | | | | | | |

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | Result | Concentration | LCS | Low | High |
| **EP003: Total Organic Carbon (TOC) in Soil (QCLot: 1889174) - continued** | | | | | | | | |
| EP003: Total Organic Carbon | ---- | 0.02 | % | <0.02 | 17.61 % | 95.7 | 70 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 1882972)** | | | | | | | | |
| EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | 16 mg/kg | 84.9 | 72 | 120 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 1882973)** | | | | | | | | |
| EP071: C10 - C14 Fraction | ---- | 50 | mg/kg | <50 | 318 mg/kg | 91.2 | 79 | 123 |
| EP071: C15 - C28 Fraction | ---- | 100 | mg/kg | <100 | 531 mg/kg | 101 | 77 | 123 |
| EP071: C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1882972)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | 18.5 mg/kg | 79.6 | 70 | 119 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1882973)** | | | | | | | | |
| EP071: >C10 - C16 Fraction | ---- | 50 | mg/kg | <50 | 428 mg/kg | 96.5 | 81 | 122 |
| EP071: >C16 - C34 Fraction | ---- | 100 | mg/kg | <100 | 395 mg/kg | 99.7 | 74 | 122 |
| EP071: >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | ---- | ---- | ---- | ---- |
| **EP080: BTEXN (QCLot: 1882972)** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | 1 mg/kg | 85.5 | 69 | 118 |
| EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 84.8 | 73 | 123 |
| EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 80.3 | 73 | 115 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | 2 mg/kg | 84.9 | 75 | 115 |
| EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 87.1 | 75 | 115 |
| EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | 1 mg/kg | 94.3 | 71 | 113 |
| **EP131A: Organochlorine Pesticides (QCLot: 1889288)** | | | | | | | | |
| EP131A: 4.4`-DDD | 72-54-8 | 0.5 | µg/kg | <0.50 | 5 µg/kg | 42.2 | 26 | 141 |
| EP131A: 4.4`-DDE | 72-55-9 | 0.5 | µg/kg | <0.50 | 5 µg/kg | 67.9 | 35 | 129 |
| EP131A: 4.4`-DDT | 50-29-3 | 0.5 | µg/kg | <0.50 | 5 µg/kg | 109 | 23 | 138 |
| EP131A: Sum of DDD + DDE + DDT | 72-54-8/72-5<br>5-9/50-2 | 0.5 | µg/kg | <0.50 | ---- | ---- | ---- | ---- |
| **EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1889289)** | | | | | | | | |
| EP131B: Total Polychlorinated biphenyls | ---- | 5 | µg/kg | <5.0 | 50 µg/kg | 88.5 | 45 | 115 |
| EP131B: Aroclor 1016 | 12674-11-2 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| EP131B: Aroclor 1221 | 11104-28-2 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| EP131B: Aroclor 1232 | 11141-16-5 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| EP131B: Aroclor 1242 | 53469-21-9 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| EP131B: Aroclor 1248 | 12672-29-6 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| EP131B: Aroclor 1254 | 11097-69-1 | 5 | µg/kg | <5.0 | 50 µg/kg | 88.5 | 45 | 115 |
| EP131B: Aroclor 1260 | 11096-82-5 | 5 | µg/kg | <5.0 | ---- | ---- | ---- | ---- |
| **EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1889290)** | | | | | | | | |
| EP132B-SD: Naphthalene | 91-20-3 | 5 | µg/kg | <5 | 25 µg/kg | 87.4 | 63 | 129 |

