

# Port of Brisbane Sediment Sampling and Analysis Plan Implementation Report - August 2022





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Synopsis	A report describing the physio-chemical characterises of sediments to be dredging during the 2022 maintenance dredge program at the Port of Brisbane. The assessment was carried out in accordance with the project Sampling and Analysis Plan (SAP) and the National Assessment Guidelines for Dredging (CA 2009)
Author	Angus Williams, Darren Richardson
Reviewed By	Darren Richardson
Project Manager	Dr Darren Richardson

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# **Executive Summary**

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# Background

Port of Brisbane Pty Ltd (PBPL) undertakes annual maintenance dredging within the navigational areas of the Brisbane River and western Moreton Bay, primarily using the Trailer Suction Hopper Dredge 'Brisbane'. Sampling and analysis was undertaken in accordance with National Assessment Guidelines for Dredging (NAGD) in 2021 to assess the suitability of maintenance 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 provide 'background' contextual data. 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.

#### **Assessments**

Sediments within Zone 2 displayed low spatial variability with high proportions of fines (clay and silts) contents, whereas Zones 3 and 4 were comprised of sands and fines. The Moreton Bay reference sites were comprised mostly of fines, whereas the MIDMPA was similar to Zone 4. The 2022 results were generally comparable to previous sampling between 2013 and 2021. However, sediments in Zone 2 had higher fines content than in previous years.

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

- The upper 95 % confidence limits (95 % UCL) of the mean concentration of most analysed metals and metalloids (except nickel) were less than their respective NAGD screening levels, and therefore considered suitable for ocean disposal in accordance with NAGD guidelines.
- Nickel concentrations were higher in 2022 than previous years in Zones 2, 3, 4 and some reference sites. This is likely a result in increased fines content, which is positively correlated with nickel, from flooding.
- The 95% UCL for nickel concentrations recorded for the overall dredge Zone areas (30.2 mg/kg) was higher than the NAGD screening level of 21 mg/kg. As a result, phase III bioavailability testing was carried out on 18 samples of which nickel concentrations were the highest. The bioavailable fraction of nickel in waters and sediments were below relevant guideline values. Therefore, dredged material was considered suitable for ocean disposal in accordance with NAGD.
- All organic contaminants including organotins, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), and organochlorine pesticides (OCPs) had concentrations below the LOR in most samples. This indicates dredged sediments were suitable for ocean disposal in accordance with NAGD.
- Acid Sulfate Soil testing indicated that while sediments were characterised as potential acid sulfate soils (PASS), the acid neutralizing capacity appears to be sufficient for neutralising acids upon oxidation. However, if land placement is required then additional testing would be required.

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 Induction



# 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 2022. The overall aim of this study is to assess the physico-chemical properties of sediments to be dredged from the Port of Brisbane, and based on the approach set out in the 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 the 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 based on 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 m³ to 350,000 m³ of material each year. Dredging volumes are predominantly driven by catchment rainfall events and subsequently additional dredging needs to be undertaken following major flood events, as occurred in 2011, 2013 and 2022.

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 Approximate Maintenance Dredge Volumes

Dredging Subarea	Location	Average Dredge Volume (m³)
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 substrates that provide habitat for a benthic invertebrate (BMT WBM 2008b) and fish assemblages.



# 2 Methodology

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# 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) provided in Annex A

## 2.2 Timing of Sampling

Sampling was undertaken between the 29th and 30th of August 2022 during daylight hours.

# 2.3 Sampling Locations and Sampling Numbers

#### Sampling Locations

A map showing the sampling locations is provided in

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 the a basic suite with a detailed suite analysed at selected study locations (refer to and Section 2.5).

#### 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.



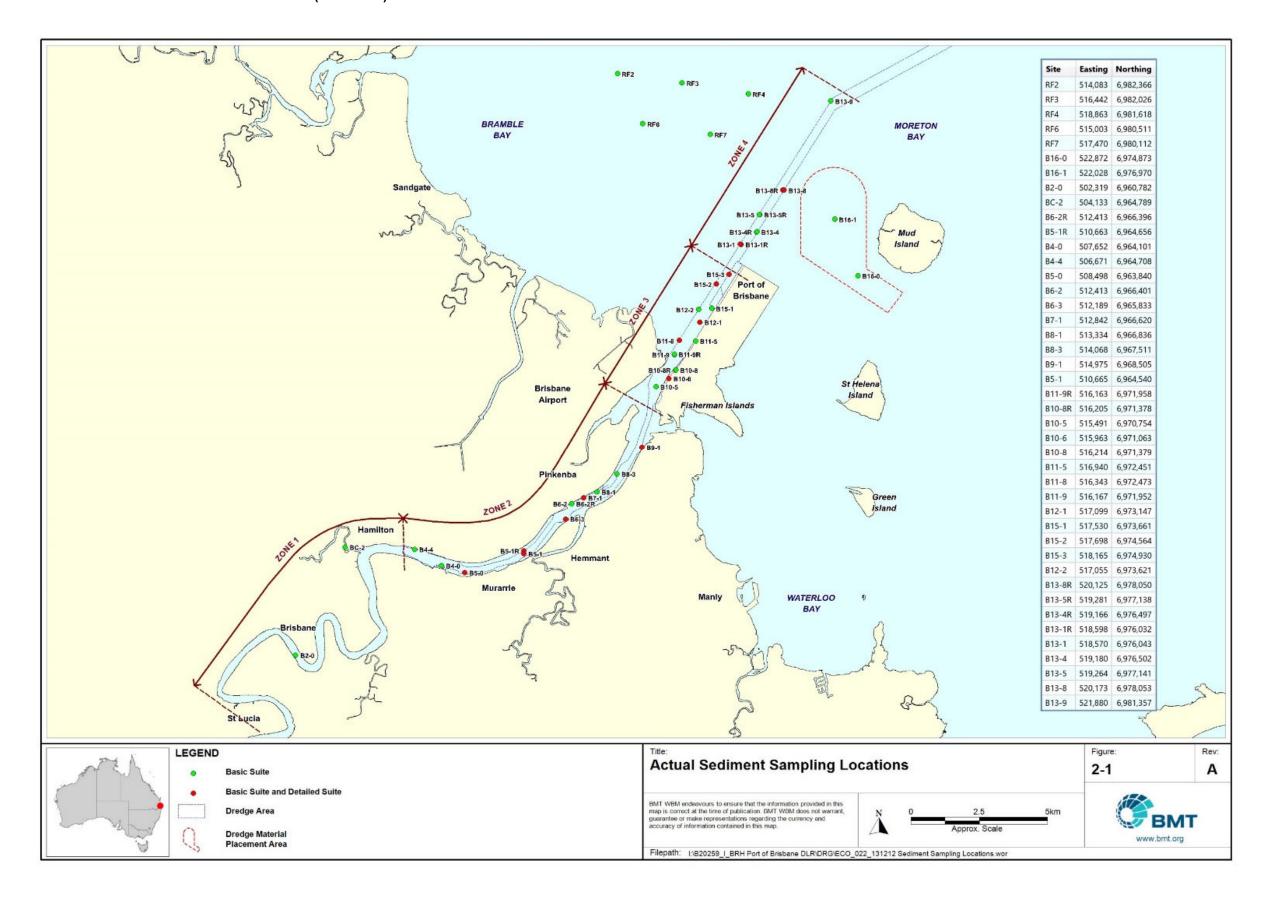


Figure 2.1 Sampling locations

29 November 2022

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### Phase III - 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

## Survey Vessel, Sampling Equipment and Personnel

BMT's vessel "Resolution II" was used for sampling the sediments. A handheld GPS was used on the survey vessel for position fixing and navigation to each sampling location. All sediment sampling was undertaken by a team of two qualified marine scientists with experience in the implementation of sediment sampling and analysis programs.

#### Sampling Procedure

Sediment samples were collected using a stainless steel Van Veen grab sampler (0.14 m² 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.

## Survey Vessel and Equipment

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.



#### 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 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 (Annex C and Annex 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 Annex A).

## **Analytical Testing**

Primary analysis of sediment samples was conducted by Australian Laboratory Services (ALS). The analysis of Particle Size Distribution was conducted by Microanalysis Australia. Symbio Laboratories was selected 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, NOx, TKN); and
  - Radionuclides.

#### Elutriate and Bioavailability Testing:

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

#### **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 Annex A of NAGD to confirm suitable data quality for undertaking a rigorous characterisation of the proposed dredge material.

# **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 LOR of the method used.

#### **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 LOR. 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 ALS uses the following approach to assess duplicate RPD's:

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

The secondary laboratory Symbio follows this approach:

- Result <10 times LOR no limit to RPD;</li>
- 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.

# 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

#### **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 Limit of Reporting (LOR) were set to one-half of the 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 LORs 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 80th percentile value was calculated from reference site data. The mean of the sediment concentrations at the dredge site was then compared with the 80th 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 80th 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.

# Variability in Sediment Properties and Correlation Analysis

Summary statistics, for analytical results, namely minimum, maximum, mean and relative standard deviation (RSD) values are presented and referred to throughout this report. Relative standard deviation (also known as coefficient of variation) indicates the extent of variability in a dataset in relation to the mean value, by expressing the standard deviation as a percentage of the mean. For the purposes of this report, nominal percentage ranges have been selected to aid in interpretation.



Therefore, an RSD of less than 30 % will be considered low variability, 30 % to 70 % will be considered moderate variability and more than 70 % will be considered high variability.

In addition, Pearson product-moment correlation analysis was performed on select parameters to measure the strength of the linear association between the chosen parameters. The Pearson correlation coefficient, r, can take a range of values from +1 indicating a positive association to -1 indicating a negative association.

#### Phase III - 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  $\mu$ m) 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.

#### **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 the sediment grain particle size distribution (PSD) results for each location during the current survey and the 2021 survey.

#### Zone 2

Sediments from Zone 2 were dominated by fines fractions, ranging from 80 to 99 % with a mean content of 92 % and low variability (RSD 7 %). The sand content ranged from 1 to 17 %, with a mean content of 8 % and moderate variability (RSD 68 %). Gravel was present at two sample locations in low proportions (< 3%). The mean fines content from the current survey was higher than the mean fines content recorded in 2020 (68 %; BMT, 2020) and 2021 (78 %; BMT, 2021).

Similarly, when reviewing the sediment composition recorded post flood earlier this year (Figure 3.2; BMT, 2022) the mean fines content was higher during the current survey than the mean recorded in March post flood (65 %; BMT, 2022). Sand content was higher during the post flood survey than the current survey, ranging from 1 to 80 % with a mean of 32.6 % and high variability (RSD 74 %).

#### Zone 3 and 4

Sediments obtained from Zones 3 and 4, displayed moderate variability in composition relaying a degree of spatial variation. However, similar to Zone 2 sediments were generally dominated by the fines fractions (Zone 3 mean 76 %; Zone 4 mean 61 %). The mean sand content for sediments in Zones 3 (22 %) and 4 (37 %) were higher than the mean sand content in Zone 2. Gravel proportions were low and generally less than 1 %, except for one location (B15-2) recording a gravel content of 15 %.

The mean fines content in Zone 3 (76 %) was higher than the mean fines content recorded in 2020 (60 %; BMT, 2020) and 2021 (52 %; BMT, 2021). The mean fines content in Zone 4 (61 %) was broadly comparable to the mean fines content recorded in 2020 (65 %; BMT, 2020) and 2021 (66 %; BMT, 2021). In contrast to Zone 2 having a higher fines content than in sediments recorded post flood; the mean fines contents recorded in Zone 3 and Zone 4 were comparable to the means recorded during the post flood survey (74 % and 60 %, respectively; BMT, 2022).

# MIDMPA and Reference/Background

Sediments recovered at the MIDMPA had moderate sand content (42-43 %), consistent with previous years (BMT, 2020; BMT, 2021). Moreton Bay reference sites were characterised by a high proportion of fines content (mean 90 %). This was consistent with results from 2021 (83 %; BMT, 2021), 2020 (76 %; BMT, 2020), 2019 (85 %; BMT, 2019), 2018 (89 %; BMT, 2018), 2017 (84 %; BMT, 2017), 2016 (90 %; BMT, 2016), 2015 (85 %; BMT, 2015), 2014 (86 %; BMT, 2014) and 2013 (89 %; BMT, 2013).

Similar results were observed during the post flood survey, with MIDMPA sites having sand content ranging from 41 to 54 %. Moreton Bay reference sites were also characterised by a high fines content (mean 86 %; BMT, 2022) during the post flood survey.



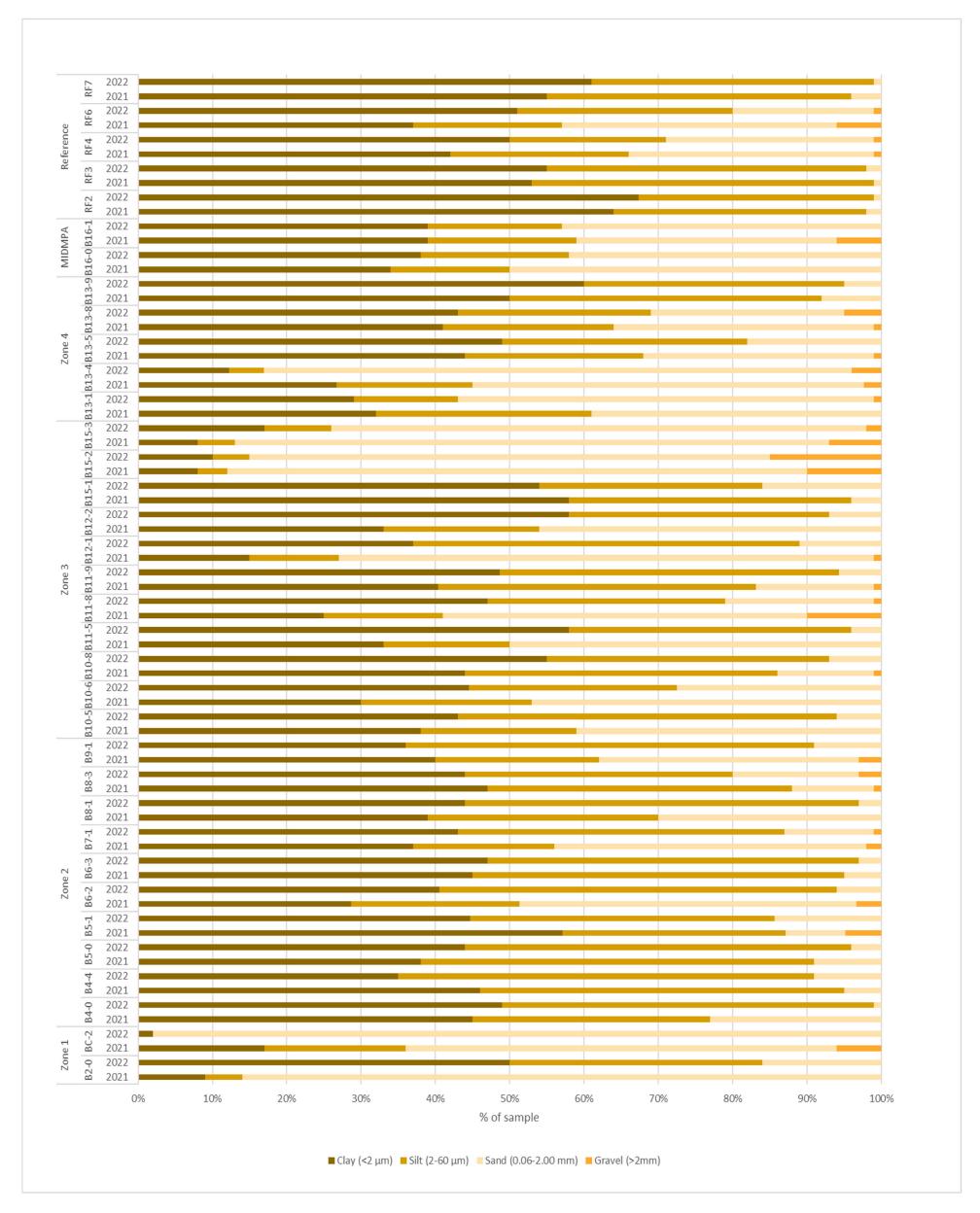


Figure 3.1 Comparison Sediment Particle Size Distribution Analysis between 2022 and 2021 survey results



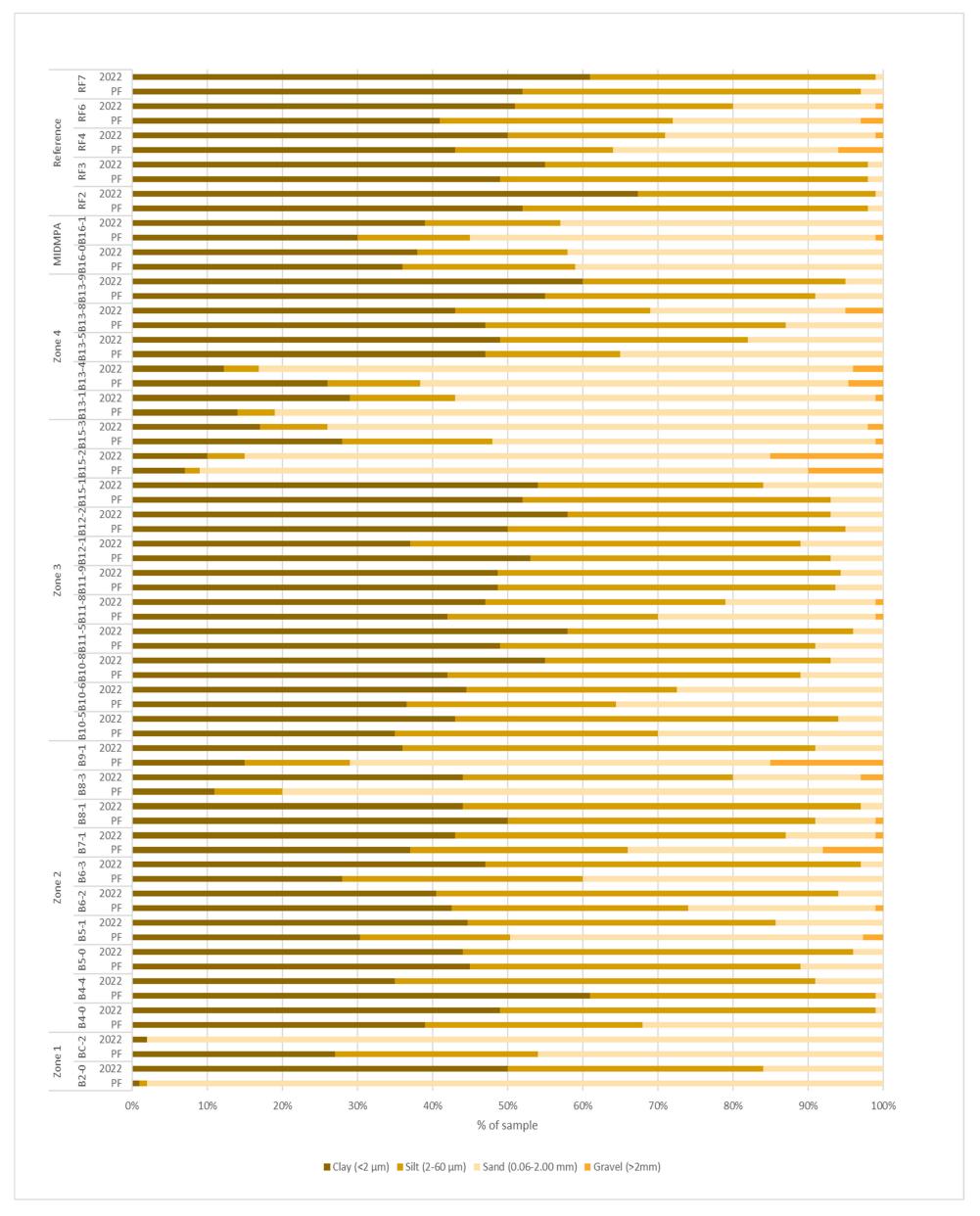


Figure 3.2 Comparison Sediment Particle Size Distribution Analysis between current and post flood (PF) surveys, 2022



#### 3.2 Analytical Results

#### Metals and Metalloids

#### **Bulk Sediments**

Results for metals and metalloids are presented in Table 3.3 Consistent with previous survey results, cadmium and silver had concentrations less than the LOR (0.1 mg/kg) in several 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 for lead at one site (BC-2), mercury at one site (B12-1) and nickel at 23 sites. The trace metal and metalloid concentrations recorded at reference locations follow similar trends to those at the dredge sites and were also consistent with trends observed in previous surveys.

#### Lead

Lead concentrations across the survey area were below the NAGD screening level (50 mg/kg) except at site BC-2 (Zone 1), which recorded a lead concentration of 61.5 mg/kg. This anomalously high concentration is likely a result of the flooding that occurred earlier in the year; the lead concentration recorded at site BC-2 during the post-flood survey was 105 mg/kg (BMT, 2022). Therefore, lead concentrations at this site are likely decreasing, returning to background concentrations.

#### Mercury

Mercury concentrations across the dredge Zones ranged from 0.01 mg/kg to 0.70 mg/kg, with a mean concentration of 0.09 mg/kg. Mercury concentrations across the survey area, including the 95% UCL (13 mg/kg) and the reference 80<sup>th</sup> percentile (0.08 mg/kg) were below the NAGD screening level (0.15 mg/kg) except at site B12-1 which recorded a concentration of 0.70 mg/kg. This result is likely an outlier, however phase III testing was conservatively undertaken on site B12-1 to assess the bioavailability of mercury at this location.

#### Nickel

Across the dredge Zones, nickel concentrations ranged from 8.67 mg/kg to 46.5 mg/kg, with a mean concentration of 27.4 mg/kg. The mean nickel concentration in August 2022 was higher than the mean concentration recorded in 2020 (19.2 mg/kg; BMT, 2020), 2021 (18.0 mg/kg; BMT, 2021) and the February 2022 post-flood survey (18.8 mg/kg; BMT, 2022).

The physical and chemical characteristics of sediment particles influence how other chemical components and biological species interact with marine sediments. The clay/silt fraction is widely known to adsorb petroleum hydrocarbons/heavy metals out of seawater acting as an environmental sink for these pollutants; and through this pathway, these chemicals become incorporated into sediment systems (Meyers and Quinn, 1973). Consistent with this, there was a strong positive correlation between fines content and nickel concentrations (r = 0.75, p < 0.05), indicating that the delivery of fine catchment sediments by floodwaters is a key driver of temporal changes in nickel concentrations in the dredge area and surrounds. As discussed earlier (Section 3.1), the sediments within dredge Zones 2 and 3 contained higher proportions of the finer clay and silt particle fractions. Due to the low variability in fines content observed in both Zone 2 and 3, it is likely that the high nickel concentrations recorded in bulk sediment are influenced by natural variations in sediment characteristics within the area.

The 95 % UCL for nickel concentrations within the dredge area (Zone 2, 3 and 4) was 30.6 mg/kg. Both the mean nickel concentration and the 95 % UCL exceeded the NADG screening value of 21 mg/kg. In accordance with NADG, nickel concentrations at the dredge sites were compared to reference sites. The 80<sup>th</sup> percentile nickel concentration at the reference sites was 22.8 mg/kg, which is lower than both



the mean nickel concentration and the 95 % UCL value. As a result, Phase III testing was undertaken to assess the bioavailability of nickel in sediments.

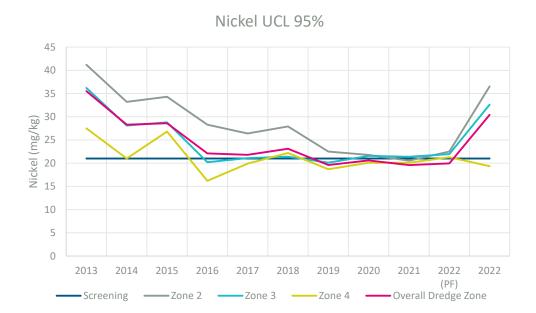


Figure 3.3 95 % UCL of Nickel concentrations over time

# **Bioavailability Testing**

For samples that underwent further bioavailability testing there were no samples that reported a concentration of nickel in exceedance of the NAGD (2006) screening level and ANZG (2018) guideline value (Table 3.1). There were strong positive correlations between fines content and nickel in bulk sediment and DAE (Table 3.2). There was no significant correlation between fines content and nickel in elutriate samples, indicating that most nickel is bound to sediment and unlikely to pose to significant water quality risk.

The bioavailable mercury concentration at site B12-1 was also < 0.10 mg/kg, below the NAGD screening level (0.15 mg/kg).

These results indicate that the bioavailable proportion of nickel and mercury is unlikely to result in adverse ecological impacts. Based on the phase II and III testing, dredge sediments are considered suitable for ocean disposal.



Table 3.1 Nickel bioavailability results 2022

			Nickel									
Zone	Sample	Bulk sed.	DAE	Elutriate	Porewater							
		mg/kg mg/kg		μg/L	μg/L							
Guideli	ne value	21		70	-							
	B4-0	33.7	10.7	4.2	Not tested							
	B4-4	37.0	9.7	5.1	Not tested							
2	B6-3	34.6	11.9	4.7	Not tested							
2	B6-2a	34.7	11.6	5.0	Not tested							
	B6-2b	33.8	10.9	6.8	Not tested							
	B9-1	46.5	12.1	17.4	Not tested							
	B10-5	32.4	14.2	12.9	20.6							
	B10-6a	30.5	6.9	1.5	2.3							
	B10-6b	34.2	9.0	1.3	2.9							
3	B11-5	45.7	11.8	11.2	Not tested							
3	B11-8	29.3	7.0	0.9	0.8							
	B11-9a	29.5	7.8	3.3	8.2							
	B11-9b	37.5	7.7	5.0	12.5							
	B15-1	28.2	7.6	2.4	Not tested							
	B13-9	17.0	5.8	0.8	Not tested							
4	B13-5	20.3	7.1	1.4	Not tested							
4	B13-4a	9.8	2.0	1.7	Not tested							
	B13-4b	9.4	2.1	2.4	Not tested							

Red text – exceeds NAGD screening level

Table 3.2 Pearson Product Moment correlations between nickel and fines content

	Ni in bulk sediment	Ni DAE	Ni elutriate
Ni DAE	0.84	1	
Ni elutriate	0.65	0.69	1
Fines content	0.74	0.79	0.36



#### 3.3 Nutrients and Carbon Content

Results for nutrients and total organic carbon (TOC) content of marine sediment samples are presented in Table 3.3. No screening values exist for TOC and nutrients in sediments within NADG (2009).

Inorganic nitrogen concentrations (NO<sub>x</sub>) were low and either below the LOR (< 0.1 mg/kg) or ranged from 0.1 mg/kg to 0.3 mg/kg. Therefore, Total nitrogen (TN) and Total Kjeldahl nitrogen (TKN) concentrations were analogous. TN and TKN concentrations across the dredge Zones ranged from 280 mg/kg to 1670 mg/kg, with a mean of 1059 mg/kg and a 95 % UCL of 1299 mg/kg (Table 3.3). The TN and TKN concentrations recorded across the survey area were broadly comparable to the ranges recorded previously in 2018 (420 to 1600 mg/kg; BMT, 2018), 2019 (470 to 1440 mg/kg; BMT, 2019), 2020 (300 to 1300 mg/kg; BMT, 2020) and 2021 (180 to 2300 mg/kg; BMT, 2021). Total phosphorus (TP) concentrations ranged from 242 mg/kg to 1010 mg/kg, with a mean of 697 mg/kg and a 95 % UCL of 828 mg/kg. TP concentrations were broadly comparable to the range of concentrations recorded previously in 2019 (293 to 889 mg/kg; BMT, 2019), 2020 (312 to 847 mg/kg; BMT, 2020) and 2021 (183 to 929 mg/kg; BMT, 2021).

Pearson Product Moment correlation analysis found there was significant correlation between fines content and TN (r = 0.92, p < 0.05) and TP (r = 0.92, p < 0.05). This indicates that the delivery of fine sediments by flood waters is a major driver of sediment nutrient content in the study area.

TOC content ranged from 0.26 % 1.98 % across the dredge Zones, with a mean of 1.39 %. The TOC 95 % UCL for dredge Zones was 1.57 %, which was slightly higher than the reference sites (1.00 %). TOC content was comparable to or slightly higher than the TOC content previously recorded in 2019 (0.69 %; BMT, 2019), 2020 (1.00 %; BMT, 2020) and 2021 (0.99 %; BMT, 2021).



Table 3.3 Summary statistics and 95% UCLs for combined locations in Zones 2, 3, and 4 - trace metals/metalloids and nutrients (mg/L)

Parameter	LOR (mg/kg)	No. detects	Screening level	Statistical distribution	95 % UCL	Min	Max	Mean	Geometric average
Moisture content	1	26 (100%)	n/a	Non-Parametric	59.4	27.1	68.4	56.2	53.1
Aluminium	50	26 (100%)	n/a	Normal	16949	4310	25400	15460	14651
Arsenic	1	26 (100%)	20	Normal	7.55	3.31	9.92	7.08	6.94
Cadmium	0.1	2 (8%)	1.5	n/a	NC2	< 0.1	0.1	NC2	NC2
Chromium	1	26 (100%)	80	Normal	35.4	12.5	43.8	33.0	32.0
Copper	1	26 (100%)	65	Non-Parametric	24.8	5.23	32.4	22.1	19.9
Iron	50	26 (100%)	n/a	Normal	40193	13633	55200	37060	35620
Lead	1	26 (100%)	50	Normal	15.4	5.27	22.8	13.9	13.0
Mercury	0.01	26 (100%)	0.15	Non-Parametric	0.13	0.01	0.7	0.09	0.06
Nickel	1	26 (100%)	21	Normal	30.6	8.67	46.5	27.4	25.5
Silver	0.1	7 (27%)	1	n/a	NC2	< 0.1	0.3	NC2	NC2
Zinc	1	26 (100%)	200	Normal	84.6	29	113	77.0	72.8
TOC	0.02	26 (100%)	n/a	Non-Parametric	1.57	0.26	1.98	1.39	1.24
TKN	20	12 (100%)	n/a	Normal	1299	280	1670	1059	924
TN	20	12 (100%)	n/a	Normal	1299	280	1670	1059	924
TP	2	12 (100%)	n/a	Normal	828	242	1010	697	644

Red text - exceeds NAGD screening level



#### 3.4 Organotin

Monobutyltin (MBT), Dibutyltin (DBT) and Tributyltin (TBT) were analysed in all sediment samples obtained; results are presented in Table 3.4. MBT and DBT were below the detection limit in all sediment samples analysed. TBT was detected in 10 samples located across the dredge Zones ranging from <0.5  $\mu$ gSn/kg to 4.39  $\mu$ gSn/kg, all of which were below the NADG screening level of 9  $\mu$ Sn/kg. The 95% UCL for TBT could not be calculated due to the percentage of non-detects amounting to greater than 30% of the total dataset. All reference locations recorded concentrations below the LOR for all three analytes.

## 3.5 Total Petroleum Hydrocarbons (TPHs)

Total petroleum hydrocarbon (TPH) concentrations within the  $C_{10}$  to  $C_{14}$ ,  $C_{15}$  to  $C_{28}$  and  $C_{29}$  to  $C_{36}$  carbon fractions were recorded at most locations within the dredge Zones. The TPH carbon fraction  $C_6$  to  $C_9$  was below the LOR in all sediment samples. The 95% UCL for TPHs  $C_{10}$  to  $C_{36}$  was 84.5 mg/kg (normalised to 1% TOC), which is below the screening level of 550 mg/kg (Table 3.4). The 95% UCL for TPHs  $C_{10}$  to  $C_{36}$  from the current survey was comparable to the 95% UCL recorded previously in 2019 (83.0 mg/kg; BMT, 2019), 2020 (69.7 mg/kg; BMT, 2020) and 2021 (108 mg/kg; BMT, 2021).

## 3.6 Polynuclear Aromatic Hydrocarbons (PAHs)

Low level detections of PAHs were recorded at all 12 locations analysed in the dredge Zones (Table 3.4). Total PAHs concentrations (corrected to 1 % TOC) ranged from 162  $\mu$ g/kg to 809  $\mu$ g/kg, well below the NADG screening level of 10,000  $\mu$ g/kg in all samples. The 95% UCL for total PAHs across all dredge Zones was 567  $\mu$ g/kg. The 95% UCL for total PAHs was comparable to the value calculated in 2020 (493  $\mu$ g/kg; BMT, 2020) and lower than the values calculated in 2019 (1261  $\mu$ /kg; BMT, 2019) and 2021 (761  $\mu$ g/kg; BMT, 2021).

#### 3.7 Organochlorine Pesticides (OCPs)

There were two detections of OCPs within the dredge Zones:

- *p p'*-DDD detected at three locations, with two samples having concentrations greater than the screening level (2 μg/kg). The UCL was not calculated due to the large number of non-detects.
- p p'-DDE detected at 17 locations, with four samples having concentrations higher than the screening level (2.2 μg/kg). The UCL was not calculated due to the percentage of non-detects exceeding 30%

Phase III analysis was undertaken on OCPs; all samples had concentrations less than the laboratory detection limit (< 0.01 µg/L). There were no detections of any other OCPs.

