



MRL Ashburton Project

Sediment Sampling and Analysis Plan Implementation Report



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Version Register

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Rev A	DRAFT	C Del Deo E Riboni	T Hurley		
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Rev 2	Issue for use	C Del Deo E Riboni	D Gull	Update and finalise	S Morillo

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Changes to this Revision

Changes beyond amendment of typographical and formatting errors, or adjustment of text for clarity are included in Table 1.

Table 1: Change Register

Section	Revision	Change
	Rev 0	[First submission, no changes]
All	Rev 1	Throughout reorganisation of report

Abbreviations and Acronyms

Abbreviation / Acronym	Expanded text
°C	Degrees Celsius
AASS	Actual Acid Sulfate Soils
ADAS	Australian Diver Accreditation Scheme
AIP	Ashburton Infrastructure Project
ANC	Acid Neutralising Capacity
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
BTEXN	benzene, toluene, ethylbenzene, xylenes and naphthalene
CaCO ₃	Calcium Carbonate
COC	Chain of Custody

Abbreviation / Acronym	Expanded text
COPC	Contaminant of Potential Concern
DAWE	Department of Agriculture Water and Environment
DBT	Dibutyl tin
DDMP	Dredging and Disposal Management Plan
DE	Development Envelope
DEC	Department of Environment and Conservation
EIA	Environmental Impact Assessment
EP	Environmental Protection
EPP	Eastern Planning Precinct
LAT	Lowest Astronomical Tide
LoR	Limit of Reporting
MBT	Monobutyl Tin
MOF	Materials Offloading Facility
MRL	Mineral Resources Limited
MS	Ministerial Statement
NAGD	National Assessment Guidelines for Dredging 2009
NATA	National Association of Testing Authorities
OGV	Ocean Going Vessel
QA/QC	Quality Assurance/Quality Control
PAH	Polycyclic Aromatic Hydrocarbon
PASS	Potential Acid Sulfate Soils
PC	Push-corer
pH _F	Screening Acidity
pH _{FOX}	Oxidised Screening Acidity
PPA	Pilbara Port Authority
PQL	Practical Quantitation Level
PSD	Particle size distribution
Project	MRL's Ashburton Project
RPD	Relative Percent Difference

Abbreviation / Acronym	Expanded text
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
TAA	Titratable Actual Acidity
TBT	tributyl tin
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbon
TSVs	Transshipment Vessels
TTA	Total Titratable Acid
UCL	Upper Confidence Limit
VC	Vibrocorer

Executive Summary

MRL is proposing to develop the Ashburton Project (the Project) located within the Port of Ashburton in the Pilbara region. The Project involves the construction of a dedicated wharf facility immediately east of the existing Materials Offloading Facility (MOF) for loading iron ore onto transshipment vessels (TSVs) which ship the material to an offshore anchorage loading area. The iron ore will be transferred onto Cape Size vessels at the offshore anchorage site. Capital dredging of approximately 150,000 m³ will be required at the nearshore wharf site to a depth of -4 m LAT to allow safe access and berthing of TSVs. Dredge material is proposed to be disposed at the existing designated offshore disposal site C managed by Pilbara Port Authority (PPA) (Figure 1). Sediment sampling of the material to be dredged is required to ensure the potential impacts of dredged material loading and disposal are adequately assessed and managed responsibly and effectively.

Sediment sampling and analysis of the material to be dredged was undertaken following the Sediment Sampling and Analysis Plan (SAP) (O2 Marine 2021). **Note that until the SAP is approved by Department of Agriculture Water and Environment (DAWE), this report is submitted as a DRAFT.** Samples were collected using diver operated vibrocorer (VC) and hand push-corer (PC) equipment at nine (9) locations randomly distributed over the 30,000 m² dredge footprint. Refusal at <10cm was encountered at a 10th site but since it was not possible to retrieve sufficient sediment material for analysis, it is not included in this report. Samples collected using the VC equipment (two sites) encountered refusal at approximately 1 m depth, whereas refusal was encountered between 0.5 m and 1.0 m for samples collected using the at PC equipment (seven sites). Samples were analysed for particle size distribution, total organic carbon, metals, total petroleum hydrocarbon, polyaromatic hydrocarbon, organotins and acid sulfate soils by two National Association of Testing Authorities (NATA) accredited laboratories (ALS and ARL). The contaminant results were compared against recommended screening levels in the National Assessment Guidelines for Dredging (NAGD 2009) and ANZG (2018), while acid sulfate soils were compared against the action criteria in DER (2015).

The proposed dredge area was dominated by sand fraction (0.060 mm – 2 mm). Samples with the highest proportion of fines (clay/silt) were found closer to the MOF. Most samples reported analyte concentrations below the available ANZG (2018) guideline values and NAGD 2009 screening levels. All analytes exceeding recommended screening levels were consistent with values detected on previous sediment quality studies from this area, suggesting the background conditions are stable over time. Guideline values have not been set for aluminium or iron so these analytes were compared to the natural background concentrations reported for the Pilbara Coastal Sediments (DEC 2009). All hydrocarbons and organic compounds were below the laboratory Limit or Reporting (LoR).

The screening acid sulfate test did not detect the presence of Potential Acid Sulfate Soils (PASS), nonetheless the Chromium Suite analysis was undertaken on seven samples deemed to have a higher risk of PASS. Most of these samples exceeded the action criteria (0.03%S) for coarse texture sands to loamy sands and peats (DER 2015). However, the acid neutralising ability of the sediments (calculated using a fineness factor of 1.5) was found to be sufficient to buffer any acidity generated. This indicates that the likelihood of encountering PASS or Actual Acid Sulfate Soils (AASS) during dredging is low. However, given the requirements outlined in the DEC guideline (2009b), it is likely that an Acid Sulfate Soil Management Plan (ASSMP) will be required as part of the Dredging and Disposal Management Plan (DDMP).

Overall, the environmental risk associated to acids sulfate soil is considered to be negligible as the dredging material will be disposed at a subaqueous offshore disposal, however it is likely that as a management action of the ASSMP the sediment will be required to remain underwater and/or kept saturated during transport to the offshore disposal site.

Interlaboratory results for aluminium, arsenic, manganese and zinc exceeded the Relative Percent Difference (RPD) of 35%, indicating results presented in this report for these analytes should be used with caution. Interlaboratory results for other analytes returned low RPD hence values reported herein are deemed reliable.

Based on the laboratory results and their comparison to guidelines and background levels, it is concluded that the proposed dredge sediments are suitable for offshore disposal.

Table of Contents

1.	Introduction	11
	1.1. Purpose	14
	1.2. Objective	14
2.	Methods	15
	2.1. Sampling and Analysis Plan	15
	2.2. Field Sediment Sampling	15
	2.3. Analytes	20
3.	Results	21
	3.1. Particle size distribution	21
	3.2. Moisture Content and Total Organic Carbon	22
	3.3. Metals	23
	3.4. Hydrocarbons and TBT	26
	3.5. Acid Sulfate Soil	27
4.	Quality Assurance/Quality Control	31
	4.1. Metal QA/QC	32
	4.2. Total Recoverable Hydrocarbons (TRH) BTEX QA/QC	33
	4.3. Total Petroleum Hydrocarbons (TPH) QA/QC	35
	4.4. Poly Aromatic Hydrocarbon (PAH) QA/QC	36
	4.5. BTEX QA/QC	39
	4.6. Organic Compound QA/QC	A
5.	Conclusion	B
6.	Reference List	C

Figures

Figure 1. Project Area and main features	13
Figure 2 Proposed sediment sampling locations	15
Figure 3 Actual sediment sampling locations	18
Figure 4. Borehole undertaken by Chevron as part of the ASS investigation for the Wheatstone Project (Chevron 2009)	20
Figure 5 Particle Size Distribution (PSD) analysis results	21

Tables

Table 1: Change Register	iv
Table 2 Sample identification identifier and sample recovery depth (i.e. horizon)	19
Table 3 Moisture Content and TOC	22
Table 4 Total metal concentrations in sediments	24

Table 5 TRH and BTEXN laboratory results	26
Table 6 Texture base action criteria for ASS (Ahern <i>et al.</i> 1998, McDonald <i>et al.</i> 1990)	27
Table 7 Acid sulfate soils field screening results	29
Table 8. Chromium reducible sulfur suite results	30
Table 9 Metals QA/QC Results	32
Table 10 TRH and BETEX QA/QC Results	33
Table 11 PAH QA/QC results	36

Appendices

Appendix A	Samples Photos	D
Appendix B	Laboratory Results	E
Appendix C	Quality Control Report	F
Appendix D	Chain of Custody	G

1. Introduction

MRL is undertaking planning for iron ore mining and export developments in the West Pilbara region of WA. The proposed Ashburton Infrastructure Project (AIP) involves a fully sealed private road, commencing at the boundary of the approved Buckland mine (Bungaroo South mine) (MS906 and MS1147), about 45 km southwest of Pannawonica, and continuing for about 150 km westward to a new port landside handling and storage facilities at the Port of Ashburton (the Port). Export is proposed from port landside and marine export facilities within the Port, including a dedicated nearshore berth facility and offshore anchorages. The AIP will initially support the export of approximately 30 million tonnes of iron ore per annum (Mtpa) through the Port over a 10-year period as a Direct Shipping Ore (DSO), with future plans to support the export of 40 Mtpa over a 30 to 40-year period from approved future mine developments.

The AIP Port Marine elements will be located within the existing Port and includes three main Development Envelopes (DEs): Port Landside (Landside), Port Nearshore (Nearshore) and Port Offshore (Offshore) (Figure 1).

Landside DE: located within the Eastern Planning Precinct (EPP), of the PPA's landside planning area. No new disturbance is proposed within this DE.

Landside facilities include a storage of bulk handling of iron ore, a seawater desalination plant, power station bulk storage of fuel, administration building, a sewerage treatment facility and a seawater desalination plant at the Port.

Nearshore DE: The Marine Nearshore infrastructure, includes a dedicated berthing pocket, a modular jetty wharf and ship loader and will be constructed in Port Waters managed by the PPA east of the existing MOF. The modular wharf has been designed to be a fixed-point loading wharf, with roadway access and lifting areas for up to 130 t cranes. The jetty and wharf structure includes provision for seawater intake and outfall pipelines.

A temporary causeway (rock structure) is required for the construction of the approach jetty and will be removed once jetty construction has been completed. Construction from a temporary causeway versus overhand construction will reduce the number of piles required and also, also reducing the duration of proposed piling. This will reduce the impacts to sensitive marine fauna. Piling for the temporary causeway will involve the installation of twenty 1,000 mm drive piles.

The new berth and jetty will require a dredging programme and offshore disposal of dredge material at PPA's existing Spoil Ground C (see Figure 1). Capital dredging of approximately 150,000 m³ to modify the existing access channel for the MOF to allow safe access and berthing of TSVs at the nearshore wharf facility. Capital dredging will be undertaken to achieve a depth of -4 m lowest astronomical tide (LAT), with the proposed dredge footprint extending approximately 30,000 m². The location of the jetty has been selected to enable transshipment barges to sail into port under ballast draft (3.5 m maximum draft) without any tidal constraints and moor at the berth.

Offshore DE: Includes the offshore anchorage points for transfer of ore from TSVs to Cape size Ocean Going Vessels (OGV). The TSV navigation route traverses between the Offshore and Nearshore DEs.

This report focusses on the results from the sediment sampling related to the construction components of the Nearshore and Offshore DE shown in Figure 1:

- > capital dredging of a berth pocket and the construction of a dedicated wharf for loading of Transshipment Vessels (TSVs) located immediately east of the existing Port of Ashburton Materials Offloading Facility (MOF),
- > marine disposal locations for dredge material removed from the berthing pocket
- > the transshipment area in ~30-50 m water depth approximately 10 km to the west/north-west of Thevenard Island for anchorage of Cape Size vessels.

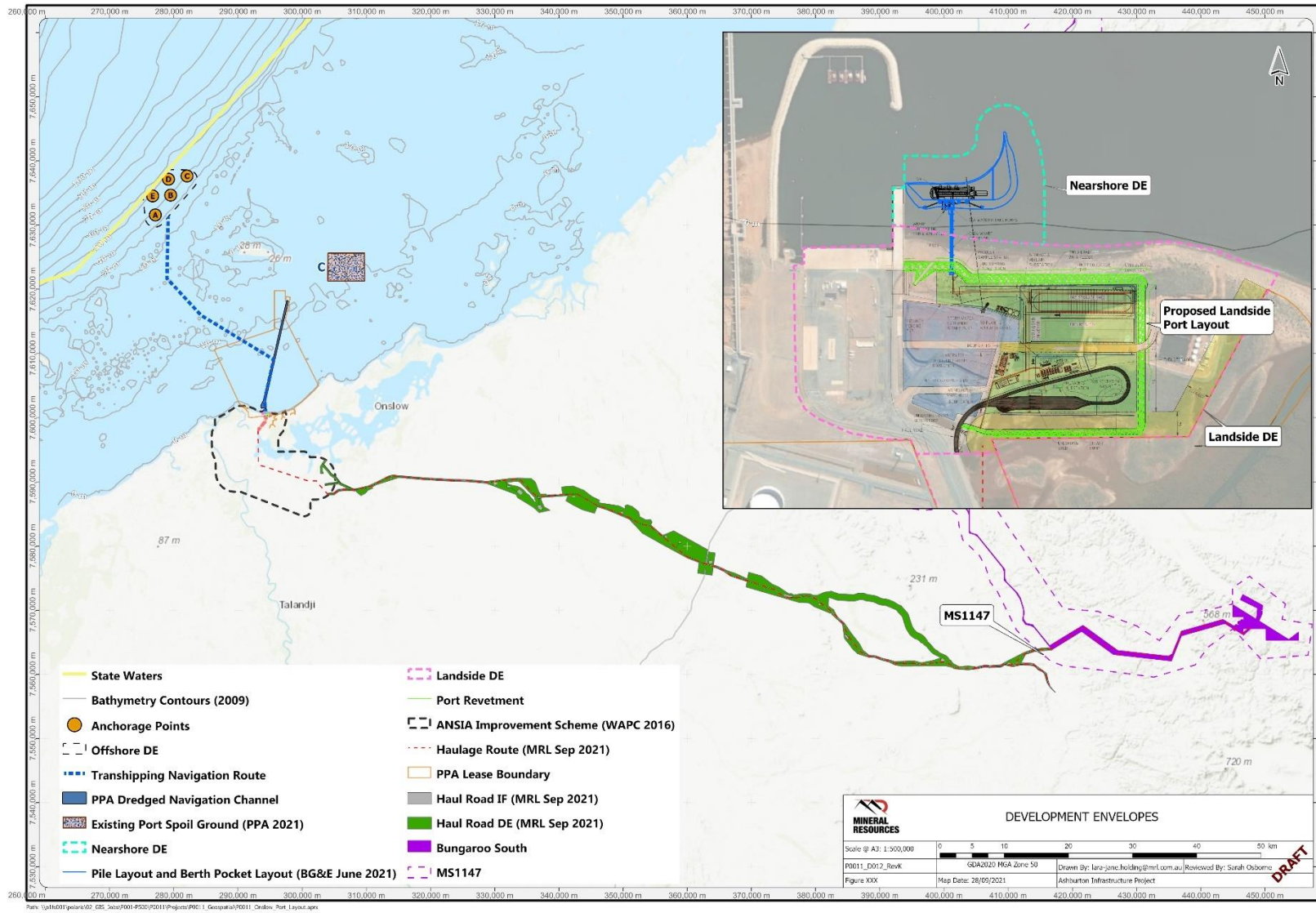


Figure 1. Project Area and main features

1.1. Purpose

The primary purpose of this sediment quality investigation is to inform the Environmental Impact Assessment (EIA) for the project and assess suitability of sediment material for disposal.

The secondary purpose is to support application for a sea dumping permit to be submitted to the DAWE, if required in the future.

1.2. Objective

In accordance with the Sediment SAP¹ (O2Marine 2021), an investigation of the level of contamination and potential acid sulfate soils (PASS) in the proposed dredge sediments is required to ensure potential impacts of dredged material loading and disposal are adequately assessed and managed responsibly and effectively.

The regulatory framework for assessment of sediments to be dredged and proposed for ocean disposal is outlined in NAGD (2009), methodology for assessment of PASS is outlined in the Identification and Investigation of Acid Sulfate Soil and Acidic Landscape DEC (2015). The findings of this investigation will support preparation of an EIA and regulatory environmental approvals for the AIP.

Specific objectives of the sediment sampling program are:

- > Implement a sediment investigation of the proposed dredge footprint in accordance with the SAP (O2M, 2021)
- > Describe any variation in methods implemented from that described in the SAP (O2M, 2021)
- > Identify the risk to marine environmental quality resulting from disturbance and mobilisation of the sediments, and
- > Determine the suitability of the dredged sediment for disposal.

¹ *The SAP has currently not been submitted to DAWE for approval as part of sea dumping permit application. Additional analysis/studies may be required to fulfill a sea dumping permit application.*

2. Methods

2.1. Sampling and Analysis Plan

The sediment sampling field investigation was implemented in accordance with the SAP (O2M, 2021). Sediment samples were planned to be collected from nine (9) randomly positioned sampling locations within the proposed dredge footprint in accordance with the sampling design described in the SAP (Figure 2).