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report Result | Laboratory Control Spike (LCS) Report Spike Concentration | Spike Recovery (%) LCS | Recovery Limits (%) Low | High |
|---|---|---|---|---|---|---|---|---|
| **EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1889290) - continued** | | | | | | | | |
| EP132B-SD: 2-Methylnaphthalene | 91-57-6 | 5 | µg/kg | <5 | 25 µg/kg | 83.5 | 64 | 128 |
| EP132B-SD: Acenaphthylene | 208-96-8 | 4 | µg/kg | <4 | 25 µg/kg | 90.7 | 65 | 129 |
| EP132B-SD: Acenaphthene | 83-32-9 | 4 | µg/kg | <4 | 25 µg/kg | 87.7 | 68 | 132 |
| EP132B-SD: Fluorene | 86-73-7 | 4 | µg/kg | <4 | 25 µg/kg | 90.4 | 68 | 124 |
| EP132B-SD: Phenanthrene | 85-01-8 | 4 | µg/kg | <4 | 25 µg/kg | 87.5 | 64 | 134 |
| EP132B-SD: Anthracene | 120-12-7 | 4 | µg/kg | <4 | 25 µg/kg | 87.5 | 65 | 131 |
| EP132B-SD: Fluoranthene | 206-44-0 | 4 | µg/kg | <4 | 25 µg/kg | 87.0 | 64 | 130 |
| EP132B-SD: Pyrene | 129-00-0 | 4 | µg/kg | <4 | 25 µg/kg | 87.6 | 67 | 133 |
| EP132B-SD: Benz(a)anthracene | 56-55-3 | 4 | µg/kg | <4 | 25 µg/kg | 77.7 | 62 | 130 |
| EP132B-SD: Chrysene | 218-01-9 | 4 | µg/kg | <4 | 25 µg/kg | 84.5 | 65 | 133 |
| EP132B-SD: Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 4 | µg/kg | <4 | 25 µg/kg | 88.5 | 68 | 120 |
| EP132B-SD: Benzo(k)fluoranthene | 207-08-9 | 4 | µg/kg | <4 | 25 µg/kg | 92.7 | 61 | 133 |
| EP132B-SD: Benzo(e)pyrene | 192-97-2 | 4 | µg/kg | <4 | 25 µg/kg | 91.5 | 63 | 127 |
| EP132B-SD: Benzo(a)pyrene | 50-32-8 | 4 | µg/kg | <4 | 25 µg/kg | 88.8 | 66 | 118 |
| EP132B-SD: Perylene | 198-55-0 | 4 | µg/kg | <4 | 25 µg/kg | 90.6 | 69 | 119 |
| EP132B-SD: Benzo(g.h.i)perylene | 191-24-2 | 4 | µg/kg | <4 | 25 µg/kg | 81.9 | 66 | 120 |
| EP132B-SD: Dibenz(a.h)anthracene | 53-70-3 | 4 | µg/kg | <4 | 25 µg/kg | 82.0 | 64 | 122 |
| EP132B-SD: Indeno(1.2.3.cd)pyrene | 193-39-5 | 4 | µg/kg | <4 | 25 µg/kg | 81.5 | 64 | 120 |
| EP132B-SD: Coronene | 191-07-1 | 5 | µg/kg | <5 | 25 µg/kg | 90.9 | 68 | 136 |
| EP132B-SD: Sum of PAHs | ---- | 4 | µg/kg | <4 | ---- | ---- | ---- | ---- |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report Spike Concentration | SpikeRecovery(%) MS | Recovery Limits (%) Low | High |
|---|---|---|---|---|---|---|---|
| **EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 1882970)** | | | | | | | |
| EB1820011-002 | B6 - 2C | EG020-SD: Arsenic | 7440-38-2 | 50 mg/kg | 97.3 | 70 | 130 |
| | | EG020-SD: Cadmium | 7440-43-9 | 25 mg/kg | 94.0 | 70 | 130 |
| | | EG020-SD: Chromium | 7440-47-3 | 50 mg/kg | 100 | 70 | 130 |
| | | EG020-SD: Copper | 7440-50-8 | 50 mg/kg | 102 | 70 | 130 |
| | | EG020-SD: Lead | 7439-92-1 | 50 mg/kg | 95.2 | 70 | 130 |
| | | EG020-SD: Nickel | 7440-02-0 | 50 mg/kg | 100 | 70 | 130 |
| | | EG020-SD: Zinc | 7440-66-6 | 50 mg/kg | 105 | 70 | 130 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 1882969)** | | | | | | | |

