



Port of Cairns Maintenance Dredging 2020

Sediment Characterisation and Introduced Marine Pest Report: Outer Channel, Offshore Disposal Site

Ports North

20 March 2020

301001-02058 – 00-EN-RPT-0009

Advisian
Worley Group

advisian.com

Disclaimer

This report has been prepared on behalf of and for the exclusive use of Ports North, and is subject to and issued in accordance with the agreement between Ports North and Advisian. Advisian accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party. Copying this report without the permission of Ports North and Advisian is not permitted.

Company details

Worley trading as Advisian Pty Ltd
61 001 279 812

Blue Tower, Level 25
12 Creek Street
Brisbane City,
QLD, 4000

T: 07 3377 7000

PROJECT 301001-02058 – 00-EN-RPT-0009: Port of Cairns Maintenance Dredging 2020 - Sediment Characterisation and Introduced Marine Pest Report: Outer Channel, Offshore Disposal Site

Rev	Description	Author	Review	Advisian approval	Revision date
0	Issued for use	 J Hogg	 A Kochnieff	 B Boylson	23.03.20

Table of contents

1	Introduction.....	6
1.1	Dredging Plan.....	6
1.2	Sediment Sampling and Analysis Plan.....	7
1.3	Objectives.....	7
2	Sediment Sampling Method	9
2.1	Study Timing.....	9
2.2	Sample Locations	9
2.3	Sediment Sample Collection.....	12
2.4	Sample Descriptions	12
2.5	Sampling Horizons.....	12
2.6	Laboratory Analysis	13
2.7	Data Analysis.....	15
	2.7.1 Phase II – Sediment Analysis for Total Sediment Concentrations.....	15
2.8	Quality Assurance and Quality Control	16
	2.8.1 QA/QC – Field Sampling.....	16
	2.8.2 QA/QC – Laboratory Analysis	17
3	Sediment Characterisation Results.....	18
3.1	Outer Channel	18
	3.1.1 Physical Characteristics.....	18
	3.1.2 Chemical Results	19
	3.1.3 Screening Level Assessment of Suitability for Unconfined Placement at Sea...20	
3.2	Offshore Disposal Site.....	22
	3.2.1 Physical Characteristics.....	22
	3.2.2 Chemical Results	23
4	Data Validation.....	25
4.1	Field QA/QC	25

4.1.1	Field Triplicates	25
4.1.2	Split Triplicates.....	25
4.1.3	Rinsate Blanks	26
4.2	Laboratory QA/QC.....	28
5	Introduced Marine Pest Survey	30
5.1	Objectives.....	30
5.2	Method.....	31
5.3	Results.....	31
5.3.1	Outer Channel.....	31
5.3.2	Offshore Disposal Site.....	31
5.4	Discussion.....	31
6	Conclusions	32
7	References.....	33

Appendices

- Appendix A Sediment Logs**
- Appendix B ALS Laboratory Report**
- Appendix C SGS Laboratory Report**
- Appendix D Introduced Marine Pest Survey Logs**

Table list

Table 1-1	Proposed 2020 maintenance dredging program	7
Table 2-1	Laboratory work orders.....	13
Table 2-2	Summary of Phase II analysis undertaken at the Outer Channel and Offshore Disposal Site.....	14
Table 2-3	Summary of field triplicate and split replicate samples collected.....	16
Table 3-1	Summary statistics of PSD for sediments within the Outer Channel dredge area	19
Table 3-2	Summary results for the Outer Channel dredge area.....	21

Table 3-3	Summary statistics of PSD for sediments within the ODS.....	23
Table 3-4	Summary results for the Offshore Disposal Site.....	24
Table 4-1	Outer Channel Field QA/QC results.....	27
Table 4-2	Rinsate Blank sample results.....	27
Table 4-3	Outliers noted in laboratory QA/QC compliance assessment.....	28

Figure list

Figure 2-1	Outer Channel sampling locations	10
Figure 2-2	Offshore Disposal Site sampling locations.....	11
Figure 3-1	Graphical summary of PSD for sediments within the Outer Channel dredge area.....	18
Figure 3-2	Graphical summary of PSD for sediments within the ODS	22

1 Introduction

Far North Queensland Ports Corporation (FNQPC), trading as Ports North, owns and operates the Port of Cairns, known as Cairns Seaport, which is a multi-purpose regional port that caters to a diverse range of customers from project, bulk and general cargo, cruise shipping, fishing fleet and reef passenger ferries. The Port of Cairns provides a range of marine facilities including:

- Bulk cargo facilities for petroleum products, sugar, fertiliser and liquid petroleum gas
- A marina that accommodates 261 berths for yachts, fishing and tourism vessels
- Her Majesty's Australian Ship (HMAS) Cairns Navy Base
- A cruise ship terminal and tourism facilities for access to the Great Barrier Reef.

Ports North maintains a regular sediment monitoring program to provide information regarding port operations management and to enable determination of the suitability of material for dredging and disposal at sea under a Marine Parks Permit (G10/33155.1) and Sea Dumping Permit (10/03). Both permits are administered by the Great Barrier Reef Marine Park Authority (GBRMPA). The program incorporates monitoring for introduced marine pests.

Ports North intends to undertake maintenance dredging at the following locations over the 2020 campaign and place the material at the approved Offshore Disposal Site (ODS):

- Outer Channel (OC)
- Inner Port (IP) – Wharves 1 to 8 and 10 to 12
- Navy Base – Inner (NB-I)
- Marlin Marina (MM) – Northern Portion

In February 2020, Advisian and Ports North undertook sampling of the OC, IP, NB-I, MM and ODS in advance of the annual maintenance dredging.

This report documents the findings of sediment and marine pest sampling at the OC and ODS. Sampling results relevant to the NB, IP and MM are reported separately (documents 301001-02058-00-EN-RPT-0008 and 301001-02058-00-EN-RPT-0010).

1.1 Dredging Plan

Maintenance dredging has been required annually at the Port of Cairns for over one hundred years. Ports North is required under the *Transport Infrastructure Act 1994* to maintain navigable depths within the port navigation areas.

A trailer suction hopper dredge (TSHD) (the 'Brisbane' in recent years) and bucket grab dredger (the 'Willunga') undertake annual maintenance dredging at the Port of Cairns. The 'Brisbane' is owned and operated by the Port of Brisbane and the 'Willunga' is owned and operated by Ports North. At the completion of dredging, bed levelling is typically undertaken to provide a more uniform bed profile.

Table 1-1 indicates the approximate dredge volume for each area for the 2020 dredge campaign, along with the dredge vessel likely to be used to undertake dredging.

Table 1-1 Proposed 2020 maintenance dredging program

Year	Dredge Area	Dredging Volume (<i>in situ</i> m ³)	Dredge Volume (dry tonnes)	Dredge Name	Dredge Type	Design dredge depth (m ^o LAT ^{**})
2020	OC	515,000	324,450	TSHD Brisbane	Trailing Arm Suction Hopper Dredge	9.1 - 10.3
	IP (Wharves 1 to 8, 10 to 12)	14,750	8,918	Willunga	Bucket Grab Dredge	9.1
	Navy Base (Inner)	15,000	8,700	Willunga	Bucket Grab Dredge	2.5 – 4.5
	MM (Northern Portion)	7,500	4,350	Willunga	Bucket Grab Dredge	2.5
Approximate Total		552,250	346,418			

Note: The OC dredge volumes includes a 3% increase in maintenance dredging associated with the CSDP.

* Estimated dry tonne amounts are based on historical long-term averages, however, where required, wet *in situ* volume is converted to dry tonnes using the method described in Recommended Amendment to Port of Cairns Marine Parks Permit G10/33155.1 & Sea Dumping Permit 10/03 Technical memorandum, document number 301001-01812-00-EN-MEM-0001 (WorleyParsons, 2014) and Port of Cairns – Sea Dumping Permit SD10/03 – Annual International Reporting Form – 2014 (Ports North, 2015).

** m^oLAT is metres below LAT

Due to the likely required timing of dredging works, the OC and ODS is reported in this document. The balance of the other Port of Cairns areas to be dredged in 2020 and sampled under the approved 2020 SAP are in separate documents; document 301001-02058-00-EN-RPT-0008 (NB), and document 301001-02058-00-EN-RPT-0010 (IP and MM).

1.2 Sediment Sampling and Analysis Plan

As part of the sediment and marine pest monitoring program a Sampling and Analysis Plan (SAP) for 2020 was prepared by Advisian (2020) on behalf of Ports North. The SAP was prepared in compliance with the approved *Cairns Port Long Term Management Plan: Dredging and Dredge Spoil Management* (LTMP) (WorleyParsons, 2010) and the methodology applied as outlined in the National Assessment Guidelines for Dredging (NAGD; Commonwealth of Australia, 2009). The SAP was approved by GBRMPA for implementation on 10 February 2020.

1.3 Objectives

The aim of the sediment investigations is to assess the quality of marine sediments and their suitability for dredging and placement at the approved ODS during 2020. The key objectives are to:

- Analyse sediments for a range of physical and chemical properties
- Provide comparison of chemical concentrations against the NAGD Screening Levels
- Determine the suitability of dredged sediment for placement at sea
- Provide information to GBRMPA in the decision-making process for approval under Ports North's Sea Dumping Permit (10/03) and Marine Parks Permit (G10/33155.1).

The objectives of the marine pest investigation are to:

- Sample sediments for presence/absence of marine pest species previously detected within port limits, namely:
 - *Hydroides sanctaerucis* (Caribbean Tubeworm)
 - *Perna viridis* (Asian Green Mussel)
 - *Musculista senhousia* (Asian Bag Mussel).
- Survey sediments for presence of other potential marine pest species not previously identified within port limits
- Characterise sediments for suitability for colonisation by identified marine pest species.

2 Sediment Sampling Method

Sampling of the OC dredge area and the ODS was undertaken in accordance with the methodology described in the approved SAP (Advisian, 2020).

The NAGD provides a decision tree approach for assessing potential contaminants comprising five phases. Phase I includes an evaluation of existing information and Phase II involves sampling and analysis of sediments. Subsequent phases are sometimes required dependent on the results of Phase I and II. These include:

- Phase III (elutriate and bioavailability testing)
- Phase IV (toxicity and bioaccumulation testing)
- Phase V (weight-of-evidence assessment).

This study only required Phase I and II.

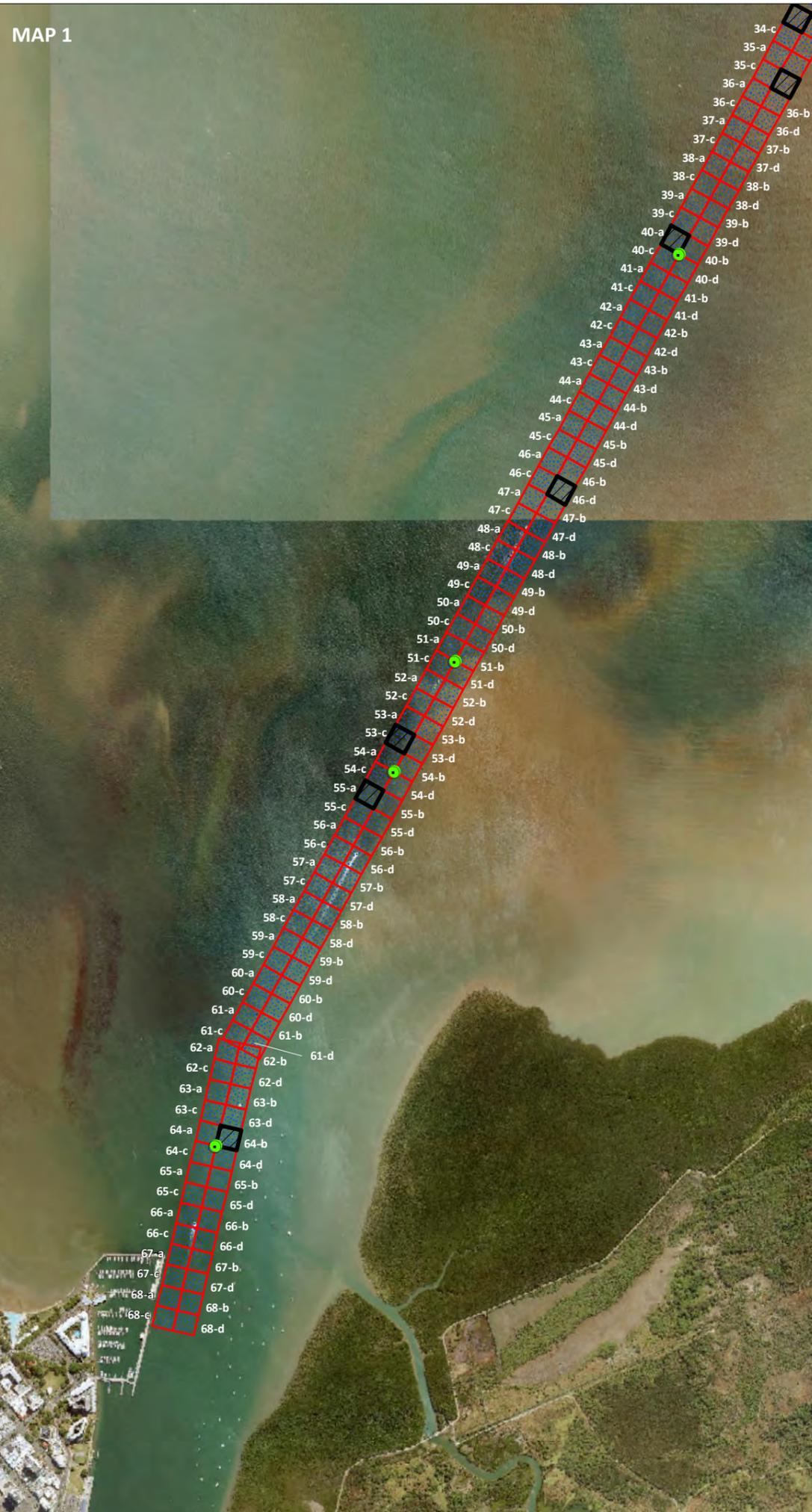
2.1 Study Timing

Sediments for Phase II assessment (sampling and analysis of sediments) were collected on 27 February 2020. Outcomes of the Phase II assessment informed the decision that Phase III analysis was not required as all parameters tested were within the NAGD Screening Levels.

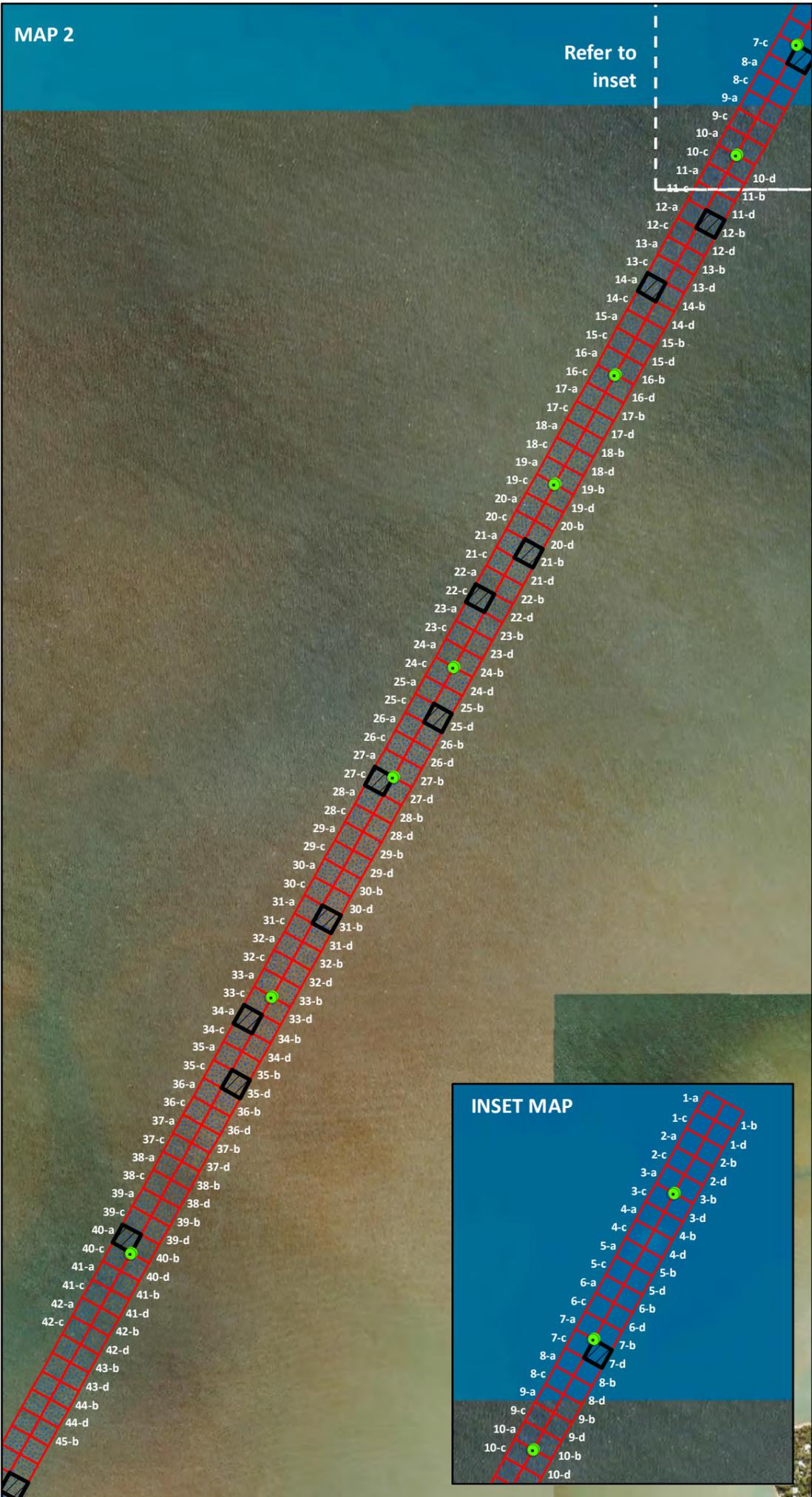
2.2 Sample Locations

Sampling locations corresponded to those randomly selected during the preparation of the SAP and within the overall sampling grid area (in the SAP). The OC area contained 15 sediment sampling locations, and the ODS area contained six sediment sampling locations. In both cases, samples from each location were used for data analysis. The sampling locations are provided in Figure 2-1 and Figure 2-2.

MAP 1



MAP 2



Cairns Port Maintenance Dredging Program 2020
Sediment Sampling and Analysis Plan and Introduced Marine Pest Survey Plan

Figure 2-1
Outer Channel
Sampling Locations 2020

LEGEND

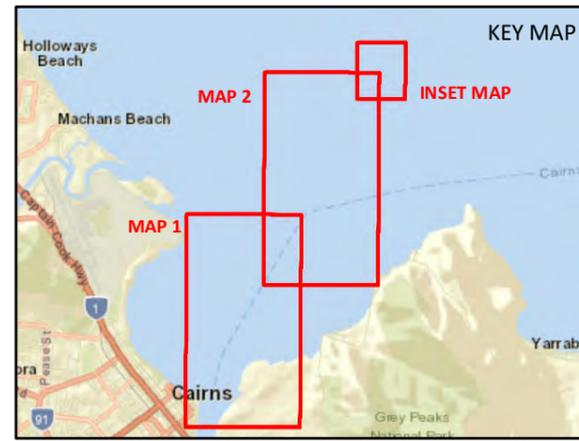
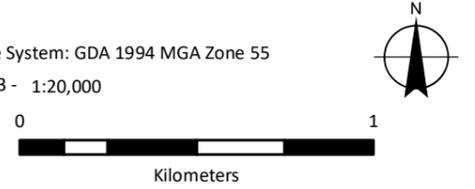
- 2020 marine pest sampling location (Towed sled)
- 2020 sediment sampling location
- Sampling grid
- 2020 dredge area

Source Information:
 Port facility layout and sampling grid location
 Based on data provided by Cairns Ports - June 2008.
 Dredge area
 Defined by client
 Imagery
 Queensland imagery (public) image web map service

While every care is taken to ensure the accuracy of this data, Advisian makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.

© Advisian Pty Ltd
 © State of Queensland 2020

Coordinate System: GDA 1994 MGA Zone 55
 Scale at A3 - 1:20,000



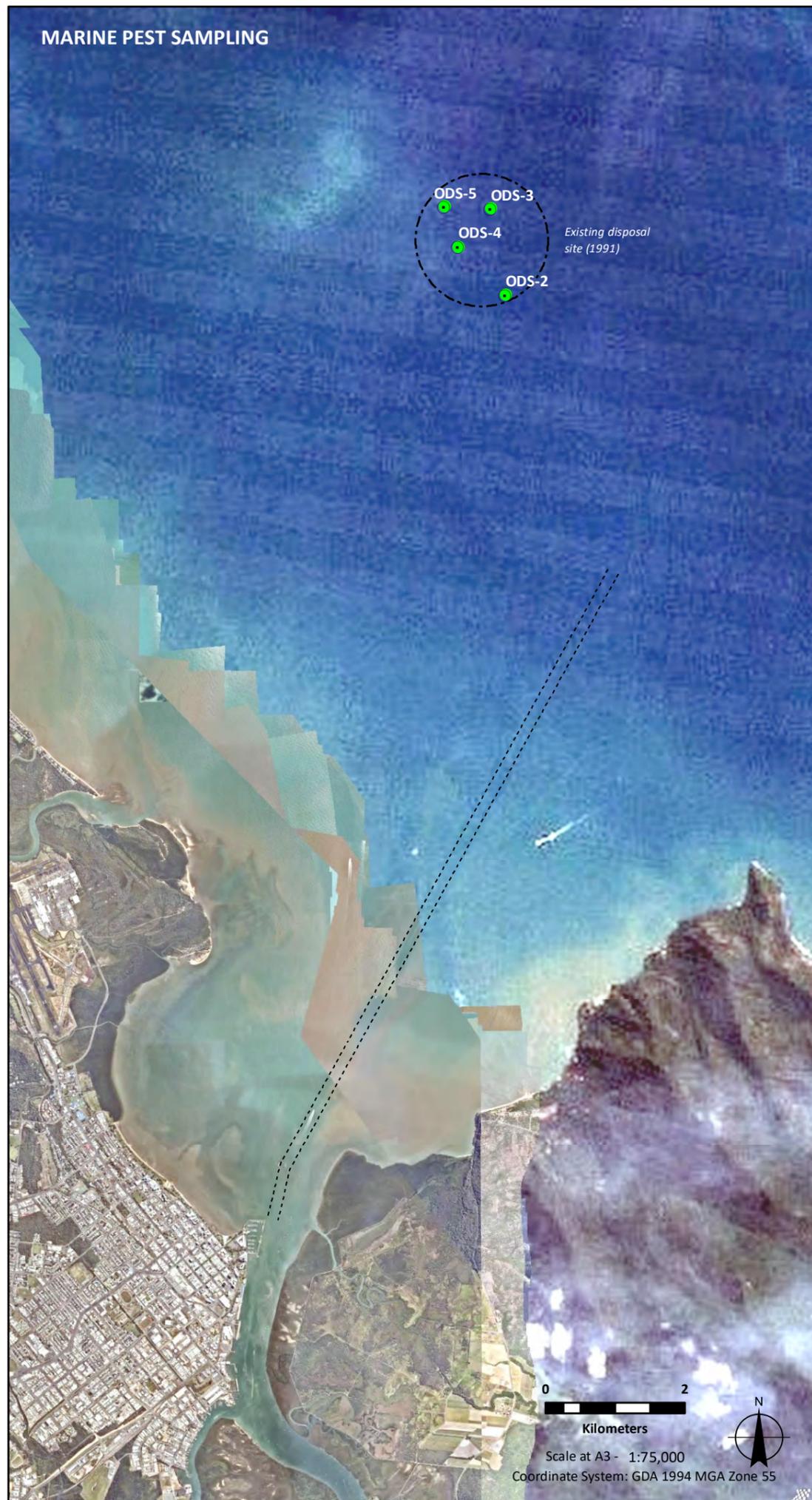
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

G:\301001\02058 PROJ - Cairns SAP 2018-2019\100 Engineering\10 GM - Geomatics\SAP 2020\Output\301001-02058-00-GM-SKT-1002-C (SAP2020_Sampling_OC).mxd
 5/03/2020 Rev: C ISSUED FOR INFORMATION Orig: KM Chk: JH

SEDIMENT SAMPLING



MARINE PEST SAMPLING



**Cairns Port Maintenance Dredging Program 2020
Sediment Sampling and Analysis Plan and Introduced Marine Pest Survey Plan**

**Figure 2-1
Offshore Disposal Site Sampling Locations for 2020**

LEGEND

- 2020 sediment sampling location
- 2020 marine pest sampling location
- Towed sled
- Entrance channel
- ⊞ Existing disposal site (1991)

Source Information:

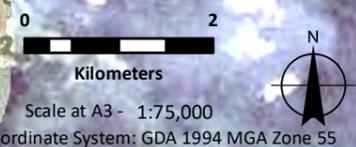
Port facility layout and sampling grid location
Based on data provided by Cairns Ports - June 2008.
Dredge area
Defined by client
Imagery August 19, 2019
NearMap

While every care is taken to ensure the accuracy of this data, Advisian makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the data being inaccurate or incomplete in any way and for any reason.