#### 3.8 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.



#### 3.9 Radionuclides

Gross alpha and gross beta activity ranged between < 0.5 Bq/g (LOR) to 1.08 Bq/g dry weight and < 0.5 Bq/g (LOR) to 0.61 Bq/g dry weight respectively. The gross alpha and beta activities were comparable to the ranges recorded in 2021 (< 0.5 Bq/g to 1.07 Bq/g dry weight and < 0.5 Bq/g to 0.6 Bq/g dry weight; BMT, 2021). Furthermore, activities were comparable to activities in previous years (BMT, 2020; BMT, 2019).

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

## 3.10 Acid Sulphate Soils

Acid sulphate soil test results are presented in Table 3.5. All samples recorded pH potassium chloride (pH KCL) values ranging from 7.2 to 9.2 (neutral to alkaline), indicating there was no existing acidity present in any of the sediments tested. Furthermore, all samples had sulfidic titratable actual acidity (sTAA) values less than the LOR (< 0.02 %S).

All samples recorded chromium reducible sulphur values above the LOR, in the range of 0.099 to 0.47 %S, indicating low to moderate presence of inorganic potential acidity in these samples.

Results of acid neutralising capacity (ANC) ranged from 1.58 to 16.4 % CaCO<sub>3</sub>. The mean ANC in the current survey was 3.66 % CaCO<sub>3</sub> which indicates that sediments have a potential high capacity to self-neutralise if exposed to oxygen. Net acidity (excluding ANC) ranged from 0.1 to 0.47 %S, relating directly to the potential acidity as no actual acidity was recorded. The inclusion of ANC significantly reduces net acidity with all samples recording a net acidity value of less than the LOR (< 0.2% S). Notwithstanding this, the ANC values should be considered indicative only, and should land placement be required, further testing (leachate tests) would likely be required.



Table 3.4 Summary Statistics and 95% UCLs (µg/kg) for Combined Locations in Zones 2, 3 and 4 - Organic Compounds (Normalised to 1% TOC)

	Parameter	LOR	No. Detects	Screening level	Distribution	95% UCL	Min	Max	Mean	Geometric Average
	Aldrin	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	alpha-BHC	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	beta-BHC	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	delta-BHC	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	4.4`-DDD	0.5	3 (12%)	2	NC2	NC2	<0.50	4.96	NC2	NC2
	4.4`-DDE	0.5	17 (65%)	2.2	NC2	NC2	<0.50	2.79	NC2	NC2
	4.4`-DDT	0.5	0(0%)	1.6	NC1	NC1	<0.50	NC1	NC1	NC1
CD	Dieldrin	0.5	0(0%)	280	NC1	NC1	<0.50	NC1	NC1	NC1
S) S	alpha-Endosulfan	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
cide	beta-Endosulfan	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
esti	Endosulfan sulphate	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
пер	Endrin	0.5	0(0%)	10	NC1	NC1	<0.50	NC1	NC1	NC1
Organochlorine pesticides (OCP)	Endrin aldehyde	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
nocl	Endrin ketone	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
)rga	Heptachlor	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
O	Heptachlor epoxide	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	Hexachlorobenzene (HCB)	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	gamma-BHC (Lindane)	0.25	0(0%)	0.32	NC1	NC1	<0.25	NC1	NC1	NC1
	Methoxychlor	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	cis-Chlordane	0.5	0(0%)	0.5	NC1	NC1	<0.50	NC1	NC1	NC1
	trans-Chlordane	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
	Oxychlordane	0.5	0(0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1



	Parameter	LOR	No. Detects	Screening level	Distribution	95% UCL	Min	Max	Mean	Geometric Average
sr ds	Monobutyltin as Sn	1	0 (0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
Organotins compounds	Dibutyltin as Sn	1	0 (0%)	n/a	NC1	NC1	<0.50	NC1	NC1	NC1
Orga	Tributyltin as Sn	0.5	10 (38%)	9	NC2	NC2	<0.50	4.39	NC2	NC2
SL	TPH C <sub>10</sub> -C <sub>14</sub>	3	9 (75%)	n/a	Lognormal	8.8	1.7	19	3.7	4.2
Total Petroleum ydrocarbor (TPH)	TPH C <sub>15</sub> -C <sub>28</sub>	3	12 (100%)	n/a	Normal	33.6	4.1	84.6	16.9	14.5
Total etroleur rocarb (TPH)	TPH C <sub>29</sub> -C <sub>36</sub>	5	12 (100%)	n/a	Lognormal	55.4	3.4	127	26.5	14.6
Total Petroleum Hydrocarbons (TPH)	TPH C <sub>10</sub> -C <sub>36</sub>	3	12 (100%)	550	Normal	84.5	7.5	231	52.5	31.5
	Naphthalene	5	9 (75%)	n/a	Normal	6.60	< 5	11.1	5.01	4.07
	2-Methylnaphthalene	5	3 (25%)	n/a	Non-parametric	2.72	< 5	4.27	2.10	1.87
Hs)	Acenaphthylene	4	10 (83%)	n/a	Normal	15.8	< 4	24.7	11.3	7.59
(PAI	Acenaphthene	4	2 (17%)	n/a	Non-parametric	1.91	< 4	3.28	1.51	1.39
Suc	Fluorene	4	4 (33%)	n/a	Non-parametric	3.14	< 4	5.46	2.26	1.82
arbo	Phenanthrene	4	11 (92%)	n/a	Normal	21.6	< 4	38.8	15.7	11.1
droc	Anthracene	4	10 (83%)	n/a	Normal	12.6	< 4	18.2	9.15	6.38
c hy	Fluoranthene	4	12 (100%)	n/a	Normal	54.7	12.0	80.2	41.4	34.3
mati	Pyrene	4	12 (100%)	n/a	Normal	58.1	13.2	85.8	44.2	36.8
aror	Benz(a)anthracene	4	11 (92%)	n/a	Normal	37.6	< 4	58.0	27.2	18.5
ear	Chrysene	4	10 (83%)	n/a	Normal	30.3	< 4	45.7	21.3	12.6
Polynuclear aromatic hydrocarbons (PAHs)	Benzo(b+j)fluoranthene	4	11 (92%)	n/a	Normal	45.8	< 4	73.8	32.9	21.8
Poly	Benzo(k)fluoranthene	4	10 (83%)	n/a	Normal	20.7	< 4	33.8	14.3	8.52
_	Benzo(e)pyrene	4	10 (83%)	n/a	Normal	29.6	< 4	43.2	21.0	12.6
	Benzo(a)pyrene	4	11 (92%)	n/a	Normal	54.6	< 4	87.5	39.2	25.7



Paramete	er	LOR	No. Detects	Screening level	Distribution	95% UCL	Min	Max	Mean	Geometric Average
Perylene		4	12 (100%)	n/a	Non-parametric	114	34	169	84.9	69.3
Benzo(g.h.	i)perylene	4	11 (92%)	n/a	Normal	38.2	< 4	65.0	27.3	18.4
Dibenz(a.h	n)anthracene	4	10 (83%)	n/a	Normal	8.75	< 4	13.8	6.35	4.68
Indeno(1.2	.3.cd)pyrene	4	10 (83%)	n/a	Normal	31.3	< 4	52.5	22.0	13.1
Coronene		5	9 (75%)	n/a	Normal	10.2	< 4	17.5	7.24	5.13
Sum of PA	Hs	4	12 (100%)	10,000	Normal	567	162	809	431	359



Table 3.5 Acid Sulfate Soil Results (Chromium Suite and SPOCAS)

Parameter	Units	QPL	Zone 2					Zone 3				Zone 4		
Parameter	Units	QPL	B5-0	B5-1	B6-3	B7-1	B9-1	B15-3	B15-2	B12-1	B11-8	B10-6	B13-8	B13-1
Actual Acidity														
pH KCI	pH Unit	0.1	7.2	7.8	7.8	8.2	8.3	9.0	9.2	8.3	8.5	8.6	8.8	8.7
Titratable Actual Acidity	mole H <sup>+</sup> /t	2	< 2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity	% pyrite S	0.02	< 0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Potential Acidity														
Chromium Reducible Sulfur	% S	0.005	0.126	0.165	0.116	0.192	0.099	0.14	0.139	0.351	0.472	0.329	0.223	0.159
acidity - Chromium Reducible Sulfur	mole H <sup>+</sup> /t	10	79	103	72	120	62	87	87	219	295	206	139	99
Acid Neutralising Capacity														
Acid Neutralising Capacity	% CaCO <sub>3</sub>	0.01	1.58	1.76	2.03	2.61	2.48	3.25	16.4	1.71	2.38	2.430	14.7	3.72
acidity - Acid Neutralising Capacity	mole H+/t	10	315	353	405	522	495	649	3290	342	475	486.0	2930	744
sulfidic - Acid Neutralising Capacity	% pyrite S	0.01	0.5	0.56	0.65	0.84	0.79	1.04	5.27	0.55	0.76	0.780	4.70	1.19
Acid Base Accounting														
ANC Fineness Factor	-	0.5	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
Net Acidity (acidity units)	mole H <sup>+</sup> /t	10	< 10	< 10	<10	<10	<10	<10	<10	<10	<10	< 10	<10	<10
Liming Rate	kg CaCO <sub>3</sub> /t	1	< 1	< 1	<1	<1	<1	<1	<1	<1	<1	< 1	<1	<1
Net Acidity excluding ANC (sulfur units)	% S	0.02	0.13	0.16	0.12	0.19	0.1	0.14	0.14	0.35	0.47	0.33	0.22	0.16
Net Acidity excluding ANC (acidity units)	mole H+/t	10	79	103	72	120	62	87	87	219	295	206	139	99
Liming Rate excluding ANC	kg CaCO <sub>3</sub> /t	1	6	8	5	9	5	6	6	16	22	15	10	7

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# **4 Data Validation**

# 4.1 Laboratory QA/QC

Details of the laboratory QA/QC for the primary and secondary laboratories is provided in the following sections. Refer to Section 2.5 for a description of laboratory QA/QC procedures.

#### Limits of Reporting (LORs)

LOR was raised for the following parameters. Note LORs for all parameters were below the NAGD screening levels.

- Organophosphorus Pesticides (Ultra-trace) LOR raised due to the high amount of moisture present, from 10 to 12 μg/kg. No relevant screening levels.
- Polychlorinated biphenyls (as Aroclors) certain samples required dilution due to sample matrix.
   LOR values have been adjusted accordingly, from 15.6 to 31.2 μg/kg.
- PAHs LOR raised due to the high amount of moisture present.

#### Sampling 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). Laboratory holding times were breached for:

- Soil (Sample B10-8 Organophosphorus Pesticides)
- Soil (Sample B10-8 OCPs)
- Water (Samples B12-1, B11-8, B10-8, B10-6b, B10-6, B11-9, B11-9b, B10-5 OCPs)

#### **Laboratory Blanks**

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

#### **Laboratory Duplicates**

Results indicate that the laboratory duplicate assessment was generally within the acceptable criteria. The exceptions were:

 PAHs – poor duplicate precision due to sample heterogeneity. Confirmed by re-extraction and reanalysis.

#### Surrogate and Matrix Spikes

The assessment of surrogate and matrix spike recoveries was satisfactory for most samples. The exceptions were:

- Organotin samples RF6, B4-4, B15-2 shows poor matrix recovery for MBT due to matrix interference.
- Total Metals by ICP-AES poor matrix spike recovery due to sample heterogeneity. This has been confirmed by visual inspection



# 4.2 Field QA/QC

# Field Triplicate and Splits

Analyses of field triplicate and field triplicate splits were within the NAGD criterion for RSDs or RPDs for most samples. The exceptions are shown in Table 4.1. In all cases the range of values was less than screening levels.

# **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 NADG guidelines. Exceptions are discussed above and relate mostly to high sample heterogeneity and sample matrix interferences.



Table 4.1 Samples exceeding RSD and RPD acceptable range guidelines

Parameter	Field Triplicate – Prima	ary Lab (RSD)		Duplicate (RPD)	Duplicate (RPD)			
Parameter	B13-4	B5-1	B11-9	B10-6	B6-2			
Acid Reacted Calcium	-	< 0.02 - 0.228 (90.4 %)	-	0.288-0.701 (83.5 %)	-			
acidity - Acid Reacted Calcium	-	< 10-114 (90.4 %)	-	144-350 (83.4 %)	-			
sulfidic - Acid Reacted Calcium	-	< 0.02-0.183 (88.9 %)	-	0.231-0.561 (83.3 %)	-			
Chromium Reducible Sulfur	-	-	-	0.2-0.352 (55.0 %)	-			
+75μm	-	6-27 (93.2 %)	-	-	-			
+150µm	-	2-22 (125 %)	-	-	-			
+300µm	-	1-5 (98.9 %)	-	-	-			
Clay (<2 µm)	8-20 (53.9 %)	-	-	-	-			
Silt (2-60 µm)	2-10 (98.9 %)	-	-	-	-			
Sand (0.06-2.00 mm)	-	7-29 (88.6 %)	-	-	-			
Lead	-	11.8-31.6 (61.07 %)	-	-	-			
Nitrite + Nitrate as N (Sol.)	-	< 0.1-0.4 (84.85 %)	-	-	-			
Total Phosphorus as P	-	-	-	5-734 (197 %)	-			
Total Organic Carbon	0.18-0.48 (51.7 %)	-	-	-	-			
C15 - C28 Fraction	-	-	-	6-27 (127 %)	-			
C29 - C36 Fraction	-	-	-	15-63 (123 %)	-			
>C16 - C34 Fraction	-	-	-	12-48 (120 %)	-			
>C34 - C40 Fraction	-	-	-	18-73 (120 %)	-			
Tributyltin	-	-	< 0.5-0.8 (53.3 %)	0.6-5.8 (162 %)	-			



Parameter	Field Triplicate – Primary Lab (RSD)			Duplicate (RPD)	Duplicate (RPD)	
	B13-4	B5-1	B11-9	B10-6	B6-2	
4.4`-DDD		< 0.5-2.78 (72.25 %	%)	-	-	
4.4`-DDE		1.17-3.5 (64.8 %)		-		
Sum of DDD + DDE + DDT		1.34-4.4 (51.1 %)		-	-	
Acenaphthylene		8-24 (65.6 %)		11-33 (100 %)	-	
Acenaphthene				-	-	
Fluorene				-	-	
Phenanthrene		10-39 (85.13 %)		14-47 (108 %)	-	
Anthracene		7-22 (68 %)		13-32 (90.9 %)	-	
Fluoranthene		29-82 (62.5 %)		40-114 (96.1 %)	-	
Pyrene		36-88 (54.5 %)		45-122 (92.2)	-	
Benz(a)anthracene		19-47 (55.4 %)		30-89 (99.2 %)	-	
Chrysene		18-40 (50.1 %)		21-73 (110 %)		
Benzo(b+j)fluoranthene				32-100 (103 %)	-	
Benzo(k)fluoranthene		9-30 (75.8 %)		16-40 (85.7 %)	-	
Benzo(e)pyrene		16-38 (52.5 %)		23-71 (102 %)	-	
Benzo(a)pyrene		26-72 (61.9 %)		39-121 (102 %)	-	
Perylene		59-515 (124.44 %	)	-	-	
Benzo(g.h.i)perylene		18-47 (60.5 %)		26-84 (105 %)	-	
Indeno(1.2.3.cd)pyrene		14-38 (58.7 %)		22-70 (104 %)	-	
Coronene		6-14 (53.3 %)		-	-	



Parameter	Field Triplicate – Primary Lab (RSD)			Duplicate (RPD)	
	B13-4	B5-1	B11-9	B10-6	B6-2
Sum of PAHs				502-1320 (89.8 %)	-
Benzo(a)pyrene TEQ (zero)		33-99 (62.5 %)		56-174 (102 %)	-
Benzo(a)pyrene TEQ (half LOR)		35-99 (60.6 %)		56-174 (102 %)	-
Benzo(a)pyrene TEQ (LOR)		37-99 (58.8 %)		56-174 (102 %)	-



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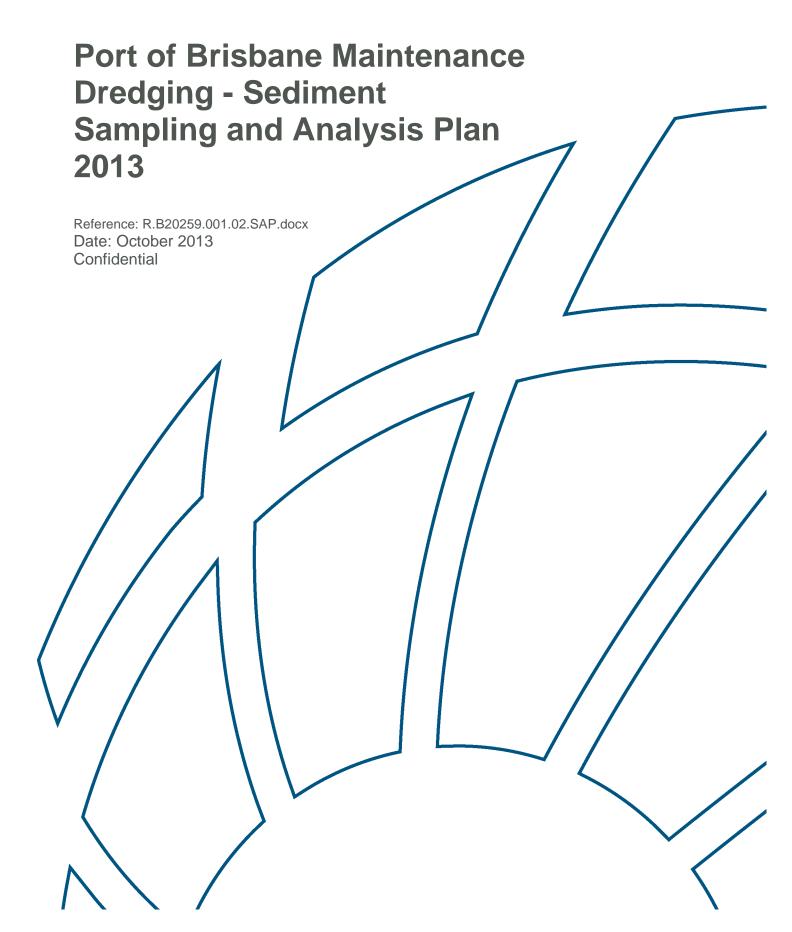
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## Annex A Sampling and Analysis Plan





# 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)

#### **Offices**

Brisbane Denver London Mackay Melbourne Newcastle Perth Sydney

Vancouver



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PO Box 203 Spring Hi		Project Manager:	Darren Richardson		
Tel: +61 7 3831 6744 Fax: + 61 7 3832 3627		Author:	Markus Billerbeck		
ABN 54 010 830 421		Client:	Port of Brisbane Pty Ltd		
www.bmtwbm.com.au		Client Contact:	Craig Wilson/Rachael Attard		
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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<sup>3</sup> to 450,000 m<sup>3</sup> 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):

Dredging SubareaExtentsAverage Dredge Volume (m³)Zone 2Colmslie to Pinkenba150,000Zone 3Within port reaches250,000Zone 4Moreton Bay entrance channel30,000

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

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



#### Introduction

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.



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

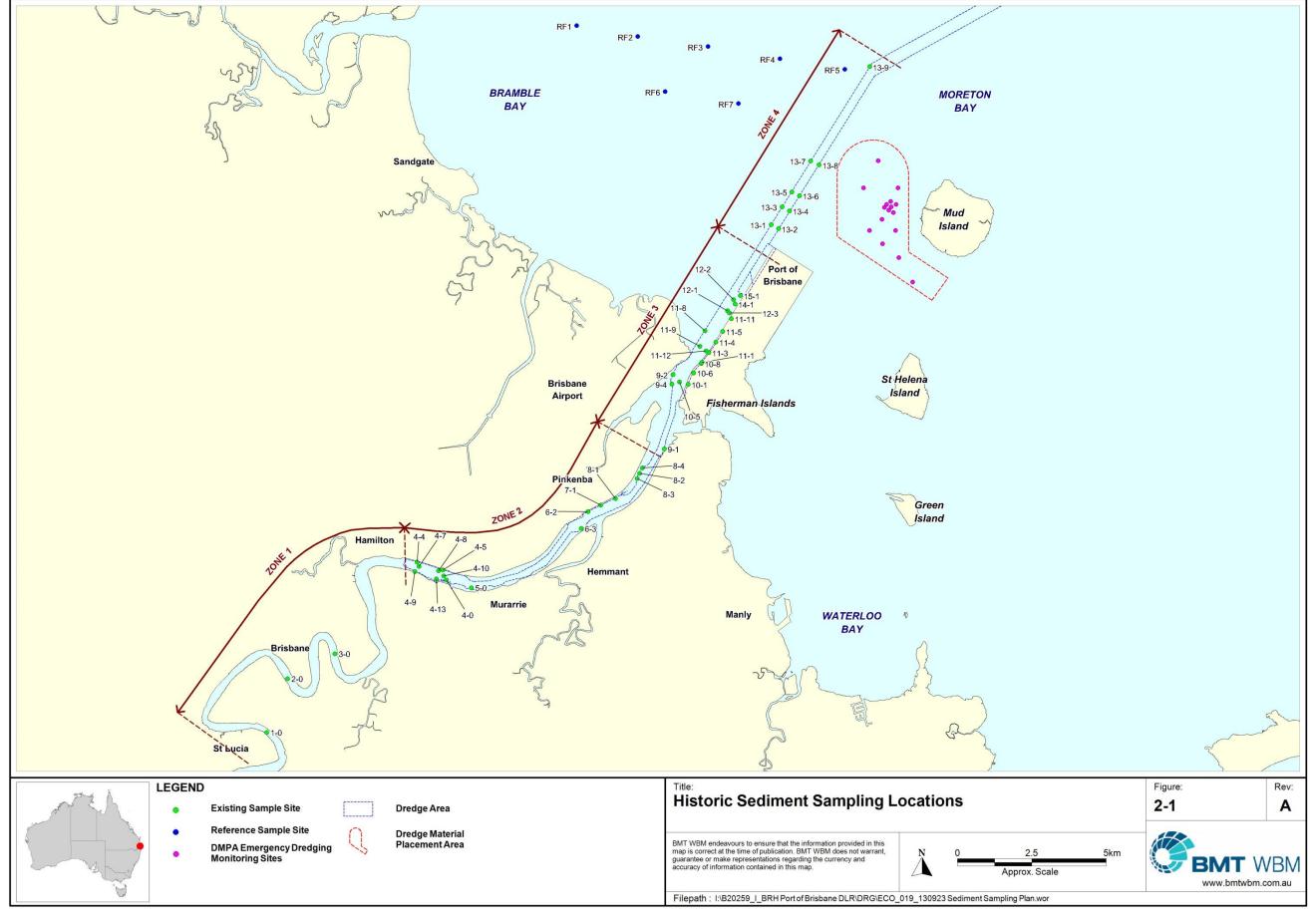
Reference	Sampling Date
Maunsell McIntyre (2001)	November 2000
Butler Partners (2002)	November 2001
Hydrobiology (2003)	November 2002
Hydrobiology (2004)	November 2003
SKM (2005)	November 2004
SKM (2006)	January 2006
SKM (2007)	February 2007
Worley Parsons (2008)	January 2008
Worley Parsons (2009)	February 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	2000-2012 (40% of locations between
Pesticides (OPPs and OCPs)	2000 and 2006)
Polychlorinated Biphenyls (PCBs)	2000-2012 (30% of locations)
Radionuclides	2010-2012
Acid Sulfate Soils	2000-2012







#### 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.



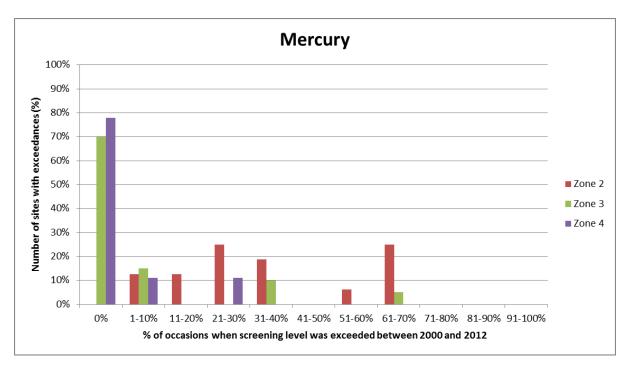


Figure 2-2 Exceedances of the NAGD Screening Level for Mercury between 2000 and 2012 in Dredge Zones 2, 3 and 4

#### 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).



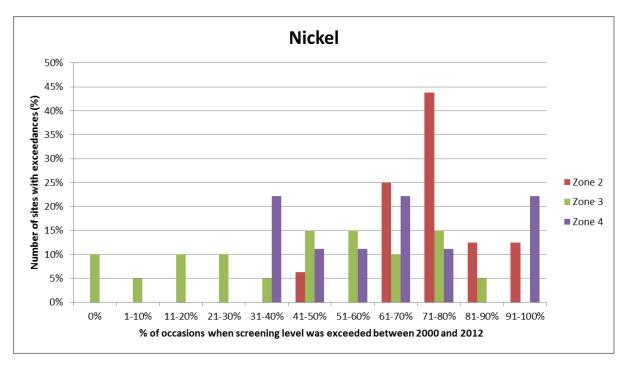


Figure 2-3 Exceedances of the NAGD Screening Level for Nickel between 2000 and 2012 in Dredge Zones 2, 3 and 4

#### 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.

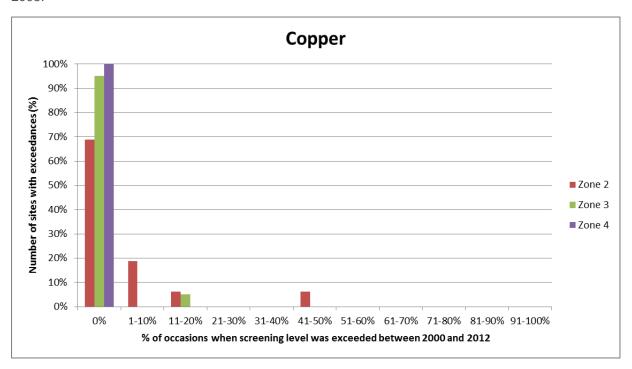


Figure 2-4 Exceedances of the NAGD Screening Level for Copper between 2000 and 2012 in Dredge Zones 2, 3 and 4

#### 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





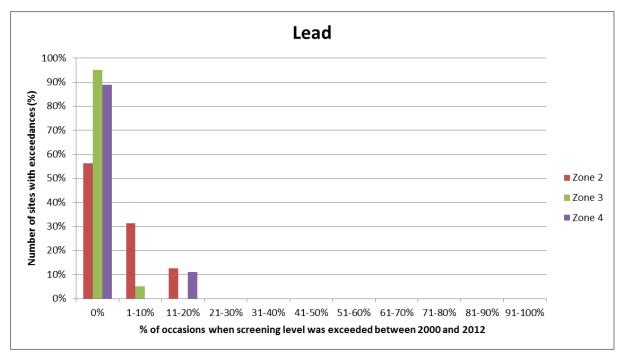


Figure 2-5 Exceedances of the NAGD Screening Level for Lead between 2000 and 2012 in Dredge Zones 2, 3 and 4

#### 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.



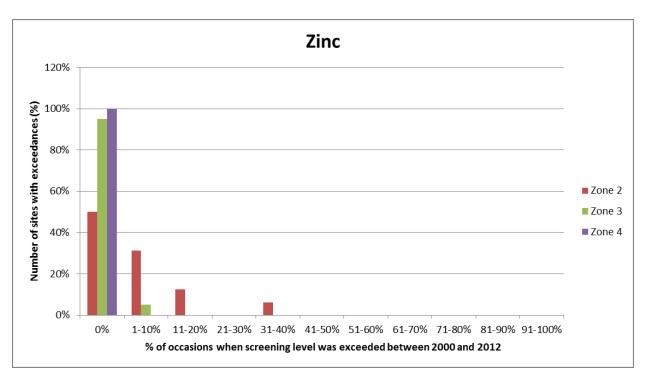


Figure 2-6 Exceedances of the NAGD Screening Level for Zinc between 2000 and 2012 in Dredge Zones 2. 3 and 4

### 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  $\mu$ g 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.

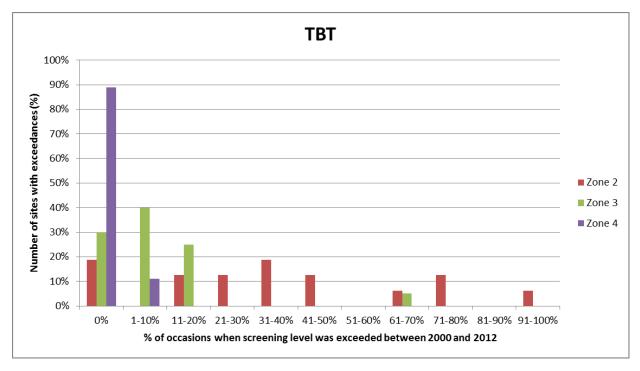


Figure 2-7 Exceedances of the NAGD Screening Level for TBT between 2000 and 2012 in Dredge Zones 2, 3 and 4

### 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  $\mu$ g/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  $\mu$ g/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  $\mu$ g/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  $\mu$ g/kg) and DDD (20  $\mu$ g/kg), but DDE concentrations did not exceed the NADG high level of 27  $\mu$ g/kg.

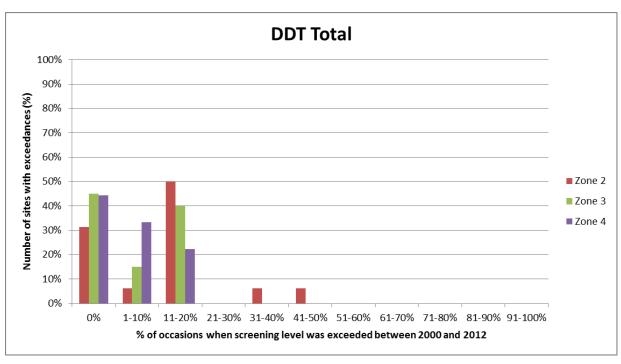
Most of these screening level exceedances for DDT, DDD and DDE were recorded at Zone 2, occasional exceedances of all three parameters were also recorded in Zone 3 and 4 between 2000 and 2012. The DDT breakdown product DDE was generally detected more frequently than DDT and DDD (Figure 2-8).

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  $0.5 \mu g/kg$  and the NAGD high level of  $6 \mu g/kg$  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).





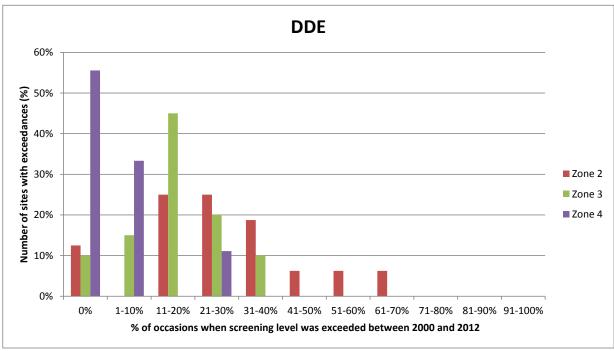


Figure 2-8 Exceedances of the NAGD Screening Level for total DDT (upper plot) and DDE (lower plot) between 2000 and 2012 in Dredge Zones 2, 3 and 4. Similar Trends for DDD.



### 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  $\mu$ g/kg in all samples with a 95% UCL of 5.25  $\mu$ g/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 ( $10\mu g/kg$  normalised to % TOC), and was also above the NAGD Screening level of  $2\mu g/kg$ .

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<sup>th</sup> 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<sup>th</sup> 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<sup>3</sup>) 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.

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

Table 3-1 Number of Sampling Locations as per NAGD

#### 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.

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

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

#### 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



#### Sampling and Analysis

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.