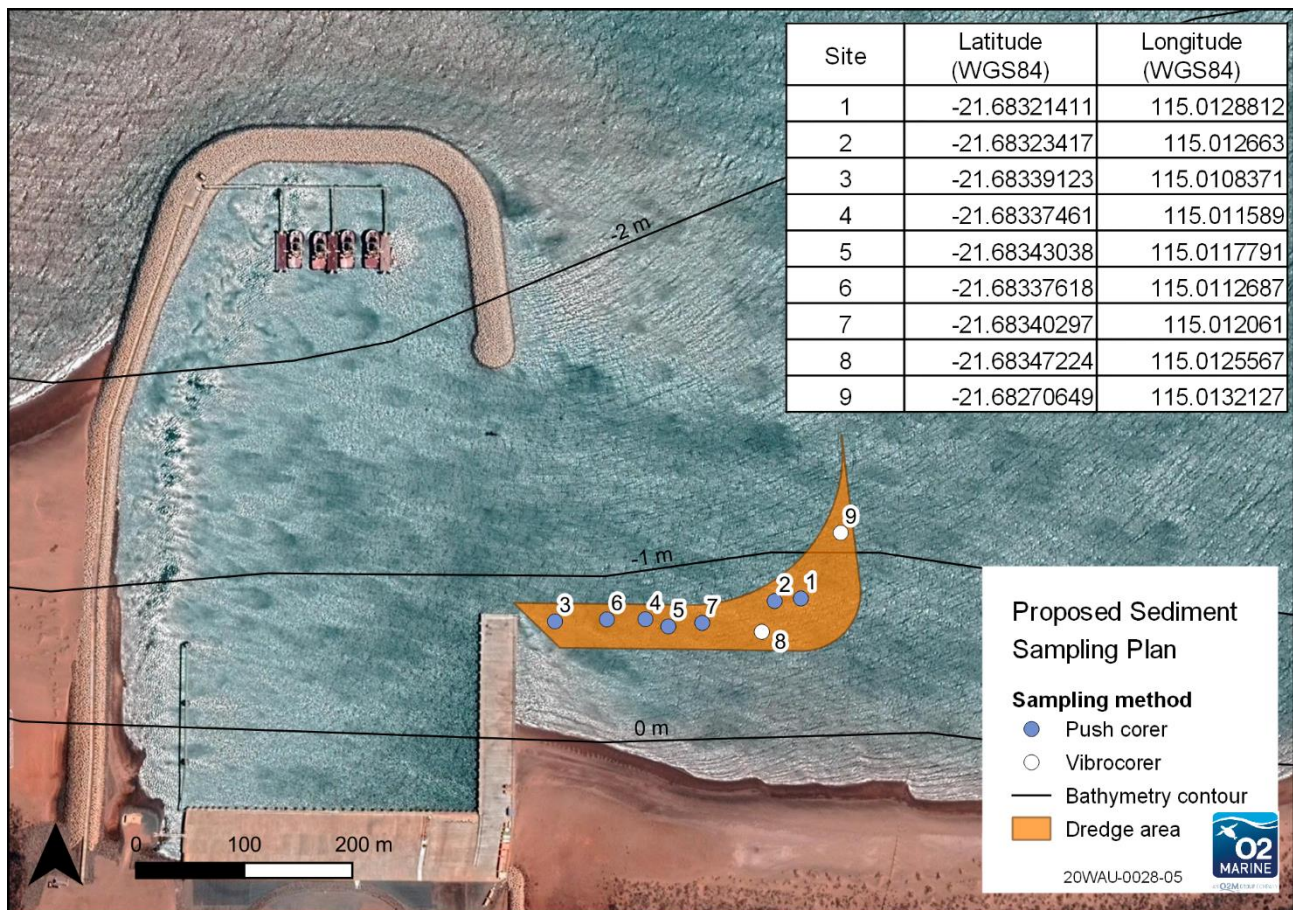


Figure 2 Proposed sediment sampling locations

2.2. Field Sediment Sampling

Sediment sampling was undertaken using O2 Marine's survey vessel between 27 and 29 February 2021. Diving activities were undertaken in accordance with Australian Standards 2299.1:2015, using Australian Diver Accreditation Scheme (ADAS) part 1 commercial certified divers and dive supervisor. Samples were collected at the nine (9) locations using equipment comprising of a diver operated vibrocorer (VC) at two (2) sites, and push-corer (PC) at seven (7) sites. Following recovery of the sediment core to the vessel, cores longer than 0.5 m were sub-sampled into 0.5 m sediment horizons and homogenised (except for volatile and ASS samples which were collected prior to homogenisation). Extracted samples were placed into labelled laboratory supplied containers.

The samples were labelled using the following naming convention:

- For samples collected using VC, the identifier '0 m - 0.5 m' and '0.5 m -1 m' were adopted, depending on the corresponding depth horizons.
- For samples collected using PC, the identifier 'TOP' (for top) or 'BOT' (for bottom) were adopted.
- The identifier 'SPLIT' refers to split samples – both samples sent to same laboratory to test for variability in the laboratory's methodology.
- The identifier 'DUP' refers to duplicate samples – samples sent to different laboratories to test for variability between both laboratory's methods. The identifier 'TRIP' refers to triplicate samples collected from the same location and sent to the same laboratory to assess variability of the field sampling technique.

The sample ID, site number, collection method, horizon, and sampling outcome are presented in Table 2. Sample photographs are presented in Appendix A and the laboratory results are included in Appendix B.

Storage and handling of field samples followed the NAGD (2009). Collected samples were stored in refrigerated containers and kept in ice during transport at a temperature of $\sim 4^{\circ}\text{C}$. Chain of Custody (COC) forms were completed at the end of each field day and always kept with the samples until delivered to the NATA laboratories (Appendix D).

A total of 16 samples were collected during the field survey, including samples collected for quality assurance and control. Sampling site coordinates were determined using a hand-held GPS with a horizontal accuracy of ± 5 m in WGS84 datum.

2.2.1. Field Quality Assurance/Quality Control (QA/QC) Procedure

The following field QA/QC samples were collected and analysed:

- > One (1) field triplicates (three separate samples taken at the same location) to determine sampling and small-scale variability of the physical and chemical characteristics of the sediment (identified as TRIP – collected at Sites 1 and labelled as MR01-TOP, MR-TRIP01 and MR-TRIP02);
- > One (1) field duplicate (one sample thoroughly mixed then split into two sub-samples) to test intra-laboratory variation (identified as DUP – collected at Site 6 and labelled as MR06-TOP and MR-DUP);
- > One (1) field split (samples thoroughly mixed then split into two sub-samples with one of the samples sent to a secondary laboratory) to assess inter laboratory variation (identified as SPLIT – collected at Site 2 and labelled as MR02_BOT and MR-SPLIT);
- > One (1) trip blank filled with inert chromatographic sand;
- > Two (2) field blanks filled with inert chromatographic sand;
- > Three (3) rinsate blanks filled with deionised water;
- > 20 L of marine water was also gathered for use in elutriate analysis, if required.

2.2.2. Modifications from the SAP

The following modifications to the sampling design described in the SAP were required during implementation of the sediment sampling survey:

- > Relocation of four (4) sites (1, 2, 5, and 6);
- > Both samples collected using the VC equipment encountered refusal before reaching the full depth of proposed dredging; and
- > Five (5) of seven (7) samples collected using PC equipment encountered refusal before collecting a bottom horizon sample (i.e. < 0.5 m).

Relocation of Sites

Due to the proximity to the existing MOF channel and restricted site access, four (4) sites were relocated approximately 30 m - 50 m away from their planned locations: sites 1, 2, 5 and 6. The modified locations are shown, and coordinates presented, in Figure 3.

Refusal of VC Sample Locations

The VC equipment was proposed to attempt coring to the full depth of proposed dredging (-4 m LAT) at two (2) locations within the dredge footprint to characterise the underlying sediments; particularly for detecting acid sulfate soils through the sediment column. Due to seabed conditions the maximum penetration achieved with the VC equipment was 1.2 m, however due to core loss a maximum of 1 m sample (core) was collected. Refusal was experienced on what appeared to be a well cemented layer of claystone gravel. This observation was consistent with the information provided from one (1) of the two (2) boreholes (i.e. MC0009) collected in close proximity of the proposed dredging area as part of the Wheatstone Nearshore Acid Sulfate Soil Investigation (Chevron 2010) reporting a similar geological layer at 1 m below seabed (Figure 4).

Refusal of PC Sample Locations

Samples collected using the PC equipment were intended to collect a core of two horizons. Due to seabed conditions the maximum penetration achieved with the PC equipment at five sites was 0.5 m, refusal was experienced on gravel and well cemented claystone, a bottom horizon was sampled from two (2) of seven (7) locations where core penetration achieved approximately 1 m.

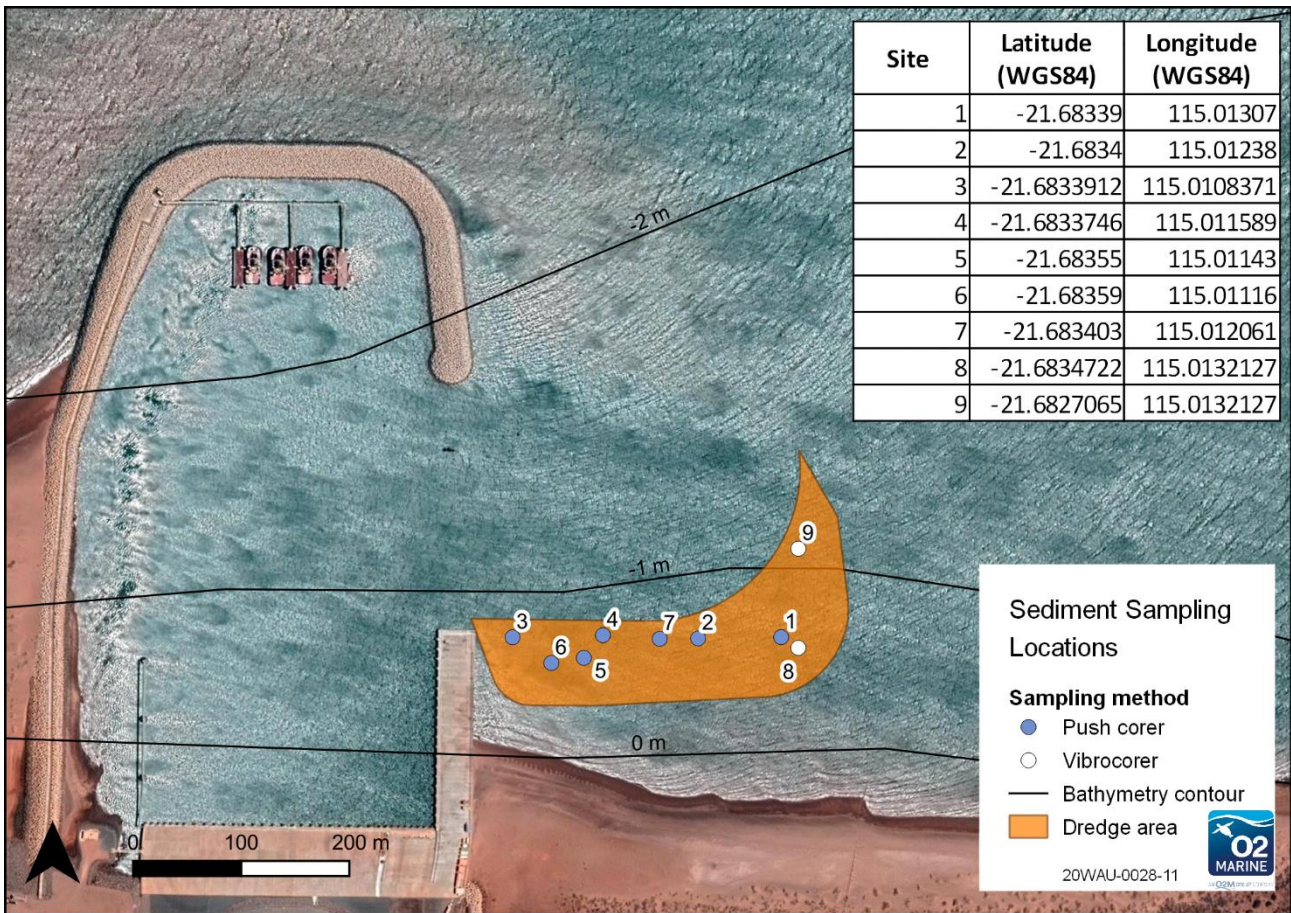


Figure 3 Actual sediment sampling locations

Table 2 Sample identification identifier and sample recovery depth (i.e. horizon)

Site	Method	Sample ID	Horizon	Sampling outcome (✓ indicates 'collected')
1	PC	MR-01-TOP	0 m-0.5 m	✓
		MR-TRIP-01	0 m-0.5 m	✓
		MR-TRIP-02	0 m-0.5 m	✓
		MR01-BOT	0.5 m-1 m	Refusal
2	PC	MR02-TOP	0 m-0.5 m	✓
		MR02-SPLIT	0.5 m-1 m	✓
		MR02-BOT	0.5 m-1 m	✓
3	PC	MR03-TOP	0 m-0.5 m	✓
		MR03-BOT	0.5 m-1 m	Refusal
4	VC	MR04-TOP	0 m-0.5 m	✓
		MR04-0.5 m-1 m	0.5 m-1 m	✓
5	PC	MR05-TOP	0 m-0.5 m	✓
		MR05-BOT	0.5 m-1 m	Refusal
6	PC	MR06 TOP	0 m-0.5 m	✓
		MR-DUP	0 m-0.5 m	✓
		MR06-BOT	0.5 m-1 m	Refusal
7	PC	MR-07-TOP	0 m-0.5 m	✓
		MR-07-BOT	0.5 m-1 m	✓
8	VC	MR-08 0 m-0.5 m	0 m-0.5 m	✓
		MR08 0.5 m-1 m	0.5 m-1 m	✓
9	PC	MR09-TOP	0 m-0.5 m	✓
		MR09-BOT	0.5 m-1 m	Refusal

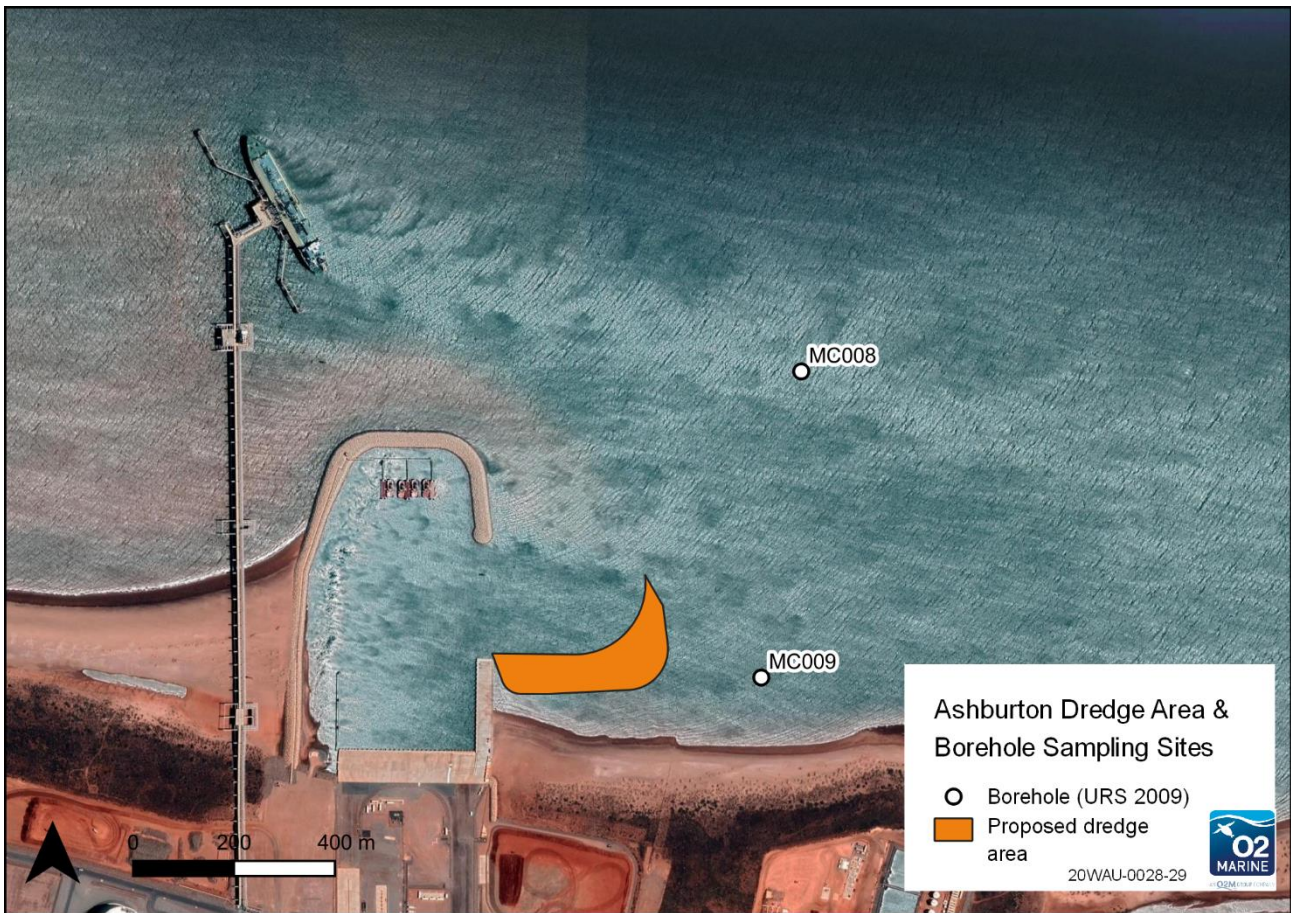


Figure 4. Borehole undertaken by Chevron as part of the ASS investigation for the Wheatstone Project (Chevron 2009)

2.3. Analytes

In accordance with the SAP and in line with historical contaminants of potential concern (COPC) identified in previous studies in the area, the following analytes were tested at the designated NATA accredited laboratories:

- Particle size distribution (PSD)
- Moisture content and total organic carbon (TOC)
- Metals (aluminium, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, zinc)
- Hydrocarbons, including total petroleum hydrocarbons (TPH), total recoverable hydrocarbon (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) and polycyclic aromatic hydrocarbon (PAH)
- Organotins: tributyl tin (TBT), dibutyl tin (DBT) and monobutyl tin (MBT)
- ASS: including both the screening test and chromium suite analysis

3. Results

3.1. Particle size distribution

Sand size fractions dominate sediment samples collected at site 1,4,8, and 9, while highest contents of clay and silt size fraction was shown at site 2, 3, 5, 6, and 7 (Figure 5). The proportion of sand seemed to increase with distance from the MOF and channel (Ref to Figure 3), except for site 4. PSD laboratory results are provided in Appendix B.