© Advisian Pty Ltd
© State of Queensland 2020



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



2.3 Sediment Sample Collection

Sampling was led by a suitably qualified person from Advisian experienced in sediment and introduced marine pest sampling. Samples were collected in accordance with strict Quality Assurance / Quality Control (QA/QC) protocols for the field sampling program as described in Section 2.8.1. A summary is provided below. Laboratory analysis QA/QC processes are described in Section 2.8.2.

The OC and ODS samples were collected by means of a boat-deployed stainless steel van Veen grab, which typically samples the top 10cm-15cm of material from the seabed. Once collected, the sample was transferred from the van Veen grab to stainless steel mixing bowls where the sediment was logged, photographed and homogenised. Sediment logs are provided in Appendix A.

Following homogenisation, sediment was transferred by powder free nitrile gloved hands into laboratory supplied sample containers and stored with ice in eskies. Following the completion of each sampling round, samples were transferred to a refrigerator for storage until dispatch to the laboratory.

Samples were dispatched in batches consigned under chain-of-custody documentation to two NATA accredited analytical laboratories: Australian Laboratory Services (ALS) and Société Générale de Surveillance (SGS). Phase II samples from the OC and ODS were submitted to ALS, while the split replicate samples from the OC were submitted to SGS. A summary of laboratory work orders is provided in Table 2-1 and laboratory reports are provided in Appendix B and Appendix C.

2.4 Sample Descriptions

At each sampling location the following information was collected / recorded:

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

Sediment logs were completed for each sample location on a field data sheet. These provided a description of the composition of each sample, including the following information:

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

2.5 Sampling Horizons

The van Veen grab collected samples from the top 10cm-15cm of sediment at the OC and ODS. Collected samples were brought to the surface and processed as a single horizon, the 'surface' horizon.

2.6 Laboratory Analysis

ALS was commissioned by Ports North to undertake the primary laboratory analyses for Phase II testing, and SGS was commissioned to provide the secondary laboratory analyses. Both laboratories are NATA accredited for the analyses undertaken. A single batch of samples were provided to ALS and a single batch provided to SGS (for the OC only). Additional sample material was held by the laboratories should Phase III analysis be required. A list of the work orders is provided in Table 2-1.

Table 2-1 Laboratory work orders

Sampling area	Primary laboratory (ALS)	Secondary laboratory (SGS)
OC	EB2005775	ME314030
ODS	EB2005775	N/A

In accordance with the QA/QC process (refer to Section 2.8.2), the laboratory reported results to the Lowest Practical Quantitation Limit (PQL) or the Limit of Reporting (LOR) at the time of analysis. The LOR is defined as the lowest chemical analysis concentration that can be reliably achieved within specified limits of precision and accuracy during routine operating conditions. The LORs achieved for each of the respective analyses are reported in Table 3-2 and Table 3-4. These LORs comply with minimum PQLs required under Appendix A, Table 1 of the NAGD.

Samples were analysed for the following physical characteristics and chemicals of concern, as indicated in the 2020 SAP (Advisian, 2020) and approved by GRMPA for Phase II analysis. These included:

- Moisture content (%)
- Particle size distribution (PSD)
- Total organic carbon (%TOC)
- Metals and metalloids including: aluminium (Al), antimony (Sb), arsenic (As), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni) selenium (Se), silver (Ag), vanadium (V) and zinc (Zn)
- Organotin compounds, tributyltin (TBT), dibutyltin (DBT) and monobutyltin (MBT).
- Nutrients, including: total nitrogen (TN), total kjeldahl nitrogen (TKN), nitrate (NO₃-), nitrite (NO₂-), ammonia (NH₃) and total phosphorus (TP).

Table 2-2 provides a summary description of the Phase I and II chemical analyses undertaken on sediments collected at specific sampling locations.

Table 2-2 Summary of Phase II analysis undertaken at the Outer Channel and Offshore Disposal Site

	Grid No.	Sample type	Analytes								
			Moisture	PSD	TOC	Metals	Diuron	Organotins	Nitrogens	Ammonia	Total Phosphorous
Outer Channel	SS7-d	Surface grab	1	1	1	1		1			
	SS12-b	Surface grab	1	1	1	1		1			
	SS14-a T1	Surface grab	1	1	1	1		1	1	1	1
	SS14-a T2	Surface grab	1		1	1		1			
	SS14-a T3	Surface grab	1		1	1		1			
	SS21-b	Surface grab	1	1	1	1		1			
	SS22-c	Surface grab	1	1	1	1		1			
	SS25-d	Surface grab	1	1	1	1		1			
	SS27-c	Surface grab	1	1	1	1		1			
	SS31-b T1	Surface grab	1	1	1	1		1	1	1	1
	SS31-b T2	Surface grab	1		1	1		1			
	SS31-b T3	Surface grab	1		1	1		1			
	SS34-a	Surface grab	1	1	1	1		1			
	SS35-d	Surface grab	1	1	1	1		1			
	SS40-a	Surface grab	1	1	1	1		1			
	SS46-d	Surface grab	1	1	1	1		1	1	1	1
	SS46-d D1	Surface grab	1		1	1		1			
	SS46-d D2	Surface grab	1		1	1		1			
	SS53-c	Surface grab	1	1	1	1		1			
	SS55-a	Surface grab	1	1	1	1		1			
SS64-b	Surface grab	1	1	1	1		1				
Offshore Disposal Site	SG / ODS 1	Surface grab	1	1	1	1		1			
	SG / ODS 2	Surface grab	1	1	1	1		1	1	1	1
	SG / ODS 3	Surface grab	1	1	1	1		1	1	1	1
	SG / ODS 4	Surface grab	1	1	1	1		1			
	SG / ODS 5	Surface grab	1	1	1	1		1			
	SG / ODS 6	Surface grab	1	1	1	1		1			
Notes	Field Triplicate location		Triplicate Split location								

2.7 Data Analysis

2.7.1 Phase II – Sediment Analysis for Total Sediment Concentrations

2.7.1.1 Screening Levels

Chemical concentration levels for sediments were compared against the NAGD Screening Levels listed in Appendix A, Table 2 of the NAGD (Commonwealth of Australia 2009), or agreed Local Screening Level, to assess whether the material is suitable for placement at sea.

Local Screening Levels were assessed and established during the development of the 2010-2020 LTMP (WorleyParsons 2010). During development of the approved 2010-2020 LTMP, the Port Authority commissioned a technical assessment of existing information to inform the contaminant list and guideline levels for the term of the LTMP. In that process, justification was provided to the Determining Authority for agreed local screening guideline limits for As and Diuron. For As, Section 4.1.2 of the LTMP (pages 36 to 38) indicates:

“Based on evaluation of existing current information an increase in the local screening level within the Cairns Port dredge management areas to 30 mg/kg for arsenic was agreed by the Determining Authority.”

In addition, a literature derived screening guideline limit for the herbicide Diuron was agreed at a level of 2 µg/kg. Note that Diuron is not tested in the OC or the ODS.

The SAP assessment process for the Port of Cairns has utilised NAGD Screening Levels and the agreed Local Screening Levels for sediment characterisation since 2010. These levels are also used in this report.

2.7.1.2 Statistical Assessment

The assessment against NAGD criteria involves comparison of the upper 95% confidence level (95% UCL) chemical concentration across all samples at a given sampling location to the NAGD Screening Levels. Further testing (e.g. Phase III elutriate and bioavailability) would be required if NAGD Screening Levels or Local Screening Levels were exceeded.

Detections for organic parameters were normalised to 1% TOC as the recorded TOC value was within the range of 0.2-10%. For the calculation of normalised values and of 95% UCLs, values below the LOR were set to one half of the LOR value in accordance with NAGD recommendations. For organic concentrations below detection, the half LOR values are not normalised to %TOC. Means, standard deviations and 95% UCLs were calculated for the OC and ODS. Means and 95% UCLs were not calculated for contaminant groups where concentrations were below detection levels at all sampling locations. Means were calculated for contaminant groups where there were at least three concentrations above detection levels, and 95% UCLs were calculated where there were at least six data points with at least three concentrations above detection levels.

The methods used to calculate the 95% UCLs were based on the required methods outlined in Appendix A of the NAGD (p38, comparison of data to Screening Levels). Normality of datasets was determined using the Shapiro-Wilks test and quantile-quantile plots in ProUCL Version 5 (5.1) developed by the US EPA. Datasets were determined as being either normal, log-normal or neither in their distributions. Normal datasets were analysed using the 1-tailed student's t UCL. Log-normal

datasets were analysed using non-parametric Jackknife analysis as recommended in the NAGD. Similarly, datasets that were neither normal nor log-normally distributed were analysed using non-parametric Jackknife analysis.

According to the NAGD, if the 95% UCL values for all chemicals of concern are below relevant Screening Levels, it is unlikely that concentrations in the sediment will have an adverse effect on organisms living in or on that sediment. Sediments are therefore considered non-toxic and there are no chemical obstacles to unconfined sea disposal.

2.8 Quality Assurance and Quality Control

This section details the methods employed in field sampling and laboratory QA/QC to ensure validity of the analytical results.

2.8.1 QA/QC – Field Sampling

Consistent with NAGD requirements, the following QA/QC measures were implemented:

- Collection of field triplicates (three separate samples taken at the same location) at 10% of sites, to determine the variability of the sediment physical and chemical characteristics
- Collection of split replicates (one sample split into three separate containers) at 5% of sites, to assess variation in results between laboratory analysis methods and processes
- Comparison of results of field quality control split replicate and field triplicate samples against NAGD criteria
- Collection of a rinsate blank sample to assess QA/QC field procedures.

A summary of the QA/QC sampling locations are presented in Table 2-3. The field QA/QC standards are outlined in Section 4.1 and the results presented in Section 4.

Table 2-3 Summary of field triplicate and split replicate samples collected

Dredge Area	Sampling Location	Horizon Depth (m)	Field Triplicate	Triplicate Split Replicate
Outer Channel	OC SS14-a	0.0-0.5m	X	
Outer Channel	OC SS31-b	0.0-0.5m	X	
Outer Channel	OC SS46-d	0.0-0.5m		X

QAQC during field work was ensured by:

- Using suitably qualified environmental staff (>5 years' experience) and support personnel experienced in grab sediment sampling, field supervision and sediment logging
- Samples contained in appropriately cleaned, pre-treated and labelled sample containers that were provided by the analytical laboratory
- Samples were kept cool (4°C) after sample containment and during transport by being stored in eskies with ice packs
- Transportation of samples under chain of custody documentation

- All field QC replicate (split) samples were 'blind' labelled in the field with QC field numbers, which did not relate to sampling location names
- All sampling equipment, including mixing bowls etc. was decontaminated between sampling locations via a decontamination procedure involving a wash with ambient sea water and a laboratory grade detergent (Decon 90), and successive rinsing with deionised water.

2.8.2 QA/QC – Laboratory Analysis

A validation of the analytical data was undertaken in accordance with Appendix A of the NAGD to confirm that the data quality was suitable for undertaking an assessment to characterise material proposed for dredging and disposal. This validation included a consideration of results for laboratory blanks, standards, spikes, duplicate samples and surrogate recovery. These results are presented in Section 4.2 and Appendix B and Appendix C.

The laboratories used for sediment sample analyses are NATA accredited for the methods used and are experienced in the analysis of marine sediments. Laboratory QA/QC procedures were carried out in accordance with the requirements of Appendix F of the NAGD. These requirements included analysis of:

- A laboratory blank
- Laboratory control sample
- Matrix spikes
- Laboratory duplicates
- Surrogate recovery.

Laboratory blanks are samples submitted by the laboratory during sample analysis to assist in identifying any cross contamination of samples during laboratory preparation, extraction or analysis. Analysis of laboratory blank samples should result in a concentration not exceeding the LOR for a particular contaminant.

Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes to monitor method precision and accuracy independent of sample matrix. Recovery limits are based on statistical evaluation of processed LCS.

The laboratory undertakes matrix spikes to identify the amount of interference from the sediment matrix on contaminant recovery. Samples collected from the field are split from the base sample and spiked with a known contaminant concentration. The percent recovery of the contaminant is then calculated. The purpose of this is to monitor potential matrix effects on analyte recoveries.

Laboratory duplicates determine the precision of analysis performed by the laboratory by the calculation of the Relative Percentage Difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the relative percent difference (RPD) between the two sample concentrations for a specific contaminant.

Surrogate recovery is undertaken by "spiking" a sample with a chemical similar to the contaminant and assessing its recovery after analysis. If a high percentage of the surrogate is recovered (specified as 75-125% under NAGD guidelines), it indicates that the laboratory analytical methods can accurately measure the contaminant of concern.

3 Sediment Characterisation Results

Sediment samples were physically characterised in the field at each sampling location. In addition, samples were collected from each location for PSD analysis. Field log data summaries and photographs are provided in Appendix A. Complete laboratory reporting is provided in Appendix B and Appendix C.

3.1 Outer Channel

3.1.1 Physical Characteristics

Sediments within the OC are dominated by silt and clay fractions (i.e. fines) which account for over 84% of sediment at most sampling locations, except for locations OC SS25-d, OC SS46-d and OC SS64-b. These locations had a higher proportion of sand and some gravel. No samples contained cobbles.

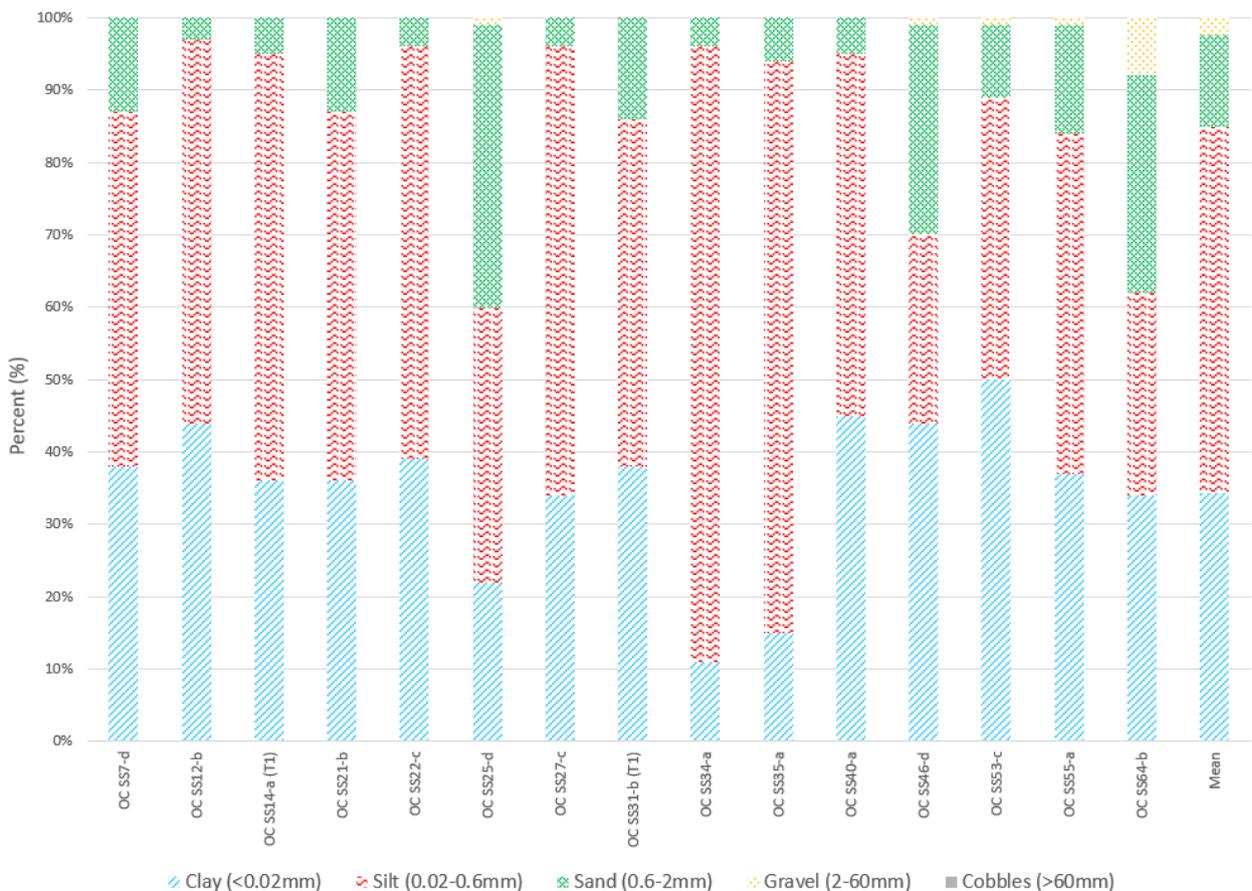


Figure 3-1 Graphical summary of PSD for sediments within the Outer Channel dredge area

Table 3-1 Summary statistics of PSD for sediments within the Outer Channel dredge area

Sample ID	Date Sampled	Texture					Soil Particle Density (Clay/Silt/Sand)
		Clay	Silt	Sand	Gravel	Cobbles	
Units		%	%	%	%	%	g/cm ³
PQL		1	1	1	1	1	0.01
Size (mm)		<0.02	0.02-0.6	0.6-2	2-60	>60	-
OC SS7-d	27/02/20	38	49	13	<1	<1	2.64
OC SS12-b	27/02/20	44	53	3	<1	<1	2.14
OC SS14-a (T1)	27/02/20	36	59	5	<1	<1	2.22
OC SS21-b	27/02/20	36	51	13	<1	<1	2.58
OC SS22-c	27/02/20	39	57	4	<1	<1	2.59
OC SS25-d	27/02/20	22	38	39	1	<1	2.64
OC SS27-c	27/02/20	34	62	4	<1	<1	2.32
OC SS31-b (T1)	27/02/20	38	48	14	<1	<1	2.41
OC SS34-a	27/02/20	11	85	4	<1	<1	2.64
OC SS35-a	27/02/20	15	79	6	<1	<1	2.79
OC SS40-a	27/02/20	45	50	5	<1	<1	2.51
OC SS46-d	27/02/20	44	26	29	1	<1	2.45
OC SS53-c	27/02/20	50	39	10	1	<1	2.39
OC SS55-a	27/02/20	37	47	15	1	<1	2.61
OC SS64-b	27/02/20	34	28	30	8	<1	2.63
Mean	-	35	51	13	2.4	-	2.50

3.1.2 Chemical Results

The results of chemical analyses for sediments in the OC dredging area are summarised below and presented in Table 3-2 which includes a comparison against Screening Levels from Table 2 Appendix A of the NAGD and agreed Local Screening Levels (refer to Section 2.7).

3.1.2.1 Metals and Metalloids

There were detectable concentrations of most metals and metalloids analysed including Al, As, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, V and Zn. Only Sb, Ag and Cd had concentrations below the respective LORs. All metals and metalloids concentrations, including means and 95% UCL of the mean values were below the respective NAGD and Local Screening Levels. These results are generally consistent with 2019 OC dredge area sampling data.

3.1.2.2 Organotin Compounds

Concentrations of MBT and DBT were below the 1 µgSn/kg LOR in every sample analysed. There are no NAGD Screening Levels for these analytes. Normalised (to %TOC) TBT concentrations ranged from below the 0.5 µgSn/kg LOR to 0.73 µgSn/kg. These TBT concentrations and the 95% UCL of the mean

were below the NAGD Screening Level of 9 µgSn/kg at all sampling locations. These results are consistent with 2019 OC dredge area sampling data.

3.1.2.3 Nutrients

Nutrients were analysed at three sampling locations (OC SS14-a, OC SS31-b and OC SS46-d). TN, TKN, TP and NH₃ were detected in each sample. TN was entirely comprised of TKN, which is evident as the TN and TKN concentrations were equal for each sample. These concentrations ranged between 1490 mg/kg and 1610 mg/kg. Concentrations for NH₃ ranged between 17.3 mg/kg and 81.5 mg/kg which is higher than the 2019 results, and TP ranged between 307 mg/kg and 423 mg/kg which is similar to results from 2019. Concentrations of NO₃⁻ and NO₂⁻ were less than the LOR. There are no NAGD Screening Levels for nutrient concentrations.

3.1.3 Screening Level Assessment of Suitability for Unconfined Placement at Sea

According to the NAGD assessment framework, sediments in the OC of the Port of Cairns are suitable for unconfined placement at sea at the approved offshore disposal site. This is on the basis that all 95% UCLs of the mean for contaminant substances analysed were below respective NAGD or agreed Local Screening Levels (Table 3-2).

Table 3-2 Summary results for the Outer Channel dredge area

Sample ID	Units	PQL	NAGD PQL	NAGD (Local) Screening Level	OC SS7-d	OC SS12-b	OC SS14-a (T1)	OC SS21-b	OC SS22-c	OC SS25-d	OC SS27-c	OC SS31-b (T1)	OC SS34-a	OC SS35-a	OC SS40-a	OC SS46-d	OC SS53-c	OC SS55-a	OC SS64-b	Mean/Geomean	Standard Deviation	95% UCL	Normal (N) Log-normal (L) Neither (X)
					27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20				
Misc																							
% Moisture	%	1	0.1	-	57.7	64.6	64.9	44.4	63.8	44.4	68.2	65.2	67.8	69.2	67.2	56.7	57.8	59.6	32.1	58.91	10.76	63.8	N
Total Organic Carbon	%	0.02	0.1	-	1.1	1.14	1.62	0.65	1.52	0.75	1.71	1.82	1.93	2.01	1.65	1.22	1.69	2.08	0.27	1.41	0.54	1.655	N
Metals and Metalloids																							
Aluminium, Al	mg/kg	50	200	-	11200	11500	12000	8360	10900	8270	12900	11300	12300	12400	12500	9810	10900	10600	7730	10844.67	1630.94	11586	N
Antimony, Sb	mg/kg	0.5	0.5	2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50			
Arsenic, As	mg/kg	1	1	20 (30)	15	17.6	18.7	10.8	19	12.5	18.3	21.6	19.6	19.9	19.1	15.4	17.8	18.4	11.5	17.01	3.25	18.49	N
Cadmium, Cd	mg/kg	0.1	0.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Chromium, Cr	mg/kg	1	1	80	22.4	23.9	22.2	15.7	18	16.3	22.2	21.8	22.3	23.4	22.6	19.5	18.8	22.5	20.8	20.83	2.56	21.99	X
Cobalt, Co	mg/kg	0.5	0.5	-	7.6	7.9	7.9	6.6	8	5.7	8.1	9.2	8.7	9	9.5	6.8	8.6	8.1	5	7.78	1.27	8.359	N
Copper, Cu	mg/kg	1	1	65	8.3	9.2	10.2	5.4	10.2	5.8	12.8	12.6	14.6	14.9	13.7	9	10.4	10.6	4.4	10.14	3.26	11.62	N
Iron, Fe	mg/kg	50	100	-	23100	23600	23900	18900	24100	17400	23500	26000	25700	25700	27100	20500	24500	25400	23600	23533	2693	24758	N
Lead, Pb	mg/kg	1	1	50	15.4	14.6	14	10.1	16.4	8.3	17.2	18.5	18.9	18.8	18.3	14.5	18	15.7	11.2	15.33	3.30	16.83	N
Manganese, Mn	mg/kg	10	10	-	543	560	629	310	599	334	698	709	742	755	767	445	621	489	493	579.60	145.43	645.7	N
Mercury, Hg	mg/kg	0.01	0.01	0.15	0.02	0.02	0.03	<0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	<0.01	0.02	0.01	0.0258	X
Nickel, Ni	mg/kg	1	1	21	10.4	11.6	10	7.6	8.1	7.4	9.9	9.8	10	10.6	10.1	8.6	8.9	9.7	7.1	9.32	1.31	9.915	N
Selenium, Se	mg/kg	0.1	0.1	-	0.4	0.5	0.5	0.4	0.5	0.3	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.3	0.49	0.10	0.532	X
Silver, Ag	mg/kg	0.1	0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Vanadium, V	mg/kg	2	2	-	34.5	34.4	33	25	33.1	21.2	32.9	35.1	34	36.1	35.8	30.6	33.1	34.8	25.9	31.97	4.42	33.98	X
Zinc, Zn	mg/kg	1	1	200	35	37.5	39	26.8	39.6	25.1	44.5	44.9	48.1	48.8	44	32	36.4	36.5	18.4	37.11	8.71	41.07	N
Organotins																							
Monobutyltin	µg Sn/kg	1	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1				
Normalised to % TOC	µg Sn/kg		-	-																			
Dibutyltin	µgSn/kg	1	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1				
Normalised to % TOC	µg Sn/kg		-	-																			
Tributyltin	µg Sn/kg	0.5	1	-	<0.5	<0.5	0.6	<0.5	0.6	<0.5	0.8	1	1.4	2	1.1	0.6	<0.5	0.9	<0.5				
Normalised to % TOC	µg Sn/kg		-	9	0.25	0.25	0.37	0.25	0.39	0.25	0.47	0.55	0.73	1.00	0.67	0.49	0.25	0.43	0.25	0.44	0.22	0.54	N
Nutrients																							
Total Nitrogen as N (TKN + NOx)	mg/kg	20	0.1	-			1490					1610				1060				1386.67	289.19		
Total Kjeldahl Nitrogen as N	mg/kg	20	0.1	-			1490					1610				1060				1386.67	289.19		
Nitrite as N (Sol.)	mg/kg	0.1	0.1	-			<0.1					<0.1				<0.1							
Nitrate as N (Sol.)	mg/kg	0.1	0.1	-			<0.1					<0.1				<0.1							
Nitrite + Nitrate as N (Sol.)	mg/kg	0.1	0.1	-			<0.1					<0.1				<0.1							
Ammonia as N	mg/kg	0.2	0.1	-			80.8					81.5				17.3				59.87	36.87		
Total Phosphorus as P	mg/kg	2	0.1	-			423					388				307				372.67	59.50		

Notes	
Note	When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD).
PQL	Practical Quantitation Limit
Sample ID	Sample location numbers
-	No guidelines levels (i.e. Screening or Maximum Levels) set in NAGD for given parameter, or no analysis undertaken for a given sample
**	Unreliable/Unstable/Unrealistic UCL due to small dataset (≤3 samples)
	Value exceeds NAGD or agreed local screening level
Normalised to % TOC	Normalised to % TOC, over the range of TOC from 0.2 to 10%
	Not tested

3.2 Offshore Disposal Site

3.2.1 Physical Characteristics

Sediments within the ODS are dominated by silt and clay fractions (i.e. fines) which account for over 83% of sediment at all sampling locations. Gravel was present in three samples at concentrations of 1% (ODS 3) and 2% (ODS3, ODS 6). No samples contained cobbles. A summary of PSD results for the ODS is presented in Figure 3-2 and Table 3-3.