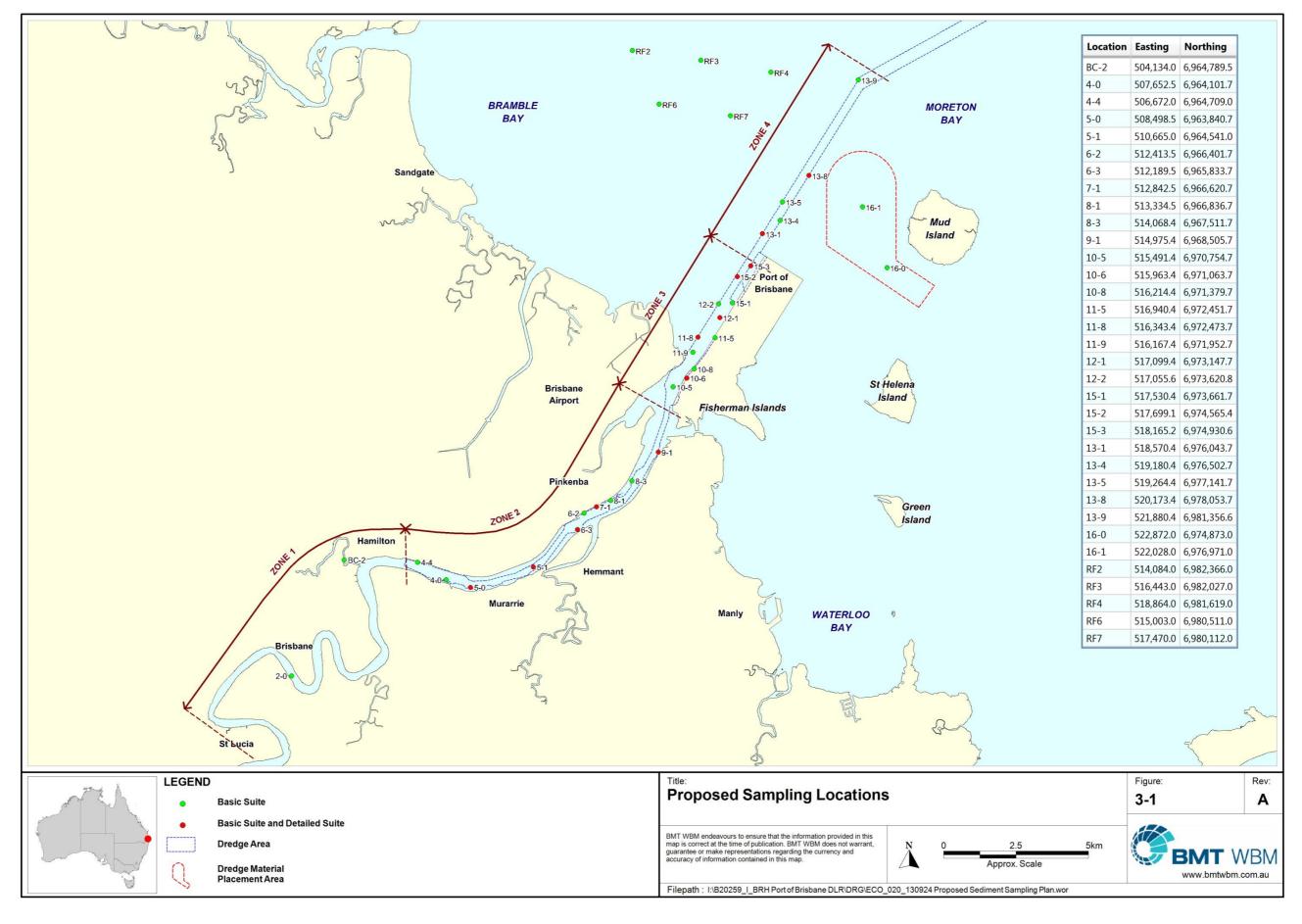
Based on the review of historical data, sample locations with the highest percentage of screening level exceedances between 2000 and 2012 were chosen for the additional pore water testing:

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.



#### **Sampling and Analysis**





## 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<sup>2</sup> 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.



#### Sampling and Analysis

## 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 mixups. 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 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	N/A	20 mg/kg
Total Kjeldahl Nitrogen	N/A	20 mg/kg
Nitrate & Nitrite as N	0.1 mg/kg N/A	0.1 mg/kg
Total Phosphorus Acid Sulfate Soils	N/A	1 mg/kg 2 mole H <sup>+</sup> /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.



## Sampling and Analysis

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</li>
- 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

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.



## Sampling and Analysis

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  $\mu$ m) 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.



## Sampling and Analysis

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-	Relative Standard Deviation <50%				
laboratory samples					
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;



## **Sampling and Analysis**

- 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.



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







BMT WBM Bangalow 6/20 Byron Street Bangalow 2479

Tel +61 2 6687 0466 Fax +61 2 66870422

Email bmtwbm@bmtwbm.com.au Web www.bmtwml.com.au

Level 8, 200 Creek Street Brisbane 4000 PO Box 203 Spring Hill QLD 4004 BMT WBM Brisbane

Tel +61 7 3831 6744 Fax +61 7 3832 3627

Email bmtwbm@bmtwbm.com.au www.bmtwml.com.au

BMT WBM Denver 8200 S. Akron Street, #B120

Centennial Denver Colorado 80112 USA Tel +1 303 792 9814 Fax +1 303 792 9742

denver@bmtwbm.com Email www.bmtwbm.com

BMT WBM London 1<sup>st</sup> Floor, International House

St Katherine's Way London E1W1TW Email london@bmtwbm.co.uk Web www.bmtwbm.com.au

BMT WBM Mackay Suite 1, 138 Wood Street Mackay 4740

PO Box 4447 Mackay QLD 4740

Tel +61 7 4953 5144 Fax +61 7 4953 5132

Email mackay@bmtwbm.com.au Web www.bmtwbm.com.au

Level 5, 99 King Street Melbourne 3000 PO Box 604 Collins Street West VIC 8007 BMT WBM Melbourne

Tel +61 3 8620 6100 Fax +61 3 8620 6105

Email melbourne@bmtwbm.com.au Web www.bmtwbm.com.au

BMT WBM Newcastle

126 Belford Street Broadmeadow 2292 PO Box 266 Broadmeadow NSW 2292 Tel +61 2 4940 8882 Fax +61 2 494 Fax +61 2 4940 8887

Email newcastle@bmtwbm.com.au www.bmtwbm.com.au

BMT WBM Perth Suite 6, 29 Hood Street Subiaco 6008

Tel +61 8 9328 2029 Fax +61 8 9486 7588

Email perth@bmtwbm.com.au Web www.bmtwbm.com.au

BMT WBM Sydney Level 1, 256-258 Norton Street Leichhardt 2040

PO Box 194 Leichhardt NSW 2040

Tel +61 2 8987 2900 Fax +61 2 8987 2999

Email sydney@bmtwbm.com.au Web www.bmtwbm.com.au

BMT WBM Vancouver Suite 401, 611 Alexander Street

Vancouver British Columbia V6E 3W1 Canada Tel +1 604 683 5777 Fax +1 604 608 3232

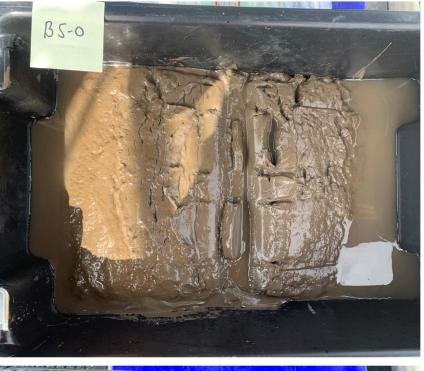
Email vancouver@bmtwbm.com.au

Web www.bmtwbm.com



## **BMT (OFFICIAL)**

# **Annex B** Sediment Log and Photographs

























































































## **BMT (OFFICIAL)**

# **Annex C** Primary Laboratory Sediment Reports



## **CERTIFICATE OF ANALYSIS**

**Work Order** : **EB2225335** Page : 1 of 35

Amendment : 1

Client : BMT COMMERCIAL AUSTRALIA PTY LTD Laboratory : Environmental Division Brisbane

Contact : Mr BRAD HILES Contact : Kimberly Hilton-Barber

Address : PO BOX 203 SPRING HILL Address : 2 Byth Street Stafford QLD Australia 4053

**BRISBANE QLD 4004** 

Telephone : ---- Telephone : +61-7-3243 7222

Project : B23621 Port of Brisbane - Sediment Quality Date Samples Received : 29-Aug-2022 17:38

Order number : ---C-O-C number : ----

Sampler : BRAD HILES

Site : --

Quote number : BN/016/19

No. of samples received : 23

No. of samples analysed : 22

Telephone : +61-7-3243 7222

Date Samples Received : 29-Aug-2022 17:38

Date Analysis Commenced : 31-Aug-2022

Issue Date : 04-Oct-2022 16:56

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation No. 825

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Inorganics, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane External Subcontracting, Stafford, QLD
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

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Work Order : EB2225335 Amendment 1

Client : BMT COMMERCIAL AUSTRALIA PTY LTD
Project : B23621 Port of Brisbane - Sediment Quality



#### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.
- EP090-Organotin: Sample 'B4-4' shows poor matrix spike recovery for MBT due to matrix interference.
- EP090-Organotin: High surrogate recovery for sample 'B2-0' deemed acceptable as all associated analyte results are less than LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP131A: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080-SD: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP130: LOR for sample raised due to the high amount of moisture present.
- Pesticides and PAH analysis are conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (27/09/2022): This report has been amended and re-released to allow the reporting of additional analytical data, specifically method EG005-SDH (Nickel) for samples B4-4, B4-0, B6-3, B6-2 and B6-2b (ALS #2,3,8.9 and 10)
- EP131B: Particular samples required dilution due to sample matrix. LOR values have been adjusted accordingly.
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- 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.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2293045. NATA and CAI accreditations' are both recognised under ILAC.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil. multiply reported results x wet bulk density of soil in t/m3.
- EN68: This analysis in accordance with National Ocean Disposal Guidelines, Commonwealth of Australia, 2002 (modified). Results reported are those determined on a 1:4 sediment/seawater elutriate without blank correction.
- EG093: Samples containing high levels of sulfate may precipitate barium under the acidic conditions of this method and may therefore bias results low.

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	B4-0	B5-0	B6-2	B6-2b	B7-1
		Samplir	ng date / time	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 12:46	29-Aug-2022 12:46	29-Aug-2022 13:40
Compound	CAS Number	LOR	Unit	EB2225335-003	EB2225335-004	EB2225335-009	EB2225335-010	EB2225335-011
				Result	Result	Result	Result	Result
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
EG093T: Total Metals in Saline Water by C	ORC-ICPMS							
Nickel	7440-02-0	0.5	μg/L	4.2	5.1	5.0	6.8	3.5
EP090: Organotin Compounds (Soluble)								
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	<2	<2
EP090S: Organotin Surrogate								
Tripropyltin		5	%	41.0	61.7	36.2	51.1	54.8

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	B8-3	Elutriate Blank	 	
		Sampli	ng date / time	29-Aug-2022 14:30	29-Aug-2022 00:00	 	
Compound	CAS Number	LOR	Unit	EB2225335-012	EB2225335-016	 	
				Result	Result	 	
EG035T: Total Mercury by FIMS							
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	 	
EG093T: Total Metals in Saline Wa	ater by ORC-ICPMS						
Nickel	7440-02-0	0.5	μg/L	3.9	<0.5	 	
EP090: Organotin Compounds (Se	oluble)						
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	 	
EP090S: Organotin Surrogate							
Tripropyltin		5	%	32.7	61.4	 	

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: PORE WATER LEACHATE			Sample ID	B4-0	B5-0	B6-2	B6-2B	B7-1
(Matrix: WATER)				Porewater leachates				
		Sampli	ng date / time	29-Aug-2022 00:00				
Compound	CAS Number	LOR	Unit	EB2225335-018	EB2225335-019	EB2225335-020	EB2225335-021	EB2225335-022
				Result	Result	Result	Result	Result
EP090: Organotin Compounds (Solo	uble)							
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	<2	<2
EP131A: Organochlorine Pesticides	;							
Aldrin	309-00-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-BHC	319-84-6	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-BHC	319-85-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	319-86-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDD	72-54-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDE	72-55-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDT	50-29-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Dieldrin	60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin	72-20-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	53494-70-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Heptachlor	76-44-8	0.005	μg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
gamma-BHC	58-89-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Methoxychlor	72-43-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Total Chlordane (sum)		0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Oxychlordane	27304-13-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
EP090S: Organotin Surrogate								
Tripropyltin		5	%	34.1	36.0	37.9	45.7	49.1
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.010	%	81.4	76.0	87.3	85.4	81.4
					!			

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: PORE WATER LEACHATE			Sample ID	B8-3		 	
(Matrix: WATER)			·	Porewater leachates			
		Samplii	ng date / time	29-Aug-2022 00:00		 	
Compound	CAS Number	LOR	Unit	EB2225335-023	******	 	
	071071011100			Result		 	
EP090: Organotin Compounds (Solub	nle)			T too at			
Tributyltin	56573-85-4	2	ngSn/L	<2		 	
EP131A: Organochlorine Pesticides	00070 00 1		<b>3</b>				
Aldrin	309-00-2	0.010	μg/L	<0.010		 	
alpha-BHC	319-84-6	0.010	μg/L	<0.010		 	
beta-BHC	319-85-7	0.010	μg/L	<0.010		 	
delta-BHC	319-86-8	0.010	μg/L	<0.010		 	
4.4`-DDD	72-54-8	0.010	μg/L	<0.010		 	
4.4`-DDE	72-55-9	0.010	μg/L	<0.010		 	
4.4`-DDT	50-29-3	0.010	μg/L	<0.010		 	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.010	μg/L	<0.010		 	
	0-2		13				
Dieldrin	60-57-1	0.010	μg/L	<0.010		 	
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010		 	
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010		 	
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010		 	
^ Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010		 	
Endrin	72-20-8	0.010	μg/L	<0.010		 	
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010		 	
Endrin ketone	53494-70-5	0.010	μg/L	<0.010		 	
Heptachlor	76-44-8	0.005	μg/L	<0.005		 	
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010		 	
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010		 	
gamma-BHC	58-89-9	0.010	μg/L	<0.010		 	
Methoxychlor	72-43-5	0.010	μg/L	<0.010		 	
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010		 	
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010		 	
^ Total Chlordane (sum)		0.010	μg/L	<0.010		 	
Oxychlordane	27304-13-8	0.010	μg/L	<0.010		 	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010		 	
EP090S: Organotin Surrogate							
Tripropyltin		5	%	35.3		 	
EP131S: OC Pesticide Surrogate							
Dibromo-DDE	21655-73-2	0.010	%	71.2		 	

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
		Sampli	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
	0,10,10,100			Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCI (23A)		0.1	pH Unit				7.2	8.1
pH OX (23B)		0.1	pH Unit				6.8	7.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		2	mole H+/t				<2	<2
Titratable Peroxide Acidity (23G)		2	mole H+/t				<2	<2
Titratable Sulfidic Acidity (23H)		2	mole H+/t				<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S				<0.020	<0.020
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S				<0.020	<0.020
(s-23G)								
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S				<0.020	<0.020
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S				0.100	0.099
Peroxide Sulfur (23De)		0.020	% S				0.277	0.275
Peroxide Oxidisable Sulfur (23E)		0.020	% S				0.177	0.176
acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t				110	110
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca				0.290	0.352
Peroxide Calcium (23Wh)		0.020	% Ca				0.388	0.476
Acid Reacted Calcium (23X)		0.020	% Ca				0.098	0.124
acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t				49	62
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S				0.078	0.099
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg				0.330	0.256
Peroxide Magnesium (23Tm)		0.020	% Mg				0.432	0.323
Acid Reacted Magnesium (23U)		0.020	% Mg				0.102	0.068
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t				84	56
sulfidic - Acid Reacted Magnesium		0.020	% S				0.134	0.090
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	ity							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3				0.726	0.824
acidity - Excess Acid Neutralising		10	mole H+ / t				145	165
Capacity (a-23Q)								
sulfidic - Excess Acid Neutralising		0.020	% S				0.232	0.264
Capacity (s-23Q)								

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
		Sampli	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
•				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capac	city - Continued							
EA029-H: Acid Base Accounting								
ANC Fineness Factor		0.5	-				1.5	1.5
Net Acidity (sulfur units)		0.02	% S				<0.02	<0.02
Net Acidity (acidity units)		10	mole H+/t				<10	<10
Liming Rate		1	kg CaCO3/t				<1	<1
Net Acidity excluding ANC (sulfur units)		0.02	% S				0.18	0.18
Net Acidity excluding ANC (acidity units)		10	mole H+ / t				110	110
Liming Rate excluding ANC		1	kg CaCO3/t				8	8
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit				7.2	8.1
Titratable Actual Acidity (23F)		2	mole H+/t				<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S				<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S				0.126	0.144
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t				79	90
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3				1.58	1.82
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t				315	365
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S				0.50	0.58
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-				1.5	1.5
Net Acidity (sulfur units)		0.02	% S				<0.02	<0.02
Net Acidity (acidity units)		10	mole H+/t				<10	<10
Liming Rate		1	kg CaCO3/t				<1	<1
Net Acidity excluding ANC (sulfur units)		0.02	% S				0.13	0.14
Net Acidity excluding ANC (acidity units)		10	mole H+/t				79	90
Liming Rate excluding ANC		1	kg CaCO3/t				6	7
EA055: Moisture Content (Dried @ 105-11	10°C)							
Moisture Content		0.1	%	30.3	65.8	63.6	62.3	59.1
EA150: Particle Sizing								
+75µm		1	%	98	<1	7	2	27

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
,		Samplii	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
A150: Particle Sizing - Continued								
+150µm		1	%	97	<1	2	<1	22
+300µm		1	%	75	<1	1	<1	5
+425µm		1	%	48	<1	<1	<1	2
+600µm		1	%	16	<1	<1	<1	1
+1180µm		1	%	<1	<1	<1	<1	<1
+2.36mm		1	%	<1	<1	<1	<1	<1
+4.75mm		1	%	<1	<1	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 μm)		1	%	2	49	35	44	39
Silt (2-60 µm)		1	%	<1	50	56	52	32
Sand (0.06-2.00 mm)		1	%	98	1	9	4	29
Gravel (>2mm)		1	%	<1	<1	<1	<1	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.69	2.66	2.47	2.55	2.51
G005(ED093)-SDH: 1M HCI-Extractabl	e Metals by ICPAE	s						
Nickel	7440-02-0	1.0	mg/kg		9.7	10.7		
G005(ED093)T: Total Metals by ICP-A	FS							
Aluminium	7429-90-5	50	mg/kg	3440	18300	15800	13800	13500
Iron	7439-89-6	50	mg/kg	10000	44000	40000	32900	34100
G020-SD: Total Metals in Sediments b			3 3					
Arsenic	7440-38-2	1.00	mg/kg	1.78	7.43	5.77	6.44	5.71
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	10.2	39.2	34.0	30.0	30.2
Copper	7440-50-8	1.0	mg/kg	4.4	28.3	25.5	23.2	20.8
Lead	7439-92-1	1.0	mg/kg	3.4	15.5	13.6	13.9	12.2
Nickel	7440-02-0	1.0	mg/kg	8.3	37.0	33.7	26.1	29.2
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
	7440-66-6	1.0	mg/kg	22.4	92.1	80.2	75.5	72.5

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
		Sampli	ing date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercur	y by FIMS (Low Level)	) - Continւ	ued					
Mercury	7439-97-6	0.01	mg/kg	0.01	0.06	0.06	0.06	0.06
EK059G: Nitrite plus Nitrate as N (N	NOx) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg				<0.1	0.1
EK061G: Total Kjeldahl Nitrogen By	Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg				1360	1350
EK062: Total Nitrogen as N (TKN +	NOx)							
^ Total Nitrogen as N		20	mg/kg				1360	1350
EK067G: Total Phosphorus as P by	Discrete Analyser							
Total Phosphorus as P		2	mg/kg				924	935
EN68: Seawater Elutriate Testing Pr	rocoduro - Inorganics/			(Glass Vossol)				
Seawater Sampling Date	ocedure - morganics/	-		(Glass Vessel)		4/09/2022	4/09/2022	
EP003: Total Organic Carbon (TOC	in Cail							
Total Organic Carbon (100)		0.02	%	0.06	1.86	1.76	1.73	1.29
		0.02	70	0.00	1.00	1.70	1.10	11.23
EP080-SD / EP071-SD: Total Petrole C6 - C9 Fraction		3	ma/ka				<3	<3
C10 - C14 Fraction		3	mg/kg mg/kg				3	7
C15 - C28 Fraction		3	mg/kg				8	33
C29 - C36 Fraction		5	mg/kg				6	41
^ C10 - C36 Fraction (sum)		3	mg/kg				17	81
			mg/kg					V.
EP080-SD / EP071-SD: Total Recover C6 - C10 Fraction	C6 C10	3	mg/kg				<3	<3
>C10 - C16 Fraction		3	mg/kg				<3	7
C6 - C10 Fraction minus BTEX	C6 C10-BTEX	3.0	mg/kg				<3.0	<3.0
(F1)	C0_C10-B1EX	0.0	9/1/9					-5.0
>C16 - C34 Fraction		3	mg/kg				11	61
>C34 - C40 Fraction		5	mg/kg				<5	21
^ >C10 - C40 Fraction (sum)		3	mg/kg				11	89
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg				<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg				<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg				<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg				<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg				<0.2	<0.2
^ Total Xylenes		0.5	mg/kg				<0.5	<0.5

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
		Sampli	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
^ Sum of BTEX		0.2	mg/kg				<0.2	<0.2
Naphthalene	91-20-3	0.2	mg/kg				0.2	<0.2
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	0.7	0.6	0.8	0.5
EP130A: Organophosphorus Pes								
Bromophos-ethyl	4824-78-6	10	μg/kg	<10	<12	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<10	<12	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<10.0	<12.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<10	<12	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<10	<12	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<10	<12	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<10	<12	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<10	<12	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<10	<12	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<10	<12	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<10	<12	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<10	<12	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<10	<12	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<10	<12	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<10	<12	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<10	<12	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<10	<12	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<10	<12	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<10	<12	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<10	<12	<12	<12	<12
EP131A: Organochlorine Pesticid	les							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	2.78
4.4`-DDE	72-55-9	0.50	μg/kg	0.82	<0.50	2.14	1.17	1.17

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
·		Sampli	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticide	es - Continued							
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.50	μg/kg	0.82	<0.50	2.14	1.17	3.95
	0-2							
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphenyl	s (as Aroclors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg				<31.2	<31.2
Aroclor 1016	12674-11-2	5.0	μg/kg				<31.2	<31.2
Aroclor 1221	11104-28-2	5.0	μg/kg				<31.2	<31.2
Aroclor 1232	11141-16-5	5.0	μg/kg				<31.2	<31.2
Aroclor 1242	53469-21-9	5.0	μg/kg				<31.2	<31.2
Aroclor 1248	12672-29-6	5.0	μg/kg				<31.2	<31.2
Aroclor 1254	11097-69-1	5.0	μg/kg				<31.2	<31.2
Aroclor 1260	11096-82-5	5.0	μg/kg				<31.2	<31.2
EP132B: Polynuclear Aromatic Hyd	drocarbons							
Naphthalene	91-20-3	5	μg/kg				<5	8
2-Methylnaphthalene	91-57-6	5	μg/kg				<5	<5
Acenaphthylene	208-96-8	4	μg/kg				9	24
Acenaphthene	83-32-9	4	μg/kg				<5	<5

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
,		Sampli	ing date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hyd	rocarbons - Continued							
Fluorene	86-73-7	4	μg/kg				<5	7
Phenanthrene	85-01-8	4	μg/kg				10	39
Anthracene	120-12-7	4	μg/kg				7	22
Fluoranthene	206-44-0	4	μg/kg				30	82
Pyrene	129-00-0	4	μg/kg				32	88
Benz(a)anthracene	56-55-3	4	μg/kg				18	47
Chrysene	218-01-9	4	μg/kg				15	40
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg				26	56
Benzo(k)fluoranthene	207-08-9	4	μg/kg				8	30
Benzo(e)pyrene	192-97-2	4	μg/kg				16	38
Benzo(a)pyrene	50-32-8	4	μg/kg				27	72
Perylene	198-55-0	4	μg/kg				59	59
Benzo(g.h.i)perylene	191-24-2	4	μg/kg				19	47
Dibenz(a.h)anthracene	53-70-3	4	μg/kg				5	9
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg				16	38
Coronene	191-07-1	5	μg/kg				6	14
\ Sum of PAHs		4	μg/kg				303	720
^ Benzo(a)pyrene TEQ (zero)		4	μg/kg				39	99
Benzo(a)pyrene TEQ (half LOR)		4	μg/kg				39	99
Benzo(a)pyrene TEQ (LOR)		4	μg/kg				39	99
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW				540	630
Gross beta		500	Bq/kg DW				570	610
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%				81.7	97.6
Toluene-D8	2037-26-5	0.2	%				69.5	84.2
4-Bromofluorobenzene	460-00-4	0.2	%				77.3	92.0
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	132	86.3	80.2	81.0	92.3
EP130S: Organophosphorus Pestic								<u> </u>
DEF	78-48-8	10	%	78.4	80.1	73.4	59.5	64.0
EP131S: OC Pesticide Surrogate	70-70-0		, ,					3
Dibromo-DDE	21655-73-2	0.50	%	66.2	77.6	67.1	65.6	59.9
EP131T: PCB Surrogate	21000-73-2	0.00	70	00.2	77.0	07.1	00.0	33.3

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B2-0	B4-4	B4-0	B5-0	B5-1
		Samplii	ng date / time	29-Aug-2022 08:25	29-Aug-2022 09:20	29-Aug-2022 09:44	29-Aug-2022 10:12	29-Aug-2022 10:45
Compound	CAS Number	LOR	Unit	EB2225335-001	EB2225335-002	EB2225335-003	EB2225335-004	EB2225335-005
				Result	Result	Result	Result	Result
EP131T: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.5	%				62.5	75.0
EP132T: Base/Neutral Extractable Surr	ogates							
2-Fluorobiphenyl	321-60-8	10	%				89.0	76.1
Anthracene-d10	1719-06-8	10	%				105	99.9
4-Terphenyl-d14	1718-51-0	10	%				97.6	83.5

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
(watrix. Soile)		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
Compound	CAS Nullibel	2071	01.11	Result	Result	Result	Result	Result
EA020 At all Massurements				Nesuit	rvesuit	Nesuit	resuit	Nesuit
EA029-A: pH Measurements pH KCI (23A)		0.1	pH Unit	7.5	7.7	7.8		
pH OX (23B)		0.1	pH Unit	6.4	6.8	6.8		
		0.1	prionit	0.4	0.0	0.0		
EA029-B: Acidity Trail		2	mala III. / A	<2	<2	<2		
Titratable Actual Acidity (23F)			mole H+ / t					
Titratable Peroxide Acidity (23G)		2	mole H+ / t	8	<2	<2		
Titratable Sulfidic Acidity (23H)		2	mole H+ / t	8	<2	<2		
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S	<0.020	<0.020	<0.020		
sulfidic - Titratable Peroxide Acidity (s-23G)		0.020	% pyrite S	<0.020	<0.020	<0.020		
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S	<0.020	<0.020	<0.020		
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S	0.123	0.126	0.150		
Peroxide Sulfur (23De)		0.020	% S	0.396	0.339	0.339		
Peroxide Oxidisable Sulfur (23E)		0.020	% S	0.273	0.213	0.189		
acidity - Peroxide Oxidisable Sulfur		10	mole H+/t	170	133	118		
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca	0.265	0.315	0.317		
Peroxide Calcium (23Wh)		0.020	% Ca	0.275	0.543	0.527		
Acid Reacted Calcium (23X)		0.020	% Ca	<0.020	0.228	0.210		
acidity - Acid Reacted Calcium (a-23X)		10	mole H+/t	<10	114	104		
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S	<0.020	0.183	0.168		
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg	0.338	0.344	0.364		
Peroxide Magnesium (23Tm)		0.020	% Mg	0.421	0.439	0.474		
Acid Reacted Magnesium (23U)		0.020	% Mg	0.084	0.095	0.110		
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	69	78	90		
sulfidic - Acid Reacted Magnesium		0.020	% S	0.110	0.125	0.145		
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	city							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3		0.900	1.09		
acidity - Excess Acid Neutralising		10	mole H+ / t		180	218		
Capacity (a-23Q)								
sulfidic - Excess Acid Neutralising		0.020	% S		0.288	0.349		
Capacity (s-23Q)								

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
·				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capac	city - Continued							
EA029-H: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5	1.5		
Net Acidity (sulfur units)		0.02	% S	0.10	<0.02	<0.02		
Net Acidity (acidity units)		10	mole H+ / t	62	<10	<10		
Liming Rate		1	kg CaCO3/t	5	<1	<1		
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.27	0.21	0.19		
Net Acidity excluding ANC (acidity units)		10	mole H+ / t	170	133	118		
Liming Rate excluding ANC		1	kg CaCO3/t	13	10	9		
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit	7.5	7.7	7.8		
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	<2		
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	<0.02		
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S	0.205	0.147	0.116		
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+/t	128	92	72		
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3	1.65	1.82	2.03		
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t	329	365	405		
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S	0.53	0.58	0.65		
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5	1.5		
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02	<0.02		
Net Acidity (acidity units)		10	mole H+ / t	<10	<10	<10		
Liming Rate		1	kg CaCO3/t	<1	<1	<1		
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.20	0.15	0.12		
Net Acidity excluding ANC (acidity units)		10	mole H+ / t	128	92	72		
Liming Rate excluding ANC		1	kg CaCO3/t	10	7	5		
EA055: Moisture Content (Dried @ 105-11	0°C)							
Moisture Content		0.1	%	62.8	63.2	65.2	62.3	62.8
EA150: Particle Sizing								
+75µm		1	%	6	6	2	4	4

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
·		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
•				Result	Result	Result	Result	Result
EA150: Particle Sizing - Continued								
+150µm		1	%	3	2	<1	1	1
+300µm		1	%	1	1	<1	<1	<1
+425µm		1	%	1	<1	<1	<1	<1
+600µm		1	%	<1	<1	<1	<1	<1
+1180µm		1	%	<1	<1	<1	<1	<1
+2.36mm		1	%	<1	<1	<1	<1	<1
+4.75mm		1	%	<1	<1	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 µm)		1	%	48	47	47	42	39
Silt (2-60 µm)		1	%	45	46	50	53	54
Sand (0.06-2.00 mm)		1	%	7	7	3	5	7
Gravel (>2mm)		1	%	<1	<1	<1	<1	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.63	2.51	2.67	2.70	2.57
G005(ED093)-SDH: 1M HCI-Extractable	e Metals by ICPAE	S						
Nickel	7440-02-0		mg/kg			11.9	11.6	10.7
G005(ED093)T: Total Metals by ICP-Al	ES							
Aluminium	7429-90-5	50	mg/kg	17200	14600	16500	15000	15300
Iron	7439-89-6	50	mg/kg	36200	35400	40600	38200	39100
G020-SD: Total Metals in Sediments b	y ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	7.41	6.03	7.66	6.59	6.45
Cadmium	7440-43-9	0.1	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	35.2	30.8	36.2	35.4	33.2
Copper	7440-50-8	1.0	mg/kg	28.8	22.0	26.7	23.7	22.8
Lead	7439-92-1	1.0	mg/kg	31.6	11.8	14.8	12.4	12.4
Nickel	7440-02-0	1.0	mg/kg	27.6	29.6	34.6	35.6	33.8
Silver	7440-22-4	0.1	mg/kg	0.2	<0.1	0.1	<0.1	<0.1
Zinc	7440-66-6	1.0	mg/kg	104	70.1	87.8	77.2	76.2

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Sampli	ing date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
,				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercury	by FIMS (Low Level	) - Continւ	red					
Mercury	7439-97-6	0.01	mg/kg	0.08	0.05	0.06	0.05	0.06
EK059G: Nitrite plus Nitrate as N (NO	x) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg	<0.1	0.4	0.1		
EK061G: Total Kjeldahl Nitrogen By D	iscrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg	1480	1320	1670		
EK062: Total Nitrogen as N (TKN + NC	Dx)							
^ Total Nitrogen as N		20	mg/kg	1480	1320	1670		
EK067G: Total Phosphorus as P by D	iscrete Analyser					<u> </u>		
Total Phosphorus as P		2	mg/kg	1040	924	1010		
EN68: Seawater Elutriate Testing Proc	redure - Inorganics/	Non-Vola	atile Organics	(Glass Vessel)				
Seawater Sampling Date		-	-				4/09/2022	4/09/2022
EP003: Total Organic Carbon (TOC) ir	Soil							
Total Organic Carbon		0.02	%	1.56	1.64	1.98	1.66	1.26
EP080-SD / EP071-SD: Total Petroleur								
C6 - C9 Fraction		3	mg/kg	<3	<3	<3		
C10 - C14 Fraction		3	mg/kg	9	5	11		
C15 - C28 Fraction		3	mg/kg	66	28	53		
C29 - C36 Fraction		5	mg/kg	71	30	59		
^ C10 - C36 Fraction (sum)		3	mg/kg	146	63	123		
EP080-SD / EP071-SD: Total Recovera	able Hydrocarbons							
C6 - C10 Fraction	C6 C10	3	mg/kg	<3	<3	<3		
>C10 - C16 Fraction		3	mg/kg	11	5	14		
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0		
(F1)								
>C16 - C34 Fraction		3	mg/kg	116	48	90		
>C34 - C40 Fraction		5	mg/kg	40	18	34		
^ >C10 - C40 Fraction (sum)		3	mg/kg	167	71	138		
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2		
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2		
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2		
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2		
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2		
^ Total Xylenes		0.5	mg/kg	<0.5	<0.5	<0.5		

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
^ Sum of BTEX		0.2	mg/kg	<0.2	<0.2	<0.2		
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2		
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	0.5	0.6	<0.5	<0.5
EP130A: Organophosphorus Pesti	cides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<12	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<12	<12	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<12.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<12	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<12	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<12	<12	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<12	<12	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<12	<12	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<12	<12	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<12	<12	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<12	<12	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<12	<12	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<12	<12	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<12	<12	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<12	<12	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<12	<12	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<12	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<12	<12	<12	<12	<12
EP131A: Organochlorine Pesticide	es							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	0.90	<0.50	<0.50	<0.50	6.25
4.4`-DDE	72-55-9	0.50	μg/kg	3.50	1.34	1.58	3.13	3.19