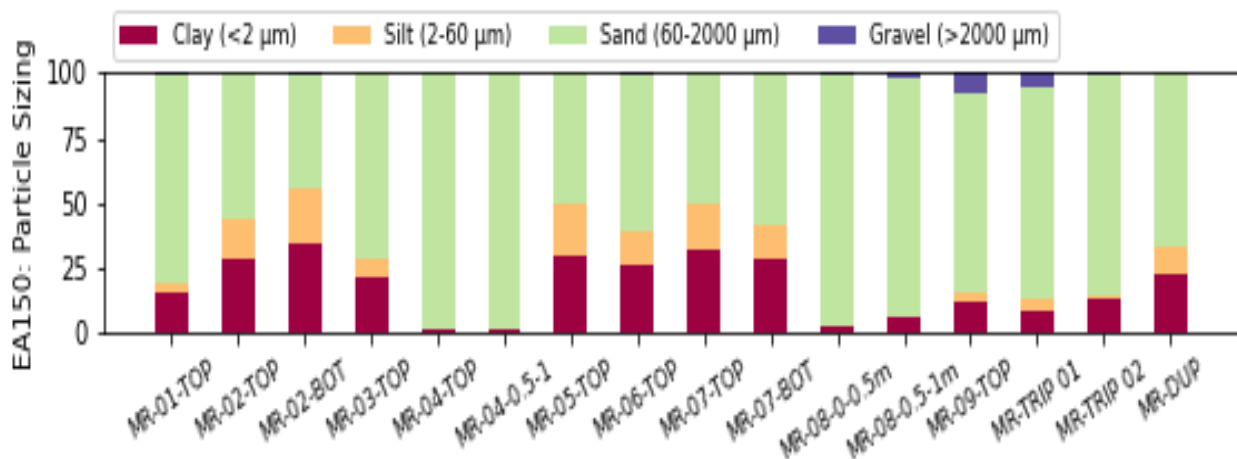


Figure 5 Particle Size Distribution (PSD) analysis results

3.2. Moisture Content and Total Organic Carbon

The moisture content of the samples ranged from 17.2% (MR-TRIP 01) up to 46.8% (MR-02-BOT) shown in Table 3. The TOC ranged from <0.02% (i.e. LoR) which was observed at several sites up to 0.49% (MR-02-TOP). Higher levels of total organic carbon were typically found in the top layer of the core.

Table 3 Moisture Content and TOC

Sample ID	Moisture Content (%)	Total Organic Carbon (%)
MR-01-TOP	22.6	0.14
MR-02-TOP	33.7	0.49
MR-02-BOT	46.8	0.14
MR-03-TOP	22.0	0.07
MR-04-TOP	20.0	<0.02
MR-04-0.5-1	18.9	<0.02
MR-05-TOP	42.8	0.30
MR-06-TOP	33.5	0.29
MR-07-TOP	38.6	0.26
MR-07-BOT	29.3	0.09
MR-08-0-0.5m	18.6	0.07
MR-08-0.5-1m	18.9	0.07
MR-09-TOP	17.7	0.07
MR-TRIP 01	17.2	0.02
MR-TRIP 02	24.9	<0.02
MR-DUP	41.1	0.24

3.3. Metals

With the exception for nickel, all metal concentrations were below NAGD (2009) screening levels (Table 4).

Nickel values were found to slightly exceeded the NAGD Screening Levels at two locations (MR05 and MR07) only for the superficial (i.e. TOP) sample. The 95% Upper Confidence Limit (UCL) for nickel was calculated for all sites and was below the ISQG. This result is consistent with previous sediment quality investigations conducted in this area (MScience 2020, Chevron, 2010) which showed low bioavailability of nickel (MScience 2020 and Chevron 2010). Further to this, the values reported were consistent with the background quality of marine sediment conducted by Department of Environment and Conservation (DEC) conducted in Ashburton (DEC, 2006) which found natural background results for Nickel of 42mg/kg attributed to high composition of fine sediments.

The sediment quality investigation conducted by Chevron for the deployment of the Wheatstone Project in proximity of the proposed dredging concluded that the exceedance of NAGD Screening Levels is unlikely to be related to anthropogenic contribution. During this study the 95% UCL Screening Levels for deep cores was found to only slightly exceed the NAGD Screening Levels (i.e. 23.4mg/Kg vs 21 mg/Kg) and for short superficial cores nickel value of 14.4mg/Kg suggest that all of the nickel in this area is of natural source.

Relatively high values of aluminium (site MR02-BOT, MR05-TOP and MR07-TOP) and iron (sites MR05-TOP, MR06-TOP, MR07-TOP and MR08-0.5-1m) were also observed. However, these levels are consistent with the results of the Background Quality of Marine Sediment study conducted by DEC (2006) and SAP investigations conducted for the Port of Ashburton (Advisian 2019; MScience 2017; MScience 2018). Therefore, the concentrations should be treated as representative of ambient natural conditions. Moreover, should be noted that Aluminium and Iron are not toxic contaminants for the purpose of the NAGD.

High concentration of Manganese (MR02-TOP, MR02-BOT, MR05-TOP, MR06-TOP and MR07-TOP) were also observed. This was consistent with previous sediment quality investigations conducted in this area (Chevron 2010, MScience 2020). Moreover, manganese is not listed in the NAGD as having a specific screening guideline. The NAGD (Commonwealth of Australia 2009) does not specifically list manganese as a COPC, citing a practical quantitation limit (PQL) but not a fixed screening level, and there is no stated target for manganese and cobalt concentrations for marine waters in the national water quality management strategy (ANZG 2018).

Table 4 Total metal concentrations in sediments

Samples	Aluminium	Iron	Antimony	Arsenic	Cadmium	Copper	Cobalt	Lead	Manganese	Nickel	Silver	Zinc	Mercury
Unit	mg/kg	mg/kg	mg/k g	mg/k g	mg/k g	mg/k g	mg/kg	mg/k g	mg/k g	mg/k g	mg/k g	mg/k g	mg/k g
ISQG-low	6300¹	16200	2	20	2.5	65	N/A	50	N/A	21	2	200	0.15
NAGD PQL	200	100	0.5	1	0.2	1	0.5	1	10	1	0.1	1	0.01
MR-01-TOP	6390	37700	<0.50	13.6	<0.1	13.6	11.0	6.4	417	16.8	<0.1	29.7	<0.01
MR-02-TOP	5370	23700	<0.50	9.01	<0.1	12.5	8.3	6.0	530	11.4	<0.1	22.0	<0.01
MR-02-BOT	8660	38400	<0.50	10.6	<0.1	23.0	12.5	10.2	619	19.8	<0.1	33.5	0.01
MR-03-TOP	6220	37200	<0.50	8.58	<0.1	14.6	6.4	6.8	200	14.9	<0.1	23.4	<0.01
MR-04-TOP	3880	26000	<0.50	8.13	<0.1	8.0	6.5	3.7	265	11.8	<0.1	20.5	<0.01
MR-04-0.5-1	3340	21400	<0.50	6.83	<0.1	7.3	5.6	3.0	228	10.4	<0.1	18.8	<0.01
MR-05-TOP	11000	47900	<0.50	15.9	<0.1	24.6	13.8	9.6	527	23.7	<0.1	43.0	0.01
MR-06-TOP	7110	42300	<0.50	14.6	<0.1	14.5	11.2	7.0	480	17.5	<0.1	33.7	<0.01
MR-07-TOP	10500	44000	<0.50	16.4	<0.1	23.0	13.5	9.4	650	21.9	<0.1	40.4	0.01
MR-07-BOT	3360	16700	<0.50	4.46	<0.1	9.4	5.0	4.8	202	7.6	<0.1	12.4	<0.01

Samples	Aluminium	Iron	Antimony	Arsenic	Cadmium	Copper	Cobalt	Lead	Manganese	Nickel	Silver	Zinc	Mercury
MR-08-0-0.5m	4150	32200	<0.50	12.7	<0.1	8.2	8.8	4.7	334	12.5	<0.1	22.8	<0.01
MR-08-0.5-1m	5140	40900	<0.50	13.8	<0.1	10.8	10.7	6.8	340	14.2	<0.1	26.3	<0.01
MR-09-TOP	5030	34700	<0.50	11.5	<0.1	10.4	9.1	5.9	333	12.3	<0.1	20.6	<0.01
MR-TRIP 01	7100	38600	<0.50	11.3	<0.1	16.7	10.0	6.7	333	17.8	<0.1	29.1	<0.01
MR-TRIP 02	5610	34900	<0.50	12.5	<0.1	12.4	9.6	6.0	364	15.0	<0.1	26.0	<0.01
MR-DUP	7520	46800	<0.50	14.7	<0.1	16.3	11.7	7.9	502	19.1	<0.1	34.9	<0.01
Mean	6273.75	35212.5	0.5	11	0.1	14	9.6	6.5	395	15.4	0.1	27.3	0.01
95% UCL	7506.427	40071.312	0.5	13	0.1	17	11	7.6	471	17.8	0.1	31.7	0.01

3.4. Hydrocarbons and TBT

All samples were analysed for TRH and BTEXN (Table 5). All results were below the laboratories PQL with exception of hydrocarbon just above the LoR detected within the fraction C16-C34 at site MR-02-TOP. Hydrocarbons from TPH was below the laboratory LoR for all samples and below NAGD screening levels and PQL listed in the SAP, thereby meeting the data quality objective.

All samples were analysed for Polynuclear Aromatic Hydrocarbon (PAH) and were below the laboratory PQLs, and NAGD screening levels and met the data quality objectives.

Monobutylin, Dibutylin and Tributylin were analysed for all collected samples and concentrations were below the laboratories LoR and below the PQL. MBT values were below the guideline value (ANZG 2018)

Table 5 TRH and BTEXN laboratory results

Analytes	TRH C6 - C10 Fraction	TRH C6 - C10 Fraction minus BTEX (F1)	TRH >C10 - C16 Fraction	TRH >C16 - C34 Fraction	TRH >C34 - C40 Fraction	TRH >C10 - C16 Fraction minus Naophthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
PQL	3	3	3	3	5	3	0.2	0.2	0.2	0.2	0.2	0.5
ANZG (2018)	550	550	550	550	550	550	-	-	-	-	-	-
MR-01-TOP	<3	<3.0	<3	<3	<5	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
MR-02-TOP	<3	<3.0	<3	4	<5	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
MR-TRIP 02	<3	<3.0	<3	4	<5	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
MR-DUP	<3	<3.0	<3	<3	<5	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5

3.5. Acid Sulfate Soil

3.5.1. Assessment Guideline

ASS in sediment was assessed assuming a disturbance greater than 1000 t of sediment. The action criteria adopted are shown in Table 6.

Table 6 Texture base action criteria for ASS (Ahern *et al.* 1998, McDonald *et al.* 1990)

Material Type		Net Acidity Action Criteria			
		1-1000 t		>1000 t	
Texture range	Clay Content (%)	%S	Mole H+/t	%S	Mole H+/t
Coarse Texture (Sand to loamy sands)	<5%	0.03	18.7	0.03	18.7
Medium Texture (sandy loams to light clays)	5-40%	0.06	37.4	0.03	18.7
Fine Texture (medium to heavy clays and silty clays)	>40%	0.1	64.8	0.03	18.7

*NB: an * indicates that values has exceeded the action criteria*

3.5.2. Previous investigation

An extensive PASS investigation (Chevron 2010) was undertaken in proximity of the proposed dredging footprint as part of the Environmental Impact Assessment Study for the deployment of the Wheatstone project. The sampling campaign was undertaken in conjunction with the geotechnical investigation program and sediment was collected for analysis from 15 boreholes, with 74 samples collected at different depth horizons ranging from 2 m to 45 m below seabed level (BSBL). Samples were sent to the nominated NATA accredited laboratory for ASS testing which included Acid Sulfate Soils Screening test (based on pH_F and pH_{FOX} values and reaction ratings), the Chromium Suite (Scr) for Acid Sulfate Soils test (based on levels of Scr, pH_{KCL} , total titratable acid (TTA) and acid neutralising capacity (ANC)) and a targeted Carbonate Buffering assessment (URS, 2009b).

Two of the 15 boreholes sampled (MC009 and MC008) were in close proximity of the proposed MRL dredging footprint (i.e., 70 m East and 500 m Northeast) as shown in Figure 4. Screening Results on the sediment collected at the inshore area (i.e., turning basin) in proximity of the currently proposed MRL dredging area indicate pH ranging from 7.2 to 8.5 for clay sandy gravel and strong reaction was observed in sandy clay sediment. Chromium Suite results for these samples showed presence of Alkaline sediment with pH_{KCl} ranging from 8.6 to 9.5. All titratable actual alkalinity (TAA) concentrations were below the laboratory LoR for existing acidity (Sulfur). Calculated net acidity concentration in

exceedance of action criteria 0.03 % S ranged between 0.03 % S and 0.04 % S. The ANC of sediment ranged between 0.65% kg CaCO₃/t and 52% Kg CaCO₃/t, indicating a potential for significant buffering of low pH sediment. Four sample locations showed elevated acid levels, slightly above the action criteria triggers.

This investigation concluded that risks associated to ASS in this area was negligible given that acid production of the dredged material is considered low while sediments would be kept saturated, remained underwater and released in a subaqueous disposal.

3.5.3. Field Screening Test

A data summary is provided in Table 7. The screening acidity (pH_F) of the samples ranged from 7.5 to 8.1, which are typical of marine sediments and did not indicate the presence of any Actual Acid Sulfate Soils (AASS). The oxidised screening test (pH_{FOX}) ranged from 5.9 to 8 (Table 7). The maximum change between pH_F and pH_{FOX} was 1.8 at the site MR-04-0.5-1.

Several samples showed an 'extreme' reaction to oxidation with 30% peroxide. The rate of reaction is often more vigorous due to the presence of organics, some metalloid compounds and other oxides which may be unrelated to presence of PASS. On its own the screening test cannot definitively indicate PASS (DER, 2014), therefore chromium reducible sulfur tests were undertaken for these sites to assess the potential for PASS (Table 8).

Table 7 Acid sulfate soils field screening results

ASS					
Samples	pH _f	pH _{fox}	ΔpH	Reaction Rate	PASS
Unit	pH Unit	pH Unit	pH Unit	pH Unit	
PQL					
MR-01-TOP	7.6	7.4	0.2	Extreme	U ²
MR-02-TOP	7.7	7.3	0.4	Extreme	U
MR-02-BOT	7.5	7.6	0.1	Extreme	U
MR-03-TOP	7.8	7.4	0.4	Extreme	U
MR-04-TOP	8	7.1	0.9	Strong	U
MR-04-0.5-1	7.7	5.9	1.8	Strong	U
MR-05-TOP	7.6	7.1	0.5	Extreme	U
MR-06-TOP	7.8	7.4	0.4	Extreme	U
MR-07-TOP	7.8	7.4	0.4	Extreme	U
MR-07-BOT	7.8	7.5	0.3	Strong	U
MR-08-0-0.5m	7.9	7.8	0.1	Strong	U
MR-08-0.5-1m	8	7.2	0.8	Strong	U
MR-09-TOP	8.1	7.3	0.8	Strong	U
MR-TRIP 01	8.1	8	0.1	Strong	U
MR-TRIP 02	8	7.6	0.4	Strong	U
MR-DUP	7.7	7.6	0.1	Strong	U
Mean	7.81875	7.35			
95% UCL	7.916462	7.5922425			

² Undetected

3.5.4. Chromium Reducible Sulfur Suite

A data summary is provided in Table 8 while complete analytical tests are provided in Appendix B. Chromium suite analysis was undertaken on seven samples considered to have a higher risk of PASS. Most of the samples exceed the action criteria (0.03%S) for coarse texture sands to loamy sands and peats (DER 2015). However, the acid neutralising ability of these sediments (calculated using a conservative fineness factor of 1.5) was found to be sufficient to buffer any acidity generated (Table 8). These results are consistent with previous study conducted in this area by Chevron as part of the Wheatstone project and briefly described in section 3.5.2 above.

Table 8. Chromium reducible sulfur suite results

Chromium reducible sulfur suite results								
Samples	pHKCl (23A)	TAA (mol H+/t)	Chromium Reducible Sulfur (%S)	Chromium Reducible Sulfur (mole H+/t)	Acid Neutralising Capacity (% CaCO ₃)	Acid Neutralising Capacity (mole H+/t)	ANC Fitness Factor	Net Acidity (mole H+/t)
Action Criteria	<6.5		0.03	18			1.5	18
MR-01-TOP	9.4	<2	0.036	23	7.81	1560	1.5	<10
MR-02-TOP	9.1	<2	0.056	35	11.8	2360	1.5	<10
MR-03-TOP	9.2	<2	0.024	15	3.02	604	1.5	<10
MR-05-TOP	9.1	<2	0.037	23	6.60	1320	1.5	<10
MR-06-TOP	9.3	<2	0.022	13	5.96	1190	1.5	<10
MR-07-TOP	9.2	<2	0.036	22	8.82	1760	1.5	<10
MR-07-BOT	9.2	<2	0.047	29	5.60	1120	1.5	<10

4. Quality Assurance/Quality Control

The field sampling methods and small-scale sediment variability were found to be reliable with all relative standard deviation (RSD) values below 50% as recommended in NAGD (2009) (Table 9 and Appendix F). When laboratory results were below the LoR the RSD was calculated by using half LoR value. However, when the LoR between different laboratories was significantly different (due to analytical method applied), the RSD between primary and secondary laboratory was not calculated and N/A was used in the table of results.