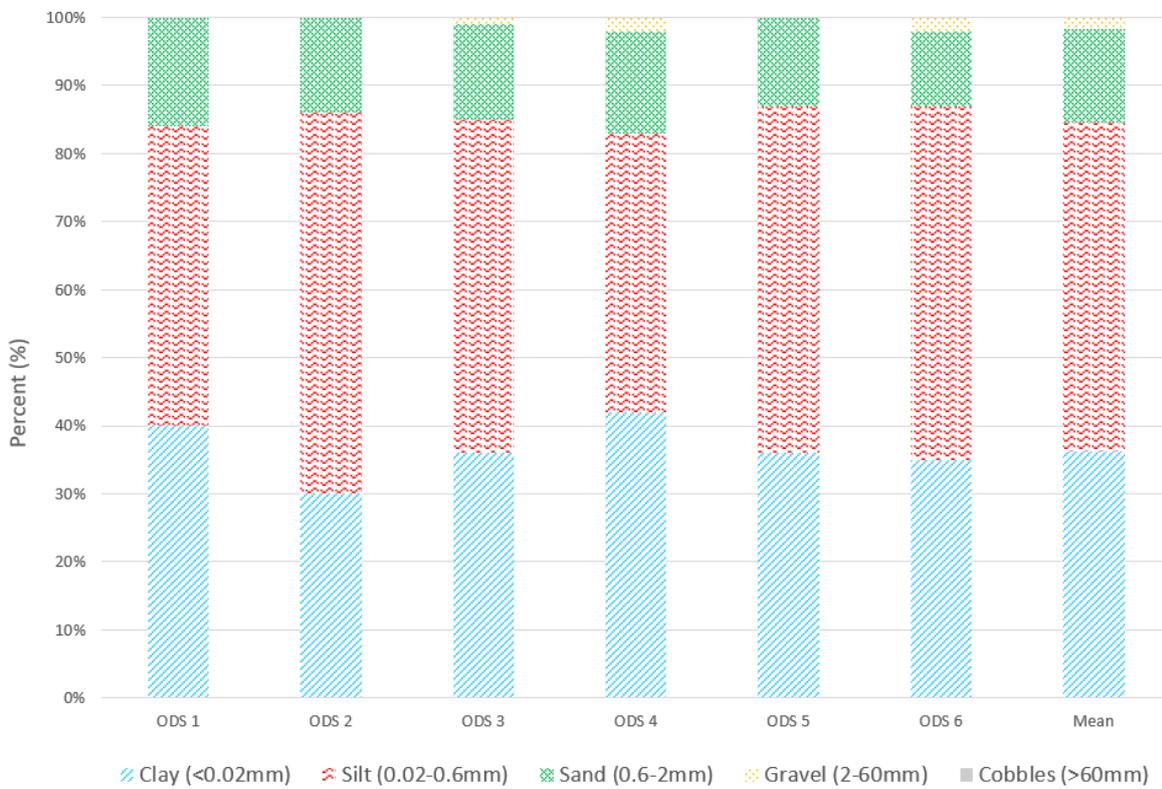


Figure 3-2 Graphical summary of PSD for sediments within the ODS

Table 3-3 Summary statistics of PSD for sediments within the ODS

Sample ID	Date Sampled	Texture					Soil Particle Density (Clay/Silt/Sand)
		Clay	Silt	Sand	Gravel	Cobbles	
Units		%	%	%	%	%	g/cm ³
PQL		1	1	1	1	1	0.01
Size (mm)		<0.02	0.02-0.6	0.6-2	2-60	>60	-
ODS 1	27/02/20	40	44	16	<1	<1	2.59
ODS 2	27/02/20	30	56	14	<1	<1	2.53
ODS 3	27/02/20	36	49	14	1	<1	2.59
ODS 4	27/02/20	42	41	15	2	<1	2.6
ODS 5	27/02/20	36	51	13	<1	<1	2.57
ODS 6	27/02/20	35	52	11	2	<1	2.66
Mean	-	37	49	14	1.7	-	2.59

3.2.2 Chemical Results

The results of chemical analyses for sediments in the ODS dredging area are summarised below and presented in Table 3-4 which includes a comparison against Screening Levels from Table 2 Appendix A of the NAGD and agreed Local Screening Levels (refer to Section 2.7).

3.2.2.1 Metals and Metalloids

There were detectable concentrations of most metals and metalloids analysed including Al, As, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, V and Zn. Only Sb, Ag and Cd had concentrations below the respective LORs. All metals and metalloids concentrations, including means and 95% UCL of the mean values, were below the respective NAGD and Local Screening Levels. These results are generally consistent with 2019 ODS sampling data.

3.2.2.2 Organotin Compounds

Concentrations of MBT and DBT were below the 1 µgSn/kg LOR in every sample analysed. There are no NAGD Screening Levels for these analytes. Normalised (to %TOC) TBT concentrations ranged from below the 0.5 µgSn/kg LOR to 0.82 µgSn/kg. These TBT concentrations and the 95% UCL of the mean were below the NAGD Screening Level of 9 µgSn/kg at all sampling locations. These results are consistent with 2019 ODS sampling data.

3.2.2.3 Nutrients

Nutrients were analysed at two sampling locations (ODS 2, ODS 3). TN, TKN, TP and NH₃ were detected in each sample. TN was entirely comprised of TKN, which is evident as the TN and TKN concentrations were equal for each sample. These concentrations ranged between 920 mg/kg and 1200 mg/kg. Concentrations for NH₃ ranged between 12.1 mg/kg and 14.5 mg/kg, and TP ranged between 318 mg/kg and 390 mg/kg. Concentrations of NO₃⁻ and NO₂⁻ were less than the LOR. These nutrients concentrations are similar to 2019 results. There are no NAGD Screening Levels for nutrient concentrations.

Table 3-4 Summary results for the Offshore Disposal Site

Sample ID	Units	PQL	NAGD PQL	NAGD (Local) Screening Level	ODS 1	ODS 2	ODS 3	ODS 4	ODS 5	ODS 6	Mean/ Geomean	Standard Deviation	95% UCL	Normal (N) Log-normal (L) Neither (X)
Date Sampled					27/02/20	27/02/20	27/02/20	27/02/20	27/02/20	27/02/20				
Misc														
% Moisture	%	1	0.1	-	53.5	59.6	50.9	52.5	54.7	61	55.37	4.04	58.69	N
Total Organic Carbon	%	0.02	0.1	-	0.6	1.11	0.98	1.35	1.18	0.85	1.01	0.26	1.229	N
Metals and Metalloids														
Aluminium, Al	mg/kg	50	200	-	9790	11000	8430	8450	8860	11200	9621.67	1248.38	10649	N
Antimony, Sb	mg/kg	0.5	0.5	2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50				
Arsenic, As	mg/kg	1	1	20 (30)	12.1	15.3	13.5	15.6	15.8	14.8	14.52	1.44	15.7	N
Cadmium, Cd	mg/kg	0.1	0.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Chromium, Cr	mg/kg	1	1	80	23.2	25.6	19.9	20.5	21.2	24.7	22.52	2.34	24.44	N
Cobalt, Co	mg/kg	0.5	0.5	-	7.2	8.1	6.7	7	6.8	7.5	7.22	0.52	7.644	N
Copper, Cu	mg/kg	1	1	65	6.4	9.9	7.6	8.8	7.8	7.5	8.00	1.20	8.991	N
Iron, Fe	mg/kg	50	100	-	19800	22800	18700	20400	20900	21900	20750	1468	21958	N
Lead, Pb	mg/kg	1	1	50	13.3	16.2	11.6	13.5	12.4	14.9	13.65	1.67	15.03	N
Manganese, Mn	mg/kg	10	10	-	396	516	460	433	502	426	455.50	46.39	493.7	N
Mercury, Hg	mg/kg	0.01	0.01	0.15	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00		
Nickel, Ni	mg/kg	1	1	21	10.8	12	9.2	9.4	9.7	11.6	10.45	1.19	11.43	N
Selenium, Se	mg/kg	0.1	0.1	-	0.4	0.5	0.4	0.5	0.4	0.4	0.43	0.05	0.476	X
Silver, Ag	mg/kg	0.1	0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Vanadium, V	mg/kg	2	2	-	31.2	35.2	27.8	29.3	28.6	33.3	30.90	2.89	33.28	N
Zinc, Zn	mg/kg	1	1	200	31.3	40.2	30.1	31.1	32	34.8	33.25	3.76	36.34	N
Organotins														
Monobutyltin	µg Sn/kg	1	1	-	<1	<1	<1	<1	<1	<1				
Normalised to % TOC	µg Sn/kg		-	-										
Dibutyltin	µgSn/kg	1	1	-	<1	<1	<1	<1	<1	<1				
Normalised to % TOC	µg Sn/kg		-	-										
Tributyltin	µg Sn/kg	0.5	1	-	<0.5	0.7	0.8	0.6	0.6	<0.5				
Normalised to % TOC	µg Sn/kg		-	9	0.25	0.63	0.82	0.44	0.51	0.25	0.48	0.22	0.665	N
Nutrients														
Total Nitrogen as N (TKN + NOx)	mg/kg	20	0.1	-		1200	920							
Total Kjeldahl Nitrogen as N	mg/kg	20	0.1	-		1200	920							
Nitrite as N (Sol.)	mg/kg	0.1	0.1	-		<0.1	<0.1							
Nitrate as N (Sol.)	mg/kg	0.1	0.1	-		<0.1	<0.1							
Nitrite + Nitrate as N (Sol.)	mg/kg	0.1	0.1	-		<0.1	<0.1							
Ammonia as N	mg/kg	0.2	0.1	-		12.1	14.5							
Total Phosphorus as P	mg/kg	2	0.1	-		390	318							

Notes	
Note	When calculating averages and 95%UCLs, values below detection for individual sample results were set to half the detection levels (consistent with the NAGD).
PQL	Practical Quantitation Limit
Sample ID	Sample location numbers
-	No guidelines levels (i.e. Screening or Maximum Levels) set in NAGD for given parameter, or no analysis undertaken for a given sample
**	Unreliable/Unstable/Unrealistic UCL due to small dataset (≤3 samples)
	Value exceeds NAGD or agreed local screening level
Normalised to % TOC	Normalised to % TOC, over the range of TOC from 0.2 to 10%
	Not tested

4 Data Validation

This section examines the validity of the analytical data reported for this study. It discusses the confidence and accuracy in the presented results. Note that QA/QC sampling and analysis was not undertaken for the ODS as the results for this area are used for an assessment of long-term condition, not an assessment of suitability for dredging or placement.

4.1 Field QA/QC

4.1.1 Field Triplicates

Field triplicates (i.e. three separate samples collected in the field at the same sampling location) were collected to determine the variability of the sediment physical and chemical characteristics. Contaminant results were compared through calculation of the relative standard deviation (RSD). The NAGD states that the RSD for field triplicates should be $\pm 50\%$, "although they may not always do so where the sediments are very inhomogeneous or greatly differing in grain size".

Field triplicate samples for the OC were collected at locations OC SS14-a and OC SS31-b and provided to the primary laboratory (ALS). All field triplicate samples were within the $\pm 50\%$ stipulated in the NAGD for all contaminants. This indicated that there was relative homogeneity in the material within each sampling location. The results of the analysis are presented in Table 4-1.

4.1.2 Split Triplicates

Split triplicates are samples that are split from the same original sample into three samples. Two samples are analysed by the primary laboratory (intra laboratory analysis) and one sample is submitted to a secondary laboratory for analysis and compared to the primary sample (inter laboratory analysis). Contaminant concentrations are compared between the two split samples through calculation of the RPD. The NAGD states that the RPD for duplicate split samples should be $\pm 35\%$. The RPD value provides an indication of variation within and between the laboratories.

Split triplicate samples were collected at OC SS46-d and provided to the primary laboratory (ALS) and secondary laboratory (SGS) as required. There were RPD exceedances for metals and metalloids including Al, As, Ch, Co, Cu, Fe, Ni, Se, V and Zn. The results of the analysis are presented in Table 4-1. For each metal or metalloid, the SGS concentrations were higher than those detected by ALS. This difference is associated with a variation in analysis method used by the laboratories, specifically in acid digest prior to analysis. ALS use the hot block digest method (USEPA 200.2) while SGS use the microwave assisted acid digestion method (USEPA 3051A). Both methods are accepted and derived from US EPA, however have variation in the concentrations of metals and metalloids that they liberate. The method used by SGS is a more aggressive digestion compared to the hot block method and therefore liberates more metals and metalloids and results in higher detected concentrations. Due to this impact of variation in the method used, the RPD calculation is not accurate and so a direct comparison between the samples cannot be made. Nonetheless, the higher SGS concentrations are below their respective NAGD Screening Levels (except Ni in sample D2). The concentration of Ni in D2 is 23 mg/kg and therefore above the NAGD Screening Level of 21 mg/kg; however, as concentrations of Ni in all primary samples, sample D1 and the 95% UCL are below the NAGD Screening Level, it is considered the RPD exceedances do not impact data quality.

4.1.3 Rinsate Blanks

A rinsate blank (RB) sample collected by rinsing decontaminated equipment with laboratory prepared deionised water was also analysed for total metals. The RB sample should have results that are below the LORs to provide evidence that effective decontamination techniques were used onsite.

RB sample R4 27/02/20 had concentrations of metals and metalloids below laboratory LORs except for Al and Cu. The concentration of Cu was at the LOR (0.001 mg/L) so not considered to impact data quality. The Al concentration was 0.04 mg/L which is above the LOR. The NAGD states that "analysis values within 5 times the blank values should be flagged as estimates rather than precise values". All Al concentrations in samples from the OC are significantly greater than 5 times the blank value, and so this is not considered to impact data quality. The results of the analysis are presented in Table 4-2.

Table 4-1 Outer Channel Field QA/QC results

Sample Description	% Moisture	Total Organic Carbon	Metals																Organotins		
			Aluminium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc	Monobutyltin	Dibutyltin	Tributyltin
Field triplicate																					
OC SS31-b (T1)	65.2	1.82	11300	<0.50	21.6	<0.1	21.8	9.2	12.6	26000	18.5	709	0.03	9.8	0.5	<0.1	35.1	44.9	<1	<1	1
OC SS31-b (T2)	53.4	1.62	9230	<0.50	20.2	<0.1	19.2	7.3	9.2	24500	15.8	507	0.02	8.2	0.5	<0.1	30.9	34.5	<1	<1	0.7
OC SS31-b (T3)	57.9	1.99	10100	<0.50	21.6	<0.1	19.8	7.5	9.8	24800	17.3	529	0.03	8.5	0.5	<0.1	31.7	35.9	<1	<1	1.1
RSD	10%	10%	10%	ND	4%	ND	7%	13%	17%	3%	8%	19%	22%	10%	0%	ND	7%	15%	ND	ND	22%
OC SS14-a (T1)	64.9	1.62	12000	<0.50	18.7	<0.1	22.2	7.9	10.2	23900	14	629	0.03	10	0.5	<0.1	33	39	<1	<1	0.6
OC SS14-a (T2)	65.2	1.33	10500	<0.50	18.2	<0.1	21.6	7.8	10	22500	14.8	663	0.02	9.8	0.5	<0.1	32.6	39	<1	<1	<0.5
OC SS14-a (T3)	67.9	1.14	12400	<0.50	14.9	<0.1	21.5	7.4	8	19500	13.8	518	0.02	10	0.4	<0.1	32.5	34.3	<1	<1	<0.5
RSD	3%	18%	9%	ND	12%	ND	2%	3%	13%	10%	4%	13%	25%	1%	12%	ND	1%	7%	ND	ND	ND
Split replicate																					
OC SS46-d	56.7	1.22	9810	<0.50	15.4	<0.1	19.5	6.8	9	20500	14.5	445	0.02	8.6	0.5	<0.1	30.6	32	<1	<1	0.6
OC D1	54.7	1.19	8190	<0.50	16.5	<0.1	18.5	7.1	9.1	21700	15.1	496	0.02	8.4	0.4	<0.1	28.7	32.1	<1	<1	0.6
RPD	4%	2%	18%	ND	7%	ND	5%	4%	1%	6%	4%	11%	0%	2%	22%	ND	6%	0%	ND	ND	0%
OC D2	56.2	1.4	46000	<2	22	<0.2	48	10	14	30000	20	510	<0.05	23	2	<2	54	61	<0.1	<0.1	<0.1
RPD	1%	14%	130%	ND	35%	ND	84%	38%	43%	38%	32%	14%	ND	91%	120%	ND	55%	62%	ND	ND	ND

Notes

- Relative percent difference (RPD) or relative standard deviation (RSD) outside suggested NAGD data validation level.
- ND Not Determinable
- NT Not Tested

Table 4-2 Rinsate Blank sample results

Sample Description	Aluminium	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Nickel	Selenium	Zinc
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR	0.01	0.001	0.0001	0.001	0.001	0.05	0.001	0.0001	0.001	0.01	0.005
Rinsate											
R4 27/02/20	0.04	<0.001	<0.0001	<0.001	0.001	<0.05	<0.001	<0.0001	<0.001	<0.01	<0.005

Notes

- Concentration is greater than the LOR

4.2 Laboratory QA/QC

Table 4-3 summaries the OC and ODS outliers reported by both the primary and secondary laboratory's QA/QC analysis.

Table 4-3 Outliers noted in laboratory QA/QC compliance assessment

QA/QC Methods	Laboratory Outliers	Comments
Raised LORs	EB2005775: None	N/A
	ME3140300: None	N/A
Method Blanks (MB)	EB2005775: None	N/A
	ME314030: None	N/A
Laboratory duplicates	EB2005775 RPD exceeds LOR based limits (0-20%) for Fe in laboratory anonymous sample (28%).	This suggests Fe concentrations reported may be considered estimates. However, as the RPD exceedance was reported in an anonymous sample and not in the OC or ODS dataset and there is no NAGD Screening Level for Fe, this RPD exceedance is not considered to impact data quality.
	ME314030: None	N/A
Laboratory Control Samples (LCS)	EB2005775: None	N/A
	ME314030: Percent recovery is below the data quality objective for MBT.	As there are no MB or MS outliers for MBT, the primary sample result is below LOR and there is no NAGD Screening Level for MBT, this outlier is not considered to impact data quality.
Matrix Spikes (MS)	EB2005775 Recovery less than lower data quality objective for Hg in one sample (ODS 2), and for MBT in one sample (OC SS31-b (T3)).	As there are no MB or LCS outliers these MS outliers are not considered to impact data quality.
	ME314030: Not calculated for metals and metalloids. Recovery is greater than the data quality objective for DBT and TBT.	As there are no MB or LCS outliers for DBT and TBT these MS outliers are not considered to impact data quality.
Surrogates	EB2005775: None	N/A
	ME314030: Not calculated	N/A

QA/QC Methods	Laboratory Outliers	Comments
Frequency of quality control samples	EB2005775 Laboratory duplicates for Soil Particle Density.	As there are no MB or LCS outliers this frequency exceedance is not considered to impact data quality.
	ME314030: Not calculated	N/A

5 Introduced Marine Pest Survey

Conditions of the Marine Park Permit G10/33155.1 and Sea Dumping Permit (10/03) included the requirement for an investigation of the presence/absence of introduced marine pests in proposed dredge sediments. The purpose of this assessment is to reduce the potential for migration and translocation of potential pest species within the port limits. Results of these investigations will aid in further understanding and informing future sampling. In addition, they contribute to ongoing surveillance activities of Ports North to assist responses by Biosecurity Queensland.

Three pest species considered to be of national significance have been detected on vessels since the Port of Cairns baseline survey in 2001. These pest species include the Asian Green Mussel (*Perna viridis*), the Caribbean Tubeworm (*Hydroides sanctaecrucis*) and the Asian Bag Mussel (*Musculista senhousia*). Intermittent, low level detections of the Asian Green Mussel, Asian Bag Mussel and Caribbean Tubeworm on poorly maintained hulls or returning defence vessels have occurred between 2007 and 2014.

Ports North has maintained a system of settlement plate samplers, aimed at detecting the presence of settling larval mussels and other fouling organisms at select locations throughout the port since 2001. This periodic surveillance has not detected any Asian Green Mussels, Asian Bag Mussels or Caribbean Tubeworm. This system is considered effective, as it does periodically detect the presence of native mussels.

The most recent check of these devices prior to the implementation of this year's SAP did not detect any suspect mussel material. These findings therefore confirm that the various incursions of the marine pest species have not resulted in an establishment of populations of Asian Green Mussels or Asian Bag Mussels within Trinity Inlet.

Assessment of the marine pest status of sediment proposed for dredging has been completed by Ports North during the implementation of each annual SAP since 2003. Over this time it has not detected the presence of any of the three nationally significant marine pest species.

It is envisaged that ongoing awareness training for slipway staff, implementation of post-deployment vessels inspections by Defence Maritime Services, the Port's settlement plates and Ports North's SAP sampling will remain as the primary monitoring methods for evaluating the ongoing risk of the incursion of marine pest species.

5.1 Objectives

The primary objectives of marine pest investigations in the sediments of the OC and ODS are to:

- Sample sediments for presence/absence of marine pest species previously detected within port limits, namely:
 - *Hydroides sanctaecrucis* (Caribbean Tubeworm)
 - *Perna viridis* (Asian Green Mussel)
 - *Musculista senhousia* (Asian Bag Mussel)
- Survey sediments for presence of other potential marine pest species not previously identified within port limits
- Characterise sediments for suitability for colonisation of identified marine pest species.