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report Spike Concentration | SpikeRecovery(%) MS | Recovery Limits (%) Low | High |
|---|---|---|---|---|---|---|---|
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 1882969) - continued** | | | | | | | |
| EB1820011-002 | B6 - 2C | EG035T-LL: Mercury | 7439-97-6 | 0.5 mg/kg | 86.2 | 70 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 1882972)** | | | | | | | |
| EB1820004-002 | Anonymous | EP080: C6 - C9 Fraction | ---- | 8 mg/kg | 85.8 | 70 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 1882973)** | | | | | | | |
| EB1820004-002 | Anonymous | EP071: C10 - C14 Fraction | ---- | 318 mg/kg | 91.0 | 70 | 130 |
| | | EP071: C15 - C28 Fraction | ---- | 531 mg/kg | 106 | 70 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1882972)** | | | | | | | |
| EB1820004-002 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 8 mg/kg | 112 | 70 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1882973)** | | | | | | | |
| EB1820004-002 | Anonymous | EP071: >C10 - C16 Fraction | ---- | 428 mg/kg | 97.8 | 70 | 130 |
| | | EP071: >C16 - C34 Fraction | ---- | 395 mg/kg | 106 | 70 | 130 |
| **EP080: BTEXN (QCLot: 1882972)** | | | | | | | |
| EB1820004-002 | Anonymous | EP080: Benzene | 71-43-2 | 2 mg/kg | 84.2 | 70 | 130 |
| | | EP080: Toluene | 108-88-3 | 2 mg/kg | 81.0 | 70 | 130 |
| **EP131A: Organochlorine Pesticides (QCLot: 1889288)** | | | | | | | |
| EB1820011-001 | B10 - 6C | EP131A: 4.4`-DDD | 72-54-8 | 5 µg/kg | 48.6 | 26 | 150 |
| | | EP131A: 4.4`-DDE | 72-55-9 | 5 µg/kg | 62.0 | 31 | 125 |
| | | EP131A: 4.4`-DDT | 50-29-3 | 5 µg/kg | 110 | 23 | 163 |
| **EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 1889289)** | | | | | | | |
| EB1820011-001 | B10 - 6C | EP131B: Total Polychlorinated biphenyls | ---- | 50 µg/kg | 70.4 | 44 | 136 |
| | | EP131B: Aroclor 1254 | 11097-69-1 | 50 µg/kg | 70.4 | 44 | 136 |
| **EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1889290)** | | | | | | | |
| EB1820011-001 | B10 - 6C | EP132B-SD: Naphthalene | 91-20-3 | 25 µg/kg | 91.3 | 70 | 130 |
| | | EP132B-SD: 2-Methylnaphthalene | 91-57-6 | 25 µg/kg | 85.6 | 70 | 130 |
| | | EP132B-SD: Acenaphthylene | 208-96-8 | 25 µg/kg | 105 | 70 | 130 |
| | | EP132B-SD: Acenaphthene | 83-32-9 | 25 µg/kg | 89.2 | 70 | 130 |
| | | EP132B-SD: Fluorene | 86-73-7 | 25 µg/kg | 90.2 | 70 | 130 |
| | | EP132B-SD: Phenanthrene | 85-01-8 | 25 µg/kg | 85.4 | 70 | 130 |
| | | EP132B-SD: Anthracene | 120-12-7 | 25 µg/kg | 88.0 | 70 | 130 |
| | | EP132B-SD: Fluoranthene | 206-44-0 | 25 µg/kg | 115 | 70 | 130 |
| | | EP132B-SD: Pyrene | 129-00-0 | 25 µg/kg | 120 | 70 | 130 |
| | | EP132B-SD: Benz(a)anthracene | 56-55-3 | 25 µg/kg | 106 | 70 | 130 |
| | | EP132B-SD: Chrysene | 218-01-9 | 25 µg/kg | 115 | 70 | 130 |
| | | EP132B-SD: Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 25 µg/kg | 86.5 | 70 | 130 |
| | | EP132B-SD: Benzo(k)fluoranthene | 207-08-9 | 25 µg/kg | 103 | 70 | 130 |

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report Spike Concentration | SpikeRecovery(%) MS | Recovery Limits (%) Low | High |
|---|---|---|---|---|---|---|---|
| **EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 1889290) - continued** | | | | | | | |
| EB1820011-001 | B10 - 6C | EP132B-SD: Benzo(e)pyrene | 192-97-2 | 25 µg/kg | 89.0 | 70 | 130 |
| | | EP132B-SD: Benzo(a)pyrene | 50-32-8 | 25 µg/kg | 99.2 | 70 | 130 |
| | | EP132B-SD: Perylene | 198-55-0 | 25 µg/kg | 93.2 | 70 | 130 |
| | | EP132B-SD: Benzo(g.h.i)perylene | 191-24-2 | 25 µg/kg | 110 | 70 | 130 |
| | | EP132B-SD: Dibenz(a.h)anthracene | 53-70-3 | 25 µg/kg | 87.5 | 70 | 130 |
| | | EP132B-SD: Indeno(1.2.3.cd)pyrene | 193-39-5 | 25 µg/kg | 106 | 70 | 130 |
| | | EP132B-SD: Coronene | 191-07-1 | 25 µg/kg | 121 | 70 | 130 |