Intra-laboratory quality assurance was undertaken using duplicate samples and aluminium, arsenic, manganese and zinc were found to exceed the recommended RPD of 35% (Table 9).

4.1. Metal QA/QC

Table 9 Metals QA/QC Results

Samples	Aluminium	Iron	Antimony	Arsenic	Cadmium	Copper	Cobalt	Lead	Manganese	Nickel	Silver	Zinc	Mercury
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PQL	200	100	0.5	1	0.2	1	N/A	1	N/A	1	0.1	1	0.01
MR-01-TOP	6390	37700	0.25	13.6	0.05	13.6	11	6.4	417	16.8	0.05	29.7	0.005
MR-TRIP-01	7100	38600	0.25	11.3	0.05	16.7	10	6.7	333	17.8	0.05	29.1	0.005
MR-TRIP-02	5610	34900	0.25	12.5	0.05	12.4	9.6	6	364	15	0.05	26	0.005
RSD (%)	12	5.2	0	9.2	0	15.5	7	5.5	11.4	8.6	0	7	0
MR02-BOT (lab1)	8660	38400	0.25	10.6	0.05	23	12.5	10.2	619	19.8	0.05	33.5	0.01
MR02-SPLIT (lab2)	14000	57000	2	17	0.05	31	14	8	490	31	1	51	0.03
RDP (%)	47	39	N/A	46	0	30	11	24	23	44	N/A	41	N/A
MR06 TOP	7110	42300	<0.50	14.6	0.05	14.5	11.2	7	480	17.5	0.05	33.7	0.005

Samples	Aluminium	Iron	Antimony	Arsenic	Cadmium	Copper	Cobalt	Lead	Manganese	Nickel	Silver	Zinc	Mercury
MR-DUP	7520	46800	<0.50	14.7	0.05	16.3	11.7	7.9	502	19.1	0.05	34.9	0.005
RPD (%)	5.6	10.1	N/A	0.7	0.0	11.7	4.4	12.1	4.5	8.7	0.0	3.5	0.0

4.2. Total Recoverable Hydrocarbons (TRH) BTEX QA/QC

All TRH and BTEXN results including results from secondary laboratory where below the LoR. Therefore, RPD and RSD value where not calculated as considered to be erroneous (Table 10).

Table 10 TRH and BTEX QA/QC Results

TRH and BTEXN concentrations	
Analytes	TRH C6 - C10 Fraction
	TRH C6 - C10 Fraction minus BTEX (F1)
	TRH >C10 - C16 Fraction
	TRH >C16 - C34 Fraction
	TRH >C34 - C40 Fraction
	TRH >C10 - C40 Fraction (sum)
	TRH >C10 - C16 Fraction minus Naphthalene (F2)
	Benzene
	Toluene
	Ethylbenzene
	meta- & para-Xylene
	ortho-Xylene
	Total Xylenes
	Sum of BTEX
	Naphthalene

TRH and BTEXN concentrations																
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
MR-01-TOP	<3	<3.0	<3	<3	<5	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
MR-TRIP 01	<3	<3.0	<3	<3	<5	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
MR-TRIP 02	<3	<3.0	<3	4	<5	4	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
RSD (%)	N/A	N/A	N/A	20.6	N/A	20.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MR-DUP	<3	<3.0	<3	<3	<5	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
MR-06-TOP	<3	<3.0	<3	<3	<5	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
RDP (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MR-02-BOT (lab1)	<3	<3.0	<3	<3	<5	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
MR-02-Split (lab2)	<2	<2	<2	<2	<5	<5	<2	<0.1	<0.1	<0.1	<0.2	<0.5	<0.1	<0.2	<0.2	
RDP (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4.3. Total Petroleum Hydrocarbons (TPH) QA/QC

All Total petroleum Hydrocarbon (TPH) results were below laboratory LoR. Therefore, RPD and RSD value were not calculated as considered to be erroneous.

4.4. Poly Aromatic Hydrocarbon (PAH) QA/QC

All Poly Aromatic Hydrocarbons samples were found to agree within an RSD of 50% with exception of MR06 and MR06 DUP for Naphthalene only where RSD was 67% (above recommended 50%). However, both values were below NAGD screening levels (Table 11).

Table 11 PAH QA/QC results

Samples	Naphthalene 91-20-3	2-Methylnaphthalene 91-57-6	Acenaphthylene 208-96-8	Acenaphthene 83-32-9	Fluorene 86-73-7	Phenanthrene 85-01-8	Anthracene 120-12-7	Fluoranthene 206-44-0	Pyrene 129-00-0	Benz(a)anthracene 56-55-3	Chrysene 218-01-9	Benzo(b+j)fluoranthene 205-99-2 205-82-3	Benzo(k)fluoranthene 207-08-9	Benzo(e)pyrene 192-97-2	Benzo(a)pyrene 50-32-8	Perylene 198-55-0	Benzo(g,h,i)perylene 191-24-2	Dibenz(a,h)anthracene 53-70-3	Indeno(1.2.3.cd)pyrene 193-39-5	Coronene 191-07-1	Sum of PAHs	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
Units	µg/kg	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
PQL	1000	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MR-01-TOP	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	4	2	5	10
MR-TRIP-01	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	4	2	5	10

Samples	Naphthalene 91-20-3	2-Methylnaphthalene 91-57-6	Acenaphthylene 208-96-8	Acenaphthene 83-32-9	Fluorene 86-73-7	Phenanthrene 85-01-8	Anthracene 120-12-7	Fluoranthene 206-44-0	Pyrene 129-00-0	Benz(a)anthracene 56-55-3	Chrysene 218-01-9	Benzo(b+j)fluoranthene 205-99-2 205-82-3	Benzo(k)fluoranthene 207-08-9	Benzo(e)pyrene 192-97-2	Benzo(a)pyrene 50-32-8	Perylene 198-55-0	Benzo(g,h,i)perylene 191-24-2	Dibenz(a,h)anthracene 53-70-3	Indeno(1.2.3.cd)pyrene 193-39-5	Coronene 191-07-1	Sum of PAHs	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
MR-TRIP-02	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	4	2	5	10
RSD (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MR02-BOT	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	4	2	5	10
MR02-SPLIT	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	-	2	-	-
RSD (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	0	0	N/A	0	N/A	N/A
MR06 TOP	2.5	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	4	2	5	10
MR-DUP	7	2.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.5	7	2	5	10

Samples	RSD (%)
Naphthalene 91-20-3	67
2-Methylnaphthalene 91-57-6	0
Acenaphthylene 208-96-8	0
Acenaphthene 83-32-9	0
Fluorene 86-73-7	0
Phenanthrene 85-01-8	0
Anthracene 120-12-7	0
Fluoranthene 206-44-0	0
Pyrene 129-00-0	0
Benz(a)anthracene 56-55-3	0
Chrysene 218-01-9	0
Benzo(b+j)fluoranthene 205-99-2	0
Benzo(k)fluoranthene 207-08-9	0
Benzo(e)pyrene 192-97-2	0
Benzo(a)pyrene 50-32-8	0
Perylene 198-55-0	0
Benzo(g,h,i)perylene 191-24-2	0
Dibenz(a,h)anthracene 53-70-3	0
Indeno(1.2.3.cd)pyrene 193-39-5	0
Coronene 191-07-1	0
Sum of PAHs	38
Benzo(a)pyrene TEQ (zero)	0
Benzo(a)pyrene TEQ (half LOR)	0
Benzo(a)pyrene TEQ (LOR)	0

4.5. BTEX QA/QC

All results were below laboratory LoR, therefore RPD and RSD value were not calculated and reported as N/A as considered to be erroneous.

4.6. Organic Compound QA/QC

All Organic Compounds results were below laboratory LoR. Therefore, RPD and RSD value where not calculated as considered to be erroneous.

5. Conclusion

During this marine sediment quality investigation, a total of 16 samples were collected from 9 sampling locations randomly distributed across the proposed dredging footprint and analysed by the two nominated NATA accredited laboratories (i.e. ALS and ARL) for a range of metals, organic compounds TPH, TRH, TBT, PAH, BTEX and ASS.

UCL was calculated for all contaminants of concern and assessed against the relevant NAGD (2009) screening levels. All calculated UCL for metals were found below the screening levels with exception of Nickel. However, these levels were consistent with several investigations previously undertaken in this area including the background quality assessment of marine sediment conducted by the Department of Environment and Conservation (DEC) (2006). Therefore, these concentrations shall be considered natural and likely to be related to the geology of the region (DEC 2006).

All analysis for organic compounds, including TPH, and BTEX were below the laboratory LoR.

ASS investigation concluded that risks associated to the release of ASS from marine sediment in this area is negligible given that acid production is considered low while sediment is kept underwater or saturated during transport. Therefore, considered most likely suitable³ for offshore disposal.

The samples collected within the proposed dredging footprint are generally composed of uncontaminated sediment. The background sediment quality within the study area is representative of natural environmental conditions likely unimpacted by anthropogenic activities.

³ This SAP was not prepared for Sea Dumping Permit and additional investigation may required for this purpose

6. Reference List

Advisian (2019) Port of Ashburton Maintenance Dredging ASAP Implementation Report (Year 3 - 2019). Report for Pilbara Ports Authority

Ahern, C. R., Ahern M. R., and Powell, B., 1998, Guidelines for sampling and analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998: QASSIT, Department of Natural Resources, Resource Sciences Centre, Indooroopilly, Qld

ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory Governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

Chevron (2010). Wheatstone Project Draft Environmental Impact Statement/Environmental Review and Management Programme, Technical Appendix Q5 Sediment Quality Assessment Wheatstone Dredging Program, Western Australia.

DEC (2006) Background quality of the marine sediments of the Pilbara coast. Department of Environment and Conservation, Marine Technical Report Series, No. MTR 1.

DER (2015). Identification and investigation of acid sulfate soils and acidic landscapes. Department of Environmental Regulation, Government of Western Australia

GHD (2017) Port of Ashburton Annual Sediment Sampling and Analysis Plan. Pilbara Ports Authority

NAGD (2009). National Assessment Guidelines for Dredging. Department of the Environment, Water, Heritage and the Arts, Commonwealth of Australia

MCDONALD, R. C., ISBELL, R. F., SPEIGHT, J. G., HNATIUK, R.J., THACKWAY, R., Walker, J., 2009, Australian Soil and Land Survey Field Handbook, Australian Soil 3rd edition: CSIRO Publishing, 2009.

MScience (2018) Port of Ashburton Maintenance Dredging. Annual Sampling and Analysis Plan Implementation Report, 2018. Report to Pilbara Ports Authority, Perth, W.A

MScience (2020) Port of Ashburton Marine Sediment Quality. Regional Background Survey, 2020. Report for Pilbara Ports Authority

O2 Marine (2021) Sediment Sampling and Analysis Plan for MRL Ashburton Project; Report Number R200334

Simpson, SL, Mosley, L, Batley, GE and Shand, P 2018, National Acid Sulfate soil guidance: Guidelines for the dredging of acid sulfate soil sediment and associated dredge spoil management, Department of Agriculture and Water Resource, Canberra , ACT. CC BY 4.0.

URS (2009b). Wheatstone Project: Nearshore Acid Sulfate Soils Investigation (Turning Basin & Dredge Channel). Report #42907466/01. Technical Appendix Q4 of Environmental Impact Statement Chevron (2010): <https://australia.chevron.com/-/media/australia/our-businesses/documents/wheatstone-draft-eis-ermp-technical-appendices-q2-to-q5-web.pdf>




Appendix A Samples Photos




Appendix B Laboratory Results




Appendix C Quality Control Report


Appendix D Chain of Custody

Samples Photos

Site ID	Date	Time	Depth (m)	Description	Image
MR01	28-Jan	12:40	4	Clay/silt/sand. Dark brown in colour. No foreign material was observed. Approximately 5% shell/biota was observed. No odor. Original coordinates in existing channel moved 30m.	
MR02	29-Jan	9:00	3.5	Silt/clay. Brown/red in colour. No foreign material was observed. No shell/biota was observed. No odor. Moved 40m from original coordinates as site wasn't suitable for sampling.	
MR3	28-Jan	16:40	3.5	Silt/clay. Red/brown in colour. No foreign material was observed. No shell/biota was observed. No odor.	

MR04	28-Jan	15:00	3	Sand/silt. Grey/brown in colour. No foreign material was observed. Approximately 5% shell/biota was observed. No odor. Some pebbles were observed.	
MR7	29-Jan	8:50	3.5	Approximately 20% clay and approximately 70% silt. Red/brown in colour. No foreign material was observed. No shell/biota was observed. No odor.	
MR08	28-Jan	13:30	4	Approximately 50% sand and approximately 50% silt. Dark brown in colour. No foreign material was observed. No shell/biota was observed. No odor. Refusal at 1m.	

MR09	29-Jan	9:00	3.5	Sand. Dark brown in colour. No foreign material was observed. Approximately 5% shell/biota was observed. No odor. Refusal at 0.5m.	
MR10	29-Jan	9:00	3	Coarse sand/shell. Dark brown in colour. Approximately 5% foreign material was observed. No shell/biota was observed. No odor. Refusal at 0.5m.	
TRIP01	28-Jan	12:50	4	Sand/silt. Dark brown in colour. No foreign material was observed. No shell/biota was observed. No odor. Original coordinates in existing channel moved 30m.	

TRIP02	28-Jan	13:00	4	Sand/silt. Dark brown in colour. No foreign material was observed. No shell/biota was observed. No odor. Original coordinates in existing channel moved 30m.	
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Certificate of Analysis

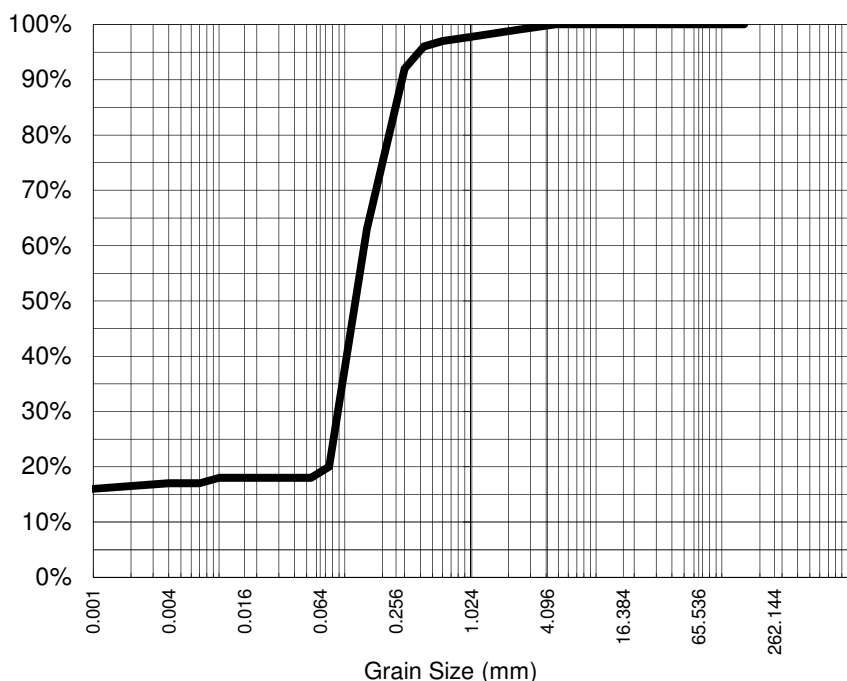
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Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
samples.newcastle@alsenviro.com

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Newcastle, NSW



CLIENT: Claudio Deldeo **DATE REPORTED:** 11-Feb-2021
COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-001 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-01-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	97%
0.425	96%
0.300	92%
0.150	63%
0.075	20%
Particle Size (microns)	
54	18%
38	18%
27	18%
19	18%
14	18%
10	18%
7	17%
5	17%
1	16%

Median Particle Size (mm)*	0.127
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.7

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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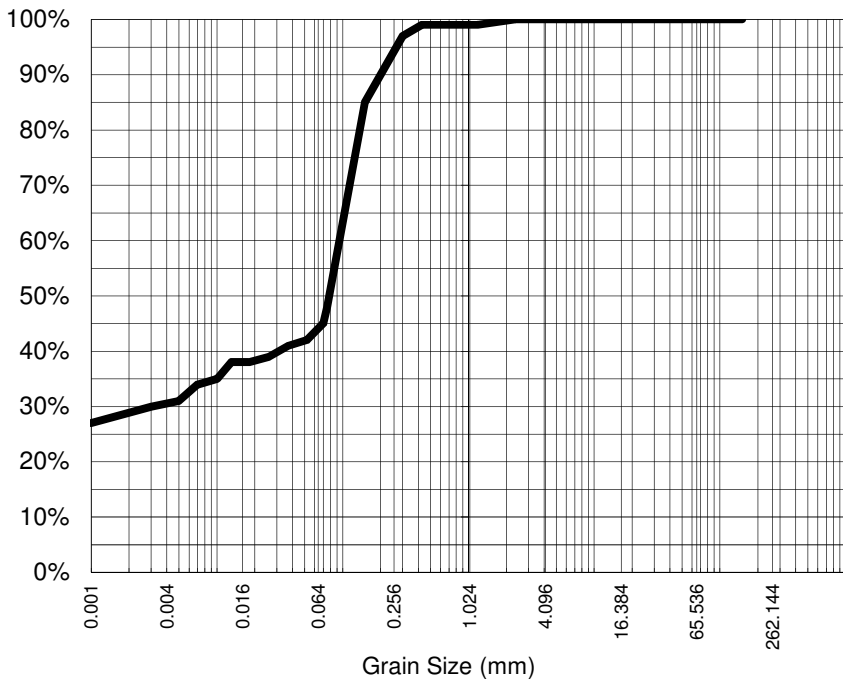
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COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-002 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-02-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	99%
0.300	97%
0.150	85%
0.075	48%
Particle Size (microns)	
52	42%
37	41%
26	39%
18	38%
13	38%
10	35%
7	34%
5	31%
1	27%

Analysis Notes

Samples analysed as received.