5.2 Method

Sediment sampling for introduced marine pest species in the OC and ODS was undertaken using 100m long benthic sled tows. The benthic sled used in the OC dredge area and ODS is designed to sample seabed surface sediments to 5-10cm depth. Sled tows were completed on the 27 and 28 February 2020 at 12 locations along the OC and four locations within the ODS. Locations are presented in Figure 2-1 and Figure 2-2.

Benthic sled tows were completed from a survey vessel positioned within 10m of each sampling location using the vessel GPS unit. The sled was deployed from the stern of the survey vessel and lowered to the seabed. Once on the seabed the sled was towed at an approximate speed of 1-2 knots for approximately 100m. At the end of each transect the sled was retrieved to the surface where any fine material less than 5mm in diameter remaining in the sled was washed through the sled sieve with seawater using the on-board deck hose. The remaining material was then flushed into a white sorting tray. All biota collected from the sled tows was photographed and assessed for presence or absence of marine pest species. Field notes describing the biota contained within each sample and any additional relevant information were recorded. Suspect individuals were noted and retained for formal identification. The field notes and photographs are presented in Appendix D.

5.3 Results

5.3.1 Outer Channel

Material in the OC can be summarised as primarily silt and silty clays with shells and shell grit at locations in the inner section of the channel (OC SS46-d, OC SS53-c, OC SS46-d). Many samples contained live marine fauna such as snails, bivalves, shrimp and crabs. Sand dollar were found in two samples, a worm was found in one sample, and a brittle star was found in one sample. Several samples also contained detritus, leaves, seagrass, and corals. No mussels (shells or fragments) were found. This is consistent with sampling results from 2019.

5.3.2 Offshore Disposal Site

Material in the ODS can be summarised as primarily silty clays with shells and shell grit. Live marine fauna included a small fish in two samples, snails in one sample, and a crab in one sample. Many samples also contained detritus, sticks and shells. No mussels (shells or fragments) were found. This is consistent with sampling results from 2019.

5.4 Discussion

Marine pest species were not identified during this investigation. Bottom substrates are unlikely to support most marine pest species except for the Asian Bag Mussel. The Asian Bag Mussel can cluster together in soft substrates such as silt (Stafford and Willan, 2007), however no evidence of the presence of this species was identified as part of this study. The results are comparable to historical studies (i.e. Neil et al 2003, Neil and Stafford 2004, GHD 2005, WorleyParsons 2010 and WorleyParsons 2014) and previous WorleyParsons / Advisian investigations of dredge material in the Port of Cairns, which found no evidence of target marine pest species.

6 Conclusions

Based on the results of the sediment monitoring program and marine pest survey, the following conclusions are drawn:

- Sediments from the OC are considered suitable for unconfined placement at sea on the basis that all sediments tested have 95% UCLs below their respective NAGD or agreed Local Screening Level.
- Field and laboratory QA/QC analyses confirm that the results upon which conclusions are drawn have acceptable levels of data validity.
- Results of sled tows at twelve sites along the OC indicated that bottom substrates are typically silt and silty clays and unlikely to support the colonisation of any of the species of concern. The exception is the Asian Bag Mussel, however no evidence of this species was identified as part of this study.
- Based on the marine pest survey undertaken, there does not appear to be any significant risk of introducing marine pest species to the ODS within Trinity Bay as a result of translocation of sediments dredged from the OC.
- Contaminant results for the ODS are consistent with prior years data and do not indicate an increasing or accumulating trend of contaminant concentrations at the ODS.

7 References

Advisian, 2019. Cairns Port Maintenance Dredging 2019: Sediment Characterisation and Introduced Marine Pest Report: Outer Channel, Offshore Disposal Site. Report prepared by Advisian, Brisbane, 20 March 2019, document number 301001-02058-00-EN-REP-0005.

Advisian, 2020. Cairns Port Maintenance Dredging 2020: Sediment Sampling and Analysis Plan and Introduced Marine Pest Survey Plan. Report prepared by Advisian, Brisbane, 9 February 2020, document number 301001-02058-00-EN-RPT-0008.

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

GHD, 2005. Marine Pest Report, unpublished report for Cairns Port Authority.

Neil, K.M., Stafford, H., Rasheed, M.A., Coles, R.C., & Weibkin, A., 2003. Port Baseline Surveys for Introduced Marine Pests: The Port of Cairns Final Report. CRC-Reef Research Centre, Queensland Department of Primary Industries and Fisheries report to Cairns Port Authority, December 2003.

Neil, K.M. & Stafford, H., 2004. Marine Pest Surveys – Cairns Port 2004. CRC Reef Research Centre and Queensland Department of Primary Industries and Fisheries, report to Cairns Port Authority 2004.

Stafford, H. & Willan, R.C. (2007) Is it a Pest? Introduced and naturalised marine animal species of Torres Strait Northern Australia. Queensland Department of Primary Industries and Fisheries, Cairns.

WorleyParsons, 2010. Cairns Port Long Term Management Plan: Dredging and Dredge Spoil Management. WorleyParsons Services Pty Ltd, Brisbane



Appendix A

Sediment Logs

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS64-b
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating. Recently dredge so clay material exposed on seafloor surface (only enough material for 1 bag and 2 jars).



PSD (%)		
Gravel (8%)	Sand (30%)	Silt & Clay (62%)

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Browny grey	Clayey SAND	Wet	Soft	Coarse	Nil	20%	Present	Marine

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS55-a
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating.



PSD (%)		
Gravel (1%)	Sand (15%)	Silt & Clay (84%)

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Dark grey	Clayey SILT	Wet	Soft	Fine	Very low	Nil	Organics	Marine

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS53-c
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating.



PSD (%)		
Gravel	Sand	Silt & Clay

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Fine	Low	Nil	Shells	Marine

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS46-d
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating



PSD (%)		
Gravel (1%)	Sand (10%)	Silt & Clay (89%)

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Fine	Low	Nil	Shells	Marine

General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS40-a							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Fine / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (5%)	Silt & Clay (95%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Clayey SILT	Wet	Soft	Nil	Nil	Nil	Nil	Marine
General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS35-d							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Fine / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (6%)	Silt & Clay (94%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT	Wet	Very soft	Nil	Nil	Nil	Organics	Marine

General Location of Sampling		Port of Cairns – Outer Chanel		Photograph not available					
Site Number		OC SS34-a							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Fine / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (4%)	Silt & Clay (96%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT	Wet	Very soft	Nil	Nil	Nil	Organics	Marine
General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS31-b (T1, T2, T3)							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (4%)	Silt & Clay (96%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT (T1) Clayey SILT (T2, T3)	Wet	Soft	Nil	Nil	Nil	Organic (some)	Marine

General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS27-c							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (4%)	Silt & Clay (96%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT	Wet	Soft	Nil	Nil	Nil	Nil	Marine
General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS25-d							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (1%)	Sand (39%)	Silt & Clay (60%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Fine	Low	Nil	Organics (fragments)	Marine

General Location of Sampling		Port of Cairns – Outer Chanel		Photograph not available					
Site Number		OC SS22-c							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (4%)	Silt & Clay (96%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT	Wet	Soft	Nil	Nil	Nil	Nil	Marine
General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS21-b							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (13%)	Silt & Clay (87%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY (with lumps of clay)	Wet	Soft	Fine	Low / Medium	Nil	Nil	Marine

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS14-a (T1, T2, T3)
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating.



PSD (%)		
Gravel (<1%)	Sand (5%)	Silt & Clay (95%)

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT (T1) Silty CLAY (T2, T3)	Wet	Soft	Nil	Low (T1) Low/ medium (T2, T3)	Nil	Nil	Marine

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS12-b
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Grab
Depth Retained	0.1m
Weather Conditions / Sea state	Clear / Calm
Comments	Some recreational boating.



PSD (%)		
Gravel (<1%)	Sand (3%)	Silt & Clay (97%)

Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Clayey SILT	Wet	Soft	Nil	Very low	Nil	Nil	Marine

General Location of Sampling		Port of Cairns – Outer Chanel							
Site Number		OC SS7-d							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (13%)	Silt & Clay (87%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Fine / Medium	Low	Nil	Nil	Marine
General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 1							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (16%)	Silt & Clay (84%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Nil	Low	Nil	Nil	Marine

General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 2							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating							
PSD (%)									
Gravel (<1%)	Sand (14%)	Silt & Clay (86%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Brown grey	Silty CLAY	Wet	Soft	Nil	Nil	Nil	Nil	Marine
General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 3							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (1%)	Sand (14%)	Silt & Clay (85%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY (with clay clumps)	Wet	Soft	Nil	Very low	Nil	Organics, shells	Marine

General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 4							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (2%)	Sand (15%)	Silt & Clay (83%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY (with clay clumps)	Wet	Soft	Large	Low	Nil	Small shells	Marine
General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 5							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (<1%)	Sand (13%)	Silt & Clay (87%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	Silty CLAY	Wet	Soft	Nil	Nil	Nil	Nil	Marine

General Location of Sampling		Port of Cairns – Offshore Disposal Site							
Site Number		ODS 6							
Date/Sample Time		27/02/20							
Water Depth at Site		~10m							
Type of Core Sampler		Grab							
Depth Retained		0.1m							
Weather Conditions / Sea state		Clear / Calm							
Comments		Some recreational boating.							
PSD (%)									
Gravel (2%)	Sand (11%)	Silt & Clay (87%)							
Strata Change (m)	Colour	Field Texture	Moist.	Consist.	Sand Grain Size	Plasticity	% Stones	Shell/Grit/Biota	Odour
0 – 0.1	Grey	SILT	Wet	Very soft	Nil	Nil	Nil	Nil	Marine



Appendix B
ALS Laboratory Report

CERTIFICATE OF ANALYSIS

Work Order : **EB2005775**
Client : **PORTS NORTH**
Contact : MR ADAM FLETCHER
Address : Ports North Cnr Grafton and Hartley Streets PO BOX 594
 CAIRNS QLD, AUSTRALIA 4870
Telephone : +61 07 40523820
Project : 301001-02058 - Port of Cairns Sediment
Order number : ----
C-O-C number : ----
Sampler : JESSICA HOGG, NICHOLAS BAINTON
Site : ----
Quote number : BN/111/18 v2
No. of samples received : 61
No. of samples analysed : 60

Page : 1 of 28
Laboratory : Environmental Division Brisbane
Contact : Caroline Hill
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8662
Date Samples Received : 29-Feb-2020 20:00
Date Analysis Commenced : 03-Mar-2020
Issue Date : 16-Mar-2020 12:14



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Franco Lentini	LCMS 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
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Minh Wills	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Santusha Pandra	Senior Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Senior Chemist	Brisbane Organics, Stafford, QLD
Santusha Pandra	Senior Chemist	WB Water Lab Brisbane, Stafford, QLD



General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
∅ = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA150H: Soil particle density results fell outside the scope of AS1289.3.6.3. Results should be scrutinised accordingly.
- **Diuron analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- EP090 Organotin: Samples 'OC SS31-b (T3)', 'MM 32-c (T3) (0.5-1)' and 'MM 2-a (0.5-1)' show poor matrix spike recovery for MBT due to matrix interference.
- EG005-SD (Total Fe and Al in Sediments by ICP-AES): Sample EB2005798-005 shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.
- EG035T (Total Mercury): Sample MM 2-a (0.5-1)(EB2005775-002) shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.
- EG035T (Total Mercury): Sample ODS 2(EB2005775-052) shows poor matrix spike recovery due to sample heterogeneity. Confirmed by visual inspection.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 2-a (0-0.5)	MM 2-a (0.5-1)	MM 33-c (0-0.5)	MM 33-c (0.5-1)	MM 33-c (1-1.5)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-001	EB2005775-002	EB2005775-003	EB2005775-004	EB2005775-005	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	66.4	60.5	58.8	57.7	55.3	
EA150: Particle Sizing									
+75µm	----	1	%	<1	<1	4	3	2	
+150µm	----	1	%	<1	<1	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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	30	39	52	40	49	
Silt (2-60 µm)	----	1	%	67	57	42	55	48	
Sand (0.06-2.00 mm)	----	1	%	3	4	6	5	3	
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	2.40	2.41	2.55	2.46	2.76	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	15400	14700	13200	13300	14600	
Iron	7439-89-6	50	mg/kg	33100	33500	29700	31100	33000	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	21.9	19.7	17.6	18.8	18.1	
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	27.1	25.8	25.1	27.3	26.5	
Copper	7440-50-8	1.0	mg/kg	22.3	21.3	18.5	19.0	20.5	
Cobalt	7440-48-4	0.5	mg/kg	11.6	12.0	10.2	10.3	10.8	
Lead	7439-92-1	1.0	mg/kg	19.9	21.4	20.7	16.0	20.0	
Manganese	7439-96-5	10	mg/kg	931	812	483	529	598	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 2-a (0-0.5)	MM 2-a (0.5-1)	MM 33-c (0-0.5)	MM 33-c (0.5-1)	MM 33-c (1-1.5)
Client sampling date / time					26-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit		EB2005775-001	EB2005775-002	EB2005775-003	EB2005775-004	EB2005775-005
					Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg		12.4	12.0	11.6	12.4	12.4
Selenium	7782-49-2	0.1	mg/kg		0.6	0.7	0.6	0.6	0.6
Silver	7440-22-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg		44.7	44.7	39.5	42.5	44.2
Zinc	7440-66-6	1.0	mg/kg		66.5	68.4	56.0	57.1	63.0
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg		0.04	0.03	0.03	0.03	0.03
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		1.86	1.84	1.89	2.05	2.05
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	2
Tributyltin	56573-85-4	0.5	µgSn/kg		0.9	0.5	1.8	6.2	5.2
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%		84.4	107	99.1	85.8	95.8