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
			•	Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticide	es - Continued							
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.50	μg/kg	4.40	1.34	1.58	3.13	9.44
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Bipheny	ls (as Aroclors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1016	12674-11-2	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1221	11104-28-2	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1232	11141-16-5	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1242	53469-21-9	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1248	12672-29-6	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1254	11097-69-1	5.0	μg/kg	<31.2	<31.2	<31.2		
Aroclor 1260	11096-82-5	5.0	μg/kg	<31.2	<31.2	<31.2		
EP132B: Polynuclear Aromatic Hy	drocarbons							
Naphthalene	91-20-3	5	μg/kg	7	<5	6		
2-Methylnaphthalene	91-57-6	5	μg/kg	<5	<5	<5		
Acenaphthylene	208-96-8	4	μg/kg	8	9	11		
Acenaphthene	83-32-9	4	μg/kg	<5	<5	<5		

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Sampli	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hyd	rocarbons - Continued							
Fluorene	86-73-7	4	μg/kg	5	<5	<5		
Phenanthrene	85-01-8	4	μg/kg	10	10	10		
Anthracene	120-12-7	4	μg/kg	8	7	9		
Fluoranthene	206-44-0	4	μg/kg	29	32	35		
Pyrene	129-00-0	4	μg/kg	38	36	40		
Benz(a)anthracene	56-55-3	4	μg/kg	20	19	21		
Chrysene	218-01-9	4	μg/kg	18	18	19		
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg	26	26	29		
Benzo(k)fluoranthene	207-08-9	4	μg/kg	9	9	10		
Benzo(e)pyrene	192-97-2	4	μg/kg	17	16	19		
Benzo(a)pyrene	50-32-8	4	μg/kg	26	28	32		
Perylene	198-55-0	4	μg/kg	515	60	81		
Benzo(g.h.i)perylene	191-24-2	4	μg/kg	18	18	24		
Dibenz(a.h)anthracene	53-70-3	4	μg/kg	<5	6	7		
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg	14	16	22		
Coronene	191-07-1	5	μg/kg	6	6	8		
Sum of PAHs		4	μg/kg	774	316	383		
Benzo(a)pyrene TEQ (zero)		4	μg/kg	33	41	48		
Benzo(a)pyrene TEQ (half LOR)		4	μg/kg	35	41	48		
Benzo(a)pyrene TEQ (LOR)		4	μg/kg	37	41	48		
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW	<500	690	610		
Gross beta		500	Bq/kg DW	530	<500	<500		
P080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	83.4	79.4	89.8		
Toluene-D8	2037-26-5	0.2	%	72.3	67.8	76.4		
4-Bromofluorobenzene	460-00-4	0.2	%	82.0	72.9	84.7		
P090S: Organotin Surrogate								
Tripropyltin		0.5	%	83.7	85.6	83.6	72.5	82.2
EP130S: Organophosphorus Pestic	ide Surrogate							
DEF	78-48-8	10	%	63.2	79.1	68.0	72.8	74.8
EP131S: OC Pesticide Surrogate	70-70-0	. •			1 2 1 1			
Dibromo-DDE	21655-73-2	0.50	%	52.1	45.4	45.1	69.7	50.5
DID ONO-DDE	21000-13-2	0.00	,0	V4. 1	70.7	70.1	55.7	30.3

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B5-1b	B5-1c	B6-3	B6-2	B6-2b
		Samplii	ng date / time	29-Aug-2022 11:12	29-Aug-2022 11:32	29-Aug-2022 12:11	29-Aug-2022 12:46	29-Aug-2022 12:46
Compound	CAS Number	LOR	Unit	EB2225335-006	EB2225335-007	EB2225335-008	EB2225335-009	EB2225335-010
				Result	Result	Result	Result	Result
EP131T: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.5	%	59.4	56.2	56.2		
EP132T: Base/Neutral Extractable Sur	rogates							
2-Fluorobiphenyl	321-60-8	10	%	80.6	106	113		
Anthracene-d10	1719-06-8	10	%	110	114	104		
4-Terphenyl-d14	1718-51-0	10	%	83.6	121	107		

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: <b>SOIL</b>			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
(Matrix: SOIL)		Compli	na doto / timo	20 Aug 2022 12:40	20 Aug 2022 14:20	20 Aug 2022 15:10	20 Aug 2022 15:54	26 Aug 2022 00:00
-			ng date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCI (23A)		0.1	pH Unit	8.2				
pH OX (23B)		0.1	pH Unit	7.3				
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		2	mole H+ / t	<2				
Titratable Peroxide Acidity (23G)		2	mole H+/t	<2				
Titratable Sulfidic Acidity (23H)		2	mole H+/t	<2				
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S	<0.020				
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S	<0.020				
(s-23G)								
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S	<0.020				
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S	0.122				
Peroxide Sulfur (23De)		0.020	% S	0.403				
Peroxide Oxidisable Sulfur (23E)		0.020	% S	0.282				
acidity - Peroxide Oxidisable Sulfur		10	mole H+/t	176				
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca	0.413				
Peroxide Calcium (23Wh)		0.020	% Ca	0.884				
Acid Reacted Calcium (23X)		0.020	% Ca	0.471				
acidity - Acid Reacted Calcium (a-23X)		10	mole H+/t	235				
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S	0.377				
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg	0.302				
Peroxide Magnesium (23Tm)		0.020	% Mg	0.415				
Acid Reacted Magnesium (23U)		0.020	% Mg	0.113				
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+/t	93				
sulfidic - Acid Reacted Magnesium		0.020	% S	0.149				
(s-23U)		3.020	/ / /	01170				
EA029-F: Excess Acid Neutralising Capac	oity							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3	1.66				
		10	mole H+ / t	333				
acidity - Excess Acid Neutralising		10	INDIE HT / L	<b>ააა</b>				
Capacity (a-23Q)		0.020	% S	0.533				
sulfidic - Excess Acid Neutralising		0.020	/6 3	0.555				
Capacity (s-23Q)			1 1		1	I	I	I

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Sampli	ing date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capac	city - Continued							
EA029-H: 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	0.28				
Net Acidity excluding ANC (acidity units)		10	mole H+ / t	176				
Liming Rate excluding ANC		1	kg CaCO3/t	13				
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit	8.2				
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	0.192				
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	120				
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3	2.61				
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t	522				
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S	0.84				
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5				
Net Acidity (sulfur units)		0.02	% S	<0.02				
Net Acidity (acidity units)		10	mole H+/t	<10				
Liming Rate		1	kg CaCO3/t	<1				
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.19				
Net Acidity excluding ANC (acidity units)		10	mole H+/t	120				
Liming Rate excluding ANC		1	kg CaCO3/t	9				
EA055: Moisture Content (Dried @ 105-11	0°C)							
Moisture Content		0.1	%	60.3	65.9	65.6	59.8	
EA150: Particle Sizing								
+75µm		1	%	11	19	2	16	

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Sampli	ng date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
A150: Particle Sizing - Continued								
+150µm		1	%	6	15	1	15	
+300µm		1	%	3	8	<1	12	
+425µm		1	%	3	6	<1	4	
+600µm		1	%	2	6	<1	1	
+1180µm		1	%	2	4	<1	<1	
+2.36mm		1	%	1	2	<1	<1	
+4.75mm		1	%	<1	<1	<1	<1	
+9.5mm		1	%	<1	<1	<1	<1	
+19.0mm		1	%	<1	<1	<1	<1	
+37.5mm		1	%	<1	<1	<1	<1	
+75.0mm		1	%	<1	<1	<1	<1	
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 µm)		1	%	43	44	44	50	
Silt (2-60 µm)		1	%	44	36	53	34	
Sand (0.06-2.00 mm)		1	%	12	17	3	16	
Gravel (>2mm)		1	%	1	3	<1	<1	
Cobbles (>6cm)		1	%	<1	<1	<1	<1	
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.61	2.61	2.62	2.67	
G005(ED093)T: Total Metals by ICP-A	ES							
Aluminium	7429-90-5	50	mg/kg	15200	16400	15000	15300	
Iron	7439-89-6	50	mg/kg	36800	37900	35900	34900	
G020-SD: Total Metals in Sediments b	oy ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	6.65	8.12	7.45	11.6	
Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.1	<0.1	0.2	
Chromium	7440-47-3	1.0	mg/kg	31.8	37.2	33.0	38.0	
Copper	7440-50-8	1.0	mg/kg	23.9	27.1	26.2	49.4	
Lead	7439-92-1	1.0	mg/kg	14.0	14.9	14.1	61.5	
Nickel	7440-02-0	1.0	mg/kg	28.0	31.5	30.9	22.9	
Silver	7440-22-4	0.1	mg/kg	<0.1	0.1	<0.1	0.6	
Zinc	7440-66-6	1.0	mg/kg	76.8	87.3	83.6	170	
G035T: Total Recoverable Mercury b	y FIMS (Low Level)							
Mercury	7439-97-6	0.01	mg/kg	0.06	0.07	0.15	0.15	

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)  Compound  EK059G: Nitrite plus Nitrate as N (No Nitrite + Nitrate as N (Sol.)	CAS Number	Samplii LOR	Sample ID	<b>B7-1</b> 29-Aug-2022 13:40	<b>B8-3</b> 29-Aug-2022 14:30	<b>B8-1</b> 29-Aug-2022 15:10	BC-2 29-Aug-2022 15:54	Trip Blank 26-Aug-2022 00:00
EK059G: Nitrite plus Nitrate as N (No			•	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26_Aug_2022 00:00
EK059G: Nitrite plus Nitrate as N (No		LOR	44.5			20 7 tag 2022 10.10	20 / lug 2022 10.04	20-Aug-2022 00.00
			Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
	Ox) by Discrete Anal	vser - Co	ntinued					
		0.1	mg/kg	<0.1				
EK061G: Total Kjeldahl Nitrogen By	Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg	1470				
EK062: Total Nitrogen as N (TKN + N			3 3					
^ Total Nitrogen as N		20	mg/kg	1470				
			99	1410				
EK067G: Total Phosphorus as P by I Total Phosphorus as P	Discrete Analyser	2	mg/kg	892				
·			0 0					
EN68: Seawater Elutriate Testing Pro		Non-Vola	itile Organics		4/00/0000			
Seawater Sampling Date		-	-	4/09/2022	4/09/2022			
EP003: Total Organic Carbon (TOC)								ı
Total Organic Carbon		0.02	%	1.64	1.68	1.90	1.54	
EP080/071: Total Petroleum Hydroca	rbons							
C6 - C9 Fraction		10	mg/kg					<10
EP080/071: Total Recoverable Hydro	carbons - NEPM 2013	3 Fraction	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg					<10
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg					<10
(F1)								
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
EP080-SD / EP071-SD: Total Petroleu	ım Hydrocarbons							
C6 - C9 Fraction		3	mg/kg	<3				
C10 - C14 Fraction		3	mg/kg	8				
C15 - C28 Fraction		3	mg/kg	49				
C29 - C36 Fraction		5	mg/kg	63				
^ C10 - C36 Fraction (sum)		3	mg/kg	120				
EP080-SD / EP071-SD: Total Recover	rable Hydrocarbons							
C6 - C10 Fraction	C6 C10	3	mg/kg	<3				

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Samplii	ng date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
EP080-SD / EP071-SD: Total Recov	verable Hydrocarbons -	Continue	d					
>C10 - C16 Fraction		3	mg/kg	9				
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg	<3.0				
(F1)								
>C16 - C34 Fraction		3	mg/kg	93				
>C34 - C40 Fraction		5	mg/kg	35				
^ >C10 - C40 Fraction (sum)		3	mg/kg	137				
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2				
Toluene	108-88-3	0.2	mg/kg	<0.2				
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2				
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2				
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2				
^ Total Xylenes		0.5	mg/kg	<0.5				
^ Sum of BTEX		0.2	mg/kg	<0.2				
Naphthalene	91-20-3	0.2	mg/kg	<0.2				
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	1	
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	<0.5	1.1	
EP130A: Organophosphorus Pesti	cides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<12	<12	<12	
Carbophenothion	786-19-6	10	μg/kg	<12	<12	<12	<12	
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<12.0	<12.0	<12.0	
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<12	<12	<12	
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<12	<12	<12	
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<12	<12	<12	
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<12	<12	<12	
Diazinon	333-41-5	10	μg/kg	<12	<12	<12	<12	
Dichlorvos	62-73-7	10	μg/kg	<12	<12	<12	<12	
Dimethoate	60-51-5	10	μg/kg	<12	<12	<12	<12	
Ethion	563-12-2	10	μg/kg	<12	<12	<12	<12	
Fenamiphos	22224-92-6	10	μg/kg	<12	<12	<12	<12	
Fenthion	55-38-9	10	μg/kg	<12	<12	<12	<12	
Malathion	121-75-5	10	μg/kg	<12	<12	<12	<12	

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Samplii	ng date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
EP130A: Organophosphorus Pes	ticides (Ultra-trace) - Co	ntinued						
Azinphos Methyl	86-50-0	10	μg/kg	<12	<12	<12	<12	
Monocrotophos	6923-22-4	10	μg/kg	<12	<12	<12	<12	
Parathion	56-38-2	10	μg/kg	<12	<12	<12	<12	
Parathion-methyl	298-00-0	10	μg/kg	<12	<12	<12	<12	
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<12	<12	<12	
Prothiofos	34643-46-4	10	μg/kg	<12	<12	<12	<12	
EP131A: Organochlorine Pesticid	les							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
4.4`-DDE	72-55-9	0.50	μg/kg	2.44	1.41	1.90	2.51	
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.50	μg/kg	2.44	1.41	1.90	2.51	
	0-2							
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
`Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
` Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Sampli	ng date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
EP131B: Polychlorinated Biphenyls	(as Aroclors) - Contin	ued						
^ Total Polychlorinated biphenyls		5.0	μg/kg	<31.2				
Aroclor 1016	12674-11-2	5.0	μg/kg	<31.2				
Aroclor 1221	11104-28-2	5.0	μg/kg	<31.2				
Aroclor 1232	11141-16-5	5.0	μg/kg	<31.2				
Aroclor 1242	53469-21-9	5.0	μg/kg	<31.2				
Aroclor 1248	12672-29-6	5.0	μg/kg	<31.2				
Aroclor 1254	11097-69-1	5.0	μg/kg	<31.2				
Aroclor 1260	11096-82-5	5.0	μg/kg	<31.2				
EP132B: Polynuclear Aromatic Hydi	rocarbons							
Naphthalene	91-20-3	5	μg/kg	8				
2-Methylnaphthalene	91-57-6	5	μg/kg	<5				
Acenaphthylene	208-96-8	4	μg/kg	10				
Acenaphthene	83-32-9	4	μg/kg	<5				
Fluorene	86-73-7	4	μg/kg	<5				
Phenanthrene	85-01-8	4	μg/kg	12				
Anthracene	120-12-7	4	μg/kg	9				
Fluoranthene	206-44-0	4	μg/kg	38				
Pyrene	129-00-0	4	μg/kg	42				
Benz(a)anthracene	56-55-3	4	μg/kg	26				
Chrysene	218-01-9	4	μg/kg	18				
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg	31				
Benzo(k)fluoranthene	207-08-9	4	μg/kg	11				
Benzo(e)pyrene	192-97-2	4	μg/kg	20				
Benzo(a)pyrene	50-32-8	4	μg/kg	36				
Perylene	198-55-0	4	μg/kg	78				
Benzo(g.h.i)perylene	191-24-2	4	μg/kg	24				
Dibenz(a.h)anthracene	53-70-3	4	μg/kg	6				
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg	21				
Coronene	191-07-1	5	μg/kg	7				
^ Sum of PAHs		4	μg/kg	397				
^ Benzo(a)pyrene TEQ (zero)		4	μg/kg	51				
^ Benzo(a)pyrene TEQ (half LOR)		4	μg/kg	51				
^ Benzo(a)pyrene TEQ (LOR)		4	μg/kg	51				
Radionuclides / Activity								

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B7-1	B8-3	B8-1	BC-2	Trip Blank
		Sampli	ing date / time	29-Aug-2022 13:40	29-Aug-2022 14:30	29-Aug-2022 15:10	29-Aug-2022 15:54	26-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225335-011	EB2225335-012	EB2225335-013	EB2225335-014	EB2225335-015
				Result	Result	Result	Result	Result
Radionuclides / Activity - Continued								
Gross alpha		500	Bq/kg DW	860				
Gross beta		500	Bq/kg DW	520				
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%					115
Toluene-D8	2037-26-5	0.2	%					101
4-Bromofluorobenzene	460-00-4	0.2	%					108
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	83.2				
Toluene-D8	2037-26-5	0.2	%	72.5				
4-Bromofluorobenzene	460-00-4	0.2	%	78.0				
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	81.1	84.8	85.8	87.0	
EP130S: Organophosphorus Pesticide S	Surrogate							
DEF	78-48-8	10	%	80.7	94.6	81.2	94.8	
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	69.4	91.8	69.9	57.8	
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	106				
EP132T: Base/Neutral Extractable Surro								
2-Fluorobiphenyl	321-60-8	10	%	87.4				
Anthracene-d10	1719-06-8	10	%	117				
4-Terphenyl-d14	1718-51-0	10	%	90.1				

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: <b>SOIL</b> Sample ID		B4-0	B5-0	B6-2	B6-2B	B7-1		
(Matrix: SOIL)				Porewater leachates				
		Sampli	ng date / time	29-Aug-2022 00:00				
Compound	CAS Number	LOR	Unit	EB2225335-018	EB2225335-019	EB2225335-020	EB2225335-021	EB2225335-022
				Result	Result	Result	Result	Result
EN82: Porewater Extraction								
Volume		1	mL	710	710	890	690	710

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL			Sample ID	B8-3	 	 
(Matrix: SOIL)				Porewater leachates		
Sampling date / time			29-Aug-2022 00:00	 	 	
Compound	CAS Number	LOR	Unit	EB2225335-023	 	 
				Result	 	 
EN82: Porewater Extraction						
Volume		1	mL	690	 	 

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: WATER (Matrix: SOIL)			Sample ID	Elutriate Blank				
Sampling date / time			29-Aug-2022 00:00					
Compound	CAS Number	LOR	Unit	EB2225335-016				
				Result				
EN68: Seawater Elutriate Testing Pro	EN68: Seawater Elutriate Testing Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)							
Seawater Sampling Date		-	-	4/09/2022				

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BMT COMMERCIAL AUSTRALIA PTY LTD Client B23621 Port of Brisbane - Sediment Quality Project

## Surrogate Control Limits

Sub-Matrix: ELUTRIATE		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP090S: Organotin Surrogate			
Tripropyltin		24	116
Sub-Matrix: PORE WATER LEACHATE		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP090S: Organotin Surrogate			
Tripropyltin		24	116
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	14	166
Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	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
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	145
Toluene-D8	2037-26-5	42	144
4-Bromofluorobenzene	460-00-4	58	142
EP090S: Organotin Surrogate			
Tripropyltin		35	130
EP130S: Organophosphorus Pesticide	Surrogate		
DEF	78-48-8	14	102
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	119
EP131T: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	10	106
EP132T: Base/Neutral Extractable Sur	rogates		
2-Fluorobiphenyl	321-60-8	55	135
Anthracene-d10	1719-06-8	70	136
4-Terphenyl-d14	1718-51-0	57	127



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Project : B23621 Port of Brisbane - Sediment Quality



#### Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP130A: Organophosphorus Pesticides (Ultra-trace) (SOIL) EP130S: Organophosphorus Pesticide Surrogate (SOIL) EP131B: Polychlorinated Biphenyls (as Aroclors)

(SOIL) EP131T: PCB Surrogate

(SOIL) EP132B: Polynuclear Aromatic Hydrocarbons (SOIL) EP132T: Base/Neutral Extractable Surrogates

(SOIL) EP131A: Organochlorine Pesticides (SOIL) EP131S: OC Pesticide Surrogate (WATER) EP131A: Organochlorine Pesticides (WATER) EP131S: OC Pesticide Surrogate

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**





**Brisbane QLD** 

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**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 29-Aug-2022

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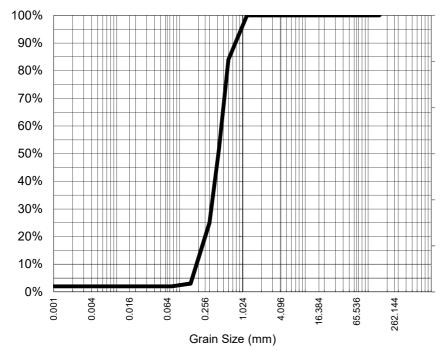
> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -

Sediment Quality

**SAMPLE ID:** B2-0

#### **Particle Size Distribution**



Analy	/sis	<b>Notes</b>
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Samples analysed as received.

Particle Size (mm)	% Passing
1.18	100%
0.600	84%
0.425	52%
0.300	25%
0.150	3%
0.075	2%
Particle Size (microns)	
56	2%
39	2%
28	2%
20	2%
14	2%
10	2%
7	2%
5	2%
1	2%

0.416 Median Particle Size (mm)\*

9-Sep-22

**Analysed:** 

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

AS1289.3.6.3 states that hydrometer analysis is not applicable for **Sample Comments:** 

samples containing <10% fines (<75um). Results should be

assessed accordingly

**Loss on Pretreatment** NA

**Sample Description:** 

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.69

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**Dispersion Method** Shaker

**Limit of Reporting: 1%** 

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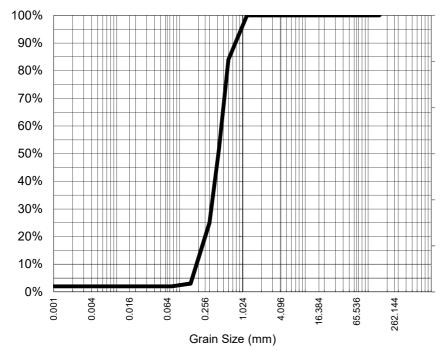
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B2-0

Sediment Quality

#### **Particle Size Distribution**



Analy	/sis	<b>Notes</b>
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Samples analysed as received.

Particle Size (mm)	% Passing
· /	Ŭ
1.18	100%
0.600	84%
0.425	52%
0.300	25%
0.150	3%
0.075	2%
Particle Size (microns)	
56	2%
39	2%
28	2%
20	2%
14	2%
10	2%
7	2%
5	2%
1	2%

Median Particle Size (mm)*	0.416
Median Particle Size (mm)*	0.416

**Limit of Reporting: 1%** 

9-Sep-22

**Analysed:** 

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

AS1289.3.6.3 states that hydrometer analysis is not applicable for **Sample Comments:** 

samples containing <10% fines (<75um). Results should be

assessed accordingly

**Loss on Pretreatment** NA

**Sample Description:** 

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.69

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**Dispersion Method** Shaker

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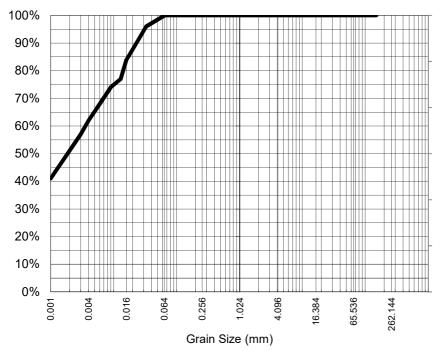
Spring Hill Brisbane Qld

PROJECT: B23621 Port of Brisbane -

Sediment Quality

**SAMPLE ID**: B4-4

#### **Particle Size Distribution**



Analy	vsis N	lotes
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Samples analysed as received.

Particle Size (mm)	% Passing
Particle Size (microns)	
46	98%
33	96%
23	90%
16	84%
13	77%
9	74%
6	68%
4	62%
1	41%

Median Particle Size (mm)\* <0.006

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.66

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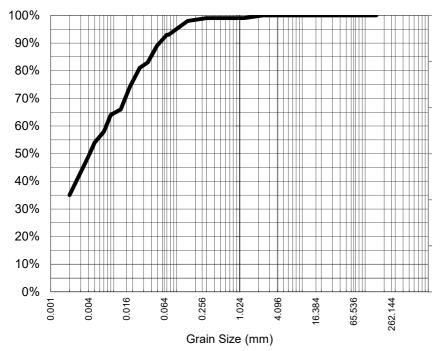
Spring Hill

Brisbane Qld

PROJECT: B23621 Port of Brisbane - SAMPLE ID: B4-0

Sediment Quality

#### **Particle Size Distribution**



Analysis Notes
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Samples analysed as received.

Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	93%
Particle Size (microns)	
49	89%
35	83%
26	81%
18	74%
13	66%
9	64%
7	58%
5	54%
2	35%

Median Particle Size (mm)\* <0.007

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.47

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#### **Brisbane QLD**

**SAMPLE ID:** 

B5-0

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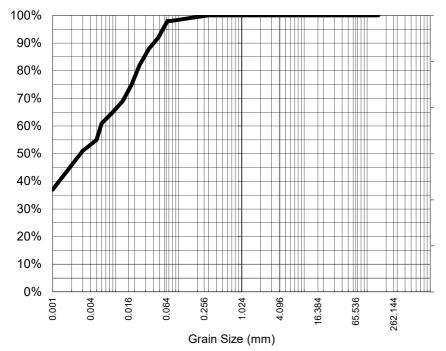
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PROJECT: B23621 Port of Brisbane -

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.300	100%
0.150	99%
0.075	98%
Particle Size (microns)	
48	92%
34	88%
24	82%
18	75%
13	69%
9	65%
6	61%
5	55%
1	37%

Median Particle Size (mm)*	< 0.006

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.55

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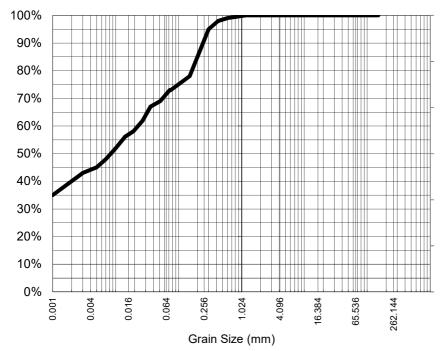
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B5-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

-	•
Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	98%
0.300	95%
0.150	78%
0.075	73%
Particle Size (microns)	
51	69%
36	67%
27	62%
19	58%
14	56%
10	52%
7	48%
5	45%
1	35%

0.009 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.51

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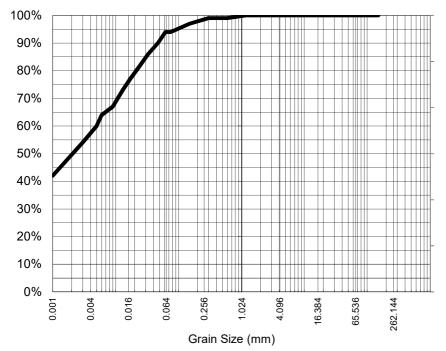
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PROJECT: B23621 Port of Brisbane - SAMPLE ID: B5-1b

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	٠
Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	97%
0.075	94%
Particle Size (microns)	
47	90%
33	86%
23	81%
17	77%
13	73%
9	67%
6	64%
5	60%
1	42%

Median Particle Size (mm)\* <0.006

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.63

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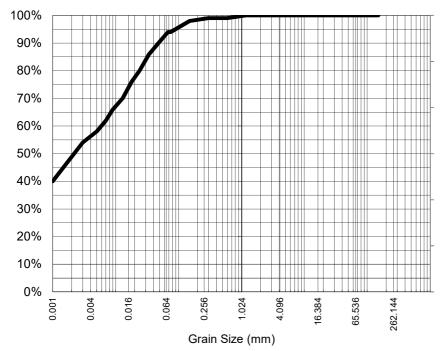
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Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B5-1c

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	94%
Particle Size (microns)	
48	90%
34	86%
24	80%
18	76%
13	70%
9	66%
7	62%
5	58%
1	40%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.51

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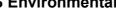
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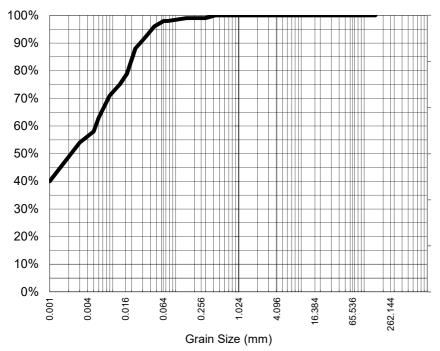
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> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** 

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	T
Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	99%
0.075	98%
Particle Size (microns)	
46	96%
33	92%
23	88%
17	79%
13	75%
9	71%
6	63%
5	58%
1	40%

B6-3

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.67

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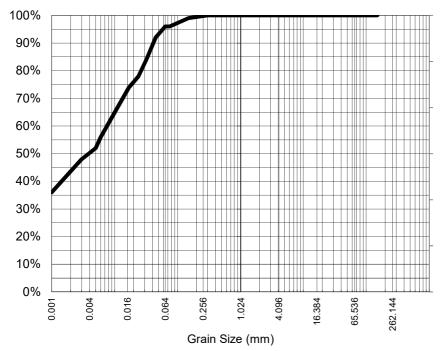
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Brisbane Qld **PROJECT:** 

B23621 Port of Brisbane -**SAMPLE ID:** B6-2

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	_
Particle Size (mm)	% Passing
0.300	100%
0.150	99%
0.075	96%
Particle Size (microns)	
45	92%
32	84%
24	78%
17	74%
12	68%
9	63%
6	56%
5	52%
1	36%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.7

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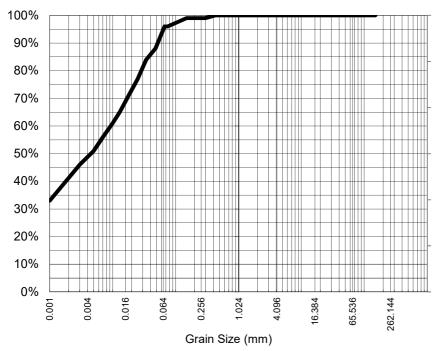
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Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B6-2b

Sediment Quality

#### **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	99%
0.075	96%
Particle Size (microns)	
48	88%
34	84%
25	77%
18	71%
13	65%
10	61%
7	56%
5	51%
1	33%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.57

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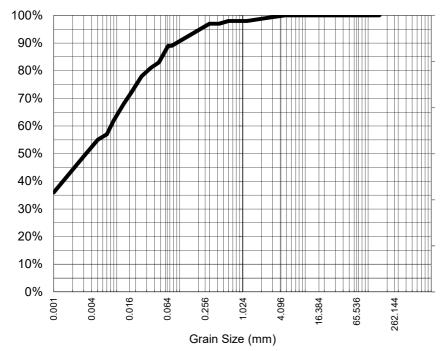
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Spring Hill Brisbane Qld

PROJECT: B23621 Port of Brisbane - SAMPLE ID: B7-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	•
Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	98%
0.425	97%
0.300	97%
0.150	93%
0.075	89%
Particle Size (microns)	
47	83%
35	81%
25	78%
17	72%
13	68%
9	62%
7	57%
5	55%
1	36%

Median Particle Size (mm)\* <0.007

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.61

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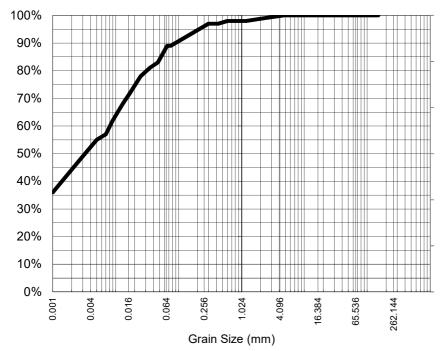
Spring Hill

Brisbane Qld

PROJECT: B23621 Port of Brisbane - SAMPLE ID: B7-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	98%
0.425	97%
0.300	97%
0.150	93%
0.075	89%
Particle Size (microns)	
47	83%
35	81%
25	78%
17	72%
13	68%
9	62%
7	57%
5	55%
1	36%

Median Particle Size (mm)\* <0.007

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.61

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**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225335-012 / PSD

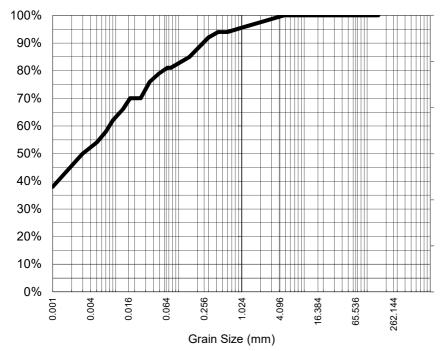
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B8-3

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	_
Particle Size (mm)	% Passing
4.75	100%
2.36	98%
1.18	96%
0.600	94%
0.425	94%
0.300	92%
0.150	85%
0.075	81%
Particle Size (microns)	
49	79%
35	76%
25	70%
17	70%
13	66%
9	62%
7	58%
5	54%
1	38%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.61

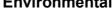
NATA Accreditation: 825 Site: Brisbane

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.