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

Median Particle Size (mm)*	0.079
----------------------------	-------

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.71

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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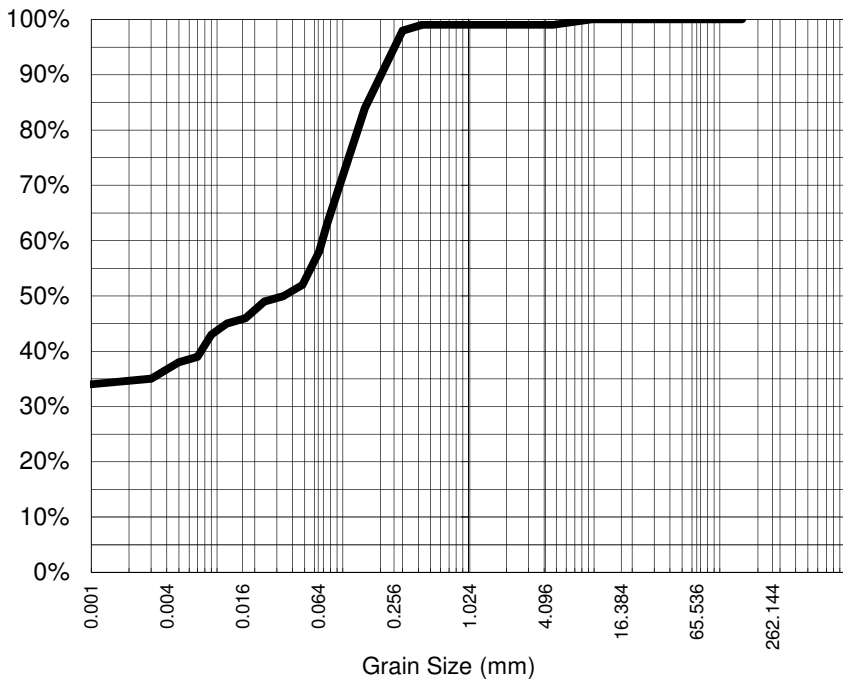
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ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-003 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-02-BOT

Particle Size Distribution



Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	99%
1.18	99%
0.600	99%
0.425	99%
0.300	98%
0.150	84%
0.075	63%
Particle Size (microns)	
48	52%
34	50%
24	49%
17	46%
12	45%
9	43%
7	39%
5	38%
1	34%

Analysis Notes

Samples analysed as received.

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

Median Particle Size (mm)*	0.034
----------------------------	-------

Sample Comments:

Loss on Pretreatment NA

Sample Description: FINES, SAND

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.8

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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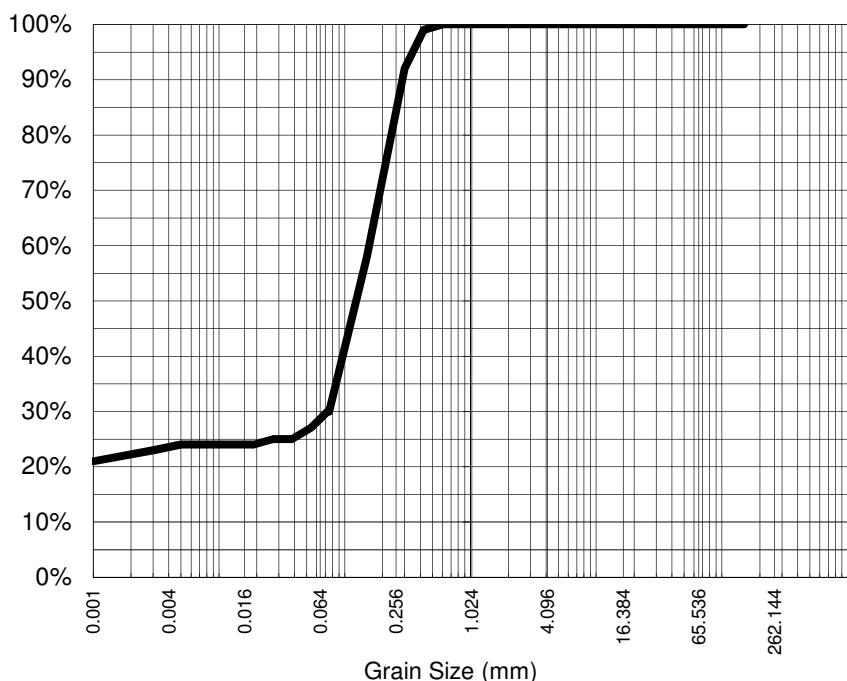
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ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-004 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-03-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	92%
0.150	58%
0.075	30%
Particle Size (microns)	
54	27%
38	25%
27	25%
19	24%
14	24%
10	24%
7	24%
5	24%
1	21%

Median Particle Size (mm)*	0.129
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.78

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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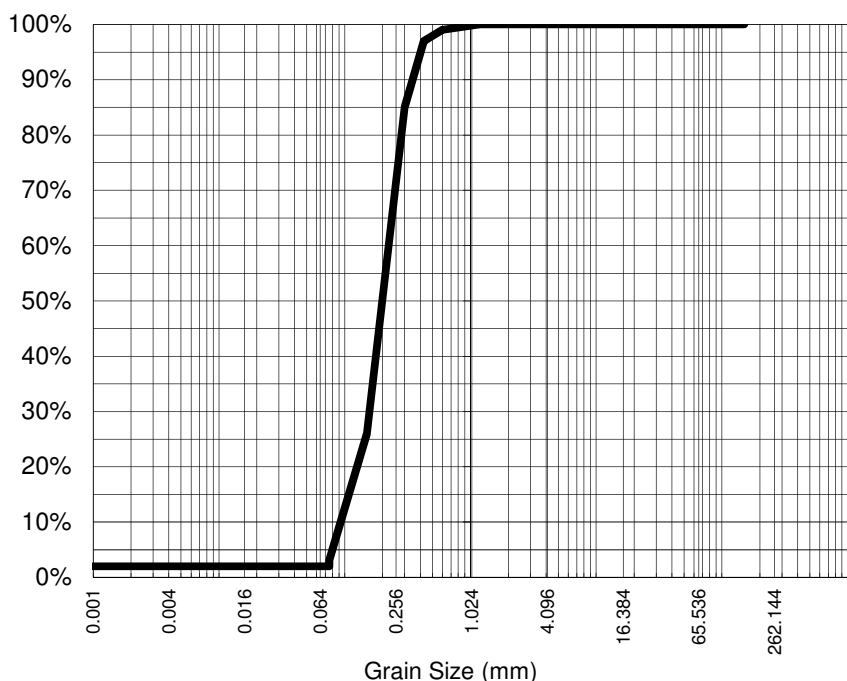
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PROJECT: 20WA0028 **SAMPLE ID:** MR-04-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	97%
0.300	85%
0.150	26%
0.075	3%
Particle Size (microns)	
57	2%
40	2%
28	2%
20	2%
15	2%
10	2%
7	2%
5	2%
1	2%

Median Particle Size (mm)*	0.211
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments: AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.74

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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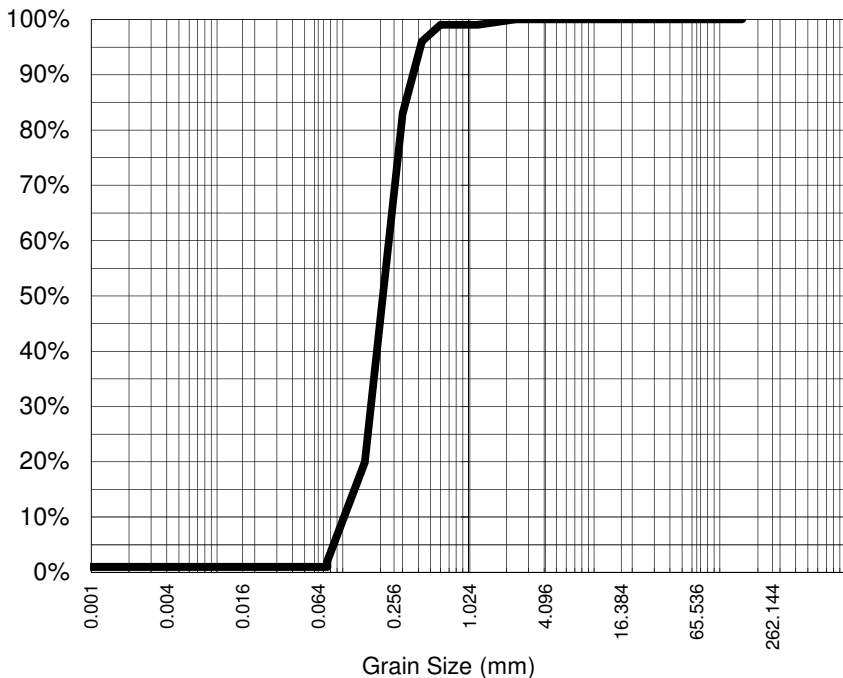
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 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-04-0.5-1

Particle Size Distribution



Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	96%
0.300	83%
0.150	20%
0.075	2%
Particle Size (microns)	
57	1%
40	1%
28	1%
20	1%
15	1%
10	1%
7	1%
5	1%
1	1%

Analysis Notes

Samples analysed as received.

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

Sample Comments: AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.71

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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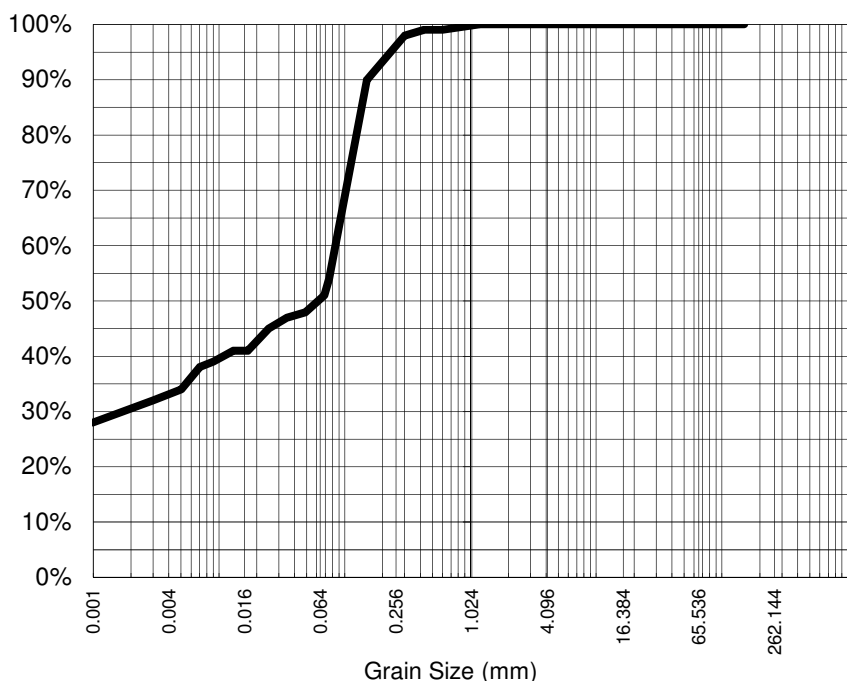
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COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
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Po Box 1370
Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-05-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
1.18	100%
0.600	99%
0.425	99%
0.300	98%
0.150	90%
0.075	54%
Particle Size (microns)	
49	48%
35	47%
25	45%
17	41%
13	41%
9	39%
7	38%
5	34%
1	28%

Median Particle Size (mm)*	0.062
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.76

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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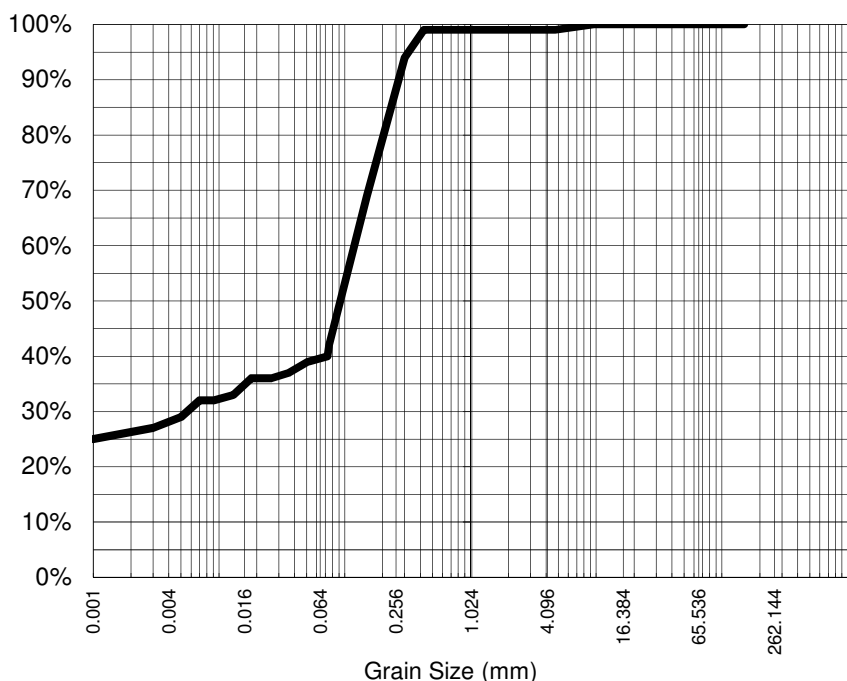
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PROJECT: 20WA0028 **SAMPLE ID:** MR-06-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	99%
1.18	99%
0.600	99%
0.425	99%
0.300	94%
0.150	69%
0.075	42%
Particle Size (microns)	
51	39%
36	37%
26	36%
18	36%
13	33%
9	32%
7	32%
5	29%
1	25%

Median Particle Size (mm)*	0.097
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.78

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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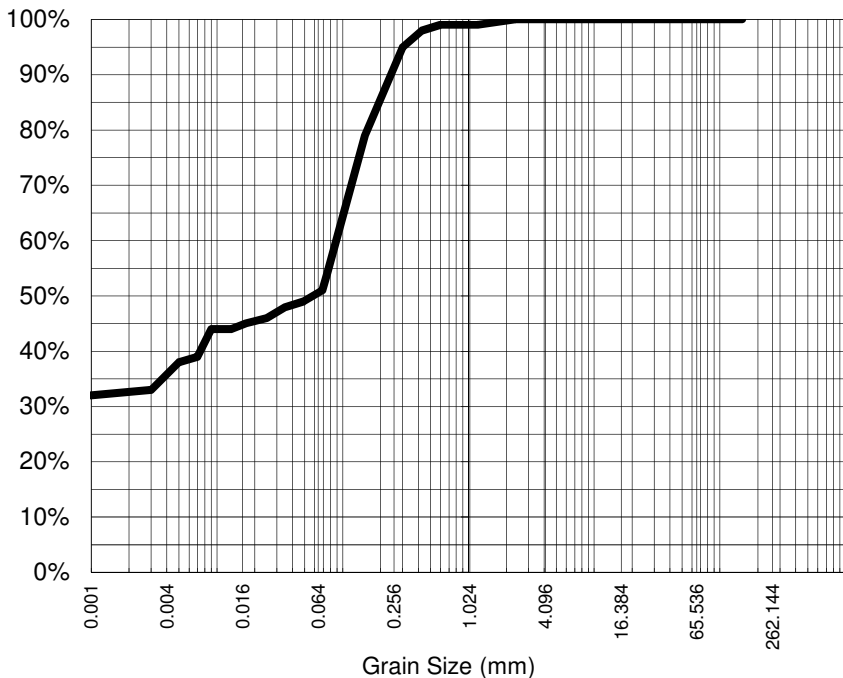
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COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-009 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-07-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	98%
0.300	95%
0.150	79%
0.075	54%
Particle Size (microns)	
49	49%
35	48%
25	46%
17	45%
13	44%
9	44%
7	39%
5	38%
1	32%

Analysis Notes

Samples analysed as received.