# Appendix E Data Analysis Zone

**Table E-1 Zone 2 Summary Statistics**

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium | 5 | 0 | n/a | Student's-t | 23028 | 8100 | 24000 | 20535 | 22000 |
| Arsenic | 0.4 | 0 | 20 | Student's-t | 7.777 | 4.9 | 8.4 | 7.158 | 7.5 |
| Cadmium | 0.1 | 8 | 1.5 | Chebyshev ( | 0.348 | 0.05 | 0.545 | 0.122 | 0.05 |
| Chromium | 0.1 | 0 | 80 | Student's-t | 45.09 | 23 | 47 | 40.95 | 43 |
| Copper | 0.1 | 0 | 65 | Student's-t | 39.69 | 16 | 47 | 34.6 | 34.25 |
| Iron | 5 | 0 | n/a | Student's-t | 40376 | 21000 | 44000 | 36775 | 37500 |
| Lead | 0.5 | 0 | 50 | Student's-t | 20.73 | 5.4 | 24.5 | 17.49 | 17 |
| Mercury | 0.01 | 0 | 0.15 | Student's-t | 0.114 | 0.032 | 0.153 | 0.0946 | 0.093 |
| Nickel | 0.1 | 0 | 21 | Student's-t | 27.87 | 17 | 37 | 24.85 | 24.75 |
| Phosphorus* | 1 | 0 | n/a | Adjusted Gamma | 1129 | 370 | 1750 | 849.3 | 801.3 |
| Silver | 0.1 | 1 | 1 | Adjusted Gamma | 0.283 | 0.05 | 0.485 | 0.186 | 0.175 |
| Zinc | 0.5 | 0 | 200 | Student's-t | 121.5 | 48 | 140 | 106.2 | 103.6 |
| Total Organic Carbon^ | 0.01 | 0 | n/a | Chebyshev ( | 2.04 | 0.3 | 1.9 | 1.455 | 1.55 |
| Moisture Content | 0.1 | 0 | n/a | Student's-t | 53.7 | 32.11 | 93.33 | 42.26 | 37.68 |
| Monobutyltin as Sn | 0.5 | 4 | n/a | Adjusted Gamma | 3.426 | 0.156 | 5.667 | 1.322 | 0.53 |
| Dibutyltin as Sn | 0.5 | 0 | n/a | Chebyshev ( | 6.141 | 0.437 | 10.33 | 1.928 | 0.793 |
| Tributlytin as Sn | 0.5 | 4 | 9 | Student's-t | 0.692 | 0.156 | 1.053 | 0.545 | 0.523 |
| Aldrin | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-BHC | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-BHC | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| gamma-BHC (Lindane) | 1 | 13 | 0.32 | n/a | n/a | n/a | n/a | n/a | n/a |
| delta-BHC | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cis-Chlordane | 1 | 13 | 0.5 | n/a | n/a | n/a | n/a | n/a | n/a |
| trans-Chlordane | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| p_p'-DDD | 1 | 12 | 2 | n/a | n/a | 3 | 3 | 3 | 3 |
| p_p'-DDE | 1 | 1 | 2.2 | Student's-t | 2.059 | 0.895 | 2.828 | 1.693 | 1.646 |
| p_p'-DDT | 1 | 13 | 1.6 | n/a | n/a | n/a | n/a | n/a | n/a |
| Dieldrin | 1 | 13 | 280 | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-Endosulfan | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-Endosulfan | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endosulfan Sulphate | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin | 1 | 13 | 10 | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin ketone | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin aldehyde | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor epoxide | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Hexachlorobenzene | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Methoxychlor | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Oxychlordane* | 1 | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Total Nitrogen^ | 20 | 0 | n/a | Student's-t | 1212 | 625 | 1400 | 925 | 866.7 |
| Total Kjeldahl Nitrogen^ | 20 | 0 | n/a | Student's-t | 1212 | 625 | 1400 | 925 | 866.7 |
| Nitrate as N^ | 0.1 | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Nitrite as N^ | 0.1 | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Total Ammonia as N^ | 0.1 | 0 | n/a | Student's-t | 20.93 | 5.2 | 25.63 | 12.99 | 12 |
| TPH C6-C9 | 10 | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