ALS Laboratory Group Pty Ltd 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**







CLIENT: BRADHILES DATE REPORTED: 13-Sep-2022

**COMPANY:** BMT COMMERCIAL **DATE RECEIVED**: 29-Aug-2022

AUSTRALIA PTY LTD

ADDRESS: Po Box 203 REPORT NO: EB2225335-014 / PSD

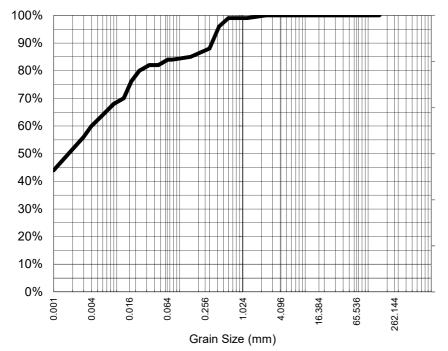
Spring Hill

Brisbane Qld

PROJECT: B23621 Port of Brisbane - SAMPLE ID: BC-2

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	96%
0.300	88%
0.150	85%
0.075	84%
Particle Size (microns)	
46	82%
33	82%
23	80%
17	76%
13	70%
9	68%
6	64%
4	60%
1	44%

Median Particle Size (mm)\* <0.006

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments: 9-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.67

NATA Accreditation: 825 Site: Brisbane
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Satish Trivedi
Soil Senior Chemist

**Authorised Signatory** 

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**





DATE REPORTED: 13-Sep-2022 **CLIENT: BRADHILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 29-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225335-013 / PSD

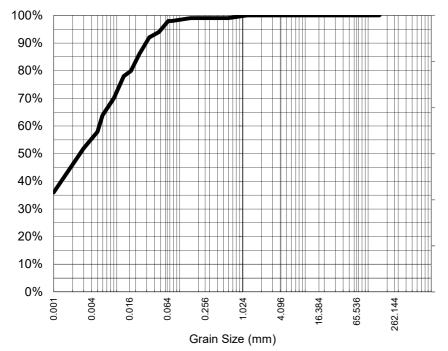
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B8-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	99%
0.075	98%
Particle Size (microns)	
47	94%
33	92%
23	86%
17	80%
13	78%
9	70%
6	64%
5	58%
1	36%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 9-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.62

NATA Accreditation: 825 Site: Brisbane This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.





### **CERTIFICATE OF ANALYSIS**

**Work Order** : EB2225490 Page : 1 of 38

Amendment : 2

Client Laboratory BMT COMMERCIAL AUSTRALIA PTY LTD : Environmental Division Brisbane

Contact : Mr BRAD HILES Contact : Kimberly Hilton-Barber

Address Address : 2 Byth Street Stafford QLD Australia 4053 : PO BOX 203 SPRING HILL

**BRISBANE QLD 4004** 

Telephone **Project** B23621 Port of Brisbane - Sediment Quality **Date Samples Received** : 30-Aug-2022 17:29

Order number C-O-C number

Sampler : BRAD HILES

Site

Quote number : BN/016/19

No. of samples received : 26 No. of samples analysed : 25 Telephone : +61-7-3243 7222

Date Analysis Commenced : 01-Sep-2022

Issue Date : 07-Oct-2022 12:49



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Layla Hafner	Acid Sulphate Soils - Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Morgan Lennox	Senior Organic Chemist	Brisbane Organics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane External Subcontracting, Stafford, QLD

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Work Order : EB2225490 Amendment 2

Client : BMT COMMERCIAL AUSTRALIA PTY LTD
Project : B23621 Port of Brisbane - Sediment Quality



#### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.
- EP090-Organotin: Sample 'B15-2' shows poor matrix spike recovery for MBT due to matrix interference.
- EP090S-Organotin: High surrogate recovery for sample 'Elutriate Water Blank' deemed acceptable as all associated analyte results are less than LOR.
- EA150H: Soil particle density results fell outside the scope of AS1289.3.6.3. Results should be scrutinised accordingly.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP131A: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080-SD: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP131B: LOR is raised due to high amount of moistures is present.
- EP132B-SD: LOR is raised due to high amount of moistures is present.
- EP130: LOR for sample raised due to the high amount of moisture present.
- Specialised Organics analysis is conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (30/9/2022): This report has been amended and re-released to allow the reporting of additional analytical data, B15-1-ALS Sample 3, B11-5-ALS sample 6, B11-8- ALS Sample 7, B10-6b-ALS Sample 9, B10-6-ALS Sample 10, B11-9-ALS sample 11, B11-9b ALS Sample 12 & B10-5 ALS Sample 14 Have had EG005-SDH Nickel to be reported.
- Amendment (07/10/2022): This report has been amended and re-released to allow the reporting of additional analytical data, specifically method EA055: Moisture for sample B12-2, B10-8, B11-9c (004, 008, 013).
- EP131B: Particular samples required dilution due to sample matrix. LOR values have been adjusted accordingly.
- EG005T (Total Metals by ICP-AES): EB2225342-001 shows poor matrix spike recovery due to sample heterogeneity. This has been confirmed by visual inspection.
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- 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.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2287148. NATA and CAI accreditations' are both recognised under ILAC.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

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Work Order EB2225490 Amendment 2

Client : BMT COMMERCIAL AUSTRALIA PTY LTD B23621 Port of Brisbane - Sediment Quality

Project



• EN68: This analysis in accordance with National Ocean Disposal Guidelines, Commonwealth of Australia, 2002 - (modified). Results reported are those determined on a 1:4 sediment/seawater elutriate without blank correction.

• EG093: Samples containing high levels of sulfate may precipitate barium under the acidic conditions of this method and may therefore bias results low.

: 4 of 38 : EB2225490 Amendment 2 Work Order

BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	Elutriate Water Blank	B12-1 Elutriate	B11-8 Elutriate	B10-8 Elutriate	B10-6b Elutriate
		Sampli	ng date / time	30-Aug-2022 00:00	30-Aug-2022 09:12	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225490-018	EB2225490-019	EB2225490-020	EB2225490-021	EB2225490-022
				Result	Result	Result	Result	Result
EP090: Organotin Compounds (Solu	ıble)							
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	<2	<2
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-BHC	319-84-6	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-BHC	319-85-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	319-86-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDD	72-54-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDE	72-55-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDT	50-29-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Dieldrin	60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin	72-20-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	53494-70-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Heptachlor	76-44-8	0.005	μg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
gamma-BHC	58-89-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Methoxychlor	72-43-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Total Chlordane (sum)		0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Oxychlordane	27304-13-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
EP090S: Organotin Surrogate								
Tripropyltin		5	%	150	66.6	87.0	45.4	80.6
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.010	%	81.9	92.7	92.4	79.8	86.5

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	B10-6 Elutriate	B11-9 Elutriate	B11-9b Elutriate	B10-5 Elutriate	
		Sampli	ng date / time	30-Aug-2022 11:05	30-Aug-2022 13:13	30-Aug-2022 12:32	30-Aug-2022 13:13	
Compound	CAS Number	LOR	Unit	EB2225490-023	EB2225490-024	EB2225490-025	EB2225490-026	
				Result	Result	Result	Result	
EP090: Organotin Compounds (Solu	ible)							
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	<2	
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
alpha-BHC	319-84-6	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
beta-BHC	319-85-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
delta-BHC	319-86-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
4.4`-DDD	72-54-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
4.4`-DDE	72-55-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
4.4`-DDT	50-29-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Dieldrin	60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
^ Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Endrin	72-20-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Endrin ketone	53494-70-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Heptachlor	76-44-8	0.005	μg/L	<0.005	<0.005	<0.005	<0.005	
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
gamma-BHC	58-89-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Methoxychlor	72-43-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
^ Total Chlordane (sum)		0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
Oxychlordane	27304-13-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	
EP090S: Organotin Surrogate								
Tripropyltin		5	%	69.2	54.3	62.4	68.9	
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.010	%	83.8	96.4	71.4	90.3	

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



tub-Matrix: PORE WATER LEACHATE Matrix: WATER)			Sample ID	B12-1	B11-8	B10-8	B10-6b	B10-6
•		Samplii	ng date / time	30-Aug-2022 09:12	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:0
Compound	CAS Number	LOR	Unit	EB2225490-005	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
•				Result	Result	Result	Result	Result
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
EG093T: Total Metals in Saline Water	by ORC-ICPMS							
Nickel	7440-02-0	0.5	μg/L	1.8	0.8	8.6	2.9	2.3
EP090: Organotin Compounds (Solul	ble)							
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	<2	<2
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-BHC	319-84-6	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-BHC	319-85-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	319-86-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDD	72-54-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDE	72-55-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
4.4`-DDT	50-29-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
	0-2							
Dieldrin	60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
`Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin	72-20-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	53494-70-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Heptachlor	76-44-8	0.005	μg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
gamma-BHC	58-89-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Methoxychlor	72-43-5	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
` Total Chlordane (sum)		0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Oxychlordane	27304-13-8	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	<0.010	<0.010

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: PORE WATER LEACHATE (Matrix: WATER)	trix: WATER)			B12-1	B11-8	B10-8	B10-6b	B10-6
		Sampli	ng date / time	30-Aug-2022 09:12	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-005	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EP090S: Organotin Surrogate - Continued								
Tripropyltin		5	%	33.0	51.3	39.2	53.5	44.8
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.010	%	88.1	89.2	97.9	97.0	99.5

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: PORE WATER LEACHATE (Matrix: WATER)			Sample ID	B11-9	B11-9b	B10-5	 
(		Samplii	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 13:13	 
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-014	 
				Result	Result	Result	 
EG035T: Total Mercury by FIMS							
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	 
EG093T: Total Metals in Saline Water			J				
Nickel	7440-02-0	0.5	μg/L	8.2	12.5	20.6	 
EP090: Organotin Compounds (Solu			P-3				
Tributyltin	56573-85-4	2	ngSn/L	<2	<2	<2	 
	30373-63-4		11gOII/E	<b>72</b>		12	 
EP131A: Organochlorine Pesticides	000.00	0.010	ug/l	<0.010	<0.010	<0.010	I
Aldrin	309-00-2	0.010	μg/L				 
alpha-BHC	319-84-6	0.010	μg/L	<0.010	<0.010	<0.010	 
beta-BHC	319-85-7	0.010	μg/L	<0.010	<0.010	<0.010	 
delta-BHC	319-86-8	0.010	μg/L	<0.010	<0.010	<0.010	 
4.4`-DDD	72-54-8	0.010	μg/L	<0.010	<0.010	<0.010	 
4.4`-DDE	72-55-9	0.010	μg/L	<0.010	<0.010	<0.010	 
4.4`-DDT	50-29-3	0.010	μg/L	<0.010	<0.010	<0.010	 
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.010	μg/L	<0.010	<0.010	<0.010	 
	0-2						
Dieldrin	60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	 
alpha-Endosulfan	959-98-8	0.010	μg/L	<0.010	<0.010	<0.010	 
beta-Endosulfan	33213-65-9	0.010	μg/L	<0.010	<0.010	<0.010	 
Endosulfan sulfate	1031-07-8	0.010	μg/L	<0.010	<0.010	<0.010	 
^ Endosulfan (sum)	115-29-7	0.010	μg/L	<0.010	<0.010	<0.010	 
Endrin	72-20-8	0.010	μg/L	<0.010	<0.010	<0.010	 
Endrin aldehyde	7421-93-4	0.010	μg/L	<0.010	<0.010	<0.010	 
Endrin ketone	53494-70-5	0.010	μg/L	<0.010	<0.010	<0.010	 
Heptachlor	76-44-8	0.005	μg/L	<0.005	<0.005	<0.005	 
Heptachlor epoxide	1024-57-3	0.010	μg/L	<0.010	<0.010	<0.010	 
Hexachlorobenzene (HCB)	118-74-1	0.010	μg/L	<0.010	<0.010	<0.010	 
gamma-BHC	58-89-9	0.010	μg/L	<0.010	<0.010	<0.010	 
Methoxychlor	72-43-5	0.010	μg/L	<0.010	<0.010	<0.010	 
cis-Chlordane	5103-71-9	0.010	μg/L	<0.010	<0.010	<0.010	 
trans-Chlordane	5103-74-2	0.010	μg/L	<0.010	<0.010	<0.010	 
^ Total Chlordane (sum)		0.010	μg/L	<0.010	<0.010	<0.010	 
Oxychlordane	27304-13-8	0.010	μg/L	<0.010	<0.010	<0.010	 
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.010	μg/L	<0.010	<0.010	<0.010	 
EP090S: Organotin Surrogate	355 55 2.55 61 1		. 0				

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: PORE WATER LEACHATE (Matrix: WATER)	Sample ID			B11-9	B11-9b	B10-5	 
		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 13:13	 
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-014	 
				Result	Result	Result	 
EP090S: Organotin Surrogate - Continued							
Tripropyltin		5	%	49.8	35.6	40.8	 
EP131S: OC Pesticide Surrogate							
Dibromo-DDE	21655-73-2	0.010	%	90.2	99.3	102	 

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
(Watrix. SOIL)		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
Compound	CAS Nullibel	LOIK		Result	Result	Result	Result	Result
EA020 At all Massurements				Nesuit	rvesuit	Nesuit	resuit	Nesuit
EA029-A: pH Measurements pH KCI (23A)		0.1	pH Unit	9.0	9,2			8.3
pH OX (23B)		0.1	pH Unit	8.6	8.8			6.2
		0.1	prionit	0.0	0.0			0.2
EA029-B: Acidity Trail		2	mala III. / A	<2	<2			<2
Titratable Actual Acidity (23F)			mole H+ / t					
Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	<2			10
Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2	<2			10
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S	<0.020	<0.020			<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)		0.020	% pyrite S	<0.020	<0.020			<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S	<0.020	<0.020			<0.020
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S	0.051	0.064			0.082
Peroxide Sulfur (23De)		0.020	% S	0.180	0.155			0.424
Peroxide Oxidisable Sulfur (23E)		0.020	% S	0.130	0.091			0.342
acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t	81	57			214
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca	0.176	0.195			0.295
Peroxide Calcium (23Wh)		0.020	% Ca	0.803	3.40			0.318
Acid Reacted Calcium (23X)		0.020	% Ca	0.626	3.21			0.024
acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	313	1600			12
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S	0.501	2.56			<0.020
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg	0.081	0.068			0.251
Peroxide Magnesium (23Tm)		0.020	% Mg	0.149	0.077			0.300
Acid Reacted Magnesium (23U)		0.020	% Mg	0.068	<0.020			0.050
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	56	<10			41
sulfidic - Acid Reacted Magnesium		0.020	% S	0.090	<0.020			0.065
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	city							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3	1.68	7.41			
acidity - Excess Acid Neutralising		10	mole H+ / t	335	1480			
Capacity (a-23Q)								
sulfidic - Excess Acid Neutralising		0.020	% S	0.536	2.37			
Capacity (s-23Q)								

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
			•	Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capa	city - Continued							
EA029-H: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5			1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02			0.12
Net Acidity (acidity units)		10	mole H+ / t	<10	<10			78
Liming Rate		1	kg CaCO3/t	<1	<1			6
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.13	0.09			0.34
Net Acidity excluding ANC (acidity units)		10	mole H+/t	81	57			214
Liming Rate excluding ANC		1	kg CaCO3/t	6	4			16
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit	9.0	9.2			8.3
Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2			<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02			<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S	0.140	0.139			0.351
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	87	87			219
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3	3.25	16.4			1.71
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t	649	3290			342
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S	1.04	5.27			0.55
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-	1.5	1.5			1.5
Net Acidity (sulfur units)		0.02	% S	<0.02	<0.02			<0.02
Net Acidity (acidity units)		10	mole H+/t	<10	<10			<10
Liming Rate		1	kg CaCO3/t	<1	<1			<1
Net Acidity excluding ANC (sulfur units)		0.02	% S	0.14	0.14			0.35
Net Acidity excluding ANC (acidity units)		10	mole H+/t	87	87			219
Liming Rate excluding ANC		1	kg CaCO3/t	6	6			16
EA055: Moisture Content (Dried @ 105-11	10°C)							
Moisture Content		1.0	%	33.6	31.3	59.4	66.2	53.4
EA150: Particle Sizing								
+75µm		1	%	73	84	14	7	9

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
·············		Samplii	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
				Result	Result	Result	Result	Result
EA150: Particle Sizing - Continued								
+150µm		1	%	66	82	6	2	2
+300µm		1	%	14	62	2	<1	1
+425µm		1	%	6	34	<1	<1	1
+600µm		1	%	3	23	<1	<1	<1
+1180µm		1	%	2	18	<1	<1	<1
+2.36mm		1	%	2	13	<1	<1	<1
+4.75mm		1	%	1	5	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 µm)		1	%	17	10	54	58	37
Silt (2-60 µm)		1	%	9	5	30	35	52
Sand (0.06-2.00 mm)		1	%	72	70	16	7	11
Gravel (>2mm)		1	%	2	15	<1	<1	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.73	2.65	2.72	2.81	2.45
G005(ED093)-SDH: 1M HCI-Extractabl	e Metals by ICPAE	S						
Nickel	7440-02-0	1.0	mg/kg			7.6		
G005(ED093)T: Total Metals by ICP-A	ES							
Aluminium	7429-90-5	50	mg/kg	8270	11400	19600	18500	15200
Iron	7439-89-6	50	mg/kg	22100	28100	45200	41200	39800
G020-SD: Total Metals in Sediments b	ov ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	6.99	5.30	8.84	8.89	7.18
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Chromium	7440-47-3	1.0	mg/kg	19.4	23.1	38.6	35.7	33.7
Copper	7440-50-8	1.0	mg/kg	6.4	8.4	29.4	24.1	32.4
Lead	7439-92-1	1.0	mg/kg	5.4	5.9	20.0	15.7	22.8
Nickel	7440-02-0	1.0	mg/kg	12.4	14.4	28.2	27.3	27.3
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	0.2
Zinc	7440-66-6	1.0	mg/kg	33.7	34.2	99.8	87.8	113

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ing date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercu	ry by FIMS (Low Level)	) - Continu	ued					
Mercury	7439-97-6	0.01	mg/kg	0.01	0.02	0.08	0.08	0.70
EK059G: Nitrite plus Nitrate as N (	NOx) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg	0.1	0.2			<0.1
EK061G: Total Kjeldahl Nitrogen B	y Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg	280	290			1160
EK062: Total Nitrogen as N (TKN +	NOx)							
^ Total Nitrogen as N		20	mg/kg	280	290			1160
EK067G: Total Phosphorus as P by	v Discrete Analyser							•
Total Phosphorus as P		2	mg/kg	334	242			706
EN82: Porewater Extraction								
Volume		1	mL					710
EP003: Total Organic Carbon (TOC	t) in Soil							
Total Organic Carbon		0.02	%	0.30	0.26	1.47	1.60	1.83
EP080-SD / EP071-SD: Total Petrole								
C6 - C9 Fraction		3	mg/kg	<3	<3			<3
C10 - C14 Fraction		3	mg/kg	<3	<3			7
C15 - C28 Fraction		3	mg/kg	6	7			49
C29 - C36 Fraction		5	mg/kg	5	6			56
^ C10 - C36 Fraction (sum)		3	mg/kg	11	13			112
EP080-SD / EP071-SD: Total Recov	verable Hydrocarbons							
C6 - C10 Fraction	C6 C10	3	mg/kg	<3	<3			<3
>C10 - C16 Fraction		3	mg/kg	<3	<3			10
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0			<3.0
(F1)								
>C16 - C34 Fraction		3	mg/kg	10	10			84
>C34 - C40 Fraction		5	mg/kg	<5	<5			33
^ >C10 - C40 Fraction (sum)		3	mg/kg	10	10			127
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2			<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2			<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2			<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2			<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2			<0.2
^ Total Xylenes		0.5	mg/kg	<0.5	<0.5			<0.5

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
^ Sum of BTEX		0.2	mg/kg	<0.2	<0.2			<0.2
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2			<0.2
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	0.6	<0.5	1.0
EP130A: Organophosphorus Pestici	des (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<10	<10	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<10	<10	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<10.0	<10.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<10	<10	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<10	<10	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<10	<10	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<10	<10	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<10	<10	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<10	<10	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<10	<10	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<10	<10	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<10	<10	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<10	<10	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<10	<10	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<10	<10	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<10	<10	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<10	<10	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<10	<10	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<10	<10	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<10	<10	<12	<12	<12
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	μg/kg	<0.50	<0.50	2.36	<0.50	4.83

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
•				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticio	des - Continued							
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.50	μg/kg	<0.50	<0.50	2.36	<0.50	4.83
	0-2							
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
`Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
` Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphen	vis (as Arociors)							
\ Total Polychlorinated biphenyls		5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1016	12674-11-2	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1221	11104-28-2	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1232	11141-16-5	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1242	53469-21-9	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1248	12672-29-6	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1254	11097-69-1	5.0	μg/kg	<15.6	<15.6			<31.2
Aroclor 1260	11096-82-5	5.0	μg/kg	<15.6	<15.6			<31.2
EP132B: Polynuclear Aromatic H								
Naphthalene	91-20-3	5	μg/kg	<5	<5			10
2-Methylnaphthalene	91-57-6	5	μg/kg	<5	<5			7
Acenaphthylene	208-96-8	4	μg/kg	<4	<4			42
Acenaphthene	83-32-9	4	μg/kg	<4	<4			6

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hyd	rocarbons - Continued							
Fluorene	86-73-7	4	μg/kg	<4	<4			10
Phenanthrene	85-01-8	4	μg/kg	5	<4			46
Anthracene	120-12-7	4	μg/kg	<4	<4			31
Fluoranthene	206-44-0	4	μg/kg	8	7			145
Pyrene	129-00-0	4	μg/kg	8	7			157
Benz(a)anthracene	56-55-3	4	μg/kg	4	<4			90
Chrysene	218-01-9	4	μg/kg	<4	<4			80
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg	4	<4			105
Benzo(k)fluoranthene	207-08-9	4	μg/kg	<4	<4			57
Benzo(e)pyrene	192-97-2	4	μg/kg	<4	<4			75
Benzo(a)pyrene	50-32-8	4	μg/kg	6	<4			120
Perylene	198-55-0	4	μg/kg	31	44			292
Benzo(g.h.i)perylene	191-24-2	4	μg/kg	4	<4			88
Dibenz(a.h)anthracene	53-70-3	4	μg/kg	<4	<4			21
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg	<4	<4			73
Coronene	191-07-1	5	μg/kg	<5	<5			22
Sum of PAHs		4	μg/kg	70	58			1480
Benzo(a)pyrene TEQ (zero)		4	μg/kg	7	<4			175
Benzo(a)pyrene TEQ (half LOR)		4	μg/kg	9	5			175
Benzo(a)pyrene TEQ (LOR)		4	μg/kg	12	10			175
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW	<500	<500			560
Gross beta		500	Bq/kg DW	<500	<500			550
P080-SD: TPH(V)/BTEX Surrogate:	s							
1.2-Dichloroethane-D4	17060-07-0	0.2	%	86.4	82.6			82.0
Toluene-D8	2037-26-5	0.2	%	74.1	72.0			72.5
4-Bromofluorobenzene	460-00-4	0.2	%	80.2	77.7			74.9
P090S: Organotin Surrogate								
Tripropyltin		0.5	%	102	81.3	65.2	78.0	69.2
P130S: Organophosphorus Pestic	ide Surrogate							
DEF	78-48-8	10	%	68.2	67.2	86.9	85.5	58.4
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	73.1	85.6	142	118	119
EP131T: PCB Surrogate	21000 10 2							1 1 1 1

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B15-3	B15-2	B15-1	B12-2	B12-1
		Sampli	ng date / time	30-Aug-2022 08:01	30-Aug-2022 08:14	30-Aug-2022 08:41	30-Aug-2022 08:57	30-Aug-2022 09:12
Compound	CAS Number	LOR	Unit	EB2225490-001	EB2225490-002	EB2225490-003	EB2225490-004	EB2225490-005
				Result	Result	Result	Result	Result
EP131T: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.5	%	62.5	68.8			90.6
EP132T: Base/Neutral Extractable Sur	ogates							
2-Fluorobiphenyl	321-60-8	10	%	80.8	85.4			108
Anthracene-d10	1719-06-8	10	%	94.3	104			110
4-Terphenyl-d14	1718-51-0	10	%	83.0	84.8			111

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
(Widdin GOIL)		Sampli	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
Compound	OAS Number			Result	Result	Result	Result	Result
EA029-A: pH Measurements				result	result	result	roout	rtodut
pH KCI (23A)		0.1	pH Unit		8.5		8.5	8.6
pH OX (23B)		0.1	pH Unit		6.6		7.2	7.6
EA029-B: Acidity Trail			pri sim				<del>.</del>	
Titratable Actual Acidity (23F)		2	mole H+ / t		<2		<2	<2
Titratable Peroxide Acidity (23G)		2	mole H+ / t		<2		<2	<2
Titratable Sulfidic Acidity (23H)		2	mole H+ / t		<2		<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S		<0.020		<0.020	<0.020
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S		<0.020		<0.020	<0.020
(s-23G)		0.020	70 pyrito G		10.020		10.020	10.020
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S		<0.020		<0.020	<0.020
EA029-C: Sulfur Trail			. ,					
KCI Extractable Sulfur (23Ce)		0.020	% S		0.140		0.119	0.107
Peroxide Sulfur (23De)		0.020	% S		0.581		0.402	0.521
Peroxide Oxidisable Sulfur (23E)		0.020	% S		0.441		0.283	0.414
acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t	****	275		176	258
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca		0.315		0.310	0.296
Peroxide Calcium (23Wh)		0.020	% Ca		0.677		0.598	0.997
Acid Reacted Calcium (23X)		0.020	% Ca		0.362		0.288	0.701
acidity - Acid Reacted Calcium (a-23X)		10	mole H+/t		181		144	350
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S		0.290		0.231	0.561
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg		0.235		0.243	0.203
Peroxide Magnesium (23Tm)		0.020	% Mg		0.316		0.318	0.338
Acid Reacted Magnesium (23U)		0.020	% Mg		0.081		0.075	0.136
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t		67		62	111
sulfidic - Acid Reacted Magnesium		0.020	% S		0.107		0.099	0.179
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	city							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3		0.647		0.962	1.31
acidity - Excess Acid Neutralising		10	mole H+/t		129		192	261
Capacity (a-23Q)								
sulfidic - Excess Acid Neutralising		0.020	% S		0.207		0.308	0.418
Capacity (s-23Q)								

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Sampli	ing date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capa	city - Continued							
EA029-H: Acid Base Accounting								
ANC Fineness Factor		0.5	-		1.5		1.5	1.5
Net Acidity (sulfur units)		0.02	% S		<0.02		<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t		<10		<10	<10
Liming Rate		1	kg CaCO3/t		<1		<1	<1
Net Acidity excluding ANC (sulfur units)		0.02	% S		0.44		0.28	0.41
Net Acidity excluding ANC (acidity units)		10	mole H+ / t		275		176	258
Liming Rate excluding ANC		1	kg CaCO3/t		21		13	19
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit		8.5		8.5	8.6
Titratable Actual Acidity (23F)		2	mole H+ / t		<2		<2	<2
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S		<0.02		<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S		0.472		0.306	0.352
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+/t		295		191	220
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3		2.38		2.12	2.74
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t		475		424	548
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S		0.76		0.68	0.88
EA033-E: Acid Base Accounting								
ANC Fineness Factor		0.5	-		1.5		1.5	1.5
Net Acidity (sulfur units)		0.02	% S		<0.02		<0.02	<0.02
Net Acidity (acidity units)		10	mole H+ / t		<10		<10	<10
Liming Rate		1	kg CaCO3/t		<1		<1	<1
Net Acidity excluding ANC (sulfur units)		0.02	% S		0.47		0.31	0.35
Net Acidity excluding ANC (acidity units)		10	mole H+ / t		295		191	220
Liming Rate excluding ANC		1	kg CaCO3/t		22		14	16
EA055: Moisture Content (Dried @ 105-11	10°C)							
Moisture Content		1.0	%	66.3	54.3	63.8	63.4	59.5
EA150: Particle Sizing								
+75µm		1	%	3	18	7	24	30

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
·		Sampli	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
•				Result	Result	Result	Result	Result
EA150: Particle Sizing - Continued								
+150µm		1	%	2	11	3	11	18
+300µm		1	%	<1	7	2	2	4
+425µm		1	%	<1	5	1	<1	2
+600µm		1	%	<1	3	<1	<1	1
+1180µm		1	%	<1	1	<1	<1	<1
+2.36mm		1	%	<1	<1	<1	<1	<1
+4.75mm		1	%	<1	<1	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 µm)		1	%	58	47	55	44	45
Silt (2-60 μm)		1	%	38	32	38	31	25
Sand (0.06-2.00 mm)		1	%	4	20	7	25	30
Gravel (>2mm)		1	%	<1	1	<1	<1	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.60	2.52	2.69	2.56	2.66
G005(ED093)-SDH: 1M HCI-Extractable	e Metals by ICPAE	S						
Nickel	7440-02-0		mg/kg	11.8	7.0		9.0	6.9
G005(ED093)T: Total Metals by ICP-Al	ES							
Aluminium	7429-90-5	50	mg/kg	25400	18900	18600	21800	17100
Iron	7439-89-6	50	mg/kg	55200	44900	41800	49800	40000
G020-SD: Total Metals in Sediments b	y ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	6.02	8.86	7.66	8.12	6.93
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	43.8	39.4	34.5	44.0	34.9
Copper	7440-50-8	1.0	mg/kg	30.4	29.3	24.3	33.2	27.6
Lead	7439-92-1	1.0	mg/kg	13.1	20.3	14.6	20.2	19.0
Nickel	7440-02-0	1.0	mg/kg	45.7	29.3	28.6	34.2	26.9
Silver	7440-22-4	0.1	mg/kg	<0.1	0.2	<0.1	0.1	0.1
	7440-66-6	1.0	mg/kg	95.1	106	86.4	113	96.6

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Sampli	ing date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercui	ry by FIMS (Low Level)	) - Continu	ued					
Mercury	7439-97-6	0.01	mg/kg	0.05	0.10	0.06	0.09	0.08
EK059G: Nitrite plus Nitrate as N (I	NOx) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg		<0.1		<0.1	<0.1
EK061G: Total Kjeldahl Nitrogen By	y Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg		1420		1130	1130
EK062: Total Nitrogen as N (TKN +	NOx)							
^ Total Nitrogen as N		20	mg/kg		1420		1130	1130
EK067G: Total Phosphorus as P by	/ Discrete Analyser							•
Total Phosphorus as P		2	mg/kg		685		840	734
EN82: Porewater Extraction								
Volume		1	mL		650	710	850	730
EP003: Total Organic Carbon (TOC	) in Soil							
Total Organic Carbon		0.02	%	1.71	1.46	1.57	1.17	1.32
EP080-SD / EP071-SD: Total Petrole								
C6 - C9 Fraction		3	mg/kg		<3		<3	<3
C10 - C14 Fraction		3	mg/kg		4		<3	5
C15 - C28 Fraction		3	mg/kg		27		6	27
C29 - C36 Fraction		5	mg/kg		27		9	31
^ C10 - C36 Fraction (sum)		3	mg/kg		58		15	63
EP080-SD / EP071-SD: Total Recov	erable Hydrocarbons							
C6 - C10 Fraction	C6 C10	3	mg/kg		<3		<3	<3
>C10 - C16 Fraction		3	mg/kg		5		<3	5
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg		<3.0		<3.0	<3.0
(F1)								
>C16 - C34 Fraction		3	mg/kg		45		12	48
>C34 - C40 Fraction		5	mg/kg		16		6	20
^ >C10 - C40 Fraction (sum)		3	mg/kg		66		18	73
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg		<0.2		<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg		<0.2		<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg		<0.2		<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg		<0.2		<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg		<0.2		<0.2	<0.2
^ Total Xylenes		0.5	mg/kg		<0.5		<0.5	<0.5

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Sampli	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
^ Sum of BTEX		0.2	mg/kg		<0.2		<0.2	<0.2
Naphthalene	91-20-3	0.2	mg/kg		<0.2		<0.2	<0.2
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	<0.5	0.6	5.8
EP130A: Organophosphorus Pesti	cides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<12	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<12	<12	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<12.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<12	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<12	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<12	<12	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<12	<12	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<12	<12	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<12	<12	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<12	<12	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<12	<12	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<12	<12	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<12	<12	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<12	<12	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<12	<12	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<12	<12	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<12	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<12	<12	<12	<12	<12
EP131A: Organochlorine Pesticide	s							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	μg/kg	2.86	<0.50	1.10	<0.50	0.96

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Sampli	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticio	des - Continued							
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.50	μg/kg	2.86	<0.50	1.10	<0.50	0.96
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphen	vis (as Arociors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1016	12674-11-2	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1221	11104-28-2	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1232	11141-16-5	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1242	53469-21-9	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1248	12672-29-6	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1254	11097-69-1	5.0	μg/kg		<31.2		<31.2	<31.2
Aroclor 1260	11096-82-5	5.0	μg/kg		<31.2		<31.2	<31.2
EP132B: Polynuclear Aromatic H								
Naphthalene	91-20-3	5	μg/kg		10		17	10
2-Methylnaphthalene	91-57-6	5	μg/kg		6		10	<5
Acenaphthylene	208-96-8	4	μg/kg		22		33	11
Acenaphthene	83-32-9	4	μg/kg		<5		7	<5