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

Median Particle Size (mm)*	0.059
----------------------------	-------

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.77

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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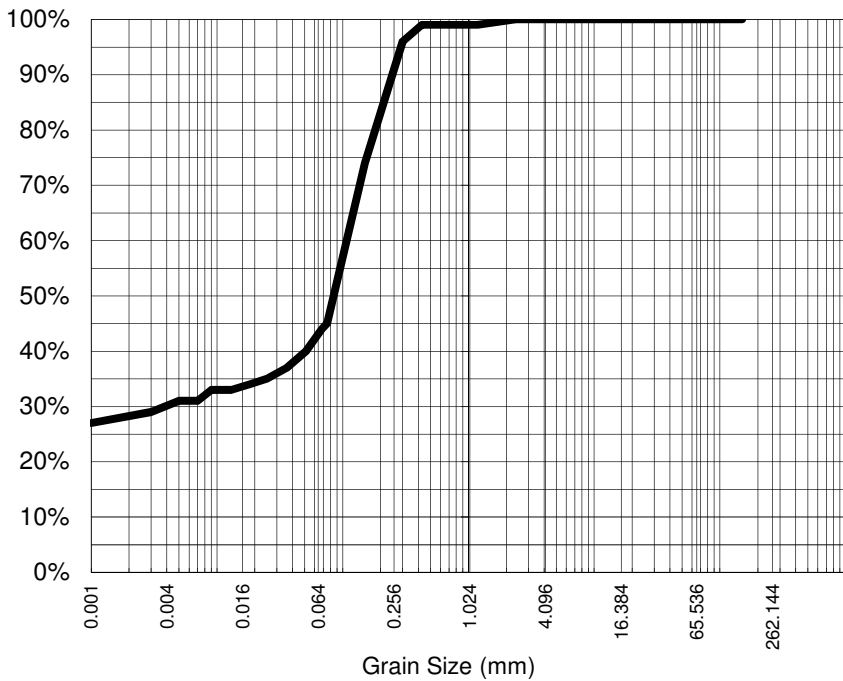
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 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-07-BOT

Particle Size Distribution



Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	99%
0.425	99%
0.300	96%
0.150	74%
0.075	45%
Particle Size (microns)	
51	40%
36	37%
25	35%
18	34%
13	33%
9	33%
7	31%
5	31%
1	27%

Analysis Notes

Samples analysed as received.

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

Median Particle Size (mm)*	0.088
----------------------------	-------

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.8

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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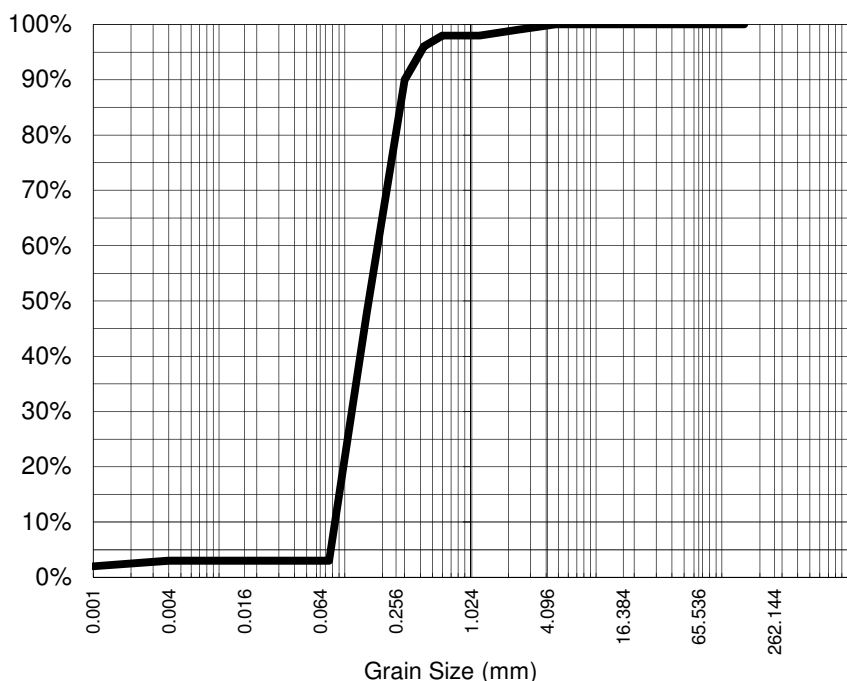
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ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-011 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-08-0-0.5m

Particle Size Distribution



Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	98%
0.425	96%
0.300	90%
0.150	48%
0.075	3%
Particle Size (microns)	
57	3%
40	3%
28	3%
20	3%
15	3%
10	3%
7	3%
5	3%
1	2%

Median Particle Size (mm)*	0.157
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments: AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.74

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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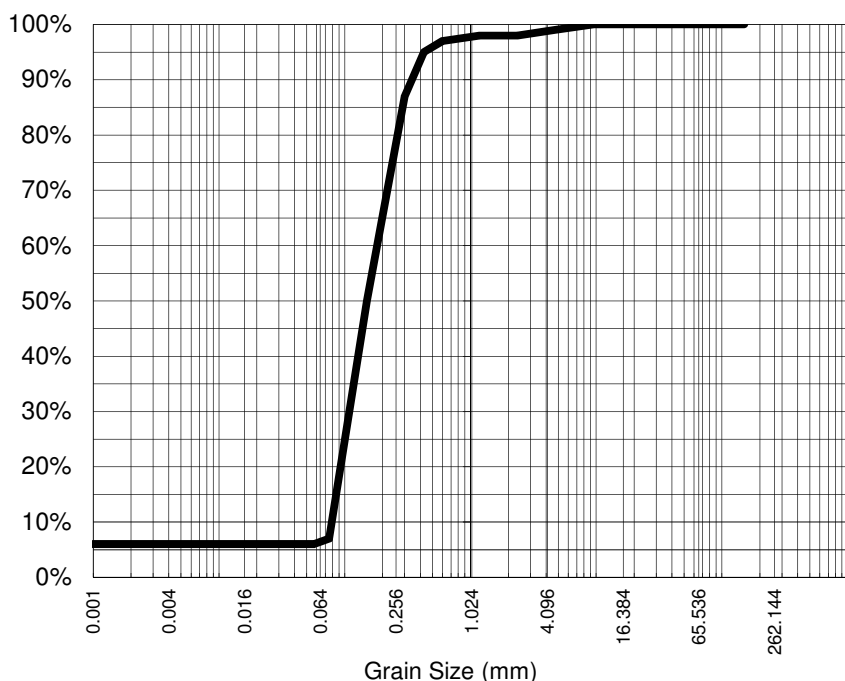
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COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-012 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-08-0.5-1m

Particle Size Distribution



Particle Size (mm)	% Passing
9.50	100%
4.75	99%
2.36	98%
1.18	98%
0.600	97%
0.425	95%
0.300	87%
0.150	50%
0.075	7%
Particle Size (microns)	
57	6%
40	6%
28	6%
20	6%
15	6%
10	6%
7	6%
5	6%
1	6%

Median Particle Size (mm)*	0.150
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Analysis Notes

Samples analysed as received.

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

Sample Comments: AS1289.3.6.3 states that hydrometer analysis is not applicable for samples containing <10% fines (<75um). Results should be assessed accordingly

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.73

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

NATA Accreditation: 825 Site: Newcastle
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Aleksandar Vujkovic
 Laboratory Supervisor
Authorised Signatory

Certificate of Analysis

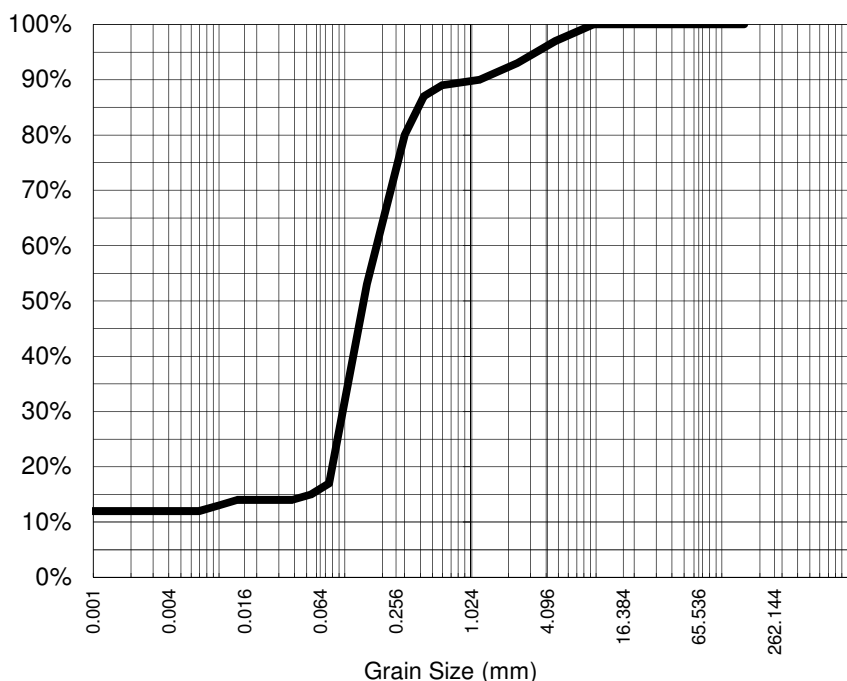
ALS Laboratory Group Pty Ltd
5/585 Maitland Road
Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental
Newcastle, NSW



CLIENT: Claudio Deldeo **DATE REPORTED:** 11-Feb-2021
COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-013 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-09-TOP

Particle Size Distribution



Particle Size (mm)	% Passing
9.50	100%
4.75	97%
2.36	93%
1.18	90%
0.600	89%
0.425	87%
0.300	80%
0.150	53%
0.075	17%
Particle Size (microns)	
54	15%
38	14%
27	14%
19	14%
14	14%
10	13%
7	12%
5	12%
1	12%

Median Particle Size (mm)*	0.144
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Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.78

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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 Laboratory Supervisor
Authorised Signatory

Certificate of Analysis

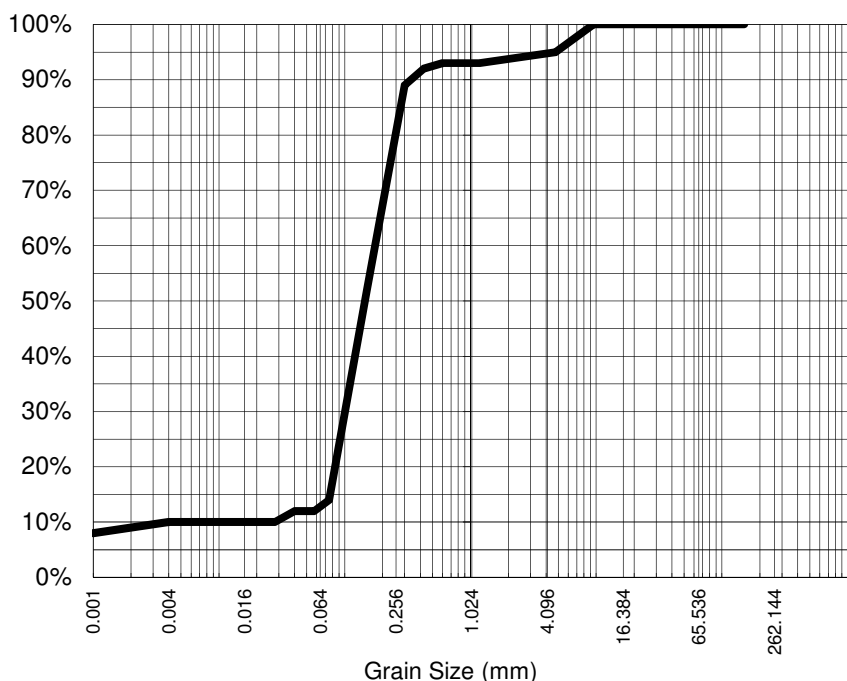
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5/585 Maitland Road
Mayfield West, NSW 2304
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fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental
Newcastle, NSW



CLIENT: Claudio Deldeo **DATE REPORTED:** 11-Feb-2021
COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-019 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-TRIP 01

Particle Size Distribution



Particle Size (mm)	% Passing
9.50	100%
4.75	95%
2.36	94%
1.18	93%
0.600	93%
0.425	92%
0.300	89%
0.150	52%
0.075	14%
Particle Size (microns)	
57	12%
40	12%
28	10%
20	10%
15	10%
10	10%
7	10%
5	10%
1	8%

Median Particle Size (mm)*	0.146
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.71

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

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Certificate of Analysis

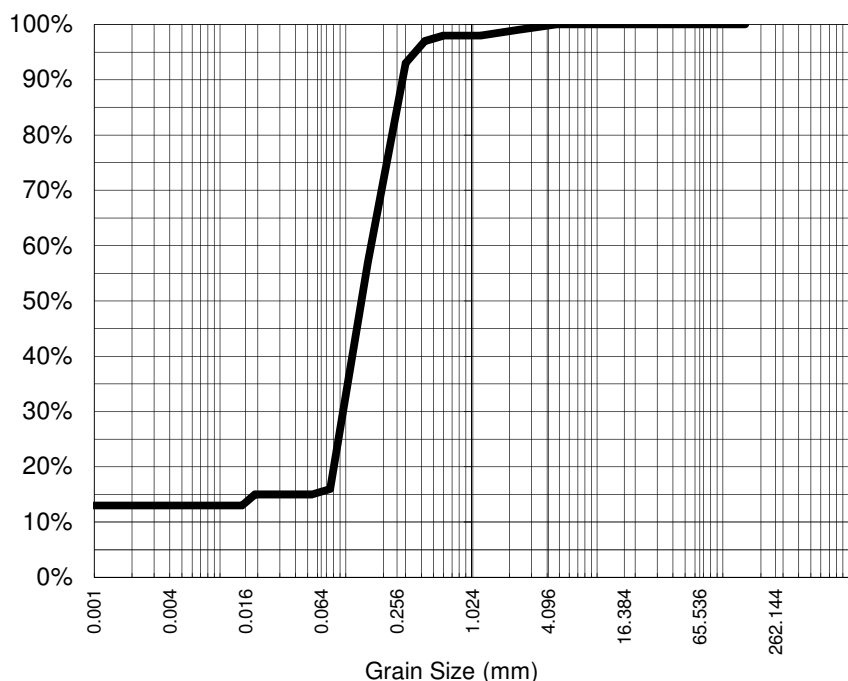


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Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
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ALS Environmental
Newcastle, NSW

CLIENT: Claudio Deldeo **DATE REPORTED:** 11-Feb-2021
COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-020 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-TRIP 02

Particle Size Distribution



Particle Size (mm)	% Passing
4.75	100%
2.36	99%
1.18	98%
0.600	98%
0.425	97%
0.300	93%
0.150	57%
0.075	16%
Particle Size (microns)	
54	15%
38	15%
27	15%
19	15%
15	13%
10	13%
7	13%
5	13%
1	13%

Median Particle Size (mm)*	0.137
----------------------------	-------

Analysis Notes

Samples analysed as received.

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

Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.7

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

NATA Accreditation: 825 Site: Newcastle
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Aleksandar Vujkovic
 Laboratory Supervisor
Authorised Signatory

Certificate of Analysis

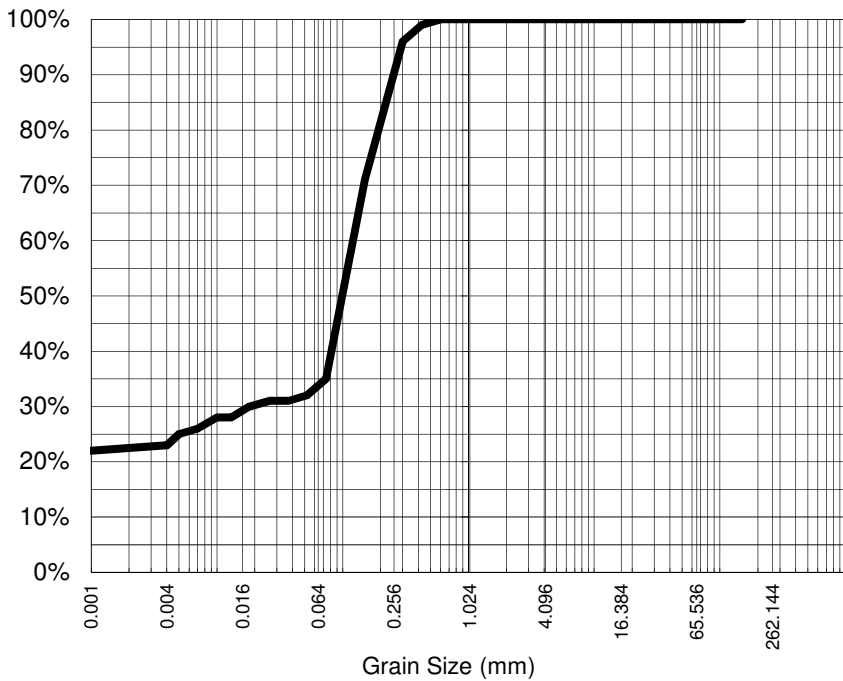
ALS Laboratory Group Pty Ltd
5/585 Maitland Road
Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental
Newcastle, NSW



CLIENT: Claudio Deldeo **DATE REPORTED:** 11-Feb-2021
COMPANY: WA MARINE PTY LTD **DATE RECEIVED:** 1-Feb-2021
ADDRESS: Suite 5, 5/18 Griffon Drive **REPORT NO:** EP2101009-021 / PSD
 Po Box 1370
 Dunsborough, Perth Wa, Australia
PROJECT: 20WA0028 **SAMPLE ID:** MR-DUP

Particle Size Distribution



Particle Size (mm)	% Passing
0.600	100%
0.425	99%
0.300	96%
0.150	71%
0.075	36%
Particle Size (microns)	
52	32%
37	31%
26	31%
18	30%
13	28%
10	28%
7	26%
5	25%
1	22%

Analysis Notes

Samples analysed as received.