## Data Analysis Zone

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| TPH C10-C14 | 10 | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| TPH C15-C28 | 50 | 0 | n/a | Student's-t | 212.8 | 75 | 238.3 | 151.7 | 126.7 |
| TPH C29-C36 | 50 | 0 | n/a | Student's-t | 284.2 | 131.3 | 333.3 | 202.7 | 160 |
| Naphthalene | 5 | 2 | n/a | Student's-t | 7.213 | 1.563 | 8.333 | 4.861 | 4.625 |
| 1-Methylnaphthalene | 5 | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 2-Methylnaphthalene | 5 | 4 | n/a | Student's-t | 6.378 | 1.563 | 8.333 | 3.542 | 1.667 |
| Acenaphthylene | 5 | 1 | n/a | Student's-t | 8.754 | 3.438 | 9.375 | 6.439 | 6.117 |
| Acenaphthene | 5 | 6 | n/a | n/a | n/a | 8.667 | 8.667 | 8.667 | 8.667 |
| Fluorene | 5 | 3 | n/a | Student's-t | 7.459 | 1.563 | 8.333 | 4.636 | 5.367 |
| Phenanthrene | 5 | 1 | n/a | Student's-t | 35.4 | 8.333 | 46.25 | 21.13 | 19.33 |
| Anthracene | 5 | 1 | n/a | Student's-t | 35.4 | 8.333 | 46.25 | 21.13 | 19.33 |
| Fluoranthene | 5 | 0 | n/a | Student's-t | 46.66 | 17 | 49.38 | 34.54 | 36.17 |
| Pyrene | 5 | 0 | n/a | Student's-t | 51.35 | 18 | 51.83 | 38.2 | 41.25 |
| Benz(a)anthracene | 5 | 0 | n/a | Student's-t | 36.93 | 17.67 | 38.5 | 27.95 | 24.38 |
| Chrysene | 5 | 1 | n/a | Student's-t | 36.53 | 8.333 | 38.67 | 25.2 | 24.38 |
| Benzo(b)&(k)fluoranthene | 10 | 0 | n/a | Student's-t | 113.5 | 33.33 | 131.3 | 76.5 | 80 |
| Benzo(a)pyrene | 5 | 0 | n/a | Student's-t | 55.5 | 17 | 61.88 | 37.88 | 39.33 |
| Indeno(1_2_3-cd)pyrene | 5 | 0 | n/a | Student's-t | 103.4 | 33.33 | 106.3 | 73.71 | 80 |
| Dibenz(a_h)anthracene | 5 | 1 | n/a | Student's-t | 13.22 | 5.875 | 14.38 | 10.15 | 10.67 |
| Benzo(g_h_i)perylene | 5 | 0 | n/a | Student's-t | 48.96 | 17.67 | 48.83 | 35.43 | 40.67 |
| Coronene | 10 | 1 | n/a | Student's-t | 13.86 | 6.875 | 16.67 | 10.23 | 9.333 |
| Benzo(e)pyrene | 5 | 1 | n/a | Student's-t | 48.27 | 8.333 | 53.75 | 31.08 | 34.67 |
| Perylene | 5 | 0 | n/a | Student's-t | 185.8 | 53.33 | 248.3 | 109.2 | 75 |
| Total PAHs (as above) | 100 | 1 | 10000 | Student's-t | 785.4 | 166.7 | 850 | 546 | 613.3 |
| PCB # 077 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| PCB # 101 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 105 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 118 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 126 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 128 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 138 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 153 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 169 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 170 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 180 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 187 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 195 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 206 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 209 | | 7 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