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Sampli	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydi	ocarbons - Continued							
Fluorene	86-73-7	4	μg/kg		6		12	<5
Phenanthrene	85-01-8	4	μg/kg		26		47	14
Anthracene	120-12-7	4	μg/kg		18		32	12
Fluoranthene	206-44-0	4	μg/kg		63		114	40
Pyrene	129-00-0	4	μg/kg		73		122	45
Benz(a)anthracene	56-55-3	4	μg/kg		55		89	30
Chrysene	218-01-9	4	μg/kg		40		73	21
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg		58		100	32
Benzo(k)fluoranthene	207-08-9	4	μg/kg		32		40	16
Benzo(e)pyrene	192-97-2	4	μg/kg		41		71	23
Benzo(a)pyrene	50-32-8	4	μg/kg		72		121	39
Perylene	198-55-0	4	μg/kg		71		238	148
Benzo(g.h.i)perylene	191-24-2	4	μg/kg		50		84	26
Dibenz(a.h)anthracene	53-70-3	4	μg/kg		12		22	7
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg		42		70	22
Coronene	191-07-1	5	μg/kg		12		20	6
Sum of PAHs		4	μg/kg		709		1320	502
Benzo(a)pyrene TEQ (zero)		4	μg/kg		104		174	56
Benzo(a)pyrene TEQ (half LOR)		4	μg/kg		104		174	56
Benzo(a)pyrene TEQ (LOR)		4	μg/kg		104		174	56
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW		<500		720	1080
Gross beta		500	Bq/kg DW		520		<500	560
P080-SD: TPH(V)/BTEX Surrogates								•
1.2-Dichloroethane-D4	17060-07-0	0.2	%		76.0		94.2	81.4
Toluene-D8	2037-26-5	0.2	%		66.1		83.7	71.1
4-Bromofluorobenzene	460-00-4	0.2	%		77.9		87.1	77.0
P090S: Organotin Surrogate								
Tripropyltin		0.5	%	70.8	85.6	75.4	83.2	85.4
P130S: Organophosphorus Pestici								
DEF	78-48-8	10	%	72.4	50.1	56.7	69.3	67.7
<del></del> -	70-40-0		,0	· =	55.1	55.7	33.3	<b>3</b> 1.11
EP131S: OC Pesticide Surrogate Dibromo-DDE	24055 72 2	0.50	%	79.6	95.8	65.9	82.4	69.2
שטייטווט-טטב	21655-73-2	0.50	70	79.0	35.0	65.8	02.4	09.4

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-5	B11-8	B10-8	B10-6b	B10-6
		Samplii	ng date / time	30-Aug-2022 09:40	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00	30-Aug-2022 11:05
Compound	CAS Number	LOR	Unit	EB2225490-006	EB2225490-007	EB2225490-008	EB2225490-009	EB2225490-010
				Result	Result	Result	Result	Result
EP131T: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.5	%		75.0		68.8	56.2
EP132T: Base/Neutral Extractable Su	ırrogates							
2-Fluorobiphenyl	321-60-8	10	%		98.3		87.1	79.8
Anthracene-d10	1719-06-8	10	%		112		112	93.6
4-Terphenyl-d14	1718-51-0	10	%		79.0		77.2	87.1

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
,				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCI (23A)		0.1	pH Unit					8.3
pH OX (23B)		0.1	pH Unit					7.2
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		2	mole H+ / t					<2
Titratable Peroxide Acidity (23G)		2	mole H+ / t					<2
Titratable Sulfidic Acidity (23H)		2	mole H+ / t					<2
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S					<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)		0.020	% pyrite S					<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S					<0.020
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S					0.054
Peroxide Sulfur (23De)		0.020	% S					0.172
Peroxide Oxidisable Sulfur (23E)		0.020	% S					0.117
acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t					73
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca					0.318
Peroxide Calcium (23Wh)		0.020	% Ca					0.692
Acid Reacted Calcium (23X)		0.020	% Ca					0.374
acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t					187
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S					0.299
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg					0.222
Peroxide Magnesium (23Tm)		0.020	% Mg					0.291
Acid Reacted Magnesium (23U)		0.020	% Mg					0.068
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t					56
sulfidic - Acid Reacted Magnesium		0.020	% S					0.090
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	ity							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3					1.55
acidity - Excess Acid Neutralising Capacity (a-23Q)		10	mole H+ / t					311
sulfidic - Excess Acid Neutralising		0.020	% S					0.497
Capacity (s-23Q)					<u> </u>	1	1	

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ing date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capa	city - Continued							
EA029-H: 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					0.12
Net Acidity excluding ANC (acidity units)		10	mole H+/t					73
Liming Rate excluding ANC		1	kg CaCO3/t					5
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit					8.3
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					0.099
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t					62
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3					2.48
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t					495
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S					0.79
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					0.10
Net Acidity excluding ANC (acidity units)		10	mole H+ / t					62
Liming Rate excluding ANC		1	kg CaCO3/t					5
EA055: Moisture Content (Dried @ 105-1	10°C)							
Moisture Content		1.0	%	66.0	67.0	63.9	64.3	51.2
EA150: Particle Sizing								
+75µm		1	%	5	4	5	4	8

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
Madixi SSIL)		Samplii	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
A150: Particle Sizing - Continued								
+150µm		1	%	2	1	1	2	7
+300µm		1	%	<1	<1	<1	<1	6
+425µm		1	%	<1	<1	<1	<1	3
+600µm		1	%	<1	<1	<1	<1	1
+1180µm		1	%	<1	<1	<1	<1	<1
+2.36mm		1	%	<1	<1	<1	<1	<1
+4.75mm		1	%	<1	<1	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	rticle Size							
Clay (<2 µm)		1	%	46	50	50	43	36
Silt (2-60 µm)		1	%	47	46	44	51	55
Sand (0.06-2.00 mm)		1	%	7	4	6	6	9
Gravel (>2mm)		1	%	<1	<1	<1	<1	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.43	2.52	2.53	2.48	2.44
G005(ED093)-SDH: 1M HCI-Extractabl	e Metals by ICPAE	s						
Nickel	7440-02-0	1.0	mg/kg	7.8	7.7		14.2	12.1
G005(ED093)T: Total Metals by ICP-A	ES							
Aluminium	7429-90-5	50	mg/kg	16900	21400	15400	19500	18400
Iron	7439-89-6	50	mg/kg	40300	48400	34100	44700	47600
G020-SD: Total Metals in Sediments b	ov ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	8.42	7.32	7.63	7.06	3.31
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	33.5	39.7	30.8	36.8	38.4
Copper	7440-50-8	1.0	mg/kg	25.4	27.8	20.2	24.7	25.6
Lead	7439-92-1	1.0	mg/kg	15.3	14.6	12.7	13.5	8.8
Nickel	7440-02-0	1.0	mg/kg	27.9	37.5	23.2	32.4	46.5
Silver	7440-22-4	0.1	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	1.0	mg/kg	89.3	92.4	72.6	83.9	75.1

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Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
(		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
•				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercury	y by FIMS (Low Level)	) - Continu	ıed					
Mercury	7439-97-6	0.01	mg/kg	0.07	0.06	0.05	0.06	0.04
EK059G: Nitrite plus Nitrate as N (N	Ox) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg					<0.1
EK061G: Total Kjeldahl Nitrogen By	Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg					1150
EK062: Total Nitrogen as N (TKN + N	(Ox)							
^ Total Nitrogen as N		20	mg/kg					1150
EK067G: Total Phosphorus as P by	Discrete Analyser							
Total Phosphorus as P		2	mg/kg					824
EN82: Porewater Extraction								
Volume		1	mL	680	690		720	
EP003: Total Organic Carbon (TOC)								
Total Organic Carbon (100)		0.02	%	1.73	1.65	1.70	1.86	1.67
		0.02	70	11.7	1100		1.00	1101
EP080-SD / EP071-SD: Total Petrolet C6 - C9 Fraction		3	mg/kg					<3
C10 - C14 Fraction		3	mg/kg					5
C15 - C28 Fraction		3	mg/kg					22
C29 - C36 Fraction		5	mg/kg					33
^ C10 - C36 Fraction (sum)		3	mg/kg					60
EP080-SD / EP071-SD: Total Recove			gg					
C6 - C10 Fraction	C6_C10	3	mg/kg					<3
>C10 - C16 Fraction		3	mg/kg					5
C6 - C10 Fraction minus BTEX	C6 C10-BTEX	3.0	mg/kg					<3.0
(F1)	55_510 B1EX							
>C16 - C34 Fraction		3	mg/kg					44
>C34 - C40 Fraction		5	mg/kg					19
^ >C10 - C40 Fraction (sum)		3	mg/kg					68
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg					<0.2
Toluene	108-88-3	0.2	mg/kg					<0.2
Ethylbenzene	100-41-4	0.2	mg/kg					<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg					<0.2
ortho-Xylene	95-47-6	0.2	mg/kg					<0.2
^ Total Xylenes		0.5	mg/kg					<0.5

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
^ Sum of BTEX		0.2	mg/kg					<0.2
Naphthalene	91-20-3	0.2	mg/kg					<0.2
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	0.8	0.5	<0.5	<0.5	<0.5
EP130A: Organophosphorus Pestici	des (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<12	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<12	<12	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<12.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<12	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<12	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<12	<12	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<12	<12	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<12	<12	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<12	<12	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<12	<12	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<12	<12	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<12	<12	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<12	<12	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<12	<12	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<12	<12	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<12	<12	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<12	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<12	<12	<12	<12	<12
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	μg/kg	1.54	1.46	0.83	2.09	4.67

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticio	des - Continued							
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.50	μg/kg	1.54	1.46	0.83	2.09	4.67
	0-2							
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphen	vis (as Arociors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg					<31.2
Aroclor 1016	12674-11-2	5.0	μg/kg					<31.2
Aroclor 1221	11104-28-2	5.0	μg/kg					<31.2
Aroclor 1232	11141-16-5	5.0	μg/kg					<31.2
Aroclor 1242	53469-21-9	5.0	μg/kg					<31.2
Aroclor 1248	12672-29-6	5.0	μg/kg					<31.2
Aroclor 1254	11097-69-1	5.0	μg/kg					<31.2
Aroclor 1260	11096-82-5	5.0	μg/kg					<31.2
EP132B: Polynuclear Aromatic H								
Naphthalene	91-20-3	5	μg/kg					8
2-Methylnaphthalene	91-57-6	5	μg/kg					<5
Acenaphthylene	208-96-8	4	μg/kg					8
Acenaphthene	83-32-9	4	μg/kg μg/kg					<5

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ing date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hyd	rocarbons - Continued							
Fluorene	86-73-7	4	μg/kg					<5
Phenanthrene	85-01-8	4	μg/kg					9
Anthracene	120-12-7	4	μg/kg					6
Fluoranthene	206-44-0	4	μg/kg					20
Pyrene	129-00-0	4	μg/kg					22
Benz(a)anthracene	56-55-3	4	μg/kg					18
Chrysene	218-01-9	4	μg/kg					13
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg					19
Benzo(k)fluoranthene	207-08-9	4	μg/kg					7
Benzo(e)pyrene	192-97-2	4	μg/kg					14
Benzo(a)pyrene	50-32-8	4	μg/kg					23
Perylene	198-55-0	4	μg/kg					66
Benzo(g.h.i)perylene	191-24-2	4	μg/kg					16
Dibenz(a.h)anthracene	53-70-3	4	μg/kg					6
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg					15
Coronene	191-07-1	5	μg/kg					<5
Sum of PAHs		4	μg/kg					270
` Benzo(a)pyrene TEQ (zero)		4	μg/kg					35
Benzo(a)pyrene TEQ (half LOR)		4	μg/kg					35
Benzo(a)pyrene TEQ (LOR)		4	μg/kg					35
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW					550
Gross beta		500	Bq/kg DW					<500
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%					88.8
Toluene-D8	2037-26-5	0.2	%					79.0
4-Bromofluorobenzene	460-00-4	0.2	%					84.2
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	82.7	87.6	90.6	82.1	82.3
EP130S: Organophosphorus Pestic	ide Surrogate							
DEF	78-48-8	10	%	76.4	69.9	67.9	85.2	83.9
EP131S: OC Pesticide Surrogate	70-40-0					2.13		
Dibromo-DDE	21655-73-2	0.50	%	85.6	71.3	91.8	108	104
DIDIOINO-DDE	21000-73-2	3.00	70	00.0	71.5	31.0	100	104

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	B11-9	B11-9b	B11-9c	B10-5	B9-1
		Sampli	ng date / time	30-Aug-2022 12:08	30-Aug-2022 12:32	30-Aug-2022 12:53	30-Aug-2022 13:13	30-Aug-2022 14:00
Compound	CAS Number	LOR	Unit	EB2225490-011	EB2225490-012	EB2225490-013	EB2225490-014	EB2225490-015
				Result	Result	Result	Result	Result
EP131T: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.5	%					81.2
EP132T: Base/Neutral Extractable Surro	ogates							
2-Fluorobiphenyl	321-60-8	10	%					90.7
Anthracene-d10	1719-06-8	10	%					112
4-Terphenyl-d14	1718-51-0	10	%					82.6

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL			Sample ID	Trip blank	B12-1	B11-8	B10-8	B10-6b
(Matrix: SOIL)					Elutriate	Elutriate	Elutriate	Elutriate
		Sampli	ng date / time	30-Aug-2022 14:00	30-Aug-2022 09:12	30-Aug-2022 10:00	30-Aug-2022 10:29	30-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2225490-016	EB2225490-019	EB2225490-020	EB2225490-021	EB2225490-022
				Result	Result	Result	Result	Result
EN68: Seawater Elutriate Testing Pr	ocedure - Inorganics	Non-Vola	tile Organics	(Glass Vessel)				
Seawater Sampling Date		-	-		4/09/2022	4/09/2022	4/09/2022	4/09/2022
EP080/071: Total Petroleum Hydroc	arbons							
C6 - C9 Fraction		10	mg/kg	<10				
EP080/071: Total Recoverable Hydro	ocarbons - NEPM 201	3 Fraction	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10				
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10				
(F1)								
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				
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	109				
Toluene-D8	2037-26-5	0.2	%	99.0				
4-Bromofluorobenzene	460-00-4	0.2	%	106				

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: SOIL			Sample ID	B10-6	B11-9	B11-9b	B10-5		
(Matrix: SOIL)				Elutriate	Elutriate	Elutriate	Elutriate		
	Samplii	ng date / time	30-Aug-2022 11:05	30-Aug-2022 13:13	30-Aug-2022 12:32	30-Aug-2022 13:13			
Compound	CAS Number	LOR	Unit	EB2225490-023	EB2225490-024	EB2225490-025	EB2225490-026		
				Result	Result	Result	Result		
EN68: Seawater Elutriate Testing Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)									
Seawater Sampling Date		-	-	4/09/2022	4/09/2022	4/09/2022	4/09/2022		

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: WATER (Matrix: SOIL)			Sample ID	Elutriate Water Blank	 	 
	Samplii	ng date / time	30-Aug-2022 00:00	 	 	
Compound	CAS Number	LOR	Unit	EB2225490-018	 	 
				Result	 	 
EN68: Seawater Elutriate Testing Proceed	dure - Inorganics	/Non-Vola	tile Organics	(Glass Vessel)		
Seawater Sampling Date		-	-	4/09/2022	 	 

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: ELUTRIATE		Recovery I	Limits (%)
Compound	CAS Number	Low	High
EP090S: Organotin Surrogate			
Tripropyltin		24	116
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	14	166
Sub-Matrix: PORE WATER LEACHATE		Recovery I	Limits (%)
Compound	CAS Number	Low	High
EP090S: Organotin Surrogate			
Tripropyltin		24	116
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	14	166
Sub-Matrix: <b>SOIL</b>		Recovery I	Limits (%)
Compound	CAS Number	Low	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
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	145
Toluene-D8	2037-26-5	42	144
4-Bromofluorobenzene	460-00-4	58	142
EP090S: Organotin Surrogate			
Tripropyltin		35	130
EP130S: Organophosphorus Pesticide Surroga	te		
DEF	78-48-8	14	102
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



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Work Order : EB2225490 Amendment 2

Client : BMT COMMERCIAL AUSTRALIA PTY LTD
Project : B23621 Port of Brisbane - Sediment Quality



#### Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP131A: Organochlorine Pesticides (WATER) EP131S: OC Pesticide Surrogate

(SOIL) EP130A: Organophosphorus Pesticides (Ultra-trace) (SOIL) EP130S: Organophosphorus Pesticide Surrogate

(SOIL) EP131A: Organochlorine Pesticides (SOIL) EP131S: OC Pesticide Surrogate

(SOIL) EP131B: Polychlorinated Biphenyls (as Aroclors)

(SOIL) EP131T: PCB Surrogate

(SOIL) EP132B: Polynuclear Aromatic Hydrocarbons (SOIL) EP132T: Base/Neutral Extractable Surrogates

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**



### **Brisbane QLD**

DATE REPORTED: 16-Sep-2022 **CLIENT: BRAD HILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225490-001 / PSD

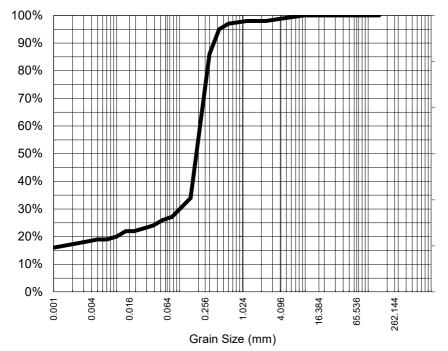
> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -

Sediment Quality

#### **SAMPLE ID:** B15-3

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	1
Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	98%
1.18	98%
0.600	97%
0.425	95%
0.300	86%
0.150	34%
0.075	27%
Particle Size (microns)	
54	26%
38	24%
27	23%
19	22%
14	22%
10	20%
7	19%
5	19%
1	16%

Median Particle Size (mm)*	0.196
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Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.73

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**



#### **Brisbane QLD**

DATE REPORTED: 16-Sep-2022 **CLIENT: BRAD HILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225490-001DUP / PSD

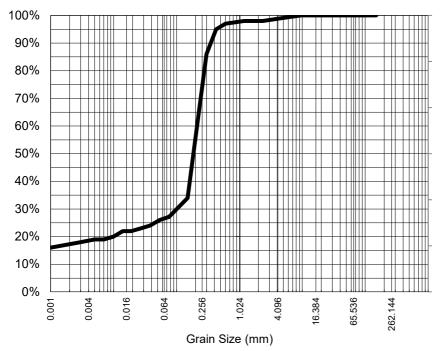
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B15-3

Sediment Quality

#### **Particle Size Distribution**



Analy	/sis	<b>Notes</b>
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Samples analysed as received.

Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	98%
1.18	98%
0.600	97%
0.425	95%
0.300	86%
0.150	34%
0.075	27%
Particle Size (microns)	
54	26%
38	24%
27	23%
19	22%
14	22%
10	20%
7	19%
5	19%
1	16%

0.196 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.73

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**



#### **Brisbane QLD**

DATE REPORTED: 16-Sep-2022 **CLIENT: BRAD HILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

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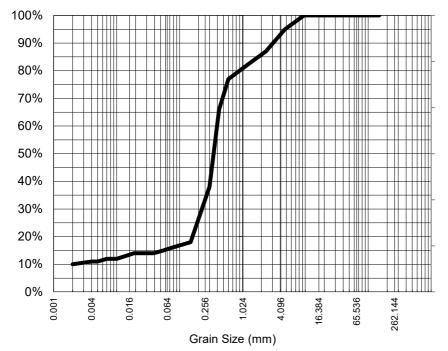
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B15-2

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
9.50	100%
4.75	95%
2.36	87%
1.18	82%
0.600	77%
0.425	66%
0.300	38%
0.150	18%
0.075	16%
Particle Size (microns)	
55	15%
39	14%
27	14%
19	14%
14	13%
10	12%
7	12%
5	11%
2	10%

Median Particle Size (mm)*	0.354
iviedian Farticle Size (IIIIII)	0.554

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.65

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#### **ALS Environmental**



#### **Brisbane QLD**

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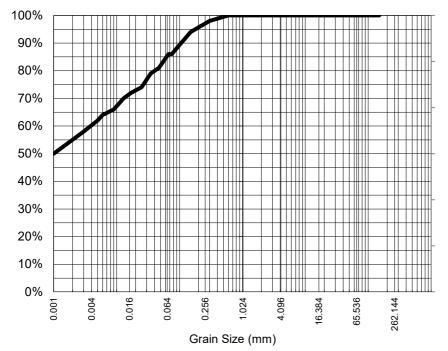
Spring Hill

Brisbane Qld **PROJECT:** B23621 Port of Brisbane -

**SAMPLE ID:** B15-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	98%
0.150	94%
0.075	86%
Particle Size (microns)	
47	81%
35	79%
25	74%
17	72%
13	70%
9	66%
6	64%
5	62%
1	50%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.72

NATA Accreditation: 825 Site: Brisbane

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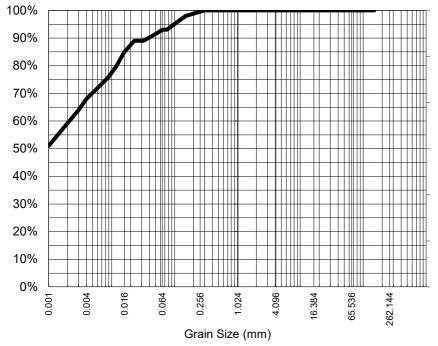
Spring Hill

Brisbane Qld **PROJECT:** 

B23621 Port of Brisbane -**SAMPLE ID:** B12-2

Sediment Quality

#### **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

-	•
Particle Size (mm)	% Passing
0.300	100%
0.150	98%
0.075	93%
Particle Size (microns)	
46	91%
32	89%
23	89%
16	85%
12	80%
9	76%
6	72%
4	68%
1	51%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.81

NATA Accreditation: 825 Site: Brisbane

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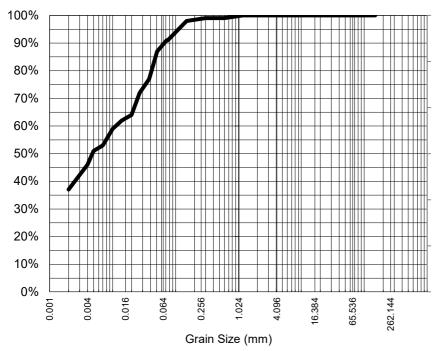
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B12-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

\* Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	99%
0.150	98%
0.075	91%
Particle Size (microns)	
51	87%
38	77%
27	72%
20	64%
14	62%
10	59%
7	53%
5	51%
2	37%

Median Particle Size (mm)*	< 0.007
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**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.45

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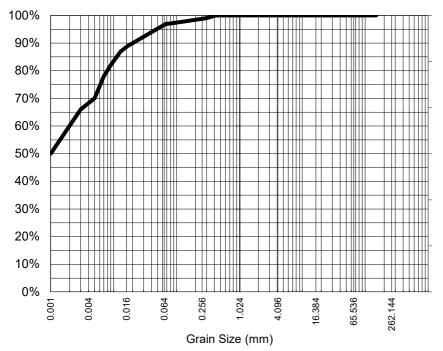
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B11-5

Sediment Quality

#### **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	98%
0.075	97%
Particle Size (microns)	
48	95%
34	93%
24	91%
17	89%
13	87%
9	82%
7	78%
5	70%
1	50%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.6

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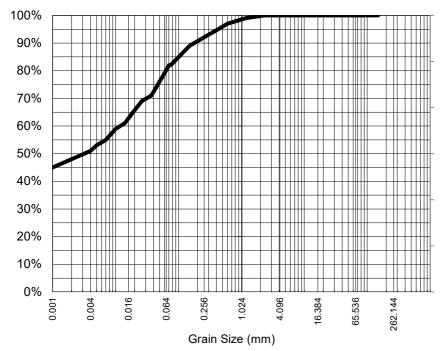
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B11-8

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	97%
0.425	95%
0.300	93%
0.150	89%
0.075	82%
Particle Size (microns)	
53	77%
37	71%
26	69%
19	65%
14	61%
10	59%
7	55%
5	53%
1	45%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.52

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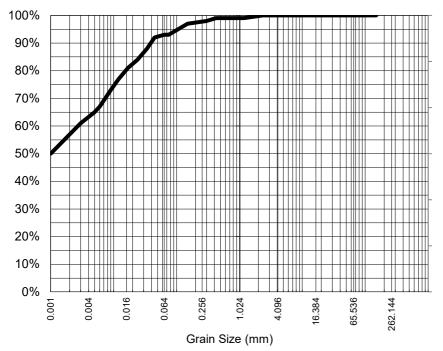
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B10-8

Sediment Quality

#### **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

Destisle Cies (sees)	0/ Danaina
Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	99%
0.300	98%
0.150	97%
0.075	93%
Particle Size (microns)	
45	92%
34	88%
24	84%
17	81%
12	77%
9	73%
6	67%
5	65%
1	50%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.69

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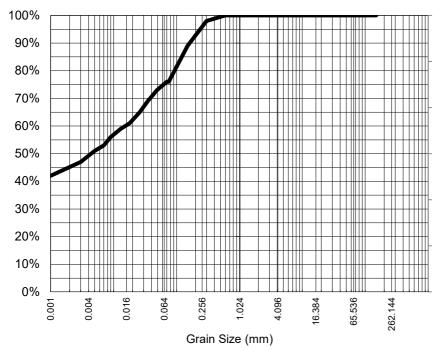
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B10-6b

Sediment Quality

#### **Particle Size Distribution**



Analy	vsis N	lotes
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Samples analysed as received.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	98%
0.150	89%
0.075	76%
Particle Size (microns)	
49	73%
35	69%
26	65%
18	61%
13	59%
9	56%
7	53%
5	51%
1	42%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.56

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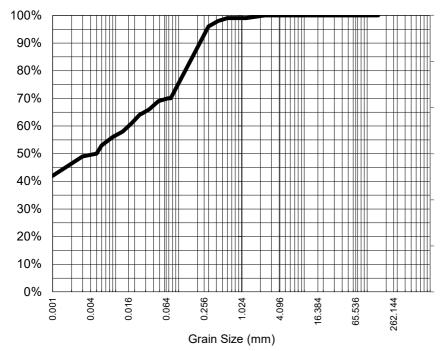
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B10-6

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

	_
Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	98%
0.300	96%
0.150	83%
0.075	70%
Particle Size (microns)	
48	69%
34	66%
24	64%
18	61%
13	58%
9	56%
6	53%
5	50%
1	42%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.66

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#### **ALS Environmental**

#### **Brisbane QLD**



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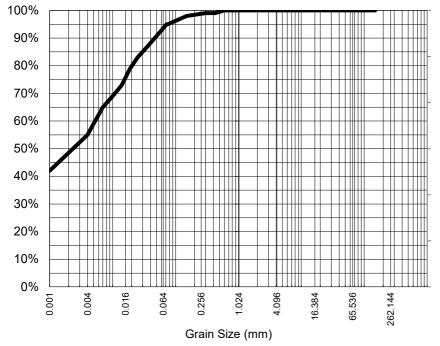
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B11-9

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

\* Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	99%
0.150	98%
0.075	95%
Particle Size (microns)	
51	91%
36	87%
25	83%
19	79%
14	73%
10	69%
7	65%
5	59%
1	42%

Median Particle Size (mm)*	< 0.007
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**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.43 (2.45)\*

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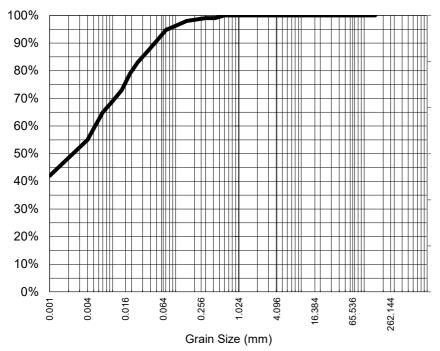
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B11-9

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	99%
0.150	98%
0.075	95%
Particle Size (microns)	
51	91%
36	87%
25	83%
19	79%
14	73%
10	69%
7	65%
5	59%
1	42%

Median Particle Size (mm)*	< 0.007
----------------------------	---------

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.43 (2.45)\*

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<sup>\*</sup> Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results

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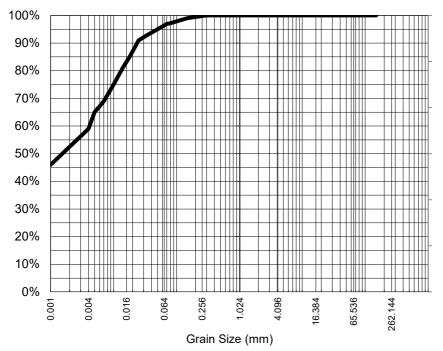
> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -

Sediment Quality

**SAMPLE ID:** B11-9b

### **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

-	•
Particle Size (mm)	% Passing
	†
0.300	100%
0.150	99%
0.075	97%
Particle Size (microns)	
50	95%
35	93%
25	91%
18	85%
14	81%
10	75%
7	69%
5	65%
1	46%

Median Particle Size (mm)*	< 0.007
----------------------------	---------

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.52

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**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

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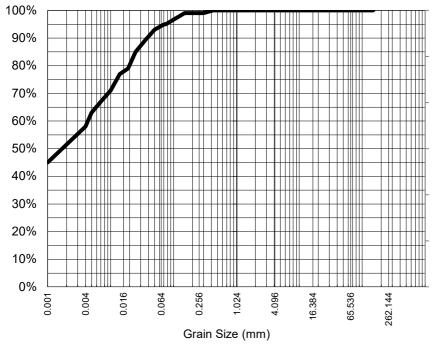
> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -

Sediment Quality

**SAMPLE ID:** B11-9c

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	99%
0.075	95%
Particle Size (microns)	
50	93%
35	89%
25	85%
19	79%
14	77%
10	71%
7	67%
5	63%
1	45%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.53

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**





DATE REPORTED: 16-Sep-2022 **CLIENT: BRAD HILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225490-014 / PSD

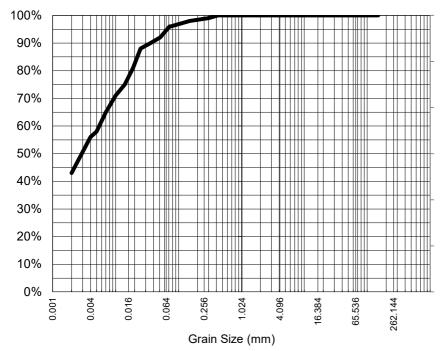
> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -

Sediment Quality

#### **SAMPLE ID:** B10-5

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	98%
0.075	96%
Particle Size (microns)	
51	92%
36	90%
25	88%
19	81%
14	75%
10	71%
7	65%
5	58%
2	43%

< 0.007 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.48

NATA Accreditation: 825 Site: Brisbane

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**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

#### **ALS Environmental**



#### **Brisbane QLD**

**CLIENT: BRAD HILES** DATE REPORTED: 16-Sep-2022

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 30-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS:** Po Box 203 **REPORT NO:** EB2225490-015 / PSD

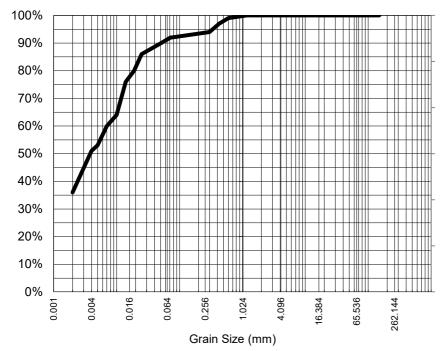
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B9-1

Sediment Quality

#### **Particle Size Distribution**



#### **Analysis Notes**

Samples analysed as received.