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

Median Particle Size (mm)*	0.105
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Sample Comments:

Loss on Pretreatment NA

Sample Description: SAND, FINES

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) 2.73

Analysed: 8-Feb-21

Limit of Reporting: 1%

Dispersion Method Shaker

Aleksandar Vujkovic
Laboratory Supervisor
Authorised Signatory



NATA Accreditation: 825 Site: Newcastle
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CERTIFICATE OF ANALYSIS

Work Order : **EP2101009**
Client : **WA MARINE PTY LTD**
Contact : Claudio Deldeo
Address : SUITE 5, 5/18 GRIFFON DRIVE PO BOX 1370
 DUNSBOROUGH, PERTH WA, AUSTRALIA 6281

Telephone : ----
Project : 20WA0028
Order number : ----
C-O-C number : ----
Sampler : Claudio Deldeo
Site : Onslow
Quote number : EN/222
No. of samples received : 22
No. of samples analysed : 21

Page : 1 of 24
Laboratory : Environmental Division Perth
Contact : Nick Courts
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 01-Feb-2021 15:10
Date Analysis Commenced : 04-Feb-2021
Issue Date : 11-Feb-2021 15:17



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

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

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>
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaire	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Morgan Lennox	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

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

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

- TOC and Organotins conducted by ALS Brisbane, NATA Site No. 818.
- PSD conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP080-SD: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG020T: Positive results for aluminium, manganese, zinc and iron for sample EP2101009-017 have been confirmed by re-digestion and re-analysis.
- EP090 Organotins: Poor matrix spike recovery for MBT due to matrix interference.
- EP090 Organotins: High LCS recovery deemed acceptable as all associated analyte results are less than LOR
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EP132: Where reported, Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-01-TOP	MR-02-TOP	MR-02-BOT	MR-03-TOP	MR-04-TOP
Sampling date / time					28-Jan-2021 12:50	29-Jan-2021 08:00	29-Jan-2021 08:00	28-Jan-2021 16:40	28-Jan-2021 15:00
Compound	CAS Number	LOR	Unit	EP2101009-001	EP2101009-002	EP2101009-003	EP2101009-004	EP2101009-005	
				Result	Result	Result	Result	Result	
EA037: Ass Field Screening Analysis									
pH (F)	----	0.1	pH Unit	7.6	7.7	7.5	7.8	8.0	
pH (Fox)	----	0.1	pH Unit	7.4	7.3	7.6	7.4	7.1	
Reaction Rate	----	1	-	Extreme	Extreme	Extreme	Extreme	Strong	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	22.6	33.7	46.8	22.0	20.0	
EA150: Particle Sizing									
+75µm	----	1	%	80	52	37	70	97	
+150µm	----	1	%	38	15	16	42	74	
+300µm	----	1	%	8	3	2	8	15	
+425µm	----	1	%	4	1	1	1	3	
+600µm	----	1	%	3	<1	<1	<1	1	
+1180µm	----	1	%	2	<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	%	16	28	35	22	2	
Silt (2-60 µm)	----	1	%	3	16	21	6	<1	
Sand (0.06-2.00 mm)	----	1	%	80	56	43	72	98	
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	2.70	2.71	2.80	2.78	2.74	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	6390	5370	8660	6220	3880	
Iron	7439-89-6	50	mg/kg	37700	23700	38400	37200	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	13.6	9.01	10.6	8.58	8.13	
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Copper	7440-50-8	1.0	mg/kg	13.6	12.5	23.0	14.6	8.0	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-01-TOP	MR-02-TOP	MR-02-BOT	MR-03-TOP	MR-04-TOP
Sampling date / time					28-Jan-2021 12:50	29-Jan-2021 08:00	29-Jan-2021 08:00	28-Jan-2021 16:40	28-Jan-2021 15:00
Compound	CAS Number	LOR	Unit	EP2101009-001	EP2101009-002	EP2101009-003	EP2101009-004	EP2101009-005	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Cobalt	7440-48-4	0.5	mg/kg	11.0	8.3	12.5	6.4	6.5	
Lead	7439-92-1	1.0	mg/kg	6.4	6.0	10.2	6.8	3.7	
Manganese	7439-96-5	10	mg/kg	417	530	619	200	265	
Nickel	7440-02-0	1.0	mg/kg	16.8	11.4	19.8	14.9	11.8	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Zinc	7440-66-6	1.0	mg/kg	29.7	22.0	33.5	23.4	20.5	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.01	<0.01	<0.01	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.14	0.49	0.14	0.07	<0.02	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
>C16 - C34 Fraction	----	3	mg/kg	<3	4	<3	<3	<3	
>C34 - C40 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	4	<3	<3	<3	
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons									
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	<3	<3	
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	
EP080-SD: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-01-TOP	MR-02-TOP	MR-02-BOT	MR-03-TOP	MR-04-TOP
Sampling date / time					28-Jan-2021 12:50	29-Jan-2021 08:00	29-Jan-2021 08:00	28-Jan-2021 16:40	28-Jan-2021 15:00
Compound	CAS Number	LOR	Unit	EP2101009-001	EP2101009-002	EP2101009-003	EP2101009-004	EP2101009-005	
				Result	Result	Result	Result	Result	
EP080-SD: BTEXN - Continued									
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	<1	<1	<1	
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
EP132B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5	
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5	
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4	
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4	
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4	
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4	
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4	
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4	
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4	
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4	
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4	
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4	
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4	
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5	
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (zero)	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (half LOR)	----	4	µg/kg	5	5	5	5	5	
^ Benzo(a)pyrene TEQ (LOR)	----	4	µg/kg	10	10	10	10	10	
EP080-SD: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	88.4	87.8	87.1	88.8	
Toluene-D8	2037-26-5	0.2	%	----	89.2	91.2	86.7	84.7	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-01-TOP	MR-02-TOP	MR-02-BOT	MR-03-TOP	MR-04-TOP
Sampling date / time				28-Jan-2021 12:50	29-Jan-2021 08:00	29-Jan-2021 08:00	28-Jan-2021 16:40	28-Jan-2021 15:00	
Compound	CAS Number	LOR	Unit	EP2101009-001	EP2101009-002	EP2101009-003	EP2101009-004	EP2101009-005	
				Result	Result	Result	Result	Result	
EP080-SD: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%	----	100	100	96.7	98.7	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	116	123	108	103	103	
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	10	%	98.2	96.4	87.3	92.8	91.1	
Anthracene-d10	1719-06-8	10	%	92.3	91.0	92.1	103	107	
4-Terphenyl-d14	1718-51-0	10	%	72.4	82.2	73.7	78.3	76.4	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-04-0.5-1	MR-05-TOP	MR-06-TOP	MR-07-TOP	MR-07-BOT
Sampling date / time				28-Jan-2021 15:00	29-Jan-2021 08:20	28-Jan-2021 15:30	29-Jan-2021 08:50	29-Jan-2021 08:50	
Compound	CAS Number	LOR	Unit	EP2101009-006	EP2101009-007	EP2101009-008	EP2101009-009	EP2101009-010	
				Result	Result	Result	Result	Result	
EA037: Ass Field Screening Analysis									
pH (F)	----	0.1	pH Unit	7.7	7.6	7.8	7.8	7.8	
pH (Fox)	----	0.1	pH Unit	5.9	7.1	7.4	7.4	7.5	
Reaction Rate	----	1	-	Strong	Extreme	Extreme	Extreme	Strong	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	18.9	42.8	33.5	38.6	29.3	
EA150: Particle Sizing									
+75µm	----	1	%	98	46	58	46	55	
+150µm	----	1	%	80	10	31	21	26	
+300µm	----	1	%	17	2	6	5	4	
+425µm	----	1	%	4	<1	2	2	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	%	1	30	26	32	28	
Silt (2-60 µm)	----	1	%	<1	20	13	18	14	
Sand (0.06-2.00 mm)	----	1	%	99	50	60	50	58	
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	2.71	2.76	2.78	2.77	2.80	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	3340	11000	7110	10500	3360	
Iron	7439-89-6	50	mg/kg	21400	47900	42300	44000	16700	
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	6.83	15.9	14.6	16.4	4.46	
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Copper	7440-50-8	1.0	mg/kg	7.3	24.6	14.5	23.0	9.4	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-04-0.5-1	MR-05-TOP	MR-06-TOP	MR-07-TOP	MR-07-BOT
Sampling date / time					28-Jan-2021 15:00	29-Jan-2021 08:20	28-Jan-2021 15:30	29-Jan-2021 08:50	29-Jan-2021 08:50
Compound	CAS Number	LOR	Unit		EP2101009-006	EP2101009-007	EP2101009-008	EP2101009-009	EP2101009-010
				Result	Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Cobalt	7440-48-4	0.5	mg/kg	5.6	13.8	11.2	13.5	5.0	
Lead	7439-92-1	1.0	mg/kg	3.0	9.6	7.0	9.4	4.8	
Manganese	7439-96-5	10	mg/kg	228	527	480	650	202	
Nickel	7440-02-0	1.0	mg/kg	10.4	23.7	17.5	21.9	7.6	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Zinc	7440-66-6	1.0	mg/kg	18.8	43.0	33.7	40.4	12.4	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	<0.01	0.01	<0.01	0.01	<0.01	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	<0.02	0.30	0.29	0.26	0.09	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
>C16 - C34 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
>C34 - C40 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3	
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons									
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	<3	<3	
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	
EP080-SD: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-04-0.5-1	MR-05-TOP	MR-06-TOP	MR-07-TOP	MR-07-BOT
Sampling date / time				28-Jan-2021 15:00	29-Jan-2021 08:20	28-Jan-2021 15:30	29-Jan-2021 08:50	29-Jan-2021 08:50	
Compound	CAS Number	LOR	Unit	EP2101009-006	EP2101009-007	EP2101009-008	EP2101009-009	EP2101009-010	
				Result	Result	Result	Result	Result	
EP080-SD: BTEXN - Continued									
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	<1	<1	<1	
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
EP132B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5	
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5	
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4	
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4	
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4	
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4	
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4	
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4	
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4	
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4	
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4	
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4	
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4	
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5	
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (zero)	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (half LOR)	----	4	µg/kg	5	5	5	5	5	
^ Benzo(a)pyrene TEQ (LOR)	----	4	µg/kg	10	10	10	10	10	
EP080-SD: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	98.2	88.4	123	114	88.3	
Toluene-D8	2037-26-5	0.2	%	81.5	86.6	75.4	76.9	88.2	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-04-0.5-1	MR-05-TOP	MR-06-TOP	MR-07-TOP	MR-07-BOT
Sampling date / time				28-Jan-2021 15:00	29-Jan-2021 08:20	28-Jan-2021 15:30	29-Jan-2021 08:50	29-Jan-2021 08:50	
Compound	CAS Number	LOR	Unit	EP2101009-006	EP2101009-007	EP2101009-008	EP2101009-009	EP2101009-010	
				Result	Result	Result	Result	Result	
EP080-SD: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%	93.9	102	86.7	88.1	100	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	114	119	119	93.0	99.7	
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	10	%	95.6	93.6	92.8	87.7	92.3	
Anthracene-d10	1719-06-8	10	%	94.3	94.4	112	91.8	93.0	
4-Terphenyl-d14	1718-51-0	10	%	89.0	75.2	91.3	73.7	81.0	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-08-0-0.5m	MR-08-0.5-1m	MR-09-TOP	MR-TRIP 01	MR-TRIP 02
Sampling date / time				28-Jan-2021 13:30	28-Jan-2021 13:30	28-Jan-2021 09:00	[29-Jan-2021]	[29-Jan-2021]	
Compound	CAS Number	LOR	Unit	EP2101009-011	EP2101009-012	EP2101009-013	EP2101009-019	EP2101009-020	
				Result	Result	Result	Result	Result	
EA037: Ass Field Screening Analysis									
pH (F)	----	0.1	pH Unit	7.9	8.0	8.1	8.1	8.0	
pH (Fox)	----	0.1	pH Unit	7.8	7.2	7.3	8.0	7.6	
Reaction Rate	----	1	-	Strong	Strong	Strong	Strong	Strong	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	18.6	18.9	17.7	17.2	24.9	
EA150: Particle Sizing									
+75µm	----	1	%	97	93	83	86	84	
+150µm	----	1	%	52	50	47	48	43	
+300µm	----	1	%	10	13	20	11	7	
+425µm	----	1	%	4	5	13	8	3	
+600µm	----	1	%	2	3	11	7	2	
+1180µm	----	1	%	2	2	10	7	2	
+2.36mm	----	1	%	1	2	7	6	<1	
+4.75mm	----	1	%	<1	<1	3	5	<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	%	3	6	12	9	13	
Silt (2-60 µm)	----	1	%	<1	<1	4	4	2	
Sand (0.06-2.00 mm)	----	1	%	96	92	76	81	84	
Gravel (>2mm)	----	1	%	1	2	8	6	1	
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1	
EA152: Soil Particle Density									
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.74	2.73	2.78	2.71	2.70	
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES									
Aluminium	7429-90-5	50	mg/kg	4150	5140	5030	7100	5610	
Iron	7439-89-6	50	mg/kg	32200	40900	34700	38600	34900	
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	12.7	13.8	11.5	11.3	12.5	
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Copper	7440-50-8	1.0	mg/kg	8.2	10.8	10.4	16.7	12.4	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-08-0-0.5m	MR-08-0.5-1m	MR-09-TOP	MR-TRIP 01	MR-TRIP 02
Sampling date / time					28-Jan-2021 13:30	28-Jan-2021 13:30	28-Jan-2021 09:00	[29-Jan-2021]	[29-Jan-2021]
Compound	CAS Number	LOR	Unit	EP2101009-011	EP2101009-012	EP2101009-013	EP2101009-019	EP2101009-020	
				Result	Result	Result	Result	Result	
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Cobalt	7440-48-4	0.5	mg/kg	8.8	10.7	9.1	10.0	9.6	
Lead	7439-92-1	1.0	mg/kg	4.7	6.8	5.9	6.7	6.0	
Manganese	7439-96-5	10	mg/kg	334	340	333	333	364	
Nickel	7440-02-0	1.0	mg/kg	12.5	14.2	12.3	17.8	15.0	
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
Zinc	7440-66-6	1.0	mg/kg	22.8	26.3	20.6	29.1	26.0	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.07	0.07	0.07	0.02	<0.02	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
>C16 - C34 Fraction	----	3	mg/kg	<3	<3	<3	<3	4	
>C34 - C40 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	4	
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3	
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5	
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3	
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons									
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	<3	<3	
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	
EP080-SD: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-08-0-0.5m	MR-08-0.5-1m	MR-09-TOP	MR-TRIP 01	MR-TRIP 02
Sampling date / time					28-Jan-2021 13:30	28-Jan-2021 13:30	28-Jan-2021 09:00	[29-Jan-2021]	[29-Jan-2021]
Compound	CAS Number	LOR	Unit	EP2101009-011	EP2101009-012	EP2101009-013	EP2101009-019	EP2101009-020	
				Result	Result	Result	Result	Result	
EP080-SD: BTEXN - Continued									
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	<1	<1	<1	
Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	<1	<1	<1	
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
EP132B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5	
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5	
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4	
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4	
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4	
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<4	
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4	
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<4	
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<4	
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<4	
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4	
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<4	
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4	
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<4	
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5	
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (zero)	----	4	µg/kg	<4	<4	<4	<4	<4	
^ Benzo(a)pyrene TEQ (half LOR)	----	4	µg/kg	5	5	5	5	5	
^ Benzo(a)pyrene TEQ (LOR)	----	4	µg/kg	10	10	10	10	10	
EP080-SD: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	101	106	112	102	102	
Toluene-D8	2037-26-5	0.2	%	86.0	90.2	91.7	88.6	88.2	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-08-0-0.5m	MR-08-0.5-1m	MR-09-TOP	MR-TRIP 01	MR-TRIP 02
Sampling date / time				28-Jan-2021 13:30	28-Jan-2021 13:30	28-Jan-2021 09:00	[29-Jan-2021]	[29-Jan-2021]	
Compound	CAS Number	LOR	Unit	EP2101009-011	EP2101009-012	EP2101009-013	EP2101009-019	EP2101009-020	
				Result	Result	Result	Result	Result	
EP080-SD: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%	97.4	103	103	99.4	102	
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	89.0	107	122	127	97.4	
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	10	%	92.9	106	97.2	98.4	102	
Anthracene-d10	1719-06-8	10	%	111	107	92.5	90.3	88.7	
4-Terphenyl-d14	1718-51-0	10	%	87.4	119	81.0	98.7	77.9	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)		Sample ID		MR-DUP	----	----	----	----
		Sampling date / time		[29-Jan-2021]	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2101009-021	-----	-----	-----	-----
				Result	----	----	----	----
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	7.7	----	----	----	----
pH (Fox)	----	0.1	pH Unit	7.6	----	----	----	----
Reaction Rate	----	1	-	Strong	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	41.1	----	----	----	----
EA150: Particle Sizing								
+75µm	----	1	%	64	----	----	----	----
+150µm	----	1	%	29	----	----	----	----
+300µm	----	1	%	4	----	----	----	----
+425µm	----	1	%	<1	----	----	----	----
+600µm	----	1	%	<1	----	----	----	----
+1180µm	----	1	%	<1	----	----	----	----
+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	%	23	----	----	----	----
Silt (2-60 µm)	----	1	%	10	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	67	----	----	----	----
Gravel (>2mm)	----	1	%	<1	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.73	----	----	----	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	7520	----	----	----	----
Iron	7439-89-6	50	mg/kg	46800	----	----	----	----
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	14.7	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----
Copper	7440-50-8	1.0	mg/kg	16.3	----	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-DUP	----	----	----	----
Sampling date / time				[29-Jan-2021]	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2101009-021	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EG020-SD: Total Metals in Sediments by ICPMS - Continued									
Cobalt	7440-48-4	0.5	mg/kg	11.7	----	----	----	----	----
Lead	7439-92-1	1.0	mg/kg	7.9	----	----	----	----	----
Manganese	7439-96-5	10	mg/kg	502	----	----	----	----	----
Nickel	7440-02-0	1.0	mg/kg	19.1	----	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	<0.1	----	----	----	----	----
Zinc	7440-66-6	1.0	mg/kg	34.9	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.01	mg/kg	<0.01	----	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%	0.24	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	3	mg/kg	<3	----	----	----	----	----
>C16 - C34 Fraction	----	3	mg/kg	<3	----	----	----	----	----
>C34 - C40 Fraction	----	5	mg/kg	<5	----	----	----	----	----
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	----	----	----	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	3	mg/kg	<3	----	----	----	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	----	----	----	----	----
C15 - C28 Fraction	----	3	mg/kg	<3	----	----	----	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----	----
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons									
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	----	----	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	----	----	----	----	----
EP080-SD: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	----	----	----	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	----	----	----	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	----	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-DUP	----	----	----	----
Sampling date / time				[29-Jan-2021]	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2101009-021	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EP080-SD: BTEXN - Continued									
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	----
Naphthalene	91-20-3	0.2	mg/kg	<0.2	----	----	----	----	----
EP090: Organotin Compounds									
Monobutyltin	78763-54-9	1	µgSn/kg	<1	----	----	----	----	----
Dibutyltin	1002-53-5	1	µgSn/kg	<1	----	----	----	----	----
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	----	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	5	µg/kg	7	----	----	----	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	----	----	----	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	----	----	----	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	----	----	----	----	----
Fluorene	86-73-7	4	µg/kg	<4	----	----	----	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	----	----	----	----	----
Anthracene	120-12-7	4	µg/kg	<4	----	----	----	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	----	----	----	----	----
Pyrene	129-00-0	4	µg/kg	<4	----	----	----	----	----
Benzo(a)anthracene	56-55-3	4	µg/kg	<4	----	----	----	----	----
Chrysene	218-01-9	4	µg/kg	<4	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	----	----	----	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	----	----	----	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	----	----	----	----	----
Perylene	198-55-0	4	µg/kg	<4	----	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	----	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	----	----	----	----	----
Coronene	191-07-1	5	µg/kg	<5	----	----	----	----	----
^ Sum of PAHs	----	4	µg/kg	7	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	4	µg/kg	<4	----	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	4	µg/kg	5	----	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	4	µg/kg	10	----	----	----	----	----
EP080-SD: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	102	----	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	80.8	----	----	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	MR-DUP	----	----	----	----
Sampling date / time				[29-Jan-2021]	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2101009-021	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
EP080-SD: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%	91.1	----	----	----	----	----
EP090S: Organotin Surrogate									
Tripopyltin	----	0.5	%	123	----	----	----	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	10	%	83.6	----	----	----	----	----
Anthracene-d10	1719-06-8	10	%	74.4	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	10	%	74.3	----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		TBS TBS 0012	FBS TBS 0014	TBS TBS 0013	----	----	
Sampling date / time		29-Jan-2021 00:00		29-Jan-2021 00:00		29-Jan-2021 00:00		----	----
Compound	CAS Number	LOR	Unit	EP2101009-014 Result	EP2101009-015 Result	EP2101009-016 Result	-----	-----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	<1.0	<1.0	<1.0	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	104	96.9	94.8	----	----	
Toluene-D8	2037-26-5	0.2	%	92.1	85.7	85.5	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	93.9	84.5	83.1	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RINS 1 MET	RINS 1 VOL	----	----	----
Sampling date / time				01-Feb-2021 14:00	01-Feb-2021 14:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2101009-017	EP2101009-018	-----	-----	-----	
				Result	Result	----	----	----	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.77	----	----	----	----	
Antimony	7440-36-0	0.001	mg/L	<0.001	----	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.009	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	
Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.016	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.73	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	<20	----	----	----	
C10 - C14 Fraction	----	50	µg/L	----	<50	----	----	----	
C15 - C28 Fraction	----	100	µg/L	----	<100	----	----	----	
C29 - C36 Fraction	----	50	µg/L	----	<50	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	<50	----	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	----	<20	----	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	<20	----	----	----	
>C10 - C16 Fraction	----	100	µg/L	----	<100	----	----	----	
>C16 - C34 Fraction	----	100	µg/L	----	<100	----	----	----	
>C34 - C40 Fraction	----	100	µg/L	----	<100	----	----	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	<100	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	<100	----	----	----	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	----	<1	----	----	----	
Toluene	108-88-3	2	µg/L	----	<2	----	----	----	
Ethylbenzene	100-41-4	2	µg/L	----	<2	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RINS 1 MET	RINS 1 VOL	----	----	----
Sampling date / time				01-Feb-2021 14:00	01-Feb-2021 14:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2101009-017	EP2101009-018	-----	-----	-----	
				Result	Result	----	----	----	
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3	106-42-3	2	µg/L	----	<2	----	----	----
ortho-Xylene	95-47-6		2	µg/L	----	<2	----	----	----
^ Total Xylenes	----		2	µg/L	----	<2	----	----	----
^ Sum of BTEX	----		1	µg/L	----	<1	----	----	----
Naphthalene	91-20-3		5	µg/L	----	<5	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5		0.1	µg/L	----	<0.1	----	----	----
2-Methylnaphthalene	91-57-6		0.1	µg/L	----	<0.1	----	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6		0.1	µg/L	----	<0.1	----	----	----
Acenaphthene	83-32-9		0.1	µg/L	----	<0.1	----	----	----
Acenaphthylene	208-96-8		0.1	µg/L	----	<0.1	----	----	----
Anthracene	120-12-7		0.1	µg/L	----	<0.1	----	----	----
Benzo(a)anthracene	56-55-3		0.1	µg/L	----	<0.1	----	----	----
Benzo(a)pyrene	50-32-8		0.05	µg/L	----	<0.05	----	----	----
Benzo(b+j)fluoranthene	205-99-2	205-82-3	0.1	µg/L	----	<0.1	----	----	----
Benzo(e)pyrene	192-97-2		0.1	µg/L	----	<0.1	----	----	----
Benzo(g,h,i)perylene	191-24-2		0.1	µg/L	----	<0.1	----	----	----
Benzo(k)fluoranthene	207-08-9		0.1	µg/L	----	<0.1	----	----	----
Chrysene	218-01-9		0.1	µg/L	----	<0.1	----	----	----
Coronene	191-07-1		0.1	µg/L	----	<0.1	----	----	----
Dibenz(a,h)anthracene	53-70-3		0.1	µg/L	----	<0.1	----	----	----
Fluoranthene	206-44-0		0.1	µg/L	----	<0.1	----	----	----
Fluorene	86-73-7		0.1	µg/L	----	<0.1	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5		0.1	µg/L	----	<0.1	----	----	----
Naphthalene	91-20-3		0.1	µg/L	----	<0.1	----	----	----
Perylene	198-55-0		0.1	µg/L	----	<0.1	----	----	----
Phenanthrene	85-01-8		0.1	µg/L	----	<0.1	----	----	----
Pyrene	129-00-0		0.1	µg/L	----	<0.1	----	----	----
^ Sum of PAHs	----		0.05	µg/L	----	<0.05	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----		0.05	µg/L	----	<0.05	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0		2	%	----	99.2	----	----	----
Toluene-D8	2037-26-5		2	%	----	94.9	----	----	----
4-Bromofluorobenzene	460-00-4		2	%	----	99.0	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RINS 1 MET	RINS 1 VOL	----	----	----
Sampling date / time				01-Feb-2021 14:00	01-Feb-2021 14:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2101009-017	EP2101009-018	-----	-----	-----	
				Result	Result	----	----	----	
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%	----	58.4	----	----	----	
Anthracene-d10	1719-06-8	0.1	%	----	64.5	----	----	----	
4-Terphenyl-d14	1718-51-0	0.1	%	----	70.5	----	----	----	