**Table E-2 Zone 3 Summary Statistics**

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium | 5 | 0 | n/a | Student's-t | 17838 | 12000 | 20000 | 16205 | 17500 |
| Arsenic | 0.4 | 0 | 20 | Student's-t | 7.457 | 5.3 | 8.4 | 6.914 | 6.9 |
| Cadmium | 0.1 | 14 | 1.5 | n/a | n/a | n/a | n/a | n/a | n/a |
| Chromium | 0.1 | 0 | 80 | Student's-t | 36.05 | 26 | 41 | 33.14 | 34 |
| Copper | 0.1 | 0 | 65 | Student's-t | 34.72 | 13 | 73 | 24.91 | 22 |
| Iron | 5 | 0 | n/a | Student's-t | 32634 | 23000 | 36000 | 30159 | 31000 |
| Lead | 0.5 | 0 | 50 | Student's-t | 13.77 | 8.1 | 16 | 12.38 | 13 |
| Mercury | 0.01 | 0 | 0.15 | Student's-t | 0.0736 | 0.043 | 0.095 | 0.0649 | 0.065 |
| Nickel | 0.1 | 0 | 21 | Student's-t | 21.42 | 14 | 24 | 19.61 | 20 |
| Phosphorus* | 1 | 0 | n/a | Student's-t | 619.3 | 410 | 670 | 573.2 | 600 |
| Silver | 0.1 | 7 | 1 | Chebyshev ( | 0.163 | 0.05 | 0.2 | 0.0943 | 0.08 |
| Zinc | 0.5 | 0 | 200 | Student's-t | 81.17 | 53 | 90 | 73.75 | 79 |
| Total Organic Carbon^ | 0.01 | 0 | n/a | Student's-t | 1.288 | 0.74 | 1.6 | 1.129 | 1.2 |
| Moisture Content | 0.1 | 0 | n/a | Student's-t | 51.12 | 26.88 | 62.16 | 46.07 | 45.83 |
| Monobutyltin as Sn | 0.5 | 13 | n/a | n/a | n/a | 1.667 | 1.667 | 1.667 | 1.667 |
| Dibutyltin as Sn | 0.5 | 4 | n/a | Student's-t | 0.801 | 0.227 | 1.217 | 0.613 | 0.508 |
| Tributlytin as Sn | 0.5 | 14 | 9 | n/a | n/a | n/a | n/a | n/a | n/a |
| Aldrin | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-BHC | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-BHC | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| gamma-BHC (Lindane) | 1 | 14 | 0.32 | n/a | n/a | n/a | n/a | n/a | n/a |
| delta-BHC | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cis-Chlordane | 1 | 13 | 0.5 | n/a | n/a | 1.481 | 1.481 | 1.481 | 1.481 |
| trans-Chlordane | 1 | 13 | n/a | n/a | n/a | 1.852 | 1.852 | 1.852 | 1.852 |
| p_p'-DDD | 1 | 14 | 2 | n/a | n/a | n/a | n/a | n/a | n/a |
| p_p'-DDE | 1 | 2 | 2.2 | Student's-t | 1.978 | 0.617 | 2.809 | 1.623 | 1.545 |
| p_p'-DDT | 1 | 13 | 1.6 | n/a | n/a | 1.975 | 1.975 | 1.975 | 1.975 |
| Dieldrin | 1 | 14 | 280 | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-Endosulfan | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-Endosulfan | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endosulfan Sulphate | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin | 1 | 14 | 10 | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin ketone | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin aldehyde | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor epoxide | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Hexachlorobenzene | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Methoxychlor | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Oxychlordane * | 1 | 14 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

## Data Analysis Zone

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Total Nitrogen^ | 20 | 0 | n/a | Student's-t | 946.8 | 625 | 923.1 | 831.2 | 853.9 |
| Total Kjeldahl Nitrogen^ | 20 | 0 | n/a | Student's-t | 946.8 | 625 | 923.1 | 831.2 | 853.9 |
| Nitrate as N^ | 0.1 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Nitrite as N^ | 0.1 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Total Ammonia as N^ | 0.1 | 0 | n/a | Adjusted Gamma | 29.75 | 5.375 | 23.33 | 10.64 | 7.917 |
| TPH C6-C9 | 10 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| TPH C10-C14 | 10 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| TPH C15-C28 | 50 | 0 | n/a | Adjusted Gamma | 501.3 | 112.5 | 404.2 | 184.2 | 125 |
| TPH C29-C36 | 50 | 0 | n/a | Chebyshev ( | 803.4 | 121.8 | 758.3 | 259.4 | 137.5 |
| Naphthalene | 5 | 5 | n/a | n/a | n/a | 4.625 | 4.625 | 4.625 | 4.625 |
| 1-Methylnaphthalene | 5 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 2-Methylnaphthalene | 5 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Acenaphthylene | 5 | 2 | n/a | Student's-t | 8.34 | 3.205 | 8.202 | 5.981 | 6.917 |
| Acenaphthene | 5 | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Fluorene | 5 | 4 | n/a | Student's-t | 4.449 | 2.083 | 4.813 | 3.415 | 3.205 |
| Phenanthrene | 5 | 0 | n/a | Student's-t | 30.79 | 13.75 | 32.05 | 24.35 | 24.72 |