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	97%
0.300	94%
0.150	93%
0.075	92%
Particle Size (microns)	
51	90%
36	88%
25	86%
19	80%
14	76%
10	64%
7	60%
5	53%
2	36%

Median Particle Size (mm	1)*	< 0.007	
Median Failible Size (IIIII	1)	~U.UU1	

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.44 (2.45)\*

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

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<sup>\*</sup> Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results



### **CERTIFICATE OF ANALYSIS**

**Work Order** : EB2225704 Page : 1 of 23

Amendment : 1

Client Laboratory BMT COMMERCIAL AUSTRALIA PTY LTD : Environmental Division Brisbane

Contact : Mr BRAD HILES Contact : Kimberly Hilton-Barber

Address Address : 2 Byth Street Stafford QLD Australia 4053 : PO BOX 203 SPRING HILL

**BRISBANE QLD 4004** 

Telephone Telephone Project B23621 Port of Brisbane - Sediment Quality **Date Samples Received** 

Order number C-O-C number

Sampler : BRAD HILES

Site

Quote number : BN/016/19

No. of samples received : 15 No. of samples analysed : 15

: +61-7-3243 7222 : 31-Aug-2022 16:39 Date Analysis Commenced : 02-Sep-2022 : 04-Oct-2022 16:58 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, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full

Issue Date

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
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Layla Hafner	Acid Sulphate Soils - Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Morgan Lennox	Senior Organic Chemist	Brisbane Organics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane External Subcontracting, Stafford, QLD

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Work Order : EB2225704 Amendment 1

Client : BMT COMMERCIAL AUSTRALIA PTY LTD
Project : B23621 Port of Brisbane - Sediment Quality



#### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.
- EP090-Organotin: Sample 'RF6' shows poor matrix spike recovery for MBT due to matrix interference.
- EA150H: Soil particle density results fell outside the scope of AS1289.3.6.3. Results should be scrutinised accordingly.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP080-SD: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP131A: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP130: LOR sample raised due to the high amount of moisture present.
- Specialty Organics analysis is conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- EP132B-SD: Poor duplicate precision due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (27/9/2022): This report has been amended and re-released to allow the reporting of additional analytical data, B13-9 ALS sample 6, B13-5 ALS sample 10, B13-4 ALS sample 11
   & B13-4b ALS sample 12 EGOO5-SDH for Nickel to be reported.
- EP131B: Particular samples required dilution due to sample matrix. LOR values have been adjusted accordingly.
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria. or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- 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.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2288233. NATA and CAI accreditations' are both recognised under ILAC.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	RF2	RF6	RF3	RF7	RF4
		Sampli	ng date / time	31-Aug-2022 08:10	31-Aug-2022 08:31	31-Aug-2022 08:54	31-Aug-2022 09:19	31-Aug-2022 09:45
Compound	CAS Number	LOR	Unit	EB2225704-001	EB2225704-002	EB2225704-003	EB2225704-004	EB2225704-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-11	10°C)							
Moisture Content		0.1	%	62.1	51.8	68.4	65.2	52.5
EA150: Particle Sizing								
+75μm		1	%	1	19	<1	1	28
+150µm		1	%	1	13	<1	<1	23
+300µm		1	%	<1	8	<1	<1	12
+425µm		1	%	<1	5	<1	<1	6
+600µm		1	%	<1	3	<1	<1	3
+1180µm		1	%	<1	2	<1	<1	2
+2.36mm		1	%	<1	1	<1	<1	<1
+4.75mm		1	%	<1	<1	<1	<1	<1
+9.5mm		1	%	<1	<1	<1	<1	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Parti	icle Size							
Clay (<2 µm)		1	%	68	51	55	61	50
Silt (2-60 µm)		1	%	31	29	43	38	21
Sand (0.06-2.00 mm)		1	%	1	19	2	1	28
Gravel (>2mm)		1	%	<1	1	<1	<1	1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.86	2.55	2.55	2.68	2.59
EG005(ED093)T: Total Metals by ICP-AES	3							
Aluminium	7429-90-5	50	mg/kg	15300	15500	16000	14700	15200
Iron	7439-89-6	50	mg/kg	34700	38300	35900	32800	36900
EG020-SD: Total Metals in Sediments by	ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	6.58	7.05	8.83	8.01	7.20
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	38.4	38.7	37.7	33.4	37.4
Copper	7440-50-8	1.0	mg/kg	16.5	17.8	20.0	19.6	14.9
Lead	7439-92-1	1.0	mg/kg	18.0	18.8	18.5	16.6	16.1
Nickel	7440-02-0	1.0	mg/kg	20.8	22.8	22.8	21.6	20.5
Silver	7440-22-4	0.1	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Zinc	7440-66-6	1.0	mg/kg	77.0	80.4	82.2	75.3	70.2

: 4 of 23 : EB2225704 Amendment 1 Work Order

BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	RF2	RF6	RF3	RF7	RF4
·		Sampli	ng date / time	31-Aug-2022 08:10	31-Aug-2022 08:31	31-Aug-2022 08:54	31-Aug-2022 09:19	31-Aug-2022 09:45
Compound	CAS Number	LOR	Unit	EB2225704-001	EB2225704-002	EB2225704-003	EB2225704-004	EB2225704-005
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercur	y by FIMS (Low Level	1)						
Mercury	7439-97-6		mg/kg	0.08	0.08	0.08	0.07	0.07
EP003: Total Organic Carbon (TOC)	in Soil							
Total Organic Carbon		0.02	%	1.22	1.01	1.33	1.31	0.96
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP130A: Organophosphorus Pestic	ides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<12	<12	<12	<12
Carbophenothion	786-19-6	10	μg/kg	<12	<12	<12	<12	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<12.0	<12.0	<12.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<12	<12	<12	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<12	<12	<12	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<12	<12	<12	<12
Diazinon	333-41-5	10	μg/kg	<12	<12	<12	<12	<12
Dichlorvos	62-73-7	10	μg/kg	<12	<12	<12	<12	<12
Dimethoate	60-51-5	10	μg/kg	<12	<12	<12	<12	<12
Ethion	563-12-2	10	μg/kg	<12	<12	<12	<12	<12
Fenamiphos	22224-92-6	10	μg/kg	<12	<12	<12	<12	<12
Fenthion	55-38-9	10	μg/kg	<12	<12	<12	<12	<12
Malathion	121-75-5	10	μg/kg	<12	<12	<12	<12	<12
Azinphos Methyl	86-50-0	10	μg/kg	<12	<12	<12	<12	<12
Monocrotophos	6923-22-4	10	μg/kg	<12	<12	<12	<12	<12
Parathion	56-38-2	10	μg/kg	<12	<12	<12	<12	<12
Parathion-methyl	298-00-0	10	μg/kg	<12	<12	<12	<12	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<12	<12	<12	<12
Prothiofos	34643-46-4	10	μg/kg	<12	<12	<12	<12	<12
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	RF2	RF6	RF3	RF7	RF4
		Sampli	ng date / time	31-Aug-2022 08:10	31-Aug-2022 08:31	31-Aug-2022 08:54	31-Aug-2022 09:19	31-Aug-2022 09:45
Compound	CAS Number	LOR	Unit	EB2225704-001	EB2225704-002	EB2225704-003	EB2225704-004	EB2225704-005
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticid	es - Continued							
4.4`-DDE	72-55-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	77.9	72.4	66.6	87.2	85.0
EP130S: Organophosphorus Pest	ticide Surrogate							
DEF	78-48-8	10	%	59.7	63.0	83.7	74.3	78.0
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	56.3	49.2	69.5	54.1	56.8

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BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
(maani CCIE)		Sampli	ing date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCI (23A)		0.1	pH Unit				8.8	
pH OX (23B)		0.1	pH Unit				8.3	
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		2	mole H+ / t				<2	
Titratable Peroxide Acidity (23G)		2	mole H+ / t				<2	
Titratable Sulfidic Acidity (23H)		2	mole H+ / t				<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S				<0.020	
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S				<0.020	
(s-23G)			''					
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S				<0.020	
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S				0.118	
Peroxide Sulfur (23De)		0.020	% S				0.460	
Peroxide Oxidisable Sulfur (23E)		0.020	% S				0.342	
acidity - Peroxide Oxidisable Sulfur		10	mole H+/t				214	
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca				0.291	
Peroxide Calcium (23Wh)		0.020	% Ca				5.45	
Acid Reacted Calcium (23X)		0.020	% Ca				5.16	
acidity - Acid Reacted Calcium (a-23X)		10	mole H+/t				2580	
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S				4.13	
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg				0.146	
Peroxide Magnesium (23Tm)		0.020	% Mg				0.393	
Acid Reacted Magnesium (23U)		0.020	% Mg				0.246	
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t				203	
sulfidic - Acid Reacted Magnesium		0.020	% S				0.325	
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	city							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3				12.0	
acidity - Excess Acid Neutralising		10	mole H+ / t				2400	
Capacity (a-23Q)								
sulfidic - Excess Acid Neutralising		0.020	% S				3.84	
Capacity (s-23Q)								

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: BMT COMMERCIAL AUSTRALIA PTY LTD Client Project B23621 Port of Brisbane - Sediment Quality



Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)	Sample ID			B13-9	B16-1	B16-0	B13-8	B13-5
		Sampli	ing date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capac	city - Continued							
EA029-H: 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				0.34	
Net Acidity excluding ANC (acidity units)		10	mole H+ / t				214	
Liming Rate excluding ANC		1	kg CaCO3/t				16	
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit				8.8	
Titratable Actual Acidity (23F)		2	mole H+ / t				<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S				<0.02	
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)		0.005	% S				0.223	
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t				139	
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3				14.7	
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t				2930	
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S				4.70	
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				0.22	
Net Acidity excluding ANC (acidity units)		10	mole H+ / t				139	
Liming Rate excluding ANC		1	kg CaCO3/t				10	
EA055: Moisture Content (Dried @ 105-11	10°C)							
Moisture Content		0.1	%	63.3	49.2	48.1	46.4	53.1
EA150: Particle Sizing								
+75µm		1	%	5	41	41	30	16

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
		Sampli	ing date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
•				Result	Result	Result	Result	Result
A150: Particle Sizing - Continued								
+150µm		1	%	5	31	33	19	11
+300µm		1	%	1	13	13	8	3
+425µm		1	%	<1	5	3	6	1
+600µm		1	%	<1	2	<1	6	<1
+1180µm		1	%	<1	<1	<1	5	<1
+2.36mm		1	%	<1	<1	<1	5	<1
+4.75mm		1	%	<1	<1	<1	4	<1
+9.5mm		1	%	<1	<1	<1	4	<1
+19.0mm		1	%	<1	<1	<1	<1	<1
+37.5mm		1	%	<1	<1	<1	<1	<1
+75.0mm		1	%	<1	<1	<1	<1	<1
A150: Soil Classification based on Pa	article Size							
Clay (<2 µm)		1	%	60	39	38	43	49
Silt (2-60 µm)		1	%	35	18	20	26	33
Sand (0.06-2.00 mm)		1	%	5	43	42	26	18
Gravel (>2mm)		1	%	<1	<1	<1	5	<1
Cobbles (>6cm)		1	%	<1	<1	<1	<1	<1
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.74	2.60	2.56	2.64	2.60
G005(ED093)-SDH: 1M HCI-Extractab	le Metals by ICPAE	S						
Nickel	7440-02-0	1.0	mg/kg	5.8				7.1
G005(ED093)T: Total Metals by ICP-A	ES							
Aluminium	7429-90-5	50	mg/kg	13000	9270	9290	11100	13900
Iron	7439-89-6	50	mg/kg	29600	24600	23200	27500	35800
G020-SD: Total Metals in Sediments b	by ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	7.65	7.68	5.83	7.59	9.92
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	31.7	25.4	24.6	30.2	38.1
Copper	7440-50-8	1.0	mg/kg	11.8	12.5	12.5	13.5	17.7
Lead	7439-92-1	1.0	mg/kg	11.4	10.7	10.2	13.3	16.2
Nickel	7440-02-0	1.0	mg/kg	17.0	14.6	15.0	16.8	20.3
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
		Sampli	ng date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercury	by FIMS (Low Level	) - Continu	ıed					
Mercury	7439-97-6	0.01	mg/kg	0.04	0.05	0.04	0.06	0.10
EK059G: Nitrite plus Nitrate as N (NO	Ox) by Discrete Anal	lyser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg				<0.1	
EK061G: Total Kjeldahl Nitrogen By I	Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg				740	
EK062: Total Nitrogen as N (TKN + N	Ox)							
^ Total Nitrogen as N		20	mg/kg				740	
EK067G: Total Phosphorus as P by E			3 3					
Total Phosphorus as P by L	Jiscrete Analyser	2	mg/kg				505	
		_	5/118					
EP003: Total Organic Carbon (TOC) i Total Organic Carbon	n Soil 	0.02	%	1.18	0.82	0.77	0.81	0.96
		0.02	70	1.10	0.02	0.77	0.01	0.90
EP080-SD / EP071-SD: Total Petroleu							-0	
C6 - C9 Fraction		3	mg/kg				<3	
C10 - C14 Fraction		3	mg/kg				3	
C15 - C28 Fraction		3	mg/kg				10	
C29 - C36 Fraction		5	mg/kg				6	
^ C10 - C36 Fraction (sum)		3	mg/kg				19	
EP080-SD / EP071-SD: Total Recover						_		
C6 - C10 Fraction	C6_C10	3	mg/kg				<3	
>C10 - C16 Fraction		3	mg/kg				<3	
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg				<3.0	
(F1)		-						
>C16 - C34 Fraction		3	mg/kg				14	
>C34 - C40 Fraction		5	mg/kg				<5	
^ >C10 - C40 Fraction (sum)		3	mg/kg				14	
EP080-SD: BTEXN								I
Benzene	71-43-2	0.2	mg/kg				<0.2	
Toluene	108-88-3	0.2	mg/kg				<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg				<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg				<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg				<0.2	
^ Total Xylenes		0.5	mg/kg				<0.5	
^ Sum of BTEX		0.2	mg/kg				<0.2	
Naphthalene	91-20-3	0.2	mg/kg				<0.2	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
(manusi co.i_)		Sampl	ing date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
Para I				Result	Result	Result	Result	Result
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	<1
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	<1
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP130A: Organophosphorus Pesti	icides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<12	<10	<10	<10	<12
Carbophenothion	786-19-6	10	μg/kg	<12	<10	<10	<10	<12
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<12.0	<10.0	<10.0	<10.0	<12.0
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<12	<10	<10	<10	<12
Chlorpyrifos	2921-88-2	10	μg/kg	<12	<10	<10	<10	<12
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<12	<10	<10	<10	<12
Demeton-S-methyl	919-86-8	10	μg/kg	<12	<10	<10	<10	<12
Diazinon	333-41-5	10	μg/kg	<12	<10	<10	<10	<12
Dichlorvos	62-73-7	10	μg/kg	<12	<10	<10	<10	<12
Dimethoate	60-51-5	10	μg/kg	<12	<10	<10	<10	<12
Ethion	563-12-2	10	μg/kg	<12	<10	<10	<10	<12
Fenamiphos	22224-92-6	10	μg/kg	<12	<10	<10	<10	<12
Fenthion	55-38-9	10	μg/kg	<12	<10	<10	<10	<12
Malathion	121-75-5	10	μg/kg	<12	<10	<10	<10	<12
Azinphos Methyl	86-50-0	10	μg/kg	<12	<10	<10	<10	<12
Monocrotophos	6923-22-4	10	μg/kg	<12	<10	<10	<10	<12
Parathion	56-38-2	10	μg/kg	<12	<10	<10	<10	<12
Parathion-methyl	298-00-0	10	μg/kg	<12	<10	<10	<10	<12
Pirimphos-ethyl	23505-41-1	10	μg/kg	<12	<10	<10	<10	<12
Prothiofos	34643-46-4	10	μg/kg	<12	<10	<10	<10	<12
EP131A: Organochlorine Pesticide	es							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	1.59
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	1.59
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
		Sampli	ng date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticid	les - Continued							
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Bipheny	yls (as Aroclors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg				<15.6	
Aroclor 1016	12674-11-2	5.0	μg/kg				<15.6	
Aroclor 1221	11104-28-2	5.0	μg/kg				<15.6	
Aroclor 1232	11141-16-5	5.0	μg/kg				<15.6	
Aroclor 1242	53469-21-9	5.0	μg/kg				<15.6	
Aroclor 1248	12672-29-6	5.0	μg/kg				<15.6	
Aroclor 1254	11097-69-1	5.0	μg/kg				<15.6	
Aroclor 1260	11096-82-5	5.0	μg/kg				<15.6	
EP132B: Polynuclear Aromatic H	ydrocarbons							
Naphthalene	91-20-3	5	μg/kg				7	
2-Methylnaphthalene	91-57-6	5	μg/kg				<5	
Acenaphthylene	208-96-8	4	μg/kg				20	
Acenaphthene	83-32-9	4	μg/kg				<4	
Fluorene	86-73-7	4	μg/kg				<4	
Phenanthrene	85-01-8	4	μg/kg				21	
Anthracene	120-12-7	4	μg/kg				14	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
		Sampli	ing date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydro	ocarbons - Continued							
Fluoranthene	206-44-0	4	μg/kg				65	
Pyrene	129-00-0	4	μg/kg				67	
Benz(a)anthracene	56-55-3	4	μg/kg				47	
Chrysene	218-01-9	4	μg/kg				37	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg				56	
Benzo(k)fluoranthene	207-08-9	4	μg/kg				22	
Benzo(e)pyrene	192-97-2	4	μg/kg				35	
Benzo(a)pyrene	50-32-8	4	μg/kg				67	
Perylene	198-55-0	4	μg/kg				37	
Benzo(g.h.i)perylene	191-24-2	4	μg/kg				43	
Dibenz(a.h)anthracene	53-70-3	4	μg/kg				9	
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg				36	
Coronene	191-07-1	5	μg/kg				13	
^ Sum of PAHs		4	μg/kg				596	
^ Benzo(a)pyrene TEQ (zero)		4	μg/kg				93	
^ Benzo(a)pyrene TEQ (half LOR)		4	μg/kg				93	
^ Benzo(a)pyrene TEQ (LOR)		4	μg/kg				93	
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW				990	
Gross beta		500	Bq/kg DW				500	
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%				94.5	
Toluene-D8	2037-26-5	0.2	%				82.0	
4-Bromofluorobenzene	460-00-4	0.2	%				86.1	
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	74.2	71.9	76.7	97.8	73.0
EP130S: Organophosphorus Pesticio	de Surrogate							
DEF	78-48-8	10	%	66.0	80.8	82.8	62.5	63.8
EP131S: OC Pesticide Surrogate	70 40-0	-						- 2.0
Dibromo-DDE	21655-73-2	0.50	%	52.4	63.5	62.8	47.4	80.7
	21000-73-2	0.00	70	V2.7	00.0	QZ.0	71.7	00.1
EP131T: PCB Surrogate	0054.04.0	0.5	%				78.1	I
Decachlorobiphenyl	2051-24-3	0.5	70				70.1	
EP132T: Base/Neutral Extractable Su		40	0,				100	
2-Fluorobiphenyl	321-60-8	10	%				102	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-9	B16-1	B16-0	B13-8	B13-5
		Samplii	ng date / time	31-Aug-2022 10:09	31-Aug-2022 10:34	31-Aug-2022 11:10	31-Aug-2022 11:32	31-Aug-2022 12:00
Compound	CAS Number	LOR	Unit	EB2225704-006	EB2225704-007	EB2225704-008	EB2225704-009	EB2225704-010
				Result	Result	Result	Result	Result
EP132T: Base/Neutral Extractabl	e Surrogates - Continued							
Anthracene-d10	1719-06-8	10	%				119	
4-Terphenyl-d14	1718-51-0	10	%				95.1	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Sampli	ing date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EA029-A: pH Measurements								
pH KCI (23A)		0.1	pH Unit				8.7	
pH OX (23B)		0.1	pH Unit				8.1	
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		2	mole H+ / t				<2	
Titratable Peroxide Acidity (23G)		2	mole H+ / t				<2	
Titratable Sulfidic Acidity (23H)		2	mole H+/t				<2	
sulfidic - Titratable Actual Acidity (s-23F)		0.020	% pyrite S				<0.020	
sulfidic - Titratable Peroxide Acidity		0.020	% pyrite S				<0.020	
(s-23G)								
sulfidic - Titratable Sulfidic Acidity (s-23H)		0.020	% pyrite S				<0.020	
EA029-C: Sulfur Trail								
KCI Extractable Sulfur (23Ce)		0.020	% S				0.075	
Peroxide Sulfur (23De)		0.020	% S				0.258	
Peroxide Oxidisable Sulfur (23E)		0.020	% S				0.183	
acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t				114	
(a-23E)								
EA029-D: Calcium Values								
KCI Extractable Calcium (23Vh)		0.020	% Ca				0.325	
Peroxide Calcium (23Wh)		0.020	% Ca				1.23	
Acid Reacted Calcium (23X)		0.020	% Ca				0.904	
acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t				451	
sulfidic - Acid Reacted Calcium (s-23X)		0.020	% S				0.724	
EA029-E: Magnesium Values								
KCI Extractable Magnesium (23Sm)		0.020	% Mg				0.161	
Peroxide Magnesium (23Tm)		0.020	% Mg				0.250	
Acid Reacted Magnesium (23U)		0.020	% Mg				0.089	
Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t				73	
sulfidic - Acid Reacted Magnesium		0.020	% S				0.118	
(s-23U)								
EA029-F: Excess Acid Neutralising Capac	ity							
Excess Acid Neutralising Capacity (23Q)		0.020	% CaCO3				2.52	
acidity - Excess Acid Neutralising Capacity (a-23Q)		10	mole H+ / t				504	
sulfidic - Excess Acid Neutralising		0.020	% S				0.808	
Capacity (s-23Q)								

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Sampli	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EA029-F: Excess Acid Neutralising Capac	city - Continued							
EA029-H: 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				0.18	
Net Acidity excluding ANC (acidity units)		10	mole H+/t				114	
Liming Rate excluding ANC		1	kg CaCO3/t				8	
EA033-A: Actual Acidity								
pH KCI (23A)		0.1	pH Unit				8.7	
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				0.159	
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t				99	
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)		0.01	% CaCO3				3.72	
acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t				744	
sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S				1.19	
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				0.16	
Net Acidity excluding ANC (acidity units)		10	mole H+/t				99	
Liming Rate excluding ANC		1	kg CaCO3/t				7	
EA055: Moisture Content (Dried @ 105-11	0°C)							
Moisture Content		0.1	%	24.4	22.5	34.4	45.4	
EA150: Particle Sizing								
+75µm		1	%	88	89	70	56	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
·		Sampli	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EA150: Particle Sizing - Continued								
+150µm		1	%	81	82	60	35	
+300µm		1	%	52	56	32	12	
+425µm		1	%	35	34	21	7	
+600µm		1	%	16	15	13	4	
+1180µm		1	%	5	4	6	1	
+2.36mm		1	%	4	2	4	<1	
+4.75mm		1	%	2	<1	2	<1	
+9.5mm		1	%	<1	<1	<1	<1	
+19.0mm		1	%	<1	<1	<1	<1	
+37.5mm		1	%	<1	<1	<1	<1	
+75.0mm		1	%	<1	<1	<1	<1	
A150: Soil Classification based on Pa	article Size							
Clay (<2 µm)		1	%	9	8	20	29	
Silt (2-60 µm)		1	%	2	2	10	14	
Sand (0.06-2.00 mm)		1	%	85	87	65	56	
Gravel (>2mm)		1	%	4	3	5	1	
Cobbles (>6cm)		1	%	<1	<1	<1	<1	
A152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)		0.01	g/cm3	2.70	2.63	2.65	2.67	
:G005(ED093)-SDH: 1M HCI-Extractab	le Metals by ICPAE	S						
Nickel	7440-02-0	1.0	mg/kg	2.0	2.1			
G005(ED093)T: Total Metals by ICP-A	ES							
Aluminium	7429-90-5	50	mg/kg	4600	2850	5480	7280	
Iron	7439-89-6	50	mg/kg	14500	10900	15500	18600	
G020-SD: Total Metals in Sediments I	by ICPMS							
Arsenic	7440-38-2	1.00	mg/kg	5.13	4.75	5.12	6.20	
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	
Chromium	7440-47-3	1.0	mg/kg	13.2	9.4	14.8	20.6	
Copper	7440-50-8	1.0	mg/kg	6.6	3.2	5.9	7.7	
Lead	7439-92-1	1.0	mg/kg	5.9	4.1	5.8	8.3	
Nickel	7440-02-0	1.0	mg/kg	9.8	6.8	9.4	12.3	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	
	7440-66-6	1.0	mg/kg	32.8	24.8	29.4	41.8	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Sampli	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EG035T: Total Recoverable Mercury	by FIMS (Low Level	) - Continu	ıed					
Mercury	7439-97-6	0.01	mg/kg	0.02	<0.01	0.02	0.03	
EK059G: Nitrite plus Nitrate as N (NO	x) by Discrete Anal	lvser						
Nitrite + Nitrate as N (Sol.)		0.1	mg/kg				<0.1	
EK061G: Total Kjeldahl Nitrogen By D	Discrete Analyser							
Total Kjeldahl Nitrogen as N		20	mg/kg				650	
EK062: Total Nitrogen as N (TKN + NO	Dx)							
^ Total Nitrogen as N		20	mg/kg				650	
EK067G: Total Phosphorus as P by D	iscrete Analyser							
Total Phosphorus as P		2	mg/kg				492	
EP003: Total Organic Carbon (TOC) in	Soil							
Total Organic Carbon		0.02	%	0.25	0.18	0.48	0.80	
EP080-SD / EP071-SD: Total Petroleui								
C6 - C9 Fraction		3	mg/kg				<3	
C10 - C14 Fraction		3	mg/kg				<3	
C15 - C28 Fraction		3	mg/kg				6	
C29 - C36 Fraction		5	mg/kg				6	
^ C10 - C36 Fraction (sum)		3	mg/kg				12	
EP080-SD / EP071-SD: Total Recovera	able Hydrocarbons							
C6 - C10 Fraction	C6 C10	3	mg/kg				<3	
>C10 - C16 Fraction		3	mg/kg				<3	
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	3.0	mg/kg				<3.0	
(F1)								
>C16 - C34 Fraction		3	mg/kg				10	
>C34 - C40 Fraction		5	mg/kg				<5	
^ >C10 - C40 Fraction (sum)		3	mg/kg				10	
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg				<0.2	
Toluene	108-88-3	0.2	mg/kg				<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg				<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg				<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg				<0.2	
^ Total Xylenes		0.5	mg/kg				<0.5	
^ Sum of BTEX		0.2	mg/kg				<0.2	
Naphthalene	91-20-3	0.2	mg/kg				<0.2	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Sampli	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
•				Result	Result	Result	Result	
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	μgSn/kg	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	μgSn/kg	<1	<1	<1	<1	
Tributyltin	56573-85-4	0.5	μgSn/kg	<0.5	<0.5	<0.5	<0.5	
EP130A: Organophosphorus Pesti	cides (Ultra-trace)							
Bromophos-ethyl	4824-78-6	10	μg/kg	<10	<10	<10	<10	
Carbophenothion	786-19-6	10	μg/kg	<10	<10	<10	<10	
Chlorfenvinphos (E)	18708-86-6	10.0	μg/kg	<10.0	<10.0	<10.0	<10.0	
Chlorfenvinphos (Z)	18708-87-7	10	μg/kg	<10	<10	<10	<10	
Chlorpyrifos	2921-88-2	10	μg/kg	<10	<10	<10	<10	
Chlorpyrifos-methyl	5598-13-0	10	μg/kg	<10	<10	<10	<10	
Demeton-S-methyl	919-86-8	10	μg/kg	<10	<10	<10	<10	
Diazinon	333-41-5	10	μg/kg	<10	<10	<10	<10	
Dichlorvos	62-73-7	10	μg/kg	<10	<10	<10	<10	
Dimethoate	60-51-5	10	μg/kg	<10	<10	<10	<10	
Ethion	563-12-2	10	μg/kg	<10	<10	<10	<10	
Fenamiphos	22224-92-6	10	μg/kg	<10	<10	<10	<10	
Fenthion	55-38-9	10	μg/kg	<10	<10	<10	<10	
Malathion	121-75-5	10	μg/kg	<10	<10	<10	<10	
Azinphos Methyl	86-50-0	10	μg/kg	<10	<10	<10	<10	
Monocrotophos	6923-22-4	10	μg/kg	<10	<10	<10	<10	
Parathion	56-38-2	10	μg/kg	<10	<10	<10	<10	
Parathion-methyl	298-00-0	10	μg/kg	<10	<10	<10	<10	
Pirimphos-ethyl	23505-41-1	10	μg/kg	<10	<10	<10	<10	
Prothiofos	34643-46-4	10	μg/kg	<10	<10	<10	<10	
P131A: Organochlorine Pesticide	s							
Aldrin	309-00-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
alpha-BHC	319-84-6	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
beta-BHC	319-85-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
delta-BHC	319-86-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
4.4`-DDD	72-54-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
4.4`-DDE	72-55-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
4.4`-DDT	50-29-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Dieldrin	60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Samplii	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
·				Result	Result	Result	Result	
EP131A: Organochlorine Pesticides	- Continued							
alpha-Endosulfan	959-98-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
beta-Endosulfan	33213-65-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endosulfan sulfate	1031-07-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
^ Endosulfan (sum)	115-29-7	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin	72-20-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin aldehyde	7421-93-4	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Endrin ketone	53494-70-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Heptachlor	76-44-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Heptachlor epoxide	1024-57-3	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Hexachlorobenzene (HCB)	118-74-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
gamma-BHC	58-89-9	0.25	μg/kg	<0.25	<0.25	<0.25	<0.25	
Methoxychlor	72-43-5	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
cis-Chlordane	5103-71-9	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
trans-Chlordane	5103-74-2	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
^ Total Chlordane (sum)		0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
Oxychlordane	27304-13-8	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.50	μg/kg	<0.50	<0.50	<0.50	<0.50	
EP131B: Polychlorinated Biphenyls	(as Aroclors)							
^ Total Polychlorinated biphenyls		5.0	μg/kg				<15.6	
Aroclor 1016	12674-11-2	5.0	μg/kg				<15.6	
Aroclor 1221	11104-28-2	5.0	μg/kg				<15.6	
Aroclor 1232	11141-16-5	5.0	μg/kg				<15.6	
Aroclor 1242	53469-21-9	5.0	μg/kg				<15.6	
Aroclor 1248	12672-29-6	5.0	μg/kg				<15.6	
Aroclor 1254	11097-69-1	5.0	μg/kg				<15.6	
Aroclor 1260	11096-82-5	5.0	μg/kg				<15.6	
EP132B: Polynuclear Aromatic Hydr	ocarbons							
Naphthalene	91-20-3	5	μg/kg				6	
2-Methylnaphthalene	91-57-6	5	μg/kg				<5	
Acenaphthylene	208-96-8	4	μg/kg				17	
Acenaphthene	83-32-9	4	μg/kg				<4	
Fluorene	86-73-7	4	μg/kg				<4	
Phenanthrene	85-01-8	4	μg/kg				31	
Anthracene	120-12-7	4	μg/kg				13	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Sampli	ing date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EP132B: Polynuclear Aromatic Hydr	ocarbons - Continued							
Fluoranthene	206-44-0	4	μg/kg				58	
Pyrene	129-00-0	4	μg/kg				59	
Benz(a)anthracene	56-55-3	4	μg/kg				40	
Chrysene	218-01-9	4	μg/kg				34	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	μg/kg				59	
Benzo(k)fluoranthene	207-08-9	4	μg/kg				27	
Benzo(e)pyrene	192-97-2	4	μg/kg				34	
Benzo(a)pyrene	50-32-8	4	μg/kg				70	
Perylene	198-55-0	4	μg/kg				28	
Benzo(g.h.i)perylene	191-24-2	4	μg/kg				52	
Dibenz(a.h)anthracene	53-70-3	4	μg/kg				11	
Indeno(1.2.3.cd)pyrene	193-39-5	4	μg/kg				42	
Coronene	191-07-1	5	μg/kg				14	
^ Sum of PAHs		4	μg/kg				595	
^ Benzo(a)pyrene TEQ (zero)		4	μg/kg				99	
^ Benzo(a)pyrene TEQ (half LOR)		4	μg/kg				99	
^ Benzo(a)pyrene TEQ (LOR)		4	μg/kg				99	
Radionuclides / Activity								
Gross alpha		500	Bq/kg DW				570	
Gross beta		500	Bq/kg DW				<500	
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%				74.3	
Toluene-D8	2037-26-5	0.2	%				58.7	
4-Bromofluorobenzene	460-00-4	0.2	%				77.5	
EP090S: Organotin Surrogate								
Tripropyltin		0.5	%	98.3	74.0	89.0	93.1	
EP130S: Organophosphorus Pestici	de Surrogate							
DEF	78-48-8	10	%	70.4	79.9	75.3	73.4	
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	68.4	60.7	57.7	57.9	
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%				81.2	
EP132T: Base/Neutral Extractable Su								
2-Fluorobiphenyl	321-60-8	10	%				71.8	
2 . 100.001pilotty1	321-00-0	10	70				7 1.0	

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Sub-Matrix: MARINE SEDIMENT (Matrix: SOIL)			Sample ID	B13-4	B13-4b	B13-4c	B13-1	
		Samplii	ng date / time	31-Aug-2022 12:35	31-Aug-2022 12:50	31-Aug-2022 00:00	31-Aug-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2225704-011	EB2225704-012	EB2225704-013	EB2225704-014	
				Result	Result	Result	Result	
EP132T: Base/Neutral Extractable S	Surrogates - Continued							
Anthracene-d10	1719-06-8	10	%				96.0	
4-Terphenyl-d14	1718-51-0	10	%				79.0	

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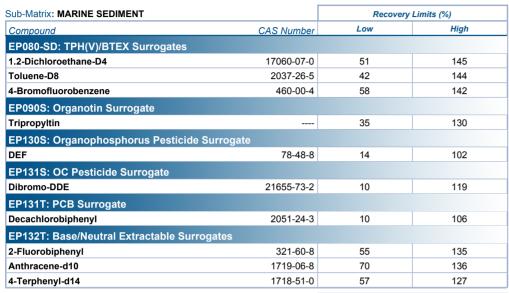
Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	Trip Blank				
(Mask Co.2)		Sampli	ng date / time	31-Aug-2022 00:00				
Compound	CAS Number	LOR	Unit	EB2225704-015				
				Result				
EP080/071: Total Petroleum Hydroc								
C6 - C9 Fraction		10	mg/kg	<10				
EP080/071: Total Recoverable Hydr	ocarbons - NEPM 201	3 Fraction	ns					
C6 - C10 Fraction	C6_C10	10	mg/kg	<10				
^ C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10				
(F1)								
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				
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	109				
Toluene-D8	2037-26-5	0.2	%	79.3				
4-Bromofluorobenzene	460-00-4	0.2	%	88.6				

Page : 23 of 23

Work Order : EB2225704 Amendment 1

Client : BMT COMMERCIAL AUSTRALIA PTY LTD
Project : B23621 Port of Brisbane - Sediment Quality





Sub-Matrix: SOIL	Recovery Limits (%)		
Compound	CAS Number	Low	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

## Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP131A: Organochlorine Pesticides

(SOIL) EP131S: OC Pesticide Surrogate

(SOIL) EP130A: Organophosphorus Pesticides (Ultra-trace)

(SOIL) EP130S: Organophosphorus Pesticide Surrogate

(SOIL) EP131B: Polychlorinated Biphenyls (as Aroclors)

(SOIL) EP131T: PCB Surrogate

(SOIL) EP132B: Polynuclear Aromatic Hydrocarbons

(SOIL) EP132T: Base/Neutral Extractable Surrogates



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## **ALS Environmental**





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COMPANY: BMT COMMERCIAL DATE RECEIVED: 31-Aug-2022

**AUSTRALIA PTY LTD** 

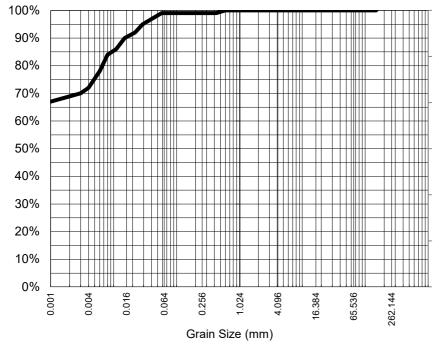
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Spring Hill

PROJECT: Brisbane Qld
B23621 Port of Brisbane -

B23621 Port of Brisbane - **SAMPLE ID:** RF2 Sediment Quality

## **Particle Size Distribution**



	Analy	/sis	<b>Notes</b>
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Samples analysed as received.