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 34-d (0-0.5)	MM 34-d (0.5-1)	MM 34-d (1-1.5)	D7 (0-0.5)	D7 (0.5-1)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-006	EB2005775-007	EB2005775-008	EB2005775-009	EB2005775-010	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	61.7	61.0	59.6	60.3	60.2	
EA150: Particle Sizing									
+75µm	----	1	%	3	3	3	----	----	
+150µm	----	1	%	1	1	1	----	----	
+300µm	----	1	%	<1	<1	<1	----	----	
+425µm	----	1	%	<1	<1	<1	----	----	
+600µm	----	1	%	<1	<1	<1	----	----	
+1180µm	----	1	%	<1	<1	<1	----	----	
+2.36mm	----	1	%	<1	<1	<1	----	----	
+4.75mm	----	1	%	<1	<1	<1	----	----	
+9.5mm	----	1	%	<1	<1	<1	----	----	
+19.0mm	----	1	%	<1	<1	<1	----	----	
+37.5mm	----	1	%	<1	<1	<1	----	----	
+75.0mm	----	1	%	<1	<1	<1	----	----	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	38	34	49	----	----	
Silt (2-60 µm)	----	1	%	57	59	46	----	----	
Sand (0.06-2.00 mm)	----	1	%	5	7	5	----	----	
Gravel (>2mm)	----	1	%	<1	<1	<1	----	----	
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.46	2.19	2.73	----	----	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	13500	13400	13200	12800	14100	
Iron	7439-89-6	50	mg/kg	30600	30400	30300	27300	31800	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	18.7	17.6	18.1	15.4	18.6	
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	26.2	27.9	25.1	25.6	26.9	
Copper	7440-50-8	1.0	mg/kg	18.4	19.4	19.7	16.2	21.3	
Cobalt	7440-48-4	0.5	mg/kg	10.5	10.2	10.2	9.8	11.0	
Lead	7439-92-1	1.0	mg/kg	19.4	21.0	19.6	19.7	22.7	
Manganese	7439-96-5	10	mg/kg	522	555	610	508	569	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 34-d (0-0.5)	MM 34-d (0.5-1)	MM 34-d (1-1.5)	D7 (0-0.5)	D7 (0.5-1)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-006	EB2005775-007	EB2005775-008	EB2005775-009	EB2005775-010	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	12.2	12.7	11.6	12.0	12.5	
Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.6	0.6	0.6	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	42.7	39.3	39.6	38.6	42.7	
Zinc	7440-66-6	1.0	mg/kg	59.0	58.2	58.8	51.2	62.8	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.03	0.03	0.03	0.03	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1820	1910	1820	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	1820	1910	1820	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	494	446	499	----	----	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	120	304	390	----	----	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.68	1.83	1.96	1.70	1.86	
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	1.1	2.6	0.9	1.2	
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides									
Diuron	330-54-1	0.001	mg/kg	<0.001	<0.001	<0.001	----	----	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	49.7	93.4	86.8	87.3	93.3	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D7 (1-1.5)	MM 18-c (0-0.5)	MM 18-c (0.5-1)	MM 18-c (1-1.5)	MM 32-c (T1) (0-0.5)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-011	EB2005775-012	EB2005775-013	EB2005775-014	EB2005775-015	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	57.3	62.0	55.5	56.4	58.7	
EA150: Particle Sizing									
+75µm	----	1	%	----	<1	1	<1	3	
+150µm	----	1	%	----	<1	<1	<1	1	
+300µm	----	1	%	----	<1	<1	<1	<1	
+425µm	----	1	%	----	<1	<1	<1	<1	
+600µm	----	1	%	----	<1	<1	<1	<1	
+1180µm	----	1	%	----	<1	<1	<1	<1	
+2.36mm	----	1	%	----	<1	<1	<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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	----	30	34	46	50	
Silt (2-60 µm)	----	1	%	----	65	61	49	44	
Sand (0.06-2.00 mm)	----	1	%	----	5	5	5	6	
Gravel (>2mm)	----	1	%	----	<1	<1	<1	<1	
Cobbles (>6cm)	----	1	%	----	<1	<1	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	2.44	2.52	2.54	2.32	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	14000	15800	14200	14500	13800	
Iron	7439-89-6	50	mg/kg	32700	34900	32400	33200	30500	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	17.9	20.7	19.5	22.0	17.2	
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	25.5	28.6	25.9	20.7	27.0	
Copper	7440-50-8	1.0	mg/kg	19.4	21.3	20.3	17.7	17.7	
Cobalt	7440-48-4	0.5	mg/kg	10.9	11.6	10.7	11.0	10.0	
Lead	7439-92-1	1.0	mg/kg	23.5	25.3	22.8	23.7	19.9	
Manganese	7439-96-5	10	mg/kg	722	958	841	718	560	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D7 (1-1.5)	MM 18-c (0-0.5)	MM 18-c (0.5-1)	MM 18-c (1-1.5)	MM 32-c (T1) (0-0.5)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-011	EB2005775-012	EB2005775-013	EB2005775-014	EB2005775-015	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	11.8	13.3	12.3	9.7	12.4	
Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.6	0.7	0.6	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	47.3	47.8	42.3	46.9	38.3	
Zinc	7440-66-6	1.0	mg/kg	60.3	64.4	61.6	54.0	57.6	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.03	0.04	0.04	0.04	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	----	----	----	----	<0.1	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	----	----	----	----	<0.1	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
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	----	----	----	----	1790	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	----	----	----	----	1790	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	----	----	----	----	440	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	----	----	----	----	174	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.88	1.74	1.74	1.63	1.87	
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	2.1	<0.5	<0.5	<0.5	<0.5	
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides									
Diuron	330-54-1	0.001	mg/kg	----	----	----	----	<0.001	
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%	82.1	37.5	77.3	71.0	40.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 32-c (T1) (0.5-1)	MM 32-c (T1) (1-1.5)	MM 32-c (T2) (0-0.5)	MM 32-c (T2) (0.5-1)	MM 32-c (T2) (1-1.5)
Client sampling date / time				26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	
Compound	CAS Number	LOR	Unit	EB2005775-016	EB2005775-017	EB2005775-018	EB2005775-019	EB2005775-020	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	57.0	52.6	56.4	55.0	52.1	
EA150: Particle Sizing									
+75µm	----	1	%	3	5	----	----	----	
+150µm	----	1	%	2	3	----	----	----	
+300µm	----	1	%	1	3	----	----	----	
+425µm	----	1	%	<1	3	----	----	----	
+600µm	----	1	%	<1	2	----	----	----	
+1180µm	----	1	%	<1	2	----	----	----	
+2.36mm	----	1	%	<1	2	----	----	----	
+4.75mm	----	1	%	<1	2	----	----	----	
+9.5mm	----	1	%	<1	<1	----	----	----	
+19.0mm	----	1	%	<1	<1	----	----	----	
+37.5mm	----	1	%	<1	<1	----	----	----	
+75.0mm	----	1	%	<1	<1	----	----	----	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	47	37	----	----	----	
Silt (2-60 µm)	----	1	%	47	54	----	----	----	
Sand (0.06-2.00 mm)	----	1	%	6	7	----	----	----	
Gravel (>2mm)	----	1	%	<1	2	----	----	----	
Cobbles (>6cm)	----	1	%	<1	<1	----	----	----	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.65	2.33	----	----	----	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	14200	13800	12900	13400	13200	
Iron	7439-89-6	50	mg/kg	32200	30900	28500	30000	30100	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	17.3	18.2	16.3	15.7	16.6	
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	25.5	23.4	26.0	26.5	24.9	
Copper	7440-50-8	1.0	mg/kg	18.8	19.5	17.6	17.5	17.3	
Cobalt	7440-48-4	0.5	mg/kg	10.6	10.7	9.4	10.1	9.8	
Lead	7439-92-1	1.0	mg/kg	24.0	23.0	19.2	20.9	22.1	
Manganese	7439-96-5	10	mg/kg	479	500	505	538	447	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 32-c (T1) (0.5-1)	MM 32-c (T1) (1-1.5)	MM 32-c (T2) (0-0.5)	MM 32-c (T2) (0.5-1)	MM 32-c (T2) (1-1.5)
Client sampling date / time					26-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit	EB2005775-016	EB2005775-017	EB2005775-018	EB2005775-019	EB2005775-020	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	11.8	10.8	12.0	12.2	10.9	
Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.5	0.6	0.5	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	42.6	43.2	36.4	35.3	37.5	
Zinc	7440-66-6	1.0	mg/kg	61.2	63.8	53.6	59.4	57.2	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.03	0.03	0.03	0.04	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	<0.1	<0.1	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	----	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1640	1540	----	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	1640	1540	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	415	438	----	----	----	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	233	201	----	----	----	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.89	1.67	1.81	1.96	1.59	
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	µgSn/kg	2	2	<1	<1	2	
Tributyltin	56573-85-4	0.5	µgSn/kg	3.4	3.7	0.7	2.2	2.5	
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides									
Diuron	330-54-1	0.001	mg/kg	<0.001	<0.001	----	----	----	
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%	114	73.2	87.1	78.5	106	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 32-c (T3) (0-0.5)	MM 32-c (T3) (0.5-1)	MM 32-c (T3) (1-1.5)	MM 20-b (0-0.5)	MM 20-b (0.5-1)
Client sampling date / time				26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00
Compound	CAS Number	LOR	Unit	EB2005775-021	EB2005775-022	EB2005775-023	EB2005775-024	EB2005775-025	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	58.5	55.3	53.0	62.2	55.2	
EA150: Particle Sizing									
+75µm	----	1	%	----	----	----	4	6	
+150µm	----	1	%	----	----	----	3	5	
+300µm	----	1	%	----	----	----	3	4	
+425µm	----	1	%	----	----	----	2	4	
+600µm	----	1	%	----	----	----	2	3	
+1180µm	----	1	%	----	----	----	<1	2	
+2.36mm	----	1	%	----	----	----	<1	1	
+4.75mm	----	1	%	----	----	----	<1	<1	
+9.5mm	----	1	%	----	----	----	<1	<1	
+19.0mm	----	1	%	----	----	----	<1	<1	
+37.5mm	----	1	%	----	----	----	<1	<1	
+75.0mm	----	1	%	----	----	----	<1	<1	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	----	----	----	51	44	
Silt (2-60 µm)	----	1	%	----	----	----	43	48	
Sand (0.06-2.00 mm)	----	1	%	----	----	----	6	6	
Gravel (>2mm)	----	1	%	----	----	----	<1	2	
Cobbles (>6cm)	----	1	%	----	----	----	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	----	2.71	2.29	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	13500	13900	12200	13300	13500	
Iron	7439-89-6	50	mg/kg	30000	32200	28100	28500	32900	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	15.9	18.0	16.7	17.6	21.0	
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	31.4	32.0	30.7	31.4	32.0	
Copper	7440-50-8	1.0	mg/kg	19.4	20.7	18.0	18.6	19.5	
Cobalt	7440-48-4	0.5	mg/kg	10.0	10.3	10.2	10.2	10.4	
Lead	7439-92-1	1.0	mg/kg	21.7	23.2	21.8	20.9	21.3	
Manganese	7439-96-5	10	mg/kg	483	479	491	499	603	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 32-c (T3) (0-0.5)	MM 32-c (T3) (0.5-1)	MM 32-c (T3) (1-1.5)	MM 20-b (0-0.5)	MM 20-b (0.5-1)
Client sampling date / time				26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	26-Feb-2020 00:00	
Compound	CAS Number	LOR	Unit	EB2005775-021	EB2005775-022	EB2005775-023	EB2005775-024	EB2005775-025	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	13.8	13.6	13.5	15.3	13.9	
Selenium	7782-49-2	0.1	mg/kg	0.5	0.6	0.6	0.6	0.6	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	39.6	39.4	37.4	38.8	42.1	
Zinc	7440-66-6	1.0	mg/kg	58.3	63.2	59.0	59.7	60.8	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.03	0.04	0.03	0.03	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	----	----	----	<0.1	<0.1	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	----	----	----	<0.1	<0.1	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	----	----	----	<0.1	<0.1	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	----	----	1730	1660	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	----	----	----	1730	1660	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	----	----	----	456	466	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	----	----	----	114	237	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.90	1.94	1.63	1.70	1.70	
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	2	<1	<1	
Tributyltin	56573-85-4	0.5	µgSn/kg	1.1	1.9	2.8	0.7	<0.5	
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides									
Diuron	330-54-1	0.001	mg/kg	----	----	----	<0.001	<0.001	
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%	67.9	43.6	84.0	87.4	77.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 21-a (0-0.5)	MM 21-a (0.5-1)	MM 21-a (1-1.5)	MM 1-b (0-0.5)	MM 1-b (0.5-1)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-026	EB2005775-027	EB2005775-028	EB2005775-029	EB2005775-030	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	61.2	60.2	55.7	66.8	60.9	
EA150: Particle Sizing									
+75µm	----	1	%	2	3	3	<1	1	
+150µm	----	1	%	<1	2	2	<1	<1	
+300µm	----	1	%	<1	1	2	<1	<1	
+425µm	----	1	%	<1	1	2	<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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	52	37	47	3	54	
Silt (2-60 µm)	----	1	%	45	56	47	95	44	
Sand (0.06-2.00 mm)	----	1	%	3	6	5	2	2	
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	2.62	2.48	2.69	2.38	2.62	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	13800	14300	14000	14500	14200	
Iron	7439-89-6	50	mg/kg	30000	35300	32900	31000	32200	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	19.0	27.7	19.1	22.9	19.6	
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	30.5	33.3	34.9	33.3	32.8	
Copper	7440-50-8	1.0	mg/kg	19.2	19.7	20.2	20.1	20.1	
Cobalt	7440-48-4	0.5	mg/kg	9.7	10.8	10.9	11.1	10.9	
Lead	7439-92-1	1.0	mg/kg	19.3	21.6	22.3	21.2	19.2	
Manganese	7439-96-5	10	mg/kg	640	734	713	958	815	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MM 21-a (0-0.5)	MM 21-a (0.5-1)	MM 21-a (1-1.5)	MM 1-b (0-0.5)	MM 1-b (0.5-1)
Client sampling date / time				26-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-026	EB2005775-027	EB2005775-028	EB2005775-029	EB2005775-030	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	13.1	14.7	14.1	14.7	14.3	
Selenium	7782-49-2	0.1	mg/kg	0.5	0.6	0.6	0.6	0.6	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	37.4	42.2	43.0	42.9	42.6	
Zinc	7440-66-6	1.0	mg/kg	55.3	57.4	62.9	60.3	60.9	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.03	0.04	0.04	0.03	0.04	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.86	1.99	1.81	1.86	1.78	
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	0.7	1.0	0.6	1.0	<0.5	
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%	88.2	80.2	81.5	77.0	79.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS7-d	OC SS12-b	OC SS14-a (T1)	OC SS14-a (T2)	OC SS14-a (T3)
Client sampling date / time					27-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit	EB2005775-031	EB2005775-032	EB2005775-033	EB2005775-034	EB2005775-035	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	57.7	64.6	64.9	65.2	67.9	
EA150: Particle Sizing									
+75µm	----	1	%	10	2	2	----	----	
+150µm	----	1	%	7	<1	<1	----	----	
+300µm	----	1	%	3	<1	<1	----	----	
+425µm	----	1	%	2	<1	<1	----	----	
+600µm	----	1	%	2	<1	<1	----	----	
+1180µm	----	1	%	<1	<1	<1	----	----	
+2.36mm	----	1	%	<1	<1	<1	----	----	
+4.75mm	----	1	%	<1	<1	<1	----	----	
+9.5mm	----	1	%	<1	<1	<1	----	----	
+19.0mm	----	1	%	<1	<1	<1	----	----	
+37.5mm	----	1	%	<1	<1	<1	----	----	
+75.0mm	----	1	%	<1	<1	<1	----	----	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	38	44	36	----	----	
Silt (2-60 µm)	----	1	%	49	53	59	----	----	
Sand (0.06-2.00 mm)	----	1	%	13	3	5	----	----	
Gravel (>2mm)	----	1	%	<1	<1	<1	----	----	
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.64	2.14	2.22	----	----	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	11200	11500	12000	10500	12400	
Iron	7439-89-6	50	mg/kg	23100	23600	23900	22500	19500	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	15.0	17.6	18.7	18.2	14.9	
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	22.4	23.9	22.2	21.6	21.5	
Copper	7440-50-8	1.0	mg/kg	8.3	9.2	10.2	10.0	8.0	
Cobalt	7440-48-4	0.5	mg/kg	7.6	7.9	7.9	7.8	7.4	
Lead	7439-92-1	1.0	mg/kg	15.4	14.6	14.0	14.8	13.8	
Manganese	7439-96-5	10	mg/kg	543	560	629	663	518	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS7-d	OC SS12-b	OC SS14-a (T1)	OC SS14-a (T2)	OC SS14-a (T3)
Client sampling date / time					27-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit	EB2005775-031	EB2005775-032	EB2005775-033	EB2005775-034	EB2005775-035	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	10.4	11.6	10.0	9.8	10.0	
Selenium	7782-49-2	0.1	mg/kg	0.4	0.5	0.5	0.5	0.4	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	34.5	34.4	33.0	32.6	32.5	
Zinc	7440-66-6	1.0	mg/kg	35.0	37.5	39.0	39.0	34.3	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.03	0.02	0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	----	----	<0.1	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	----	----	<0.1	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
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	----	----	1490	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	----	----	1490	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	----	----	423	----	----	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	----	----	80.8	----	----	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.10	1.14	1.62	1.33	1.14	
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	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	82.3	76.8	79.4	53.0	52.0	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS21-b	OC SS22-c	OC SS25-d	OC SS27-c	OC SS31-b (T1)
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-036	EB2005775-037	EB2005775-038	EB2005775-039	EB2005775-040	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	44.4	63.8	44.4	68.2	65.2	
EA150: Particle Sizing									
+75µm	----	1	%	11	2	38	2	13	
+150µm	----	1	%	2	<1	8	<1	4	
+300µm	----	1	%	2	<1	6	<1	1	
+425µm	----	1	%	1	<1	5	<1	<1	
+600µm	----	1	%	1	<1	4	<1	<1	
+1180µm	----	1	%	<1	<1	2	<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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	36	39	22	34	38	
Silt (2-60 µm)	----	1	%	51	57	38	62	48	
Sand (0.06-2.00 mm)	----	1	%	13	4	39	4	14	
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	2.58	2.59	2.64	2.32	2.41	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	8360	10900	8270	12900	11300	
Iron	7439-89-6	50	mg/kg	18900	24100	17400	23500	26000	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	10.8	19.0	12.5	18.3	21.6	
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	15.7	18.0	16.3	22.2	21.8	
Copper	7440-50-8	1.0	mg/kg	5.4	10.2	5.8	12.8	12.6	
Cobalt	7440-48-4	0.5	mg/kg	6.6	8.0	5.7	8.1	9.2	
Lead	7439-92-1	1.0	mg/kg	10.1	16.4	8.3	17.2	18.5	
Manganese	7439-96-5	10	mg/kg	310	599	334	698	709	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS21-b	OC SS22-c	OC SS25-d	OC SS27-c	OC SS31-b (T1)
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-036	EB2005775-037	EB2005775-038	EB2005775-039	EB2005775-040	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	7.6	8.1	7.4	9.9	9.8	
Selenium	7782-49-2	0.1	mg/kg	0.4	0.5	0.3	0.5	0.5	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	25.0	33.1	21.2	32.9	35.1	
Zinc	7440-66-6	1.0	mg/kg	26.8	39.6	25.1	44.5	44.9	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	<0.01	0.02	0.02	0.03	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	----	----	----	----	<0.1	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	----	----	----	----	<0.1	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
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	----	----	----	----	1610	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	----	----	----	----	1610	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	----	----	----	----	388	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	----	----	----	----	81.5	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.65	1.52	0.75	1.71	1.82	
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	0.6	<0.5	0.8	1.0	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	84.6	75.4	103	75.5	86.6	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS31-b (T2)	OC SS31-b (T3)	OC SS34-a	OC SS35-a	OC SS40-a
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-041	EB2005775-042	EB2005775-043	EB2005775-044	EB2005775-045	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	53.4	57.9	67.8	69.2	67.2	
EA150: Particle Sizing									
+75µm	----	1	%	----	----	2	4	4	
+150µm	----	1	%	----	----	<1	2	1	
+300µm	----	1	%	----	----	<1	1	<1	
+425µm	----	1	%	----	----	<1	1	<1	
+600µm	----	1	%	----	----	<1	<1	<1	
+1180µm	----	1	%	----	----	<1	<1	<1	
+2.36mm	----	1	%	----	----	<1	<1	<1	
+4.75mm	----	1	%	----	----	<1	<1	<1	
+9.5mm	----	1	%	----	----	<1	<1	<1	
+19.0mm	----	1	%	----	----	<1	<1	<1	
+37.5mm	----	1	%	----	----	<1	<1	<1	
+75.0mm	----	1	%	----	----	<1	<1	<1	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	----	----	11	15	45	
Silt (2-60 µm)	----	1	%	----	----	85	79	50	
Sand (0.06-2.00 mm)	----	1	%	----	----	4	6	5	
Gravel (>2mm)	----	1	%	----	----	<1	<1	<1	
Cobbles (>6cm)	----	1	%	----	----	<1	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	----	----	2.64	2.79	2.51	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	9230	10100	12300	12400	12500	
Iron	7439-89-6	50	mg/kg	24500	24800	25700	25700	27100	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	20.2	21.6	19.6	19.9	19.1	
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	19.2	19.8	22.3	23.4	22.6	
Copper	7440-50-8	1.0	mg/kg	9.2	9.8	14.6	14.9	13.7	
Cobalt	7440-48-4	0.5	mg/kg	7.3	7.5	8.7	9.0	9.5	
Lead	7439-92-1	1.0	mg/kg	15.8	17.3	18.9	18.8	18.3	
Manganese	7439-96-5	10	mg/kg	507	529	742	755	767	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS31-b (T2)	OC SS31-b (T3)	OC SS34-a	OC SS35-a	OC SS40-a
Client sampling date / time					27-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit		EB2005775-041	EB2005775-042	EB2005775-043	EB2005775-044	EB2005775-045
					Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg		8.2	8.5	10.0	10.6	10.1
Selenium	7782-49-2	0.1	mg/kg		0.5	0.5	0.6	0.6	0.6
Silver	7440-22-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg		30.9	31.7	34.0	36.1	35.8
Zinc	7440-66-6	1.0	mg/kg		34.5	35.9	48.1	48.8	44.0
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg		0.02	0.03	0.03	0.03	0.03
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		1.62	1.99	1.93	2.01	1.65
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		0.7	1.1	1.4	2.0	1.1
EP090S: Organotin Surrogate									
Tripropyltin	----	0.5	%		82.4	88.6	86.0	85.9	77.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS46-d	OC D1	OC SS53-c	OC SS55-a	OC SS64-b
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-046	EB2005775-047	EB2005775-048	EB2005775-049	EB2005775-050	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	56.7	54.7	57.8	59.6	32.1	
EA150: Particle Sizing									
+75µm	----	1	%	28	----	10	15	36	
+150µm	----	1	%	21	----	6	9	35	
+300µm	----	1	%	11	----	4	4	32	
+425µm	----	1	%	8	----	3	4	27	
+600µm	----	1	%	6	----	2	3	22	
+1180µm	----	1	%	2	----	1	2	13	
+2.36mm	----	1	%	<1	----	<1	<1	7	
+4.75mm	----	1	%	<1	----	<1	<1	2	
+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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	44	----	50	37	34	
Silt (2-60 µm)	----	1	%	26	----	39	47	28	
Sand (0.06-2.00 mm)	----	1	%	29	----	10	15	30	
Gravel (>2mm)	----	1	%	1	----	1	1	8	
Cobbles (>6cm)	----	1	%	<1	----	<1	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.45	----	2.39	2.61	2.63	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	9810	8190	10900	10600	7730	
Iron	7439-89-6	50	mg/kg	20500	21700	24500	25400	23600	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	15.4	16.5	17.8	18.4	11.5	
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	19.5	18.5	18.8	22.5	20.8	
Copper	7440-50-8	1.0	mg/kg	9.0	9.1	10.4	10.6	4.4	
Cobalt	7440-48-4	0.5	mg/kg	6.8	7.1	8.6	8.1	5.0	
Lead	7439-92-1	1.0	mg/kg	14.5	15.1	18.0	15.7	11.2	
Manganese	7439-96-5	10	mg/kg	445	496	621	489	493	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	OC SS46-d	OC D1	OC SS53-c	OC SS55-a	OC SS64-b
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-046	EB2005775-047	EB2005775-048	EB2005775-049	EB2005775-050	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	8.6	8.4	8.9	9.7	7.1	
Selenium	7782-49-2	0.1	mg/kg	0.5	0.4	0.5	0.6	0.3	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Vanadium	7440-62-2	2.0	mg/kg	30.6	28.7	33.1	34.8	25.9	
Zinc	7440-66-6	1.0	mg/kg	32.0	32.1	36.4	36.5	18.4	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.02	0.02	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg	<0.1	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
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	1060	----	----	----	----	
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg	1060	----	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg	307	----	----	----	----	
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg	17.3	----	----	----	----	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	1.22	1.19	1.69	2.08	0.27	
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	0.6	0.6	<0.5	0.9	<0.5	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	76.5	85.9	83.8	78.0	70.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ODS 1	ODS 2	ODS 3	ODS 4	ODS 5
Client sampling date / time				27-Feb-2020 00:00					
Compound	CAS Number	LOR	Unit	EB2005775-051	EB2005775-052	EB2005775-053	EB2005775-054	EB2005775-055	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	53.5	59.6	50.9	52.5	54.7	
EA150: Particle Sizing									
+75µm	----	1	%	14	12	12	16	12	
+150µm	----	1	%	2	4	6	10	4	
+300µm	----	1	%	<1	2	3	7	2	
+425µm	----	1	%	<1	2	2	6	1	
+600µm	----	1	%	<1	1	2	5	<1	
+1180µm	----	1	%	<1	<1	1	3	<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	
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	40	30	36	42	36	
Silt (2-60 µm)	----	1	%	44	56	49	41	51	
Sand (0.06-2.00 mm)	----	1	%	16	14	14	15	13	
Gravel (>2mm)	----	1	%	<1	<1	1	2	<1	
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.59	2.53	2.59	2.60	2.57	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	9790	11000	8430	8450	8860	
Iron	7439-89-6	50	mg/kg	19800	22800	18700	20400	20900	
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic	7440-38-2	1.00	mg/kg	12.1	15.3	13.5	15.6	15.8	
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	23.2	25.6	19.9	20.5	21.2	
Copper	7440-50-8	1.0	mg/kg	6.4	9.9	7.6	8.8	7.8	
Cobalt	7440-48-4	0.5	mg/kg	7.2	8.1	6.7	7.0	6.8	
Lead	7439-92-1	1.0	mg/kg	13.3	16.2	11.6	13.5	12.4	
Manganese	7439-96-5	10	mg/kg	396	516	460	433	502	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ODS 1	ODS 2	ODS 3	ODS 4	ODS 5
Client sampling date / time					27-Feb-2020 00:00				
Compound	CAS Number	LOR	Unit		EB2005775-051	EB2005775-052	EB2005775-053	EB2005775-054	EB2005775-055
				Result	Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg		10.8	12.0	9.2	9.4	9.7
Selenium	7782-49-2	0.1	mg/kg		0.4	0.5	0.4	0.5	0.4
Silver	7440-22-4	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg		31.2	35.2	27.8	29.3	28.6
Zinc	7440-66-6	1.0	mg/kg		31.3	40.2	30.1	31.1	32.0
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg		0.02	0.02	0.02	0.02	0.02
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg		----	<0.1	<0.1	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg		----	<0.1	<0.1	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		----	<0.1	<0.1	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	20	mg/kg		----	1200	920	----	----
EK062: Total Nitrogen as N (TKN + NOx)									
^ Total Nitrogen as N	----	20	mg/kg		----	1200	920	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	2	mg/kg		----	390	318	----	----
EK255A SD: Ammonia in Sediment									
Ammonia as N	7664-41-7	0.2	mg/kg		----	12.1	14.5	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		0.60	1.11	0.98	1.35	1.18
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	0.8	0.6	0.6
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%		75.9	93.4	91.8	83.3	91.4



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID			ODS 6	----	----	----	----
Client sampling date / time		27-Feb-2020 00:00			----	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2005775-056	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	61.0	----	----	----	----	----
EA150: Particle Sizing									
+75µm	----	1	%	11	----	----	----	----	----
+150µm	----	1	%	6	----	----	----	----	----
+300µm	----	1	%	5	----	----	----	----	----
+425µm	----	1	%	4	----	----	----	----	----
+600µm	----	1	%	4	----	----	----	----	----
+1180µm	----	1	%	3	----	----	----	----	----
+2.36mm	----	1	%	1	----	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----	----
EA150: Soil Classification based on Particle Size									
Clay (<2 µm)	----	1	%	35	----	----	----	----	----
Silt (2-60 µm)	----	1	%	52	----	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	11	----	----	----	----	----
Gravel (>2mm)	----	1	%	2	----	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----	----
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.66	----	----	----	----	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	11200	----	----	----	----	----
Iron	7439-89-6	50	mg/kg	21900	----	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS									
Antimony	7440-36-0	0.50	mg/kg	<0.50	----	----	----	----	----
Arsenic	7440-38-2	1.00	mg/kg	14.8	----	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----	----
Chromium	7440-47-3	1.0	mg/kg	24.7	----	----	----	----	----
Copper	7440-50-8	1.0	mg/kg	7.5	----	----	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	7.5	----	----	----	----	----
Lead	7439-92-1	1.0	mg/kg	14.9	----	----	----	----	----
Manganese	7439-96-5	10	mg/kg	426	----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ODS 6	----	----	----	----
Client sampling date / time				27-Feb-2020 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2005775-056	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Nickel	7440-02-0	1.0	mg/kg	11.6	----	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg	0.4	----	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	33.3	----	----	----	----	----
Zinc	7440-66-6	1.0	mg/kg	34.8	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	0.02	----	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.85	----	----	----	----	----
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	----	----	----	----	----
Dibutyltin	1002-53-5	1	µgSn/kg	<1	----	----	----	----	----
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	----	----	----	----	----
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	89.6	----	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	R1	R2	R3	R4	----
Client sampling date / time				27-Feb-2020 00:00	27-Feb-2020 00:00	27-Feb-2020 00:00	27-Feb-2020 00:00	----	
Compound	CAS Number	LOR	Unit	EB2005775-057	EB2005775-058	EB2005775-059	EB2005775-060	-----	
				Result	Result	Result	Result	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.04	0.04	0.03	0.04	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	<0.001	0.001	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP090S: Organotin Surrogate			
Tripropyltin	----	35	130

QUALITY CONTROL REPORT

Work Order	: EB2005775	Page	: 1 of 14
Client	: PORTS NORTH	Laboratory	: Environmental Division Brisbane
Contact	: MR ADAM FLETCHER	Contact	: Caroline Hill
Address	: Ports North Cnr Grafton and Hartley Streets PO BOX 594 CAIRNS QLD, AUSTRALIA 4870	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 40523820	Telephone	: +61 7 3552 8662
Project	: 301001-02058 - Port of Cairns Sediment	Date Samples Received	: 29-Feb-2020
Order number	: ----	Date Analysis Commenced	: 03-Mar-2020
C-O-C number	: ----	Issue Date	: 16-Mar-2020
Sampler	: JESSICA HOGG, NICHOLAS BAINTON		
Site	: ----		
Quote number	: BN/111/18 v2		
No. of samples received	: 61		
No. of samples analysed	: 60		



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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Franco Lentini	LCMS 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
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Minh Wills	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Santusha Pandra	Senior Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Senior Chemist	Brisbane Organics, Stafford, QLD
Santusha Pandra	Senior Chemist	WB Water Lab Brisbane, Stafford, QLD



General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2890288)									
EB2005775-001	MM 2-a (0-0.5)	EG005-SD: Aluminium	7429-90-5	50	mg/kg	15400	15200	1.64	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	33100	32100	3.00	0% - 20%
EB2005775-011	D7 (1-1.5)	EG005-SD: Aluminium	7429-90-5	50	mg/kg	14000	13700	2.11	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	32700	31200	4.86	0% - 20%
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2890292)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EG005-SD: Aluminium	7429-90-5	50	mg/kg	13500	13300	1.70	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	30000	29200	2.64	0% - 20%
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2890298)									
EB2005775-031	OC SS7-d	EG005-SD: Aluminium	7429-90-5	50	mg/kg	11200	10700	4.84	0% - 20%
EB2005775-041	OC SS31-b (T2)	EG005-SD: Aluminium	7429-90-5	50	mg/kg	9230	9500	2.92	0% - 20%
EB2005775-031	OC SS7-d	EG005-SD: Iron	7439-89-6	50	mg/kg	23100	24200	5.04	0% - 20%
EB2005775-041	OC SS31-b (T2)	EG005-SD: Iron	7439-89-6	50	mg/kg	24500	24500	0.0540	0% - 20%
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2890301)									
EB2005775-051	ODS 1	EG005-SD: Aluminium	7429-90-5	50	mg/kg	9790	9850	0.626	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	19800	19800	0.00	0% - 20%
EB2005798-005	Anonymous	EG005-SD: Aluminium	7429-90-5	50	mg/kg	12500	12500	0.302	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	39600	# 29900	28.0	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2890290)									
EB2005775-001	MM 2-a (0-0.5)	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.04	0.03	0.00	0% - 20%
EB2005775-011	D7 (1-1.5)	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.03	0.03	0.00	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2890291)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.03	0.03	0.00	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2890297)									
EB2005775-031	OC SS7-d	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.00	0% - 20%

Page : 3 of 14
 Work Order : EB2005775
 Client : PORTS NORTH
 Project : 301001-02058 - Port of Cairns Sediment



Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2890297) - continued									
EB2005775-041	OC SS31-b (T2)	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.03	0.00	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2890300)									
EB2005775-051	ODS 1	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.02	0.02	0.00	0% - 20%
EB2005798-005	Anonymous	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.14	0.17	19.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2890295)									
EB2005775-001	MM 2-a (0-0.5)	EA055: Moisture Content	----	0.1	%	66.4	64.6	2.72	0% - 20%
EB2005775-011	D7 (1-1.5)	EA055: Moisture Content	----	0.1	%	57.3	56.8	0.889	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2890296)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EA055: Moisture Content	----	0.1	%	58.5	58.2	0.570	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2890306)									
EB2005775-031	OC SS7-d	EA055: Moisture Content	----	0.1	%	57.7	57.0	1.18	0% - 20%
EB2005775-041	OC SS31-b (T2)	EA055: Moisture Content	----	0.1	%	53.4	53.4	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2890307)									
EB2005775-051	ODS 1	EA055: Moisture Content	----	0.1	%	53.5	54.0	0.837	0% - 20%
EB2005798-005	Anonymous	EA055: Moisture Content	----	0.1	%	49.0	50.0	2.09	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890289)									
EB2005775-001	MM 2-a (0-0.5)	EG020-SD: Chromium	7440-47-3	1	mg/kg	27.1	27.8	2.75	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	12.4	12.8	3.24	0% - 50%
EB2005775-011	D7 (1-1.5)	EG020-SD: Chromium	7440-47-3	1	mg/kg	25.5	28.2	9.92	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	11.8	13.1	10.1	0% - 50%
EB2005775-001	MM 2-a (0-0.5)	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	11.6	11.5	0.00	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	21.9	21.0	4.21	0% - 20%
		EG020-SD: Copper	7440-50-8	1	mg/kg	22.3	21.5	3.96	0% - 20%
		EG020-SD: Lead	7439-92-1	1	mg/kg	19.9	22.6	12.9	0% - 20%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	66.5	64.8	2.57	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	931	907	2.66	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	44.7	44.0	1.40	0% - 20%
EB2005775-011	D7 (1-1.5)	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.6	0.6	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	10.9	10.4	4.70	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	17.9	17.7	1.11	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	19.4	18.7	3.69	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	23.5	22.1	5.95	0% - 20%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890289) - continued									
EB2005775-011	D7 (1-1.5)	EG020-SD: Zinc	7440-66-6	1	mg/kg	60.3	57.2	5.17	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	722	703	2.70	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	47.3	43.0	9.56	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890293)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.5	0.6	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	10.0	9.9	1.24	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	15.9	16.4	3.00	0% - 50%
		EG020-SD: Chromium	7440-47-3	1	mg/kg	31.4	30.6	2.42	0% - 20%
		EG020-SD: Copper	7440-50-8	1	mg/kg	19.4	18.6	4.26	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	21.7	19.5	10.4	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	13.8	13.4	2.87	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	58.3	57.5	1.34	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	483	482	0.338	0% - 20%
EG020-SD: Vanadium	7440-62-2	2	mg/kg	39.6	38.8	1.84	0% - 50%		
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890299)									
EB2005775-031	OC SS7-d	EG020-SD: Chromium	7440-47-3	1	mg/kg	22.4	24.4	8.71	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	10.4	11.5	10.0	0% - 50%
EB2005775-041	OC SS31-b (T2)	EG020-SD: Chromium	7440-47-3	1	mg/kg	19.2	17.8	7.33	0% - 50%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	8.2	7.8	5.28	No Limit
EB2005775-031	OC SS7-d	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.4	0.6	28.9	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	7.6	7.6	0.00	0% - 50%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	15.0	17.3	14.4	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	8.3	8.3	0.00	No Limit
		EG020-SD: Lead	7439-92-1	1	mg/kg	15.4	16.2	4.44	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	35.0	34.5	1.43	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	543	512	5.88	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	34.5	35.4	2.57	0% - 50%
		EB2005775-041	OC SS31-b (T2)	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1
EG020-SD: Selenium	7782-49-2			0.1	mg/kg	0.5	0.5	0.00	No Limit
EG020-SD: Silver	7440-22-4			0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG020-SD: Antimony	7440-36-0			0.5	mg/kg	<0.50	<0.50	0.00	No Limit
EG020-SD: Cobalt	7440-48-4			0.5	mg/kg	7.3	7.4	1.43	0% - 50%
EG020-SD: Arsenic	7440-38-2			1	mg/kg	20.2	20.6	1.54	0% - 20%
EG020-SD: Copper	7440-50-8			1	mg/kg	9.2	8.8	4.20	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890299) - continued									
EB2005775-041	OC SS31-b (T2)	EG020-SD: Lead	7439-92-1	1	mg/kg	15.8	17.4	9.54	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	34.5	35.3	2.15	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	507	484	4.48	0% - 20%
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	30.9	31.4	1.64	0% - 50%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2890302)									
EB2005775-051	ODS 1	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.4	0.4	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	7.2	7.1	1.46	0% - 50%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	12.1	12.2	0.517	0% - 50%
		EG020-SD: Chromium	7440-47-3	1	mg/kg	23.2	21.9	5.72	0% - 20%
		EG020-SD: Copper	7440-50-8	1	mg/kg	6.4	6.1	4.79	No Limit
		EG020-SD: Lead	7439-92-1	1	mg/kg	13.3	13.4	1.07	0% - 50%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	10.8	10.5	3.00	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	31.3	30.6	2.33	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	396	394	0.606	0% - 20%
EG020-SD: Vanadium	7440-62-2	2	mg/kg	31.2	30.4	2.63	0% - 50%		
EB2005798-005	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.7	0.7	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	10.4	10.1	2.01	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	23.1	19.8	15.4	0% - 20%
		EG020-SD: Chromium	7440-47-3	1	mg/kg	32.7	31.9	2.44	0% - 20%
		EG020-SD: Copper	7440-50-8	1	mg/kg	14.5	15.6	6.87	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	37.5	31.3	18.0	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	14.9	14.2	4.82	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	63.2	66.8	5.56	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	661	546	19.0	0% - 20%
EG020-SD: Vanadium	7440-62-2	2	mg/kg	42.9	42.0	2.29	0% - 20%		
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2890285)									
EB2005775-006	MM 34-d (0-0.5)	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB2005775-046	OC SS46-d	EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2890284)									
EB2005775-006	MM 34-d (0-0.5)	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB2005775-046	OC SS46-d	EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2890271)									
EB2005775-006	MM 34-d (0-0.5)	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1820	1800	0.869	0% - 20%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2890271) - continued									
EB2005775-046	OC SS46-d	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1060	1020	3.95	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2890270)									
EB2005775-006	MM 34-d (0-0.5)	EK067G: Total Phosphorus as P	----	2	mg/kg	494	468	5.55	0% - 20%
EB2005775-046	OC SS46-d	EK067G: Total Phosphorus as P	----	2	mg/kg	307	309	0.787	0% - 20%
EK255A SD: Ammonia in Sediment (QC Lot: 2892817)									
EB2005775-006	MM 34-d (0-0.5)	EK255A: Ammonia as N	7664-41-7	0.2	mg/kg	120	141	15.9	0% - 20%
EB2005775-046	OC SS46-d	EK255A: Ammonia as N	7664-41-7	0.2	mg/kg	17.3	16.1	6.92	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2907271)									
EB2005775-001	MM 2-a (0-0.5)	EP003: Total Organic Carbon	----	0.02	%	1.86	1.80	3.32	0% - 20%
EB2005775-011	D7 (1-1.5)	EP003: Total Organic Carbon	----	0.02	%	1.88	1.94	3.51	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2907272)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EP003: Total Organic Carbon	----	0.02	%	1.90	1.86	2.14	0% - 20%
EB2005775-031	OC SS7-d	EP003: Total Organic Carbon	----	0.02	%	1.10	1.11	0.00	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2907278)									
EB2005775-041	OC SS31-b (T2)	EP003: Total Organic Carbon	----	0.02	%	1.62	1.66	2.53	0% - 20%
EB2005775-051	ODS 1	EP003: Total Organic Carbon	----	0.02	%	0.60	0.56	7.11	0% - 20%
EP090: Organotin Compounds (QC Lot: 2890012)									
EB2005775-001	MM 2-a (0-0.5)	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	0.9	0.6	44.7	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EB2005775-011	D7 (1-1.5)	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	2.1	2.8	28.9	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	1	1	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2890013)									
EB2005775-021	MM 32-c (T3) (0-0.5)	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	1.1	1.3	13.2	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EB2005775-031	OC SS7-d	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.00	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2890014)									
EB2005775-041	OC SS31-b (T2)	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	0.7	0.7	0.00	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EB2005775-051	ODS 1	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.00	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides (QC Lot: 2891235)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides (QC Lot: 2891235) - continued									
EB2005627-023	Anonymous	EP234-Diuron: Diuron	330-54-1	0.001	mg/kg	0.002	0.002	0.00	No Limit
EB2005775-006	MM 34-d (0-0.5)	EP234-Diuron: Diuron	330-54-1	0.001	mg/kg	<0.001	0.001	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2889924)									
EB2005639-047	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.011	41.8	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.26	0.24	7.90	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB2005853-001	Anonymous	EG020A-T: Iron	7439-89-6	0.05	mg/L	1.90	1.88	1.02	0% - 20%
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.051	0.052	0.00	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.005	0.006	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.05	0.05	0.00	No Limit
EB2005856-004	Anonymous	EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2889923)							
EB2005639-047	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB2005856-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2890288)									
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	12361 mg/kg	119	70.0	130	
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	30024 mg/kg	106	70.0	130	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2890292)									
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	12361 mg/kg	110	70.0	130	
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	30024 mg/kg	99.3	70.0	130	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2890298)									
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	12361 mg/kg	115	70.0	130	
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	30024 mg/kg	98.7	70.0	130	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2890301)									
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	12361 mg/kg	110	70.0	130	
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	30024 mg/kg	98.4	70.0	130	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890290)									
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.0847 mg/kg	94.4	70.0	130	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890291)									
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.0847 mg/kg	102	70.0	130	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890297)									
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.0847 mg/kg	87.7	70.0	130	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890300)									
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.0847 mg/kg	87.8	70.0	130	
EA152: Soil Particle Density (QCLot: 2889444)									
EA152: Soil Particle Density (Clay/Silt/Sand)	----	----	g/cm3	----	2.68 g/cm3	98.5	80.0	120	
EA152: Soil Particle Density (QCLot: 2889446)									
EA152: Soil Particle Density (Clay/Silt/Sand)	----	----	g/cm3	----	2.68 g/cm3	101	80.0	120	
EA152: Soil Particle Density (QCLot: 2889448)									
EA152: Soil Particle Density (Clay/Silt/Sand)	----	----	g/cm3	----	2.68 g/cm3	106	80.0	120	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890289)									
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----	
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	96.1 mg/kg	116	80.0	124	
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.74 mg/kg	118	87.0	122	
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	15.3 mg/kg	98.7	79.0	129	
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	44.8 mg/kg	118	85.0	118	
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	----	----	----	----	
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	52.8 mg/kg	119	86.0	119	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890289) - continued									
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	----	----	----	----	
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	12.2 mg/kg	97.4	77.0	123	
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	----	----	----	----	
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	114 mg/kg	121	71.0	127	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890293)									
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----	
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	96.1 mg/kg	102	80.0	124	
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.74 mg/kg	112	87.0	122	
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	15.3 mg/kg	126	79.0	129	
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	44.8 mg/kg	103	85.0	118	
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	----	----	----	----	
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	52.8 mg/kg	115	86.0	119	
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	----	----	----	----	
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	12.2 mg/kg	104	77.0	123	
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	----	----	----	----	
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	114 mg/kg	113	71.0	127	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890299)									
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----	
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	96.1 mg/kg	112	80.0	124	
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.74 mg/kg	108	87.0	122	
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	15.3 mg/kg	93.4	79.0	129	
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	44.8 mg/kg	100	85.0	118	
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	----	----	----	----	
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	52.8 mg/kg	106	86.0	119	
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	----	----	----	----	
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	12.2 mg/kg	93.4	77.0	123	
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	----	----	----	----	
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	114 mg/kg	107	71.0	127	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890302)									
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	----	----	----	----	
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	96.1 mg/kg	103	80.0	124	
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	0.74 mg/kg	109	87.0	122	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890302) - continued									
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	15.3 mg/kg	107	79.0	129	
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	44.8 mg/kg	102	85.0	118	
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	----	----	----	----	
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	52.8 mg/kg	99.5	86.0	119	
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	----	----	----	----	
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	12.2 mg/kg	98.3	77.0	123	
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	----	----	----	----	
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	114 mg/kg	112	71.0	127	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2890285)									
EK057G: Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg	<0.1	2.5 mg/kg	98.8	83.0	111	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2890284)									
EK059G: Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	<0.1	2.5 mg/kg	93.6	83.2	111	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2890271)									
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	848 mg/kg	100	73.0	121	
				<20	3644 mg/kg	103	73.0	121	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2890270)									
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	939 mg/kg	97.8	80.0	115	
				<2	1200 mg/kg	102	80.0	115	
EK255A SD: Ammonia in Sediment (QCLot: 2892817)									
EK255A: Ammonia as N	7664-41-7	0.2	mg/kg	<0.2	1 mg/kg	117	80.0	120	
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2907271)									
EP003: Total Organic Carbon	----	0.02	%	<0.02	2.95 %	99.6	70.0	130	
				<0.02	0.48 %	115	70.0	130	
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2907272)									
EP003: Total Organic Carbon	----	0.02	%	<0.02	2.95 %	92.3	70.0	130	
				<0.02	0.48 %	115	70.0	130	
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2907278)									
EP003: Total Organic Carbon	----	0.02	%	<0.02	2.95 %	98.4	70.0	130	
				<0.02	0.2 %	114	70.0	130	
EP090: Organotin Compounds (QCLot: 2890012)									
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	50.0	36.0	128	
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	49.9	42.0	132	
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	89.8	52.0	139	
EP090: Organotin Compounds (QCLot: 2890013)									
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	98.8	36.0	128	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
				Result		Low	High	
EP090: Organotin Compounds (QCLot: 2890013) - continued								
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	100	42.0	132
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	114	52.0	139
EP090: Organotin Compounds (QCLot: 2890014)								
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	106	36.0	128
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	120	42.0	132
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	116	52.0	139
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides (QCLot: 2891235)								
EP234-Diuron: Diuron	330-54-1	0.001	mg/kg	<0.001	0.004 mg/kg	111	80.0	120

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
				Result		Low	High	
EG020T: Total Metals by ICP-MS (QCLot: 2889924)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.0	80.0	114
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.0	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.4	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.6	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	89.0	112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.1	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	100	79.0	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	84.0	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	82.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2889923)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.2	84.0	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery(%) MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890290)							
EB2005775-002	MM 2-a (0.5-1)	EG035T-LL: Mercury	7439-97-6	0.5 mg/kg	# 66.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890291)							
EB2005775-022	MM 32-c (T3) (0.5-1)	EG035T-LL: Mercury	7439-97-6	0.5 mg/kg	70.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890297)							



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890297) - continued							
EB2005775-032	OC SS12-b	EG035T-LL: Mercury	7439-97-6	0.5 mg/kg	71.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2890300)							
EB2005775-052	ODS 2	EG035T-LL: Mercury	7439-97-6	0.5 mg/kg	# 66.2	70.0	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890289)							
EB2005775-002	MM 2-a (0.5-1)	EG020-SD: Arsenic	7440-38-2	100 mg/kg	93.2	70.0	130
		EG020-SD: Cadmium	7440-43-9	25 mg/kg	96.3	70.0	130
		EG020-SD: Chromium	7440-47-3	100 mg/kg	77.3	70.0	130
		EG020-SD: Copper	7440-50-8	100 mg/kg	102	70.0	130
		EG020-SD: Cobalt	7440-48-4	100 mg/kg	104	70.0	130
		EG020-SD: Lead	7439-92-1	100 mg/kg	99.8	70.0	130
		EG020-SD: Manganese	7439-96-5	100 mg/kg	102	70.0	130
		EG020-SD: Nickel	7440-02-0	100 mg/kg	76.3	70.0	130
		EG020-SD: Vanadium	7440-62-2	100 mg/kg	102	70.0	130
EG020-SD: Zinc	7440-66-6	100 mg/kg	103	70.0	130		
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890293)							
EB2005775-022	MM 32-c (T3) (0.5-1)	EG020-SD: Arsenic	7440-38-2	100 mg/kg	91.5	70.0	130
		EG020-SD: Cadmium	7440-43-9	25 mg/kg	96.2	70.0	130
		EG020-SD: Chromium	7440-47-3	100 mg/kg	102	70.0	130
		EG020-SD: Copper	7440-50-8	100 mg/kg	98.2	70.0	130
		EG020-SD: Cobalt	7440-48-4	100 mg/kg	103	70.0	130
		EG020-SD: Lead	7439-92-1	100 mg/kg	108	70.0	130
		EG020-SD: Manganese	7439-96-5	100 mg/kg	93.8	70.0	130
		EG020-SD: Nickel	7440-02-0	100 mg/kg	99.5	70.0	130
		EG020-SD: Vanadium	7440-62-2	100 mg/kg	101	70.0	130
EG020-SD: Zinc	7440-66-6	100 mg/kg	97.5	70.0	130		
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890299)							
EB2005775-032	OC SS12-b	EG020-SD: Arsenic	7440-38-2	100 mg/kg	91.4	70.0	130
		EG020-SD: Cadmium	7440-43-9	25 mg/kg	96.7	70.0	130
		EG020-SD: Chromium	7440-47-3	100 mg/kg	85.3	70.0	130
		EG020-SD: Copper	7440-50-8	100 mg/kg	90.9	70.0	130
		EG020-SD: Cobalt	7440-48-4	100 mg/kg	96.4	70.0	130
		EG020-SD: Lead	7439-92-1	100 mg/kg	108	70.0	130
		EG020-SD: Manganese	7439-96-5	100 mg/kg	95.6	70.0	130
		EG020-SD: Nickel	7440-02-0	100 mg/kg	84.3	70.0	130
		EG020-SD: Vanadium	7440-62-2	100 mg/kg	99.1	70.0	130
EG020-SD: Zinc	7440-66-6	100 mg/kg	96.1	70.0	130		
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890302)							
EB2005775-052	ODS 2	EG020-SD: Arsenic	7440-38-2	100 mg/kg	91.0	70.0	130

Page : 13 of 14
 Work Order : EB2005775
 Client : PORTS NORTH
 Project : 301001-02058 - Port of Cairns Sediment



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2890302) - continued							
EB2005775-052	ODS 2	EG020-SD: Cadmium	7440-43-9	25 mg/kg	94.1	70.0	130
		EG020-SD: Chromium	7440-47-3	100 mg/kg	96.0	70.0	130
		EG020-SD: Copper	7440-50-8	100 mg/kg	93.6	70.0	130
		EG020-SD: Cobalt	7440-48-4	100 mg/kg	96.8	70.0	130
		EG020-SD: Lead	7439-92-1	100 mg/kg	87.6	70.0	130
		EG020-SD: Manganese	7439-96-5	100 mg/kg	93.9	70.0	130
		EG020-SD: Nickel	7440-02-0	100 mg/kg	96.6	70.0	130
		EG020-SD: Vanadium	7440-62-2	100 mg/kg	96.6	70.0	130
		EG020-SD: Zinc	7440-66-6	100 mg/kg	98.3	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2890285)							
EB2005775-007	MM 34-d (0.5-1)	EK057G: Nitrite as N (Sol.)	14797-65-0	2 mg/kg	94.4	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2890284)							
EB2005775-007	MM 34-d (0.5-1)	EK059G: Nitrite + Nitrate as N (Sol.)	----	2 mg/kg	91.9	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2890271)							
EB2005775-007	MM 34-d (0.5-1)	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	107	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2890270)							
EB2005775-007	MM 34-d (0.5-1)	EK067G: Total Phosphorus as P	----	100 mg/kg	89.8	70.0	130
EK255A SD: Ammonia in Sediment (QCLot: 2892817)							
EB2005775-007	MM 34-d (0.5-1)	EK255A: Ammonia as N	7664-41-7	0.5 mg/kg	# Not Determined	70.0	130
EP090: Organotin Compounds (QCLot: 2890012)							
EB2005775-002	MM 2-a (0.5-1)	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# 3.10	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	30.1	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	91.1	20.0	130
EP090: Organotin Compounds (QCLot: 2890013)							
EB2005775-022	MM 32-c (T3) (0.5-1)	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# 9.49	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	37.3	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	94.7	20.0	130
EP090: Organotin Compounds (QCLot: 2890014)							
EB2005775-042	OC SS31-b (T3)	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# 9.70	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	56.1	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	87.5	20.0	130
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonylurea Herbicides (QCLot: 2891235)							
EB2005627-024	Anonymous	EP234-Diuron: Diuron	330-54-1	0.004 mg/kg	73.2	70.0	130
Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	

Page : 14 of 14
 Work Order : EB2005775
 Client : PORTS NORTH
 Project : 301001-02058 - Port of Cairns Sediment



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2889924)							
EB2005639-048	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	95.4	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.6	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.0	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	87.6	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2889923)							
EB2005639-048	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	94.9	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2005775	Page	: 1 of 17
Client	: PORTS NORTH	Laboratory	: Environmental Division Brisbane
Contact	: MR ADAM FLETCHER	Telephone	: +61 7 3552 8662
Project	: 301001-02058 - Port of Cairns Sediment	Date Samples Received	: 29-Feb-2020
Site	: ----	Issue Date	: 16-Mar-2020
Sampler	: JESSICA HOGG, NICHOLAS BAINTON	No. of samples received	: 61
Order number	: ----	No. of samples analysed	: 60