Data Analysis Zone

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Anthracene | 5 | 0 | n/a | Student's-t | 30.79 | 13.75 | 32.05 | 24.35 | 24.72 |
| Fluoranthene | 5 | 0 | n/a | Student's-t | 58.69 | 20.83 | 58.75 | 43.9 | 44.17 |
| Pyrene | 5 | 0 | n/a | Student's-t | 61.97 | 28.33 | 64.04 | 47.56 | 42.5 |
| Benz(a)anthracene | 5 | 0 | n/a | Student's-t | 46.37 | 22.5 | 49.17 | 37.29 | 38.2 |
| Chrysene | 5 | 0 | n/a | Student's-t | 49.05 | 33.33 | 52.5 | 42.22 | 43.33 |
| Benzo(b)&(k)fluoranthene | 10 | 0 | n/a | Student's-t | 91.57 | 66.25 | 93.75 | 80.07 | 75.64 |
| Benzo(a)pyrene | 5 | 0 | n/a | Student's-t | 51.91 | 29.58 | 50.63 | 43.77 | 47.19 |
| Indeno(1_2_3-cd)pyrene | 5 | 0 | n/a | Student's-t | 101 | 51.69 | 100 | 79.89 | 93.59 |
| Dibenz(a_h)anthracene | 5 | 1 | n/a | Student's-t | 15.59 | 2.809 | 15.83 | 10.72 | 11.88 |
| Benzo(g_h_i)perylene | 5 | 0 | n/a | Student's-t | 52.95 | 27.5 | 54.38 | 42.27 | 47.44 |
| Coronene | 10 | 4 | n/a | Student's-t | 10.7 | 4.167 | 11.25 | 7.656 | 6.41 |
| Benzo(e)pyrene | 5 | 0 | n/a | Student's-t | 40.51 | 30.34 | 40 | 36.4 | 39.17 |
| Perylene | 5 | 0 | n/a | Student's-t | 96.87 | 74.36 | 97.92 | 87.69 | 91.67 |
| Total PAHs (as above) | 100 | 0 | 10000 | Student's-t | 691.7 | 483.3 | 691.7 | 609.9 | 602.6 |
| PCB # 077 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 101 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 105 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 118 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 126 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 128 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| PCB # 138 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 153 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 169 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 170 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 180 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 187 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 195 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 206 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 209 | | 6 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