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	99%
0.150	99%
0.075	99%
Particle Size (microns)	
41	97%
29	95%
22	92%
15	90%
11	86%
8	84%
6	78%
4	72%
1	67%

Median Particle Size (mm)*	< 0.006
Median i article Size (IIIIII)	٠٥.٥٥٥

Sample Comments: Analysed: 13-Sep-22

<u>Loss on Pretreatment</u> NA <u>Limit of Reporting:</u> 1%

Sample Description: Dispersion Method Shaker

<u>Test Method:</u> AS1289.3.6.2/AS1289.3.6.3

**Soil Particle Density (<2.36mm)** 2.86 (2.85)\*

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Satish Trivedi

<sup>\*</sup> Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results

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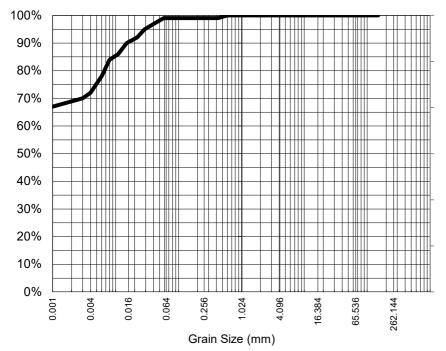
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** RF2

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

\* Soil Particle Density results fell outside the scope of AS 1289.3.6.3. Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	99%
0.150	99%
0.075	99%
Particle Size (microns)	
41	97%
29	95%
22	92%
15	90%
11	86%
8	84%
6	78%
4	72%
1	67%

Median Particle Size (mm)*	< 0.006
Median i article Size (IIIIII)	٠٥.٥٥٥

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.86 (2.85)\*

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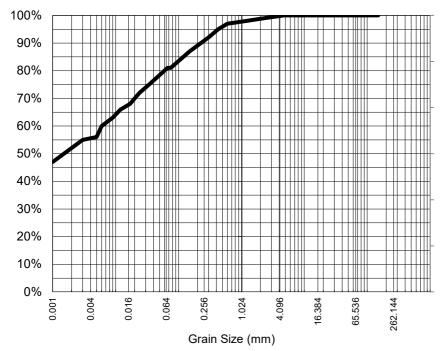
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** RF6

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	97%
0.425	95%
0.300	92%
0.150	87%
0.075	81%
Particle Size (microns)	
48	78%
34	75%
24	72%
17	68%
12	66%
9	63%
6	60%
5	56%
1	47%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.55

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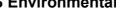
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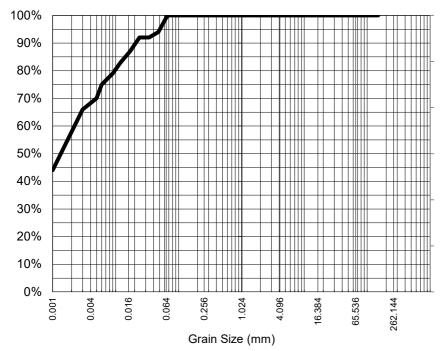
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** RF3

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
Particle Size (microns)	
48	94%
34	92%
24	92%
17	87%
12	83%
9	79%
6	75%
5	70%
1	44%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.55

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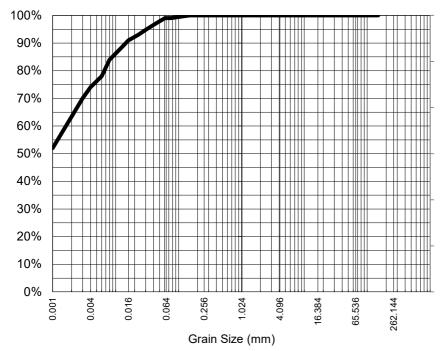
Spring Hill

Brisbane Qld **PROJECT:** B23621 Port of Brisbane -

**SAMPLE ID:** RF7

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.450	4000/
0.150	100%
0.075	99%
Particle Size (microns)	
43	97%
31	95%
23	93%
16	91%
12	88%
8	84%
6	78%
4	74%
1	52%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.68

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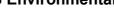
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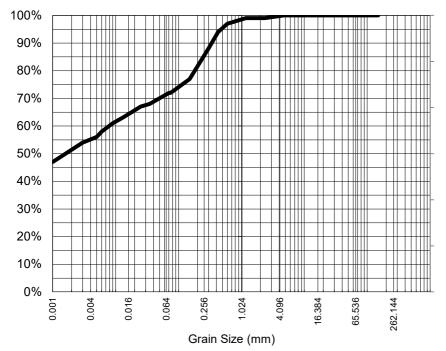
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** RF4

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

	_
Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	99%
0.600	97%
0.425	94%
0.300	88%
0.150	77%
0.075	72%
Particle Size (microns)	
50	70%
35	68%
25	67%
18	65%
13	63%
9	61%
6	58%
5	56%
1	47%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.59

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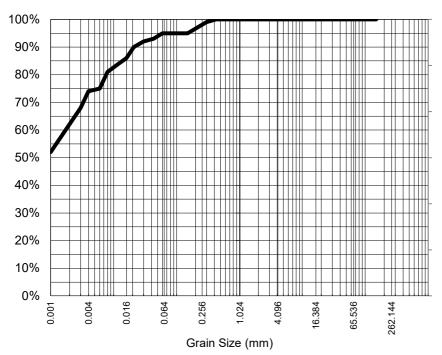
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**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** 

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
0.425	100%
0.300	99%
0.150	95%
0.075	95%
Particle Size (microns)	
43	93%
30	92%
21	90%
16	86%
12	84%
8	81%
6	75%
4	74%
1	52%

B13-9

Median Particle Size (mm)*	<0.006

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.74

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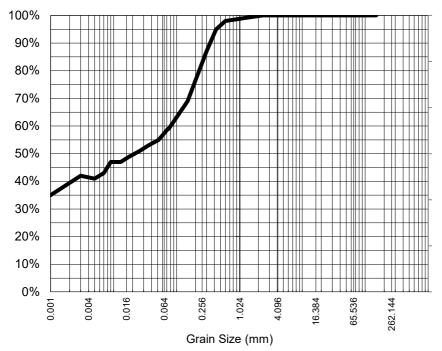
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**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B16-1

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	98%
0.425	95%
0.300	87%
0.150	69%
0.075	59%
Particle Size (microns)	
52	55%
36	53%
26	51%
18	49%
13	47%
9	47%
7	43%
5	41%
1	35%

0.022 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.6

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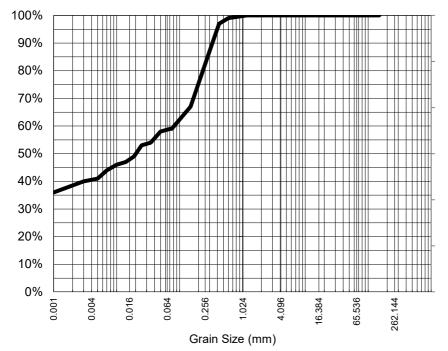
Spring Hill

Brisbane Qld **PROJECT:** 

B23621 Port of Brisbane -**SAMPLE ID:** B16-0

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

	0/ 5
Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	97%
0.300	87%
0.150	67%
0.075	59%
Particle Size (microns)	
50	58%
35	54%
25	53%
19	49%
14	47%
10	46%
7	44%
5	41%
1	36%

Median Particle Size (mm)*	0.021
----------------------------	-------

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.56

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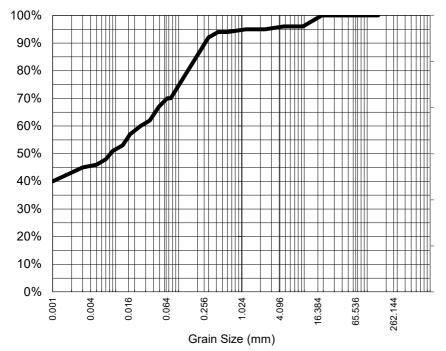
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-8

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
19.0	100%
9.50	96%
4.75	96%
2.36	95%
1.18	95%
0.600	94%
0.425	94%
0.300	92%
0.150	81%
0.075	70%
Particle Size (microns)	
49	67%
35	62%
25	60%
17	57%
13	53%
9	51%
7	48%
5	46%
1	40%

Median Particle Size (mm)*	0.008

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.64

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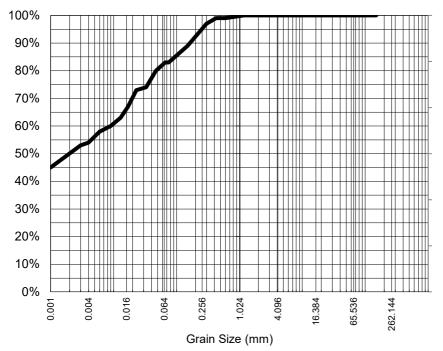
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-5

Sediment Quality

## **Particle Size Distribution**



Analys	sis N	otes
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Samples analysed as received.

Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	97%
0.150	89%
0.075	83%
Particle Size (microns)	
47	80%
33	74%
23	73%
17	67%
13	63%
9	60%
6	58%
4	54%
1	45%

<0.006 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.6

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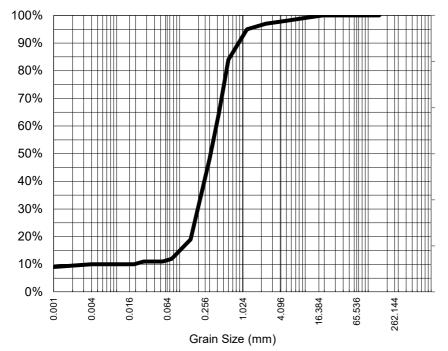
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-4

Sediment Quality

## **Particle Size Distribution**



Analy	/sis	<b>Notes</b>
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Samples analysed as received.

Particle Size (mm)	% Passing
19.0	100%
9.50	99%
4.75	98%
2.36	97%
1.18	95%
0.600	84%
0.425	65%
0.300	48%
0.150	19%
0.075	12%
Particle Size (microns)	
54	11%
39	11%
27	11%
19	10%
14	10%
10	10%
7	10%
5	10%
1	9%

0.315 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.7

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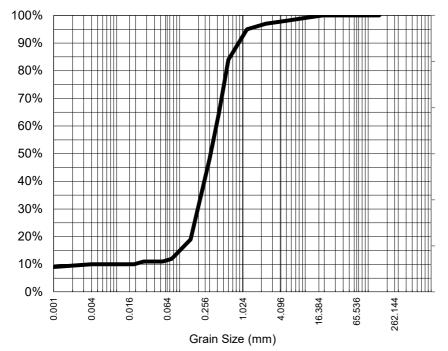
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-4

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
19.0	100%
9.50	99%
4.75	98%
2.36	97%
1.18	95%
0.600	84%
0.425	65%
0.300	48%
0.150	19%
0.075	12%
Particle Size (microns)	
54	11%
39	11%
27	11%
19	10%
14	10%
10	10%
7	10%
5	10%
1	9%

0.315 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.7

NATA Accreditation: 825 Site: Brisbane

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**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

## **ALS Environmental**





**CLIENT: BRAD HILES** DATE REPORTED: 19-Sep-2022

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 31-Aug-2022

**AUSTRALIA PTY LTD** 

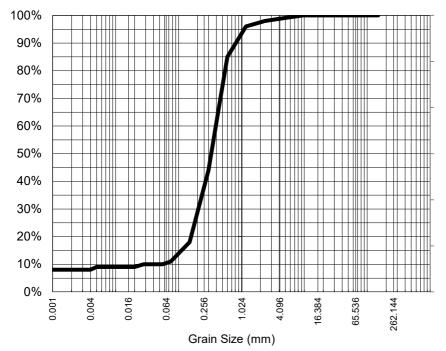
**ADDRESS**: Po Box 203 **REPORT NO:** EB2225704-012 / PSD

> Spring Hill Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-4b

Sediment Quality

## **Particle Size Distribution**



Analy	/sis	<b>Notes</b>
-------	------	--------------

Samples analysed as received.

Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	98%
1.18	96%
0.600	85%
0.425	65%
0.300	44%
0.150	18%
0.075	11%
Particle Size (microns)	
56	10%
40	10%
28	10%
20	9%
15	9%
10	9%
7	9%
5	9%
1	8%

Median Particle Size (mm)*	0.336

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.63

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

## **ALS Environmental**



## **Brisbane QLD**

**CLIENT: BRAD HILES** DATE REPORTED: 19-Sep-2022

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 31-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225704-013 / PSD

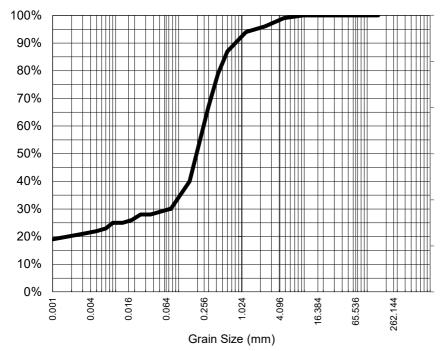
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-4c

Sediment Quality

## **Particle Size Distribution**



## **Analysis Notes**

Samples analysed as received.

Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	96%
1.18	94%
0.600	87%
0.425	79%
0.300	67%
0.150	40%
0.075	30%
Particle Size (microns)	
51	29%
36	28%
25	28%
18	26%
13	25%
9	25%
7	23%
5	22%
1	19%

Median Particle Size (mm)*	0.206
----------------------------	-------

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.65

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

Template Version PKV8.0 180919 Page 1 of 1

**ALS Laboratory Group Pty Ltd** 2 Byth Street Stafford, QLD 4053 pH 07 3243 7222 samples.brisbane@alsenviro.com

## **ALS Environmental**



## **Brisbane QLD**

DATE REPORTED: 19-Sep-2022 **CLIENT: BRAD HILES** 

**COMPANY: BMT COMMERCIAL** DATE RECEIVED: 31-Aug-2022

**AUSTRALIA PTY LTD** 

**ADDRESS**: Po Box 203 **REPORT NO:** EB2225704-014 / PSD

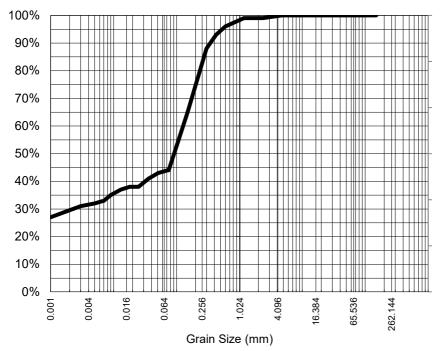
Spring Hill

Brisbane Qld

**PROJECT:** B23621 Port of Brisbane -**SAMPLE ID:** B13-1

Sediment Quality

## **Particle Size Distribution**



Analys	sis N	otes
--------	-------	------

Samples analysed as received.

Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	99%
0.600	96%
0.425	93%
0.300	88%
0.150	65%
0.075	44%
Particle Size (microns)	
51	43%
36	41%
25	38%
18	38%
13	37%
9	35%
7	33%
5	32%
1	27%

0.096 Median Particle Size (mm)\*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

**Sample Comments: Analysed:** 13-Sep-22

**Loss on Pretreatment** NA **Limit of Reporting: 1%** 

**Sample Description: Dispersion Method** Shaker

AS1289.3.6.2/AS1289.3.6.3 **Test Method:** 

Soil Particle Density (<2.36mm) 2.67

NATA Accreditation: 825 Site: Brisbane

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Satish Trivedi Soil Senior Chemist **Authorised Signatory** 

Template Version PKV8.0 180919 Page 1 of 1



## **CERTIFICATE OF ANALYSIS**

Work Order : EB2230689

: BMT COMMERCIAL AUSTRALIA PTY LTD

Contact : MR BRAD HILES

Address : PO BOX 203 SPRING HILL

**BRISBANE QLD 4004** 

Telephone : +61 07 3831 6744

Project : Port of Brisbane - Sediment Sampling

Order number : ----

Client

C-O-C number : ----

Sampler : BRAD HILES

Site : --

Quote number : BN/016/19

No. of samples received : 18
No. of samples analysed : 17

Page : 1 of 11

Laboratory : Environmental Division Brisbane

Contact : Kimberly Hilton-Barber

Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61-7-3243 7222

Date Samples Received : 10-Oct-2022 10:32

Date Analysis Commenced : 20-Oct-2022

Issue Date : 01-Nov-2022 12:06



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Kim McCabe Senior Inorganic Chemist Brisbane Inorganics, Stafford, QLD

Page : 2 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project Port of Brisbane - Sediment Sampling

# ALS

#### **General Comments**

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.
- EN68: This analysis in accordance with National Ocean Disposal Guidelines, Commonwealth of Australia, 2002 (modified). Results reported are those determined on a 1:4 sediment/seawater elutriate without blank correction.
- EG093: Samples containing high levels of sulfate may precipitate barium under the acidic conditions of this method and may therefore bias results low.

Page : 3 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

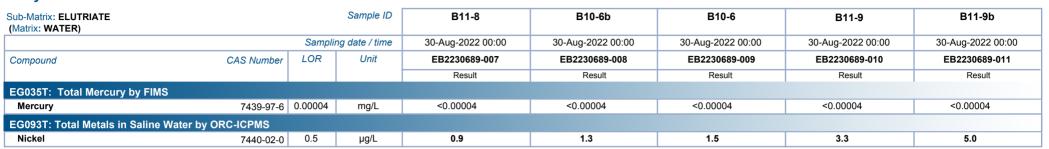
Project : Port of Brisbane - Sediment Sampling

Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	B4-4	B6-3	B9-1	B15-1	B11-5		
		Samplii	ng date / time	29-Aug-2022 00:00	29-Aug-2022 00:00	30-Aug-2022 00:00	30-Aug-2022 00:00	30-Aug-2022 00:00		
Compound	CAS Number	LOR	Unit	EB2230689-001	EB2230689-002	EB2230689-004	EB2230689-005	EB2230689-006		
				Result	Result	Result	Result	Result		
EG035T: Total Mercury by FIMS										
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004		
EG093T: Total Metals in Saline	Water by ORC-ICPMS									
Nickel	7440-02-0	0.5	μg/L	5.1	4.7	17.4	2.4	11.2		

Page : 4 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

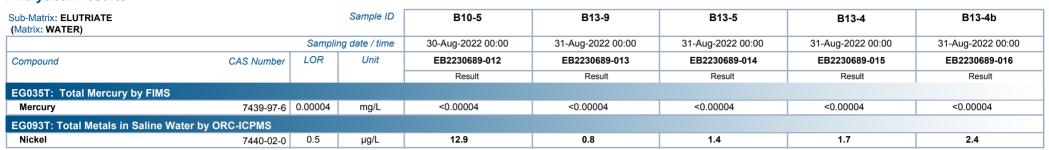




Page : 5 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling





Page : 6 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

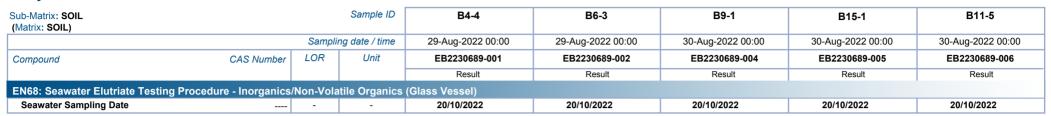
## ALS

Sub-Matrix: ELUTRIATE (Matrix: WATER)			Sample ID	Elutriate Blank					
		Sampli	ng date / time	29-Aug-2022 00:00					
Compound	CAS Number	LOR	Unit	EB2230689-017					
				Result					
EG035T: Total Mercury by FIMS									
Mercury	7439-97-6	0.00004	mg/L	<0.00004					
EG093T: Total Metals in Saline	EG093T: Total Metals in Saline Water by ORC-ICPMS								
Nickel	7440-02-0	0.5	μg/L	<0.5					

Page : 7 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

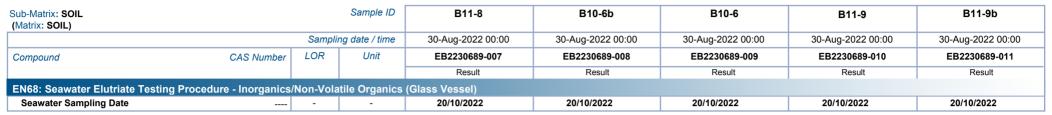




Page : 8 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

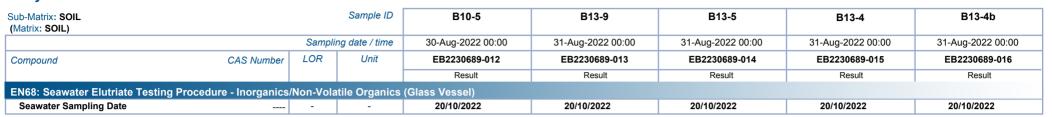




Page : 9 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling





Page : 10 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

# ALS

Sub-Matrix: SOIL			Sample ID	B12-1						
(Matrix: SOIL)			·							
		Sampli	ng date / time	30-Aug-2022 00:00						
Compound	CAS Number	LOR	Unit	EB2230689-018						
				Result						
EA055: Moisture Content (Dried	EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content		0.1	%	51.0						
EG035-SDH: 1M HCl extractable Mercury by FIMS										
Mercury	7439-97-6	0.10	mg/kg	<0.10						

Page : 11 of 11 Work Order : EB2230689

Client : BMT COMMERCIAL AUSTRALIA PTY LTD

Project : Port of Brisbane - Sediment Sampling

## ALS

Sub-Matrix: WATER (Matrix: SOIL)			Sample ID	Elutriate Blank					
	Sampling date / time								
Compound	CAS Number	LOR	Unit	EB2230689-017					
				Result					
EN68: Seawater Elutriate Testing Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)									
Seawater Sampling Date		-	-	20/10/2022					



## **BMT (OFFICIAL)**

## **Annex D** Secondary Laboratory Sediment Reports

## **GRAIN SIZE ANALYSIS (hydrometer techniques)**

2 soil samples supplied by Symbio Laboratories Pty Ltd on 7th September, 2022 - Lab Job No. N2447 Analysis requested by Customer Service Team. Job Ref B1192631

PO Box 4312 El	ICHT MILE	DI AINIS C	JI D //1/3
FU DUX 43 12 E1		L LAINS (	4113

SAMPLE ID	Lab Code	TEXTURE ISSS classification	MOISTURE CONTENT (105 °C) (% Moisture)	GRAVEL > 2 mm	SAND > 20 µm ISSS (< 2 mm fraction)	SILT 2-20 µm ISSS (< 2 mm fraction)	CLAY < 2 µm  (< 2 mm fraction)
B1192631-B-001	N2447/1	Clay	60.1%	0.0%	29.2%	24.7%	46.0%
B1192631-B-002	N2447/2	Clay	58.8%	0.1%	37.2%	20.0%	42.9%

#### Note:

- 1. The Hydrometer Analysis method was used to determine the percentage sand, silt and clay,
- modified from SOP meth004 (California Dept of Pesticide Regulation), using method of Gee & Bauder (1986)," &
- in Methods of Soil Analysis. Part 1 Agron. Monogr. 9 (2nd Ed). Klute, A., American Soc. of Agronomy Inc., Soil Sci. Soc. America Inc., Madison WI: 383-411.
- 2. The texture classification was based on the hydrometer results and the appropriate texture triangle.
- 3. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (see EAL website: scu.edu.au/eal).
- 4. This report is not to be reproduced except in full.
- 5. This report was issued on 13/09/2022

checked: ...... Graham Lancaster (Nata signatory) Laboratory Manager

Environmental Analysis Laboratory, Southern Cross University, Tel. 02 6620 3678, website: scu.edu.au/eal

## **Symbio LABORATORIES**



ABN: 82 079 645 015

CERTIFICATE OF ANALYSIS				
Certificate Number	B1192631-B [R00]	Page	1/5	
Client	BMT Commercial Australia Pty Ltd	Registering Laboratory	Brisbane	
Contact	Brad Hiles	Contact	Customer Service Team	
Address Level 8 200 Creek Street Brisbane QLD 4000	Level 8, 200 Creek Street Brishane OLD 4000	Address	52 Brandl Street, Eight Mile Plains, QLD 4113	
	Email	admin@symbiolabs.com.au		
Telephone	07 3831 6744	Telephone	1300 703 166	
Order Number	B23621_4_1	<b>Date Samples Received</b>	31/08/2022	
Project ID	Soil SUBCO- B23621- PoB SAP 2022	Date Analysis Commenced	01/09/2022	
Sampler	Customer	Issue Date	20/09/2022	
Client Job Reference		Receipt Temperature (°C)	8	
No. of Samples Registered	2   Sampler: Customer	Storage Temperature (°C)	4	
Priority	Normal	Quote Number		

This report supersedes any previous revision with this reference. This document must not be reproduced, except in full. If samples were provided by the customer, results apply only to the samples 'as received' and responsibility for representative sampling rests with the customer. Water results are reported on an 'as is' basis. Soil and sediment results are reported on a 'dry weight' basis. For other matrices the basis of reporting will be confirmed in the 'Report Comments' section. Measurement Uncertainty is available upon request. If the laboratory was authorised to conduct testing on samples received outside of the specified conditions, all test results may be impacted. Details of samples received outside of the specified conditions are mentioned in the sample description section of this test report.

#### **Definitions**

| <: Less Than | >: Greater Than | RP: Result Pending | MPN: Most Probable Number | CFU: Colony Forming Units | ---: Not Received/Not Requested | NA: Not Applicable | ND: Not Detected | LOR: Limit of Reporting | [NT]: Not Tested | | "Estimated | "Subcontracted Analysis | TBA: To Be Advised | \*\* Potential Holding Time Concern | \* Test not covered by NATA scope of accreditation | # Result derived from a calculation and includes results equal to or greater than the LOR

## **Authorised By**

Name	Position	Accreditation Category
Glen Rangott	Environmental Laboratory Manager, Brisbane	Environmental Chemistry

Client	BMT Commercial Australia Pty Ltd
Certificate Number	B1192631-B [R00]
Page	2/5

Project ID	Soil SUBCO- B23621- PoB SAP 2022
Sampler	Customer
Order Number	B23621_4_1



## Sample Information - Client/Sampler Supplied

Sample ID	B1192631-B/1	B1192631-B/2
Sample Description	B6-2C	B10-6C

Client BMT Commercial Australia Pty Ltd
Certificate Number B1192631-B [R00]
Page 3/5

Project ID Soil SUBCO- B23621- PoB SAP 2022

Sampler Customer

Order Number B23621\_4\_1



Page 3/5				Order Number
Analytical Results			B6-2C	B10-6C
	Client Sa	mple Description	50 20	510 00
	Client Sa	mpling date/time		
Compound/Analyte	LOR	Units	B1192631-B/1	B1192631-B/2
Compound, And, Sec	2011	Sints	Results	Results
Particle Size Distribution				
S023.03 - Particle Size Distribution by Hydrome	eter			
Particle Size Distribution	0.1	-	Please See Attached	Please See Attached
Acid Sulphate Soil - Cr Reduci				
ENV274 - Acid Sulphate Soil - Cr Reducible Sulphate	ohur Suite			
Chromium Reducible Sulphur	0.005	% S		0.20
pHkcl TAA	0.1	pH Units		8.3
ANCE (Acid Neutralising Capacity)	0.01	% CaCO3		2.2
Net Acid Soluble Sulfur	0.02	% S		N/A
Acid trail Titratable Actual Acidity	2	mol H+/t		<0
Sulfidic - TAA equiv	0.003	% pyrite S		<0.000
Chromium Reducible Sulfur Acidity Units	3	mol H+/t		130
Sulfur - KCI Extractable	0.02	% S		N/A
HCI Extractable Sulfur	0.02	% S		N/A
Net Acid Soluble Sulfur Acidity Units	10	mol H+/t		N/A
Net Acid Soluble Sulfur Equiv S% Pyrite	0.02	% S		N/A
Acid Neutralising Capacity Acid (ANCbt)	2	mol H+/t		440
Acid Neutralising Capacity Equiv S%	0.02	% S		0.70

Client BMT Commercial Australia Pty Ltd
Certificate Number B1192631-B [R00]
Page 4/5

Project ID Soil SUBCO- B23621- PoB SAP 2022

Sampler Customer

Order Number B23621\_4\_1



Analytical Results		and Barrier	B6-2C	B10-6C
		mple Description		
	Client Sa	mpling date/time		
Compound/Analyte	LOR	Units	B1192631-B/1 Results	B1192631-B/2 Results
Acid Sulphate Soil - Cr Reduci - Continued			Results	Results
ENV274 - Acid Sulphate Soil - Cr Reducible Sulph	hur Suite - Conti	nued		
ANC Fineness Factor		factor		1.5
Net Acidity (Sulfur Units)	0.02	% S		0.20
Net Acidity (Acidity Units)	10	mol H+/t		130
Liming Rate	1	kg CaCO3/t		10
Radiation Analysis*				
S014.00 - Determination of Gross Alpha and Be	ta			
Gross Alpha* (including K-40 correction)	0.08	Bq/g		0.080 ±0.069
Gross Beta* (including K-40 correction)	0.25	Bq/g		0.342 ±0.176
S004.09A Total Phosphorus				
S004.09 - Determination of Total Phosphorus				
Total Phosphorus^	0.5	mg/kg		5.0
S004.03A Total Nitrogen				
S004.03 - Determination of Total Nitrogen				
Total Nitrogen^	20	mg/kg		970
S004.08A NOx as N				
S004.08 - Determination of NOx as N				
NOx as N^	0.1	mg/kg		<0.1
S004.04A TKN				
S004.04 - Determination of Total Kjeldahl Nitro	gen			
Total Kjeldahl Nitrogen^	20	mg/kg		970

Client	BMT Commercial Australia Pty Ltd
Certificate Number	B1192631-B [R00]
Page	5/5

Project ID	Soil SUBCO- B23621- PoB SAP 2022
ampler	Customer
Order Number	B23621_4_1



## **Analysis Location**

All in-house analysis was completed by Symbio Laboratories - Subcontract Laboratory.

## **Report Comments**

Eurofins: Please note; Testing performed by an NATA accredited external subcontracted Laboratory.

Accreditation No.: 1261 Report no.: 921014-S

\*Please Note: Net Acidity has been reported excluding ANC\*

EAL: Please note; Testing performed by an external subcontracted Laboratory.

Report no.:N2447.

SAL: Please note; Testing performed by an NATA accredited external subcontracted Laboratory.

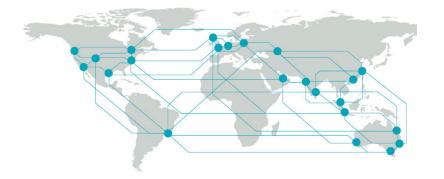
Accreditation No.: 1884 Report no.: SAL28376

SGS: Please note; Testing performed by an NATA accredited external subcontracted Laboratory.

Accreditation No.: 2562 Report no.: ME329238



## **BMT (OFFICIAL)**



BMT is a leading design, engineering, science and management consultancy with a reputation for engineering excellence. We are driven by a belief that things can always be better, safer, faster and more efficient. BMT is an independent organisation held in trust for its employees.