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)-SD: Total Metals in Sediments by ICP-A	EB2005798--005	Anonymous	Iron	7439-89-6	28.0 %	0% - 20%	RPD exceeds LOR based limits
Matrix Spike (MS) Recoveries							
EG035T: Total Recoverable Mercury by FIMS (Low Lev	EB2005775--002	MM 2-a (0.5-1)	Mercury	7439-97-6	66.2 %	70.0-130%	Recovery less than lower data quality objective
EG035T: Total Recoverable Mercury by FIMS (Low Lev	EB2005775--052	ODS 2	Mercury	7439-97-6	66.2 %	70.0-130%	Recovery less than lower data quality objective
EK255A SD: Ammonia in Sediment	EB2005775--007	MM 34-d (0.5-1)	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP090: Organotin Compounds	EB2005775--002	MM 2-a (0.5-1)	Monobutyltin	78763-54-9	3.10 %	20.0-130%	Recovery less than lower data quality objective
EP090: Organotin Compounds	EB2005775--022	MM 32-c (T3) (0.5-1)	Monobutyltin	78763-54-9	9.49 %	20.0-130%	Recovery less than lower data quality objective
EP090: Organotin Compounds	EB2005775--042	OC SS31-b (T3)	Monobutyltin	78763-54-9	9.70 %	20.0-130%	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Soil Particle Density	0	42	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
MM 2-a (0-0.5), MM 33-c (0-0.5), MM 33-c (1-1.5), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1), MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 20-b (0.5-1), MM 21-a (0.5-1), MM 1-b (0-0.5),	MM 2-a (0.5-1), MM 33-c (0.5-1), MM 34-d (0-0.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0-0.5), MM 18-c (1-1.5), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5), MM 32-c (T3) (0.5-1), MM 20-b (0-0.5), MM 21-a (0-0.5), MM 21-a (1-1.5), MM 1-b (0.5-1)	26-Feb-2020	----	----	----	03-Mar-2020	11-Mar-2020	✓
Soil Glass Jar - Unpreserved (EA055)								
OC SS7-d, OC SS14-a (T1), OC SS14-a (T3), OC SS22-c, OC SS27-c, OC SS31-b (T2), OC SS34-a, OC SS40-a, OC D1, OC SS55-a, ODS 1, ODS 3, ODS 5,	OC SS12-b, OC SS14-a (T2), OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS31-b (T3), OC SS35-a, OC SS46-d, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6,	27-Feb-2020	----	----	----	03-Mar-2020	12-Mar-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA150: Particle Sizing							
Snap Lock Bag (EA150H) MM 2-a (0-0.5), MM 34-d (0-0.5), MM 32-c (T1) (0-0.5), MM 21-a (0-0.5), MM 33-c (0-0.5), MM 18-c (0-0.5), MM 20-b (0-0.5), MM 1-b (0-0.5)	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓
Snap Lock Bag (EA150H) OC SS7-d, OC SS14-a (T1), OC SS22-c, OC SS27-c, OC SS34-a, OC SS40-a, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6, OC SS12-b, OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS35-a, OC SS46-d, OC SS55-a, ODS 1, ODS 3, ODS 5,	27-Feb-2020	----	----	----	11-Mar-2020	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA150H) MM 2-a (0.5-1), MM 33-c (1-1.5), MM 34-d (1-1.5), MM 18-c (1-1.5), MM 32-c (T1) (1-1.5), MM 21-a (0.5-1), MM 1-b (0.5-1), MM 33-c (0.5-1), MM 34-d (0.5-1), MM 18-c (0.5-1), MM 32-c (T1) (0.5-1), MM 20-b (0.5-1), MM 21-a (1-1.5),	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA150: Soil Classification based on Particle Size								
Snap Lock Bag (EA150H) MM 2-a (0-0.5), MM 34-d (0-0.5), MM 32-c (T1) (0-0.5), MM 21-a (0-0.5),	MM 33-c (0-0.5), MM 18-c (0-0.5), MM 20-b (0-0.5), MM 1-b (0-0.5)	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓
Snap Lock Bag (EA150H) OC SS7-d, OC SS14-a (T1), OC SS22-c, OC SS27-c, OC SS34-a, OC SS40-a, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6	OC SS12-b, OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS35-a, OC SS46-d, OC SS55-a, ODS 1, ODS 3, ODS 5,	27-Feb-2020	----	----	----	11-Mar-2020	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA150H) MM 2-a (0.5-1), MM 33-c (1-1.5), MM 34-d (1-1.5), MM 18-c (1-1.5), MM 32-c (T1) (1-1.5), MM 21-a (0.5-1), MM 1-b (0.5-1)	MM 33-c (0.5-1), MM 34-d (0.5-1), MM 18-c (0.5-1), MM 32-c (T1) (0.5-1), MM 20-b (0.5-1), MM 21-a (1-1.5),	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA152: Soil Particle Density								
Snap Lock Bag (EA152) MM 2-a (0-0.5), MM 34-d (0-0.5), MM 32-c (T1) (0-0.5), MM 21-a (0-0.5),	MM 33-c (0-0.5), MM 18-c (0-0.5), MM 20-b (0-0.5), MM 1-b (0-0.5)	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓
Snap Lock Bag (EA152) OC SS7-d, OC SS14-a (T1), OC SS22-c, OC SS27-c, OC SS34-a, OC SS40-a, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6	OC SS12-b, OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS35-a, OC SS46-d, OC SS55-a, ODS 1, ODS 3, ODS 5,	27-Feb-2020	----	----	----	11-Mar-2020	25-Aug-2020	✓
Soil Glass Jar - Unpreserved (EA152) MM 2-a (0.5-1), MM 33-c (1-1.5), MM 34-d (1-1.5), MM 18-c (1-1.5), MM 32-c (T1) (1-1.5), MM 21-a (0.5-1), MM 1-b (0.5-1)	MM 33-c (0.5-1), MM 34-d (0.5-1), MM 18-c (0.5-1), MM 32-c (T1) (0.5-1), MM 20-b (0.5-1), MM 21-a (1-1.5),	26-Feb-2020	----	----	----	11-Mar-2020	24-Aug-2020	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved (EG005-SD)								
MM 2-a (0-0.5), MM 33-c (0-0.5), MM 33-c (1-1.5), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1), MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 20-b (0.5-1), MM 21-a (0.5-1), MM 1-b (0-0.5),	MM 2-a (0.5-1), MM 33-c (0.5-1), MM 34-d (0-0.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0-0.5), MM 18-c (1-1.5), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5), MM 32-c (T3) (0.5-1), MM 20-b (0-0.5), MM 21-a (0-0.5), MM 21-a (1-1.5), MM 1-b (0.5-1)	26-Feb-2020	09-Mar-2020	24-Aug-2020	✓	12-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG005-SD)								
OC SS7-d, OC SS14-a (T1), OC SS14-a (T3), OC SS22-c, OC SS27-c, OC SS31-b (T2), OC SS34-a, OC SS40-a, OC D1, OC SS55-a, ODS 1, ODS 3, ODS 5,	OC SS12-b, OC SS14-a (T2), OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS31-b (T3), OC SS35-a, OC SS46-d, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6,	27-Feb-2020	06-Mar-2020	25-Aug-2020	✓	12-Mar-2020	25-Aug-2020	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved (EG020-SD)								
MM 2-a (0-0.5), MM 33-c (0-0.5), MM 33-c (1-1.5), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1), MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 20-b (0.5-1), MM 21-a (0.5-1), MM 1-b (0-0.5),	MM 2-a (0.5-1), MM 33-c (0.5-1), MM 34-d (0-0.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0-0.5), MM 18-c (1-1.5), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5), MM 32-c (T3) (0.5-1), MM 20-b (0-0.5), MM 21-a (0-0.5), MM 21-a (1-1.5), MM 1-b (0.5-1)	26-Feb-2020	09-Mar-2020	24-Aug-2020	✓	12-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EG020-SD)								
OC SS7-d, OC SS14-a (T1), OC SS14-a (T3), OC SS22-c, OC SS27-c, OC SS31-b (T2), OC SS34-a, OC SS40-a, OC D1, OC SS55-a, ODS 1, ODS 3, ODS 5,	OC SS12-b, OC SS14-a (T2), OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS31-b (T3), OC SS35-a, OC SS46-d, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6,	27-Feb-2020	06-Mar-2020	25-Aug-2020	✓	12-Mar-2020	25-Aug-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T-LL)								
MM 2-a (0-0.5), MM 33-c (0-0.5), MM 33-c (1-1.5), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1), MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 20-b (0.5-1), MM 21-a (0.5-1), MM 1-b (0-0.5),	MM 2-a (0.5-1), MM 33-c (0.5-1), MM 34-d (0-0.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0-0.5), MM 18-c (1-1.5), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5), MM 32-c (T3) (0.5-1), MM 20-b (0-0.5), MM 21-a (0-0.5), MM 21-a (1-1.5), MM 1-b (0.5-1)	26-Feb-2020	09-Mar-2020	25-Mar-2020	✓	12-Mar-2020	25-Mar-2020	✓
Soil Glass Jar - Unpreserved (EG035T-LL)								
OC SS7-d, OC SS14-a (T1), OC SS14-a (T3), OC SS22-c, OC SS27-c, OC SS31-b (T2), OC SS34-a, OC SS40-a, OC D1, OC SS55-a, ODS 1, ODS 3, ODS 5,	OC SS12-b, OC SS14-a (T2), OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS31-b (T3), OC SS35-a, OC SS46-d, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6	27-Feb-2020	06-Mar-2020	26-Mar-2020	✓	12-Mar-2020	26-Mar-2020	✓
EK057G: Nitrite as N by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK057G)								
MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	09-Mar-2020	24-Aug-2020	✓	11-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK057G)								
OC SS14-a (T1), OC SS46-d, ODS 3	OC SS31-b (T1), ODS 2,	27-Feb-2020	09-Mar-2020	25-Aug-2020	✓	11-Mar-2020	25-Aug-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK059G) MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	09-Mar-2020	24-Aug-2020	✓	11-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK059G) OC SS14-a (T1), OC SS46-d, ODS 3	OC SS31-b (T1), ODS 2,	27-Feb-2020	09-Mar-2020	25-Aug-2020	✓	11-Mar-2020	25-Aug-2020	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Soil Glass Jar - Unpreserved (EK061G) MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	06-Mar-2020	24-Aug-2020	✓	10-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK061G) OC SS14-a (T1), OC SS46-d, ODS 3	OC SS31-b (T1), ODS 2,	27-Feb-2020	06-Mar-2020	25-Aug-2020	✓	10-Mar-2020	25-Aug-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Soil Glass Jar - Unpreserved (EK067G) MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	06-Mar-2020	24-Aug-2020	✓	10-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK067G) OC SS14-a (T1), OC SS46-d, ODS 3	OC SS31-b (T1), ODS 2,	27-Feb-2020	06-Mar-2020	25-Aug-2020	✓	10-Mar-2020	25-Aug-2020	✓
EK255A SD: Ammonia in Sediment								
Soil Glass Jar - Unpreserved (EK255A SD) MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	----	----	----	04-Mar-2020	24-Aug-2020	✓
Soil Glass Jar - Unpreserved (EK255A SD) OC SS14-a (T1), OC SS46-d, ODS 3	OC SS31-b (T1), ODS 2,	27-Feb-2020	----	----	----	04-Mar-2020	25-Aug-2020	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP003: Total Organic Carbon (TOC) in Soil								
Pulp Bag (EP003) MM 2-a (0.5-1), MM 33-c (1-1.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0.5-1), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5), MM 32-c (T3) (0.5-1), MM 20-b (0.5-1), MM 21-a (1-1.5),	MM 33-c (0.5-1), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (1-1.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1), MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 21-a (0.5-1), MM 1-b (0.5-1)	26-Feb-2020	11-Mar-2020	25-Mar-2020	✓	11-Mar-2020	25-Mar-2020	✓
Pulp Bag (EP003) OC SS14-a (T2), OC SS31-b (T2), OC D1	OC SS14-a (T3), OC SS31-b (T3),	27-Feb-2020	11-Mar-2020	26-Mar-2020	✓	11-Mar-2020	26-Mar-2020	✓
Snap Lock Bag (EP003) MM 2-a (0-0.5), MM 34-d (0-0.5), MM 32-c (T1) (0-0.5), MM 21-a (0-0.5),	MM 33-c (0-0.5), MM 18-c (0-0.5), MM 20-b (0-0.5), MM 1-b (0-0.5)	26-Feb-2020	11-Mar-2020	25-Mar-2020	✓	11-Mar-2020	25-Mar-2020	✓
Snap Lock Bag (EP003) OC SS7-d, OC SS14-a (T1), OC SS22-c, OC SS27-c, OC SS34-a, OC SS40-a, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6	OC SS12-b, OC SS21-b, OC SS25-d, OC SS31-b (T1), OC SS35-a, OC SS46-d, OC SS55-a, ODS 1, ODS 3, ODS 5,	27-Feb-2020	11-Mar-2020	26-Mar-2020	✓	11-Mar-2020	26-Mar-2020	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved (EP090) MM 2-a (0-0.5), MM 33-c (0-0.5), MM 33-c (1-1.5), MM 34-d (0.5-1), D7 (0-0.5), D7 (1-1.5), MM 18-c (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 32-c (T2) (0.5-1),	MM 2-a (0.5-1), MM 33-c (0.5-1), MM 34-d (0-0.5), MM 34-d (1-1.5), D7 (0.5-1), MM 18-c (0-0.5), MM 18-c (1-1.5), MM 32-c (T1) (0.5-1), MM 32-c (T2) (0-0.5), MM 32-c (T2) (1-1.5)	26-Feb-2020	03-Mar-2020	11-Mar-2020	✓	05-Mar-2020	12-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP090) MM 32-c (T3) (0-0.5), MM 32-c (T3) (1-1.5), MM 20-b (0-0.5), MM 21-a (0.5-1), MM 1-b (0-0.5),	MM 32-c (T3) (0.5-1), MM 20-b (0-0.5), MM 21-a (0-0.5), MM 21-a (1-1.5), MM 1-b (0.5-1)	26-Feb-2020	09-Mar-2020	11-Mar-2020	✓	10-Mar-2020	18-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP090) OC SS7-d, OC SS14-a (T1), OC SS14-a (T3), OC SS22-c, OC SS27-c,	OC SS12-b, OC SS14-a (T2), OC SS21-b, OC SS25-d, OC SS31-b (T1)	27-Feb-2020	09-Mar-2020	12-Mar-2020	✓	10-Mar-2020	18-Apr-2020	✓
Soil Glass Jar - Unpreserved (EP090) OC SS31-b (T2), OC SS34-a, OC SS40-a, OC D1, OC SS55-a, ODS 1, ODS 3, ODS 5,	OC SS31-b (T3), OC SS35-a, OC SS46-d, OC SS53-c, OC SS64-b, ODS 2, ODS 4, ODS 6	27-Feb-2020	10-Mar-2020	12-Mar-2020	✓	11-Mar-2020	19-Apr-2020	✓
EP234F: Phenylurea, Thizdiazolurea, Uracil and Sulfonyleurea Herbicides								
Soil Glass Jar - Unpreserved (EP234-Diuron) MM 34-d (0-0.5), MM 34-d (1-1.5), MM 32-c (T1) (0.5-1), MM 20-b (0-0.5),	MM 34-d (0.5-1), MM 32-c (T1) (0-0.5), MM 32-c (T1) (1-1.5), MM 20-b (0.5-1)	26-Feb-2020	06-Mar-2020	11-Mar-2020	✓	06-Mar-2020	15-Apr-2020	✓

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-T)								
R1, R2,	R2,	27-Feb-2020	06-Mar-2020	25-Aug-2020	✓	06-Mar-2020	25-Aug-2020	✓
R3, R4,	R4							
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035T)								
R1, R2,	R2,	27-Feb-2020	----	----	----	09-Mar-2020	26-Mar-2020	✓
R3, R4,	R4							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Ammonia in Sediments	EK255A SD	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Diuron by LCMSMS	EP234-Diuron	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	7	64	10.94	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	6	56	10.71	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Soil Particle Density	EA152	0	42	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Fe and Al in Sediments by ICPAES	EG005-SD	9	64	14.06	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	7	64	10.94	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	11	64	17.19	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	6	60	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia in Sediments	EK255A SD	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Diuron by LCMSMS	EP234-Diuron	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	3	56	5.36	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Soil Particle Density	EA152	3	42	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Fe and Al in Sediments by ICPAES	EG005-SD	5	64	7.81	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	4	64	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	6	64	9.38	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	6	60	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia in Sediments	EK255A SD	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Diuron by LCMSMS	EP234-Diuron	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	3	56	5.36	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Total Fe and Al in Sediments by ICPAES	EG005-SD	5	64	7.81	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	4	64	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	6	64	9.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	3	60	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia in Sediments	EK255A SD	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Diuron by LCMSMS	EP234-Diuron	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx)- Soluble by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N - Soluble by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	3	56	5.36	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TKN as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	4	64	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	4	64	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosporus By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Total Mercury by FIMS	EG035T	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Soil Particle Density	EA152	SOIL	Soil Particle Density by AS 1289.3.5.1-2006 : Methods of testing soils for engineering purposes - Soil classification tests - Determination of the soil particle density of a soil - Standard method
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3). LORs per NODG
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N - Soluble by Discrete Analyser	EK057G	SOIL	In house: Referenced to APHA 4500-NO ₃ - B. Nitrite in a water extract is determined by direct colourimetry by Discrete Analyser.
Nitrate as N - Soluble by Discrete Analyser	EK058G	SOIL	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate in the 1:5 soil:water extract is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N (NO _x)- Soluble by Discrete Analyser	EK059G	SOIL	In house: Thermo Scientific Method D08727 and NEMI (National Environmental Method Index) Method ID: 9171. This method covers the determination of total oxidised nitrogen (NO _x -N) and nitrate (NO ₃ -N) by calculation, Combined oxidised Nitrogen (NO ₂ +NO ₃) in a water extract is determined by direct colourimetry by Discrete Analyser.
TKN as N By Discrete Analyser	EK061G	SOIL	In house: Referenced to APHA 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Nitrogen as N (TKN + NO _x) By Discrete Analyser	EK062G	SOIL	In house: Referenced to APHA 4500 Norg/NO ₃ - Total Nitrogen is determined as the sum of TKN and Oxidised Nitrogen, each determined separately as N.
Total Phosphorus By Discrete Analyser	EK067G	SOIL	In house: Referenced to APHA 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Ammonia in Sediments	EK255A SD	SOIL	In house: Referenced to Rayment and Higginson (1992) Method 7C1 and 7C2. This method measures exchangeable ammonium which is defined by the amount of ammonium released by shaking sediment with an un-buffered 2M potassium chloride solution.



Analytical Methods	Method	Matrix	Method Descriptions
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO ₂) is automatically measured by infra-red detector.
Organotin Analysis	EP090	SOIL	In house: Referenced to USEPA SW 846 - 8270D Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quantified against an established calibration curve.
Diuron by LCMSMS	EP234-Diuron	SOIL	In-House variation on EP234. 5 g of sample is extracted into 10 mL of an ACN/Methanol mix. A 250 µL aliquot of sample extract is made up to 2 mL final volume.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	SOIL	In house: Referenced to APHA 4500 Norg- D; APHA 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Sample preparation for Pesticides by LCMSMS	EP234-PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#
Organotin Sample Preparation	ORG35	SOIL	In house: 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)



CHAIN OF CUSTODY

ALS Laboratory, please tick

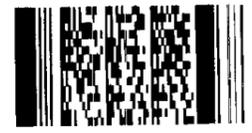
JADELAKE 311 Sims Road Pombria SA 5095
Ph: 08 8525 5133 E: sales@alslab.com.au

JMELBOURNE 244 West Road Springvale VIC 3171 JMCRA 413 Geary Place North Nowra NSW 2541
Ph: 03 8548 9500 E: samples.melbourne@alslab.com.au Ph: 02 4423 2005 E: nowra@alslab.com.au

JWOLLONGONG 126 Sydney Road Mudgee NSW 2850 Ph: 08 9209 7555 E: samples.parr@alslab.com.au
JWOLLONGONG 126 Sydney Road Mudgee NSW 2850 Ph: 08 9209 7555 E: samples.parr@alslab.com.au

CLIENT: Ports North
OFFICE: Cnr Grafton and Hartley Streets Cairns QLD 4870
PROJECT: Port of Cairns Sediment
ORDER NUMBER:
PURCHASE ORDER NO.:
PROJECT MANAGER: Adam Fletcher
SAMPLER: NICHOLAS BAINTON / Jessica Hogg
COC Reported to ALS? (YES / NO)

Environmental Division
Brisbane
Work Order Reference
EB2005775



Telephone: + 61-7-3243 7222

Table with columns: LAB ID, SAMPLE ID, DATE / TIME, MATRIX, TYPE & PRESERVATIVE, TOTAL BOTTLES, Moisture, Total Organic Carbon (TOC), Total Metals SD-3 (ppm), Total Metals W-30 (water), Dioxin, Organochlorine (OC), Organophosphorus (OP), TPH/PAH, Nutrients (Total Nitrogen, Total Kjeldahl Nitrogen, Nitrate, Nitrite + Nitrate, Ammonia, Total Phosphorus), PSD and hydrometer. Rows 1-61.

Water Container Codes: P = Unpreserved Plastic, N = Nitric Preserved Plastic, ORC = Nitric Preserved ORC, SH = Sodium Hydroxide/Cod Preserved, S = Sodium Hydroxide Preserved Plastic, AG = Amber Glass Unpreserved, AP = Air-tight Unpreserved Plastic
V = VOA Vial HCl Preserved, VS = VOA Vial Sodium Bisulphate Preserved, AV = Air-tight Unpreserved Vial SG = Sulfuric Preserved Amber Glass, H = HCl Preserved Speciation bottle, SP = Sulfuric Preserved Plastic, F = Formaldehyde Preserved Glass
Z = Zinc Acetate Preserved Bottle, E = EDTA Preserved Bottles, ST = Sterile Bottle, ASS = Plastic Bag for Acid Sulphate Soils, B = Unpreserved Bag, LI = Lugol's Iodine Preserved Bottles, STT = Sterile Sodium Thiosulfate Preserved Bottles



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB2005775

Client	: PORTS NORTH	Laboratory	: Environmental Division Brisbane
Contact	: MR ADAM FLETCHER	Contact	: Caroline Hill
Address	: Ports North Cnr Grafton and Hartley Streets PO BOX 594 CAIRNS QLD, AUSTRALIA 4870	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: adam.fletcher@portsnorth.com.au	E-mail	: Caroline.Hill@Alsglobal.com
Telephone	: +61 07 40523820	Telephone	: +61 7 3552 8662
Facsimile	: +61 07 40521493	Facsimile	: +61-7-3243 7218
Project	: 301001-02058 - Port of Cairns Sediment	Page	: 1 of 5
Order number	: ----	Quote number	: EB2018CAIPOR0001 (BN/111/18 v2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: JESSICA HOGG, NICHOLAS BAINTON		

Dates

Date Samples Received	: 29-Feb-2020 20:00	Issue Date	: 03-Mar-2020
Client Requested Due Date	: 13-Mar-2020	Scheduled Reporting Date	: 13-Mar-2020

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Intact.
No. of coolers/boxes	: 10	Temperature	: °C - Ice present
Receipt Detail	: MEDIMUM ESKY	No. of samples received / analysed	: 61 / 60

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised that where W-30 has been requested on the received chain of custody, ALS has assigned W-30T in-line with the unfiltered containers submitted for this work order. For further information, please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **Sample D8 (0-0.5)(0.5-1)(1-1.5) and OC D2 has been forwarded to SGS , as requested. Please note that this fee has been assigned to EB2005627.**
- **Diuron analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- ***03/03/20*: SRN has been resent to acknowledge revised reporting date. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Total Mercury by FIMS : EG035T		
R1	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R3	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R4	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
Total Metals by ICP-MS - Suite A : EG020A-T		
R1	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R3	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered
R4	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Unfiltered

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

- EB2005775-015 : [26-Feb-2020] : MM 32-c (T1) (0-0.5)
- EB2005775-016 : [26-Feb-2020] : MM 32-c (T1) (0.5-1)
- EB2005775-017 : [26-Feb-2020] : MM 32-c (T1) (1-1.5)
- EB2005775-018 : [26-Feb-2020] : MM 32-c (T2) (0-0.5)
- EB2005775-019 : [26-Feb-2020] : MM 32-c (T2) (0.5-1)
- EB2005775-020 : [26-Feb-2020] : MM 32-c (T2) (1-1.5)
- EB2005775-021 : [26-Feb-2020] : MM 32-c (T3) (0-0.5)
- EB2005775-022 : [26-Feb-2020] : MM 32-c (T3) (0.5-1)
- EB2005775-023 : [26-Feb-2020] : MM 32-c (T3) (1-1.5)

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EA150H/EA152 Particle Sizing with Hydrometer + Soil Particle	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP090 (solids) Organotins	SOIL - NT-11S Total N + Total P	SOIL - NT-4S NO2 and NO3	SOIL - SD-03 Metals by ICPMS (15 metals + low level Hg)
EB2005775-001	26-Feb-2020 00:00	MM 2-a (0-0.5)	✓	✓	✓	✓			✓
EB2005775-002	26-Feb-2020 00:00	MM 2-a (0.5-1)	✓	✓	✓	✓			✓
EB2005775-003	26-Feb-2020 00:00	MM 33-c (0-0.5)	✓	✓	✓	✓			✓
EB2005775-004	26-Feb-2020 00:00	MM 33-c (0.5-1)	✓	✓	✓	✓			✓
EB2005775-005	26-Feb-2020 00:00	MM 33-c (1-1.5)	✓	✓	✓	✓			✓
EB2005775-006	26-Feb-2020 00:00	MM 34-d (0-0.5)	✓	✓	✓	✓	✓	✓	✓
EB2005775-007	26-Feb-2020 00:00	MM 34-d (0.5-1)	✓	✓	✓	✓	✓	✓	✓
EB2005775-008	26-Feb-2020 00:00	MM 34-d (1-1.5)	✓	✓	✓	✓	✓	✓	✓
EB2005775-009	26-Feb-2020 00:00	D7 (0-0.5)	✓		✓	✓			✓
EB2005775-010	26-Feb-2020 00:00	D7 (0.5-1)	✓		✓	✓			✓
EB2005775-011	26-Feb-2020 00:00	D7 (1-1.5)	✓		✓	✓			✓
EB2005775-012	26-Feb-2020 00:00	MM 18-c (0-0.5)	✓	✓	✓	✓			✓