Table E-3 Zone 4 Summary Statistics

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium | 5 | 0 | n/a | Student's-t | 21205 | 13000 | 23000 | 18429 | 19000 |
| Arsenic | 0.4 | 0 | 20 | Student's-t | 8.562 | 6 | 8.8 | 7.771 | 8 |
| Cadmium | 0.1 | 8 | 1.5 | n/a | n/a | 0.52 | 0.52 | 0.52 | 0.52 |
| Chromium | 0.1 | 0 | 80 | Student's-t | 39.15 | 28 | 42 | 35.39 | 36 |
| Copper | 0.1 | 0 | 65 | Student's-t | 20.79 | 14 | 22.5 | 18.64 | 18 |
| Iron | 5 | 0 | n/a | Student's-t | 36685 | 27000 | 39000 | 33321 | 34000 |
| Lead | 0.5 | 0 | 50 | Student's-t | 14.02 | 10 | 15 | 12.54 | 13 |
| Mercury | 0.01 | 0 | 0.15 | Student's-t | 0.0707 | 0.041 | 0.0773 | 0.0613 | 0.06 |
| Nickel | 0.1 | 0 | 21 | Student's-t | 22.24 | 17 | 24 | 20.14 | 20 |
| Phosphorus* | 1 | 0 | n/a | Student's-t | 603.1 | 480 | 645 | 553.6 | 550 |
| Silver | 0.1 | 7 | 1 | n/a | n/a | 0.105 | 0.105 | 0.105 | 0.105 |
| Zinc | 0.5 | 0 | 200 | Student's-t | 75.94 | 56 | 79.75 | 69.54 | 70 |
| Total Organic Carbon^ | 0.01 | 0 | n/a | Student's-t | 1.222 | 0.96 | 1.3 | 1.131 | 1.175 |
| Moisture Content | 0.1 | 0 | n/a | Student's-t | 53.96 | 40 | 56.36 | 49.77 | 50 |
| Monobutyltin as Sn | 0.5 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Dibutyltin as Sn | 0.5 | 6 | n/a | Adjusted Gamma | 0.389 | 0.208 | 0.423 | 0.283 | 0.255 |
| Tributlytin as Sn | 0.5 | 9 | 9 | n/a | n/a | n/a | n/a | n/a | n/a |
| Aldrin | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-BHC | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-BHC | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| gamma-BHC (Lindane) | 1 | 9 | 0.32 | n/a | n/a | n/a | n/a | n/a | n/a |
| delta-BHC | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cis-Chlordane | 1 | 9 | 0.5 | n/a | n/a | n/a | n/a | n/a | n/a |
| trans-Chlordane | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| p_p'-DDD | 1 | 9 | 2 | n/a | n/a | n/a | n/a | n/a | n/a |
| p_p'-DDE | 1 | 1 | 2.2 | Student's-t | 1.788 | 0.455 | 1.936 | 1.415 | 1.563 |
| p_p'-DDT | 1 | 9 | 1.6 | n/a | n/a | n/a | n/a | n/a | n/a |
| Dieldrin | 1 | 9 | 280 | n/a | n/a | n/a | n/a | n/a | n/a |
| alpha-Endosulfan | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| beta-Endosulfan | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endosulfan Sulphate | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin | 1 | 9 | 10 | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin ketone | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Endrin aldehyde | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Heptachlor epoxide | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Hexachlorobenzene | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Methoxychlor | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Oxychlordane * | 1 | 9 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Total Nitrogen^ | 20 | 0 | n/a | n/a | n/a | 989.8 | 1083 | 1037 | 1037 |
| Total Kjeldahl Nitrogen^ | 20 | 0 | n/a | n/a | n/a | 989.8 | 1083 | 1037 | 1037 |
| Nitrate as N^ | 0.1 | 1 | n/a | n/a | n/a | 0.051 | 0.0833 | 0.0672 | 0.0672 |
| Nitrite as N^ | 0.1 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Total Ammonia as N^ | 0.1 | 0 | n/a | n/a | n/a | 24.17 | 30.61 | 27.39 | 27.39 |
| TPH C6-C9 | 10 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| TPH C10-C14 | 10 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| TPH C15-C28 | 50 | 0 | n/a | n/a | n/a | 91.67 | 112.2 | 102 | 102 |
| TPH C29-C36 | 50 | 0 | n/a | n/a | n/a | 108.3 | 112.2 | 110.3 | 110.3 |
| Naphthalene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 1-Methylnaphthalene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 2-Methylnaphthalene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Acenaphthylene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Acenaphthene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Fluorene | 5 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Phenanthrene | 5 | 0 | n/a | n/a | n/a | 11.22 | 11.67 | 11.45 | 11.45 |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| Anthracene | 5 | 0 | n/a | n/a | n/a | 11.22 | 11.67 | 11.45 | 11.45 |
| Fluoranthene | 5 | 0 | n/a | n/a | n/a | 24.17 | 35.71 | 29.94 | 29.94 |
| Pyrene | 5 | 0 | n/a | n/a | n/a | 25.83 | 40.82 | 33.32 | 33.32 |
| Benz(a)anthracene | 5 | 0 | n/a | n/a | n/a | 20 | 24.49 | 22.24 | 22.24 |
| Chrysene | 5 | 0 | n/a | n/a | n/a | 19.17 | 23.47 | 21.32 | 21.32 |
| Benzo(b)&(k)fluoranthene | 10 | 0 | n/a | n/a | n/a | 46.67 | 57.14 | 51.9 | 51.9 |
| Benzo(a)pyrene | 5 | 0 | n/a | n/a | n/a | 24.17 | 27.55 | 25.86 | 25.86 |
| Indeno(1_2_3-cd)pyrene | 5 | 0 | n/a | n/a | n/a | 55 | 63.27 | 59.13 | 59.13 |
| Dibenz(a_h)anthracene | 5 | 1 | n/a | n/a | n/a | 2.551 | 8.333 | 5.442 | 5.442 |
| Benzo(g_h_i)perylene | 5 | 0 | n/a | n/a | n/a | 25 | 30.61 | 27.81 | 27.81 |
| Coronene | 10 | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Benzo(e)pyrene | 5 | 0 | n/a | n/a | n/a | 20 | 25.51 | 22.76 | 22.76 |
| Perylene | 5 | 0 | n/a | n/a | n/a | 49.17 | 53.06 | 51.11 | 51.11 |
| Total PAHs (as above) | 100 | 0 | 10000 | n/a | n/a | 341.7 | 408.2 | 374.9 | 374.9 |
| PCB # 077 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 101 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 105 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 118 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 126 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 128 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| Parameter | Lab Detection Limit | No. of Non-Detects | Screening Level | Distribution | 95% UCL | min | max | mean | median |
|---|---|---|---|---|---|---|---|---|---|
| PCB # 138 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 153 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 169 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 170 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 180 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 187 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 195 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 206 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| PCB # 209 | | 2 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

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