			SOIL - EA055-103 Moisture Content	SOIL - EA150H/EA152 Particle Sizing with Hydrometer + Soil Particle	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP090 (solids) Organotins	SOIL - NT-11S Total N + Total P	SOIL - NT-4S NO2 and NO3	SOIL - SD-03 Metals by ICPMS (15 metals + low level Hg)
EB2005775-013	26-Feb-2020 00:00	MM 18-c (0.5-1)	✓	✓	✓	✓			✓
EB2005775-014	26-Feb-2020 00:00	MM 18-c (1-1.5)	✓	✓	✓	✓			✓
EB2005775-015	26-Feb-2020 00:00	MM 32-c (T1) (0-0.5)	✓	✓	✓	✓	✓	✓	✓
EB2005775-016	26-Feb-2020 00:00	MM 32-c (T1) (0.5-1)	✓	✓	✓	✓	✓	✓	✓
EB2005775-017	26-Feb-2020 00:00	MM 32-c (T1) (1-1.5)	✓	✓	✓	✓	✓	✓	✓
EB2005775-018	26-Feb-2020 00:00	MM 32-c (T2) (0-0.5)	✓		✓	✓			✓
EB2005775-019	26-Feb-2020 00:00	MM 32-c (T2) (0.5-1)	✓		✓	✓			✓
EB2005775-020	26-Feb-2020 00:00	MM 32-c (T2) (1-1.5)	✓		✓	✓			✓
EB2005775-021	26-Feb-2020 00:00	MM 32-c (T3) (0-0.5)	✓		✓	✓			✓
EB2005775-022	26-Feb-2020 00:00	MM 32-c (T3) (0.5-1)	✓		✓	✓			✓
EB2005775-023	26-Feb-2020 00:00	MM 32-c (T3) (1-1.5)	✓		✓	✓			✓
EB2005775-024	26-Feb-2020 00:00	MM 20-b (0-0.5)	✓	✓	✓	✓	✓	✓	✓
EB2005775-025	26-Feb-2020 00:00	MM 20-b (0.5-1)	✓	✓	✓	✓	✓	✓	✓
EB2005775-026	26-Feb-2020 00:00	MM 21-a (0-0.5)	✓	✓	✓	✓			✓
EB2005775-027	26-Feb-2020 00:00	MM 21-a (0.5-1)	✓	✓	✓	✓			✓
EB2005775-028	26-Feb-2020 00:00	MM 21-a (1-1.5)	✓	✓	✓	✓			✓
EB2005775-029	26-Feb-2020 00:00	MM 1-b (0-0.5)	✓	✓	✓	✓			✓
EB2005775-030	26-Feb-2020 00:00	MM 1-b (0.5-1)	✓	✓	✓	✓			✓
EB2005775-031	27-Feb-2020 00:00	OC SS7-d	✓	✓	✓	✓			✓
EB2005775-032	27-Feb-2020 00:00	OC SS12-b	✓	✓	✓	✓			✓
EB2005775-033	27-Feb-2020 00:00	OC SS14-a (T1)	✓	✓	✓	✓	✓	✓	✓
EB2005775-034	27-Feb-2020 00:00	OC SS14-a (T2)	✓		✓	✓			✓
EB2005775-035	27-Feb-2020 00:00	OC SS14-a (T3)	✓		✓	✓			✓
EB2005775-036	27-Feb-2020 00:00	OC SS21-b	✓	✓	✓	✓			✓
EB2005775-037	27-Feb-2020 00:00	OC SS22-c	✓	✓	✓	✓			✓
EB2005775-038	27-Feb-2020 00:00	OC SS25-d	✓	✓	✓	✓			✓
EB2005775-039	27-Feb-2020 00:00	OC SS27-c	✓	✓	✓	✓			✓
EB2005775-040	27-Feb-2020 00:00	OC SS31-b (T1)	✓	✓	✓	✓	✓	✓	✓
EB2005775-041	27-Feb-2020 00:00	OC SS31-b (T2)	✓		✓	✓			✓
EB2005775-042	27-Feb-2020 00:00	OC SS31-b (T3)	✓		✓	✓			✓
EB2005775-043	27-Feb-2020 00:00	OC SS34-a	✓	✓	✓	✓			✓
EB2005775-044	27-Feb-2020 00:00	OC SS35-a	✓	✓	✓	✓			✓
EB2005775-045	27-Feb-2020 00:00	OC SS40-a	✓	✓	✓	✓			✓
EB2005775-046	27-Feb-2020 00:00	OC SS46-d	✓	✓	✓	✓	✓	✓	✓
EB2005775-047	27-Feb-2020 00:00	OC D1	✓		✓	✓			✓
EB2005775-048	27-Feb-2020 00:00	OC SS53-c	✓	✓	✓	✓			✓
EB2005775-049	27-Feb-2020 00:00	OC SS55-a	✓	✓	✓	✓			✓
EB2005775-050	27-Feb-2020 00:00	OC SS64-b	✓	✓	✓	✓			✓
EB2005775-051	27-Feb-2020 00:00	ODS 1	✓	✓	✓	✓			✓
EB2005775-052	27-Feb-2020 00:00	ODS 2	✓	✓	✓	✓	✓	✓	✓
EB2005775-053	27-Feb-2020 00:00	ODS 3	✓	✓	✓	✓	✓	✓	✓



Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EA150H/EA152 Particle Sizing with Hydrometer + Soil Particle	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP090 (solids) Organotins	SOIL - NT-11S Total N + Total P	SOIL - NT-4S NO2 and NO3	SOIL - SD-03 Metals by ICPMS (15 metals + low level Hg)
EB2005775-054	27-Feb-2020 00:00	ODS 4	✓	✓	✓	✓			✓
EB2005775-055	27-Feb-2020 00:00	ODS 5	✓	✓	✓	✓			✓
EB2005775-056	27-Feb-2020 00:00	ODS 6	✓	✓	✓	✓			✓

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EK255A SD Ammonia in Sediment by FIA	SOIL - EP234-Diuron Low Level Diuron in Soil
EB2005775-006	26-Feb-2020 00:00	MM 34-d (0-0.5)	✓	✓
EB2005775-007	26-Feb-2020 00:00	MM 34-d (0.5-1)	✓	✓
EB2005775-008	26-Feb-2020 00:00	MM 34-d (1-1.5)	✓	✓
EB2005775-015	26-Feb-2020 00:00	MM 32-c (T1) (0-0.5)	✓	✓
EB2005775-016	26-Feb-2020 00:00	MM 32-c (T1) (0.5-1)	✓	✓
EB2005775-017	26-Feb-2020 00:00	MM 32-c (T1) (1-1.5)	✓	✓
EB2005775-024	26-Feb-2020 00:00	MM 20-b (0-0.5)	✓	✓
EB2005775-025	26-Feb-2020 00:00	MM 20-b (0.5-1)	✓	✓
EB2005775-033	27-Feb-2020 00:00	OC SS14-a (T1)	✓	
EB2005775-040	27-Feb-2020 00:00	OC SS31-b (T1)	✓	
EB2005775-046	27-Feb-2020 00:00	OC SS46-d	✓	
EB2005775-052	27-Feb-2020 00:00	ODS 2	✓	
EB2005775-053	27-Feb-2020 00:00	ODS 3	✓	



Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested	WATER - W-30T 11 Metals (Total)
EB2005775-057	27-Feb-2020 00:00	R1		✓
EB2005775-058	27-Feb-2020 00:00	R2		✓
EB2005775-059	27-Feb-2020 00:00	R3		✓
EB2005775-060	27-Feb-2020 00:00	R4		✓
EB2005775-061	02-Mar-2020 00:00	Seawater elutriate	✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ADAM FLETCHER

- *AU Certificate of Analysis - NATA (COA) Email adam.fletcher@portsnorth.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email adam.fletcher@portsnorth.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email adam.fletcher@portsnorth.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email adam.fletcher@portsnorth.com.au
- A4 - AU Tax Invoice (INV) Email adam.fletcher@portsnorth.com.au
- Chain of Custody (CoC) (COC) Email adam.fletcher@portsnorth.com.au
- EDI Format - ENMRG (ENMRG) Email adam.fletcher@portsnorth.com.au
- EDI Format - XTab (XTAB) Email adam.fletcher@portsnorth.com.au

ALEX KOCHNIEFF

- *AU Certificate of Analysis - NATA (COA) Email Alex.Kochnieff@advisian.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email Alex.Kochnieff@advisian.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email Alex.Kochnieff@advisian.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email Alex.Kochnieff@advisian.com
- Chain of Custody (CoC) (COC) Email Alex.Kochnieff@advisian.com
- EDI Format - ENMRG (ENMRG) Email Alex.Kochnieff@advisian.com
- EDI Format - XTab (XTAB) Email Alex.Kochnieff@advisian.com

NICHOLAS BAINTON

- *AU Certificate of Analysis - NATA (COA) Email nicholas.bainton@advisian.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email nicholas.bainton@advisian.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email nicholas.bainton@advisian.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email nicholas.bainton@advisian.com
- Chain of Custody (CoC) (COC) Email nicholas.bainton@advisian.com
- EDI Format - ENMRG (ENMRG) Email nicholas.bainton@advisian.com
- EDI Format - XTab (XTAB) Email nicholas.bainton@advisian.com



Appendix C
SGS Laboratory Report

CLIENT DETAILS

Contact Alex Kochnieff
 Client PORTS NORTH
 Address PO BOX 594
 QLD 4870

Telephone 07 4052 3820
 Facsimile 07 4052 1493
 Email Alex.kochnieff@advisian.com

Project **Port of Cairns Sediment - QC**
 Order Number (Not specified)
 Samples 4

LABORATORY DETAILS

Manager Adam Atkinson
 Laboratory SGS Melbourne EH&S
 Address 10/585 Blackburn Road
 Notting Hill Victoria 3168

Telephone +61395743200
 Facsimile +61395743399
 Email Au.SampleReceipt.Melbourne@sgs.com

SGS Reference **ME314030 R1**
 Date Received 04 Mar 2020
 Date Reported 20 Mar 2020

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(14420).

TOC analysis in soil subcontracted to SGS Townsville Minerals Services 50 Leyland Street, Garbutt Townsville QLD 4814, Not Accredited, TSV20-04426.

This report cancels and supersedes the report No.ME31430 dated 17/3/2020 issued by SGS Environment, Health and Safety due to missing Mn duplicate result added.

SIGNATORIES



Adam ATKINSON
 Australian Chemistry Manager



Ryan ZHANG
 Team Leader

Parameter	Units	LOR	ME314030.001	ME314030.002	ME314030.003	ME314030.004
Sample Number			ME314030.001	ME314030.002	ME314030.003	ME314030.004
Sample Matrix			Soil	Soil	Soil	Soil
Sample Date			24 Feb 2020	25 Feb 2020	25 Feb 2020	25 Feb 2020
Sample Name			OC D2	D8 (0-0.5)	D8 (0.5-1)	D8 (1-1.5)

Moisture Content Method: AN002 Tested: 12/3/2020

Parameter	Units	LOR	ME314030.001	ME314030.002	ME314030.003	ME314030.004
% Moisture*	%w/w	1	56.2	60.0	59.2	57.2

Total Carbon and TOC by LECO Furnace Method: AN203 Tested: 17/3/2020

Parameter	Units	LOR	ME314030.001	ME314030.002	ME314030.003	ME314030.004
Total Organic Carbon (TOC)*	%w/w	0.02	1.4	1.6	1.6	1.3

Organotins in Solids Method: MA 1427 Tested: 11/3/2020

Parameter	Units	LOR	ME314030.001	ME314030.002	ME314030.003	ME314030.004
Monobutyltin*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibutyltin*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Tributyltin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1

Metals/Elements in Solids Method: MA1400_1 Tested: 6/3/2020

Parameter	Units	LOR	ME314030.001	ME314030.002	ME314030.003	ME314030.004
Aluminium	mg/kg	2	46000	59000	74000	66000
Antimony	mg/kg	2	<2	<2	<2	<2
Arsenic	mg/kg	2	22	29	22	23
Cadmium	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chromium	mg/kg	2	48	56	58	60
Cobalt	mg/kg	2	10	12	13	13
Copper	mg/kg	2	14	23	22	26
Iron	mg/kg	2	30000	41000	44000	41000
Lead	mg/kg	2	20	25	26	26
Manganese	mg/kg	2	510	470	650	600
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
Nickel	mg/kg	2	23	30	30	31
Selenium	mg/kg	2	2	2	3	3
Silver	mg/kg	2	<2	<2	<2	<2
Vanadium	mg/kg	2	54	66	66	68
Zinc	mg/kg	2	61	92	88	96

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals/Elements in Solids Method: MA1400_1

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Aluminium	LB031587	mg/kg	2	<2	29%	102%
Antimony	LB031587	mg/kg	2	<2	0%	100%
Arsenic	LB031587	mg/kg	2	<2	5%	98%
Cadmium	LB031587	mg/kg	0.2	<0.2	0%	100%
Chromium	LB031587	mg/kg	2	<2	3%	102%
Cobalt	LB031587	mg/kg	2	<2	1%	101%
Copper	LB031587	mg/kg	2	<2	1%	103%
Iron	LB031587	mg/kg	2	<2	22%	108%
Lead	LB031587	mg/kg	2	<2	0%	101%
Manganese	LB031587	mg/kg	2	<2	17%	100%
Mercury	LB031587	mg/kg	0.05	<0.05	23%	99%
Nickel	LB031587	mg/kg	2	<2	1%	100%
Selenium	LB031587	mg/kg	2	<2	2%	104%
Silver	LB031587	mg/kg	2	<2	0%	93%
Vanadium	LB031587	mg/kg	2	<2	1%	99%
Zinc	LB031587	mg/kg	2	<2	2%	101%

Organotins in Solids Method: MA 1427

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery	MSD %RPD
Monobutyltin*	LB031645	mg/kg	0.1	<0.1	0%	19%	0%	NA
Dibutyltin*	LB031645	mg/kg	0.1	<0.1	0%	110%	43%	13%
Tributyltin	LB031645	mg/kg	0.1	<0.1	0%	93%	37%	0%

METHOD

METHODOLOGY SUMMARY

AN002	<p>The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.</p>
AN203	<p>The carbon in the sample is oxidised to carbon dioxide gas in a tube furnace using oxygen to aid the oxidation process. The evolved carbon dioxide is measure by an infra red cell. The infra red cell output is calibrated against the value of a known standard sample to provide the total carbon value of the unknown sample.</p>
AN203	<p>The sample is pre-treated with hydrochloric acid to remove inorganic carbon/carbonate. The residual non-carbonate carbon is oxidised to carbon dioxide gas in a tube furnace using oxygen to aid the oxidation process. The evolved carbon dioxide is measure by an infra red cell. The infra red cell output is calibrated against the value of a known standard sample to provide the total organic carbon value of the unknown sample.</p>
MA1400_1	<p>A weighed portion of as received sample is extracted in concentrated acid using microwave heating by the Microwave Digestion system. The sample and acid are placed in a microwave vessel (TFM), which is then capped and heated in the microwave unit. After cooling, the vessel contents are diluted with DI water, then filtered, centrifuged, or allowed to settle and analysed by ICP-MS.</p>
MA1427	<p>This method is intended for the trace analysis of organotin compounds by high performance liquid chromatography-mass spectrometry (HPLC-MS). This method is based on USEPA Method 8323.</p>

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received. Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This report must not be reproduced, except in full.

CHAIN OF CUSTODY ALS Laboratory: please tick ✓		250/220 @ 2020	
CLIENT: Parts North OFFICE: Car Grafton and Hartley Streets Cairns QLD 4870 PROJECT: Port of Cairns Sediment		TURNOVER REQUIREMENTS: <input type="checkbox"/> Standard TAT (List due date): <input checked="" type="checkbox"/> Non Standard or urgent TAT (List due date): 3 days	
ORDER NUMBER: PROJECT NUMBER: 301001-02058 PURCHASE ORDER NO.: COUNTRY OF ORIGIN: AUSTRALIA PROJECT MANAGER: Adam Fletcher CONTACT: Alex Kochnieff SAMPLER: NICHOLAS BAINTON / Jessica Hogg SAMPLER MOBILE: 0427407332 COC Emailed to ALS? (YES / NO) EDD FORMAT (or default): NICHOLAS BAINTON Email Reports to (will default to PM if no other addresses are listed): alex.kochnieff@advisian.com and nicholas.bainton@advisian.com Email Invoice to (will default to PM if no other addresses are listed): alex.kochnieff@advisian.com and nicholas.bainton@advisian.com		COC SEQUENCE NUMBER (Circle): 1 RECEIVED BY: DATE/TIME: 29/02/20 @ 2000	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		FOR LABORATORY USE Customise Seal Intact? Free ice / Frozen ice bricks press Random Sample Temperature on Other comment:	

SGS Melbourne EHS



ME314030 COC
Received: 04 - Mar - 2020

ALS USE ONLY		SAMPLE DETAILS MATRIX, Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED (including SUITES) (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (all metal suite required) or Dissolved (all listed suite required)											Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Microbes	Total Organic Carbon (TOC)	Total Methyl Arsenic (TMA)	Total Methyl Mercury (TMM)	Diatoms	Organisms (BMT, DMT, BTB)	TPH/PAH	Metals (Total Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Lead, Total Manganese, Total Mercury, Total Nickel, Total Silver, Total Selenium, Total Zinc)	PFOS and PFOA	Comments on Bity contaminant levels, dilutions, or samples requiring specific QC analysis etc.		
MM 2-a	(0-0.5)	26/01/2020	S	None	3 Jars + 1 bag	1	1	1	1	1	1	1	1	1	1 jar on HOLD		
MM 2-a	(0.5-1)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(0-0.5)	26/01/2020	S	None	3 Jars + 1 bag	1	1	1	1	1	1	1	1	1	1 jar on HOLD		
MM 3-a	(0.5-1)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(1-1.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(1.5-2)	26/01/2020	S	None	3 Jars + 1 bag	1	1	1	1	1	1	1	1	1	1 jar on HOLD		
MM 3-a	(2-2.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(2.5-3)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(3-3.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD		
MM 3-a	(3.5-4)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(4-4.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(4.5-5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(5-5.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(5.5-6)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(6-6.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(6.5-7)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(7-7.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(7.5-8)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(8-8.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(8.5-9)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(9-9.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(9.5-10)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(10-10.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(10.5-11)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(11-11.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(11.5-12)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(12-12.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(12.5-13)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(13-13.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(13.5-14)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(14-14.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(14.5-15)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(15-15.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(15.5-16)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(16-16.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(16.5-17)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(17-17.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(17.5-18)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(18-18.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(18.5-19)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(19-19.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(19.5-20)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(20-20.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(20.5-21)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(21-21.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(21.5-22)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(22-22.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(22.5-23)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(23-23.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(23.5-24)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(24-24.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(24.5-25)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(25-25.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(25.5-26)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(26-26.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(26.5-27)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(27-27.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(27.5-28)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(28-28.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(28.5-29)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(29-29.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(29.5-30)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(30-30.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(30.5-31)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(31-31.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(31.5-32)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(32-32.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(32.5-33)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(33-33.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(33.5-34)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(34-34.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(34.5-35)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(35-35.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(35.5-36)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(36-36.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(36.5-37)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(37-37.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(37.5-38)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(38-38.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(38.5-39)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(39-39.5)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(39.5-40)	26/01/2020	S	None	3 Jars	1	1	1	1	1	1	1	1	1	1 jar on HOLD No PSD bag - use remaining material in second jar for PSD.		
MM 3-a	(40-40.5)	26/01/2020	S	None	3 Jars	1	1	1	1								

SGS Notting Hill Bottle Map

Loose

Job Number:		Eskies /boxes:		Ice /icebricks:		Temperature:	
		1x white foam				15.6°C	
Sample ID	Tray No.	Matrix				PRESERVATIVE	BOTTLE TYPE
		soil	water	oil	filter		
GRAB							
02- ALB 0-0.1m		✓				none	250 mL Jar glass + teflon lid
D8-Core-0-0.5		✓				none	125 mL Jar glass + teflon lid
" 0.5-1		✓				none (NO HEADSPACE)	40 mL Glass VOA vial + teflon lid
" 1-1.5		✓				none (HALF FILLED)	40 mL Glass VOA vial + teflon lid
						none	1 Litre Plastic (opaque)
						none	500 mL Plastic (opaque)
						none	250 mL Plastic (opaque)
						none	125 mL Plastic (opaque)
						none	1 Litre Amber glass + teflon lid
						none	500mL Amber glass + teflon lid
						none	200mL Amber glass + teflon lid
						none	100mL Amber glass + teflon lid
						HNO3	1 Litre Plastic (opaque)
						HNO3 (field filter)	125 mL Plastic (opaque)
						HNO3 (no filtering)	125 mL Plastic (opaque)
						HCl (no filtering)	125 mL Plastic (opaque)
						HCl (field filter)	125 mL Plastic (opaque)
						0.125M EDTA (field filter)	125 mL Plastic (opaque)
						5M H2SO4	125 mL Plastic (opaque)
						NaOH	125 mL Plastic (opaque)
						Zn acetate & NaOH	125 mL Plastic (opaque)
						H2SO4	500 mL Amber glass + teflon lid
						CuSO4	100 mL Amber glass + teflon lid
						none (foil covered)	500 mL Amber glass + teflon lid
						0.5mL thiosulphate + 3mL HNO3 (NO HEADSPACE)	500 mL Amber glass + teflon lid
						Lugol	500 mL Amber glass + teflon lid
						sterilised -thiosulphate (24hr holding time)	200mL or 500 mL Plastic (clear)
						Buffer/dechlorinating agent (NH4Cl)	40 mL Glass VOA vial + teflon lid
						Dechlorinating agent (NH4Cl)	40 mL Glass VOA vial + teflon lid
Totals							
Comments:		1 of 2 x 250 mL glass jar for D8 Core-0-0.5 received with a broken base					
ALBERT 4/3/20 10:35am							



SAMPLE RECEIPT ADVICE

ME314030

CLIENT DETAILS

Contact Alex Kochnieff
Client PORTS NORTH
Address PO BOX 594
QLD 4870

Telephone 07 4052 3820
Facsimile 07 4052 1493
Email Alex.kochnieff@advisian.com

Project **Port of Cairns Sediment - QC**
Order Number (Not specified)
Samples 4

LABORATORY DETAILS

Manager Adam Atkinson
Laboratory SGS Melbourne EH&S
Address 10/585 Blackburn Road
Notting Hill Victoria 3168

Telephone +61395743200
Facsimile +61395743399
Email Au.SampleReceipt.Melbourne@sgs.com

Samples Received Wed 4/3/2020
Report Due Thu 12/3/2020
SGS Reference **ME314030**

SUBMISSION DETAILS

This is to confirm that 4 samples were received on Wednesday 4/3/2020. Results are expected to be ready by COB Thursday 12/3/2020. Please quote SGS reference ME314030 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	4 Soil
Date documentation received	4/3/2020	Type of documentation received	COC
Number of eskies/boxes received	1 white foam	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	15.6°C
Sufficient sample for analysis	Yes	Turnaround time requested	Standard

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

CLIENT DETAILS

Client **PORTS NORTH**

Project **Port of Cairns Sediment - QC**

SUMMARY OF ANALYSIS

No.	Sample ID	Metals/Elements in Solids	Moisture Content	Organotins in Solids	Total Carbon and TOC by LECO Furnace
001	OC D2	16	1	3	1
002	D8 (0-0.5)	16	1	3	1
003	D8 (0.5-1)	16	1	3	1
004	D8 (1-1.5)	16	1	3	1

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document. The numbers shown in the table indicate the number of results requested in each package. Please indicate as soon as possible should your request differ from these details. Testing as per this table shall commence immediately unless the client intervenes with a correction.



Appendix D
Introduced Marine Pest Survey Logs

General Location of Sampling	Port of Cairns – Offshore Disposal Site
Site Number	ODS 2
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Snails ▪ Shells ▪ Sticks ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Offshore Disposal Site
Site Number	ODS 3
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Shells ▪ 1 x crab ▪ Detritus, including sticks ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Offshore Disposal Site
Site Number	ODS 4
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Shells ▪ Detritus, including sticks ▪ Small, flat, bottom-dwelling fish ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Offshore Disposal Site
Site Number	ODS 5
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Shells ▪ Detritus, including sticks ▪ Small fish ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-10
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ 3 x crabs ▪ Shells ▪ Detritus, including sticks ▪ NO marine pests 	
General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-3
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Snail ▪ Shells ▪ Detritus ▪ Soft coral ▪ NO marine pests 	



General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-16
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot, clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ 1 x crab ▪ Sea grass ▪ 1 x sand dollar ▪ Shells ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-7
Date/Sample Time	27/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Hot with storm approaching
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ 1 x sand dollar ▪ Shells ▪ Detritus ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-19
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Sea grass ▪ Shell fragment ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-33
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	



Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Part of a jellyfish ▪ 6 x bivalves ▪ Sea grass and reed ▪ Shells ▪ NO marine pests 	

General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-24
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Seagrass ▪ Few shells ▪ NO marine pests 	
General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-40
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Snail ▪ Seagrass ▪ Shells ▪ NO marine pests 	



General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-64
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Crabs ▪ Snails ▪ Shells ▪ Shrimp ▪ Coral 	<ul style="list-style-type: none"> ▪ Coral ▪ Bivalves ▪ Leaves ▪ NO marine pests



General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-51
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Snails ▪ Cone shell ▪ Detritus ▪ Silky oak seed ▪ Shrimp 	<ul style="list-style-type: none"> ▪ Crab ▪ Worm ▪ NO marine pests



General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-27
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Leaf ▪ 1 x snail ▪ Seagrass and reed ▪ Barnacles ▪ NO marine pests 	



General Location of Sampling	Port of Cairns – Outer Chanel
Site Number	OC SS-54
Date/Sample Time	28/02/20
Water Depth at Site	~10m
Type of Core Sampler	Towed sled
Length of towing	100m
Weather Conditions	Clear and calm
Comments	
Marine Pest Survey	
<ul style="list-style-type: none"> ▪ Shrimp ▪ 7 x snails ▪ Bivalves ▪ Leaf 	<ul style="list-style-type: none"> ▪ Seagrass and reed ▪ 1 x brittle star ▪ NO marine pests