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080-SD: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	70	130
Toluene-D8	2037-26-5	70	130
4-Bromofluorobenzene	460-00-4	70	130
EP090S: Organotin Surrogate			
Tripropyltin	----	35	130
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	70	130
Anthracene-d10	1719-06-8	70	130
4-Terphenyl-d14	1718-51-0	70	130
Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	61	141
Toluene-D8	2037-26-5	73	126
4-Bromofluorobenzene	460-00-4	60	125
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

Page : 24 of 24
Work Order : EP2101009
Client : WA MARINE PTY LTD
Project : 20WA0028



Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) EP090: Organotin Compounds

(SOIL) EP090S: Organotin Surrogate

(SOIL) EP003: Total Organic Carbon (TOC) in Soil

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA150: Soil Classification based on Particle Size

(SOIL) EA150: Particle Sizing

(SOIL) EA152: Soil Particle Density

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

(WATER) EP132B: Polynuclear Aromatic Hydrocarbons

(WATER) EP132S: Acid Extractable Surrogates

(WATER) EP132T: Base/Neutral Extractable Surrogates

CERTIFICATE OF ANALYSIS

Work Order : **EP2102999**
Client : **WA MARINE PTY LTD**
Contact : Claudio Deldeo
Address : SUITE 5, 5/18 GRIFFON DRIVE PO BOX 1370
 DUNSBOROUGH, PERTH WA, AUSTRALIA 6281

Telephone : ----
Project : 20WA0028
Order number : ----
C-O-C number : ----
Sampler : Claudio Deldeo
Site : Onslow
Quote number : EN/222
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 4
Laboratory : Environmental Division Perth
Contact : Nick Courts
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : +61-8-9406 1301
Date Samples Received : 01-Feb-2021 15:10
Date Analysis Commenced : 23-Mar-2021
Issue Date : 26-Mar-2021 16:57



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

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

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

- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MR-01-TOP	MR-02-TOP	MR-05-TOP	MR-06-TOP	MR-07-TOP
Sampling date / time					28-Jan-2021 12:50	29-Jan-2021 08:00	29-Jan-2021 08:20	28-Jan-2021 15:30	29-Jan-2021 08:50
Compound	CAS Number	LOR	Unit	EP2102999-001	EP2102999-002	EP2102999-003	EP2102999-004	EP2102999-005	
				Result	Result	Result	Result	Result	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	9.4	9.1	9.1	9.3	9.2	
Titration Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2	
sulfidic - Titration Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.036	0.056	0.037	0.022	0.036	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	23	35	23	13	22	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	7.81	11.8	6.60	5.96	8.82	
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1560	2360	1320	1190	1760	
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.50	3.79	2.11	1.91	2.83	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02	
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10	
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.04	0.06	0.04	0.02	0.04	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	23	35	23	13	22	
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	3	2	1	2	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		MR-07-BOT	----	----	----	----
		Sampling date / time		29-Jan-2021 08:50	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2102999-006	-----	-----	-----	-----
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	9.2	----	----	----	----
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.047	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	29	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.60	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1120	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.80	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.05	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	29	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	2	----	----	----	----

LABORATORY REPORT

Job Number: 21-01858
Revision: 00
Date: 16 February 2021

ADDRESS: **O2 Marine**
 Suite 2, 4B Mews Rd
 Fremantle WA 6160


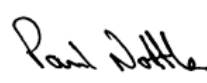


ATTENTION: Claudio Deldeo

DATE RECEIVED: 2/02/2021

YOUR REFERENCE: 20WAW0028 - Ashburton Transhipment

PURCHASE ORDER:

APPROVALS:

 Sean Sangster
 Inorganics Supervisor
  Paul Nottle
 Organics Manager
  Sam Becker
 Inorganics Manager
  Douglas Todd
 Laboratory Manager

REPORT COMMENTS:

This report is issued by Analytical Reference Laboratory (WA) Pty Ltd. The report shall not be reproduced except in full without written approval from the laboratory.

Samples are analysed on an as received basis unless otherwise noted.

Tributyl tin in Soil analysis subcontracted to MPL, NATA Accred No. 2901, Report Number 256617
 Metals and TBT in soils analysis was conducted on a dry weight basis.

METHOD REFERENCES:

Methods prefixed with "ARL" are covered under NATA Accreditation Number: 2377
 Methods prefixed with "PM" are covered under NATA Accreditation Number: 2561
 Methods prefixed with "EDP" are covered under NATA Accreditation Number: 19290

Method ID	Method Description
ARL No. 401/403	Metals in Soil and Sediment by ICPOES/MS
ARL No. 030	Metals in Soil and Sediment by AAS
ARL No. 406	Mercury by Cold Vapour Atomic Absorption Spectrophotometry
ARL No. 192	Total Recoverable Hydrocarbons (C ₆ -C ₁₀) in Soil
ARL No. 193	Total Recoverable Hydrocarbons (>C ₁₀ -C ₄₀) in Soil
ARL No. 064	Total Organic Carbon in Sediment
ARL No. 208	"Field" pH measurements
23A and 23B	QASSIT et al Method Code
Subcontracting	See Report Comments section for more information.



WORLD RECOGNISED
ACCREDITATION
 Accredited for compliance with
 ISO/IEC 17025 - Testing

O2 Marine
Job No: 21-01858

LABORATORY REPORT
Revision: 00

Date: 16/02/21

Metals in Soil and Sediment		Sample No	21-01858-1
		Sample Description	MR-SPLIT 01
		Sample Date	2/02/2021
ANALYTE	LOR	Units	Result
Aluminium	1	mg/kg	14,000
Iron	1	mg/kg	57,000
Antimony	2	mg/kg	<2
Arsenic	5	mg/kg	17
Cadmium	0.1	mg/kg	<0.1
Copper	1	mg/kg	31
Cobalt	1	mg/kg	14
Lead	1	mg/kg	8
Manganese	1	mg/kg	490
Nickel	1	mg/kg	31
Silver	1	mg/kg	<1
Zinc	1	mg/kg	51
Mercury	0.02	mg/kg	0.03

TRH (C ₆ -C ₄₀) in Soil		Sample No	21-01858-1
		Sample Description	MR-SPLIT 01
		Sample Date	2/02/2021
ANALYTE	LOR	Units	Result
Benzene	0.1	mg/kg	<0.1
Toluene	0.1	mg/kg	<0.1
Ethylbenzene	0.1	mg/kg	<0.1
Xylenes (Total)	0.2	mg/kg	<0.2
Naphthalene	0.5	mg/kg	<0.5
TRH C ₆₋₁₀	2	mg/kg	<2
TRH C ₆₋₁₀ minus BTEX (F1)	2	mg/kg	<2
TRH C _{>10-16}	20	mg/kg	<20
TRH C _{>10-16} minus Naphthalene (F2)	20	mg/kg	<20
TRH C _{>16-34}	50	mg/kg	<50
TRH C _{>34-40}	50	mg/kg	<50

Misc. Inorganics in Soil		Sample No	21-01858-1
		Sample Description	MR-SPLIT 01
		Sample Date	2/02/2021
ANALYTE	LOR	Units	Result
TOC	0.1	%	0.7

Acid Sulfate Soils		Sample No	21-01858-1
		Sample Description	MR-SPLIT 01
		Sample Date	2/02/2021
ANALYTE	LOR	Units	Result
pH _f (23Af)	0.1	pH units	7.3
pH _{fox} (23Bf)	0.1	pH units	7.6
Rate of Reaction			XXXX

O2 Marine
Job No: 21-01858

LABORATORY REPORT
Revision: 00

Date: 16/02/21

Subcontracting		Sample No	21-01858-1
		Sample Description	MR-SPLIT 01
		Sample Date	2/02/2021
ANALYTE	LOR	Units	Result
Tributyl tin	0.5	µg Sn/kg	<0.5

Result Definitions

LOR Limit of Reporting [NT] Not Tested [ND] Not Detected at indicated Limit of Reporting
* Denotes test not covered by NATA Accreditation

FOR MICROBIOLOGICAL TESTING - The data in this report may not be representative of a lot, batch or other samples and may not necessarily justify the acceptance or rejection of a lot or batch, a product recall or support legal proceedings. Tests are not routinely performed as duplicates unless specifically requested. Changes occur in the bacterial content of biological samples. Samples should be examined as soon as possible after collection, preferably within 6 hrs and must be stored at 4 degrees Celsius or below. Samples tested after 24 hrs cannot be regarded as satisfactory because of temperature abuse and variations.

QUALITY CONTROL REPORT

Work Order	: EP2101009	Page	: 1 of 13
Client	: WA MARINE PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Claudio Deldeo	Contact	: Nick Courts
Address	: SUITE 5, 5/18 GRIFFON DRIVE PO BOX 1370 DUNSBOROUGH, PERTH WA, AUSTRALIA 6281	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 20WA0028	Date Samples Received	: 01-Feb-2021
Order number	: ----	Date Analysis Commenced	: 04-Feb-2021
C-O-C number	: ----	Issue Date	: 11-Feb-2021
Sampler	: Claudio Deldeo		
Site	: Onslow		
Quote number	: EN/222		
No. of samples received	: 22		
No. of samples analysed	: 21		



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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Morgan Lennox	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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	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: 3497454)									
EP2101009-001	MR-01-TOP	EG005-SD: Aluminium	7429-90-5	50	mg/kg	6390	6200	2.99	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	37700	36400	3.40	0% - 20%
EP2101009-011	MR-08-0-0.5m	EG005-SD: Aluminium	7429-90-5	50	mg/kg	4150	3840	7.75	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	32200	29900	7.40	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 3497452)									
EP2101009-001	MR-01-TOP	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
EP2101009-011	MR-08-0-0.5m	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 3505317)									
EP2101009-001	MR-01-TOP	EA037: pH (F)	----	0.1	pH Unit	7.6	7.6	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.4	7.3	0.00	0% - 20%
EP2101009-010	MR-07-BOT	EA037: pH (F)	----	0.1	pH Unit	7.8	7.9	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.5	7.5	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3497418)									
EP2101009-001	MR-01-TOP	EA055: Moisture Content	----	0.1	%	22.6	22.0	2.55	0% - 20%
EP2101009-010	MR-07-BOT	EA055: Moisture Content	----	0.1	%	29.3	29.8	1.82	0% - 20%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 3497453)									
EP2101009-001	MR-01-TOP	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<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	11.0	10.4	5.61	0% - 20%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	13.6	13.0	4.38	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	13.6	13.2	2.48	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	6.4	6.3	0.00	No Limit
		EG020-SD: Nickel	7440-02-0	1	mg/kg	16.8	16.3	3.11	0% - 50%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	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: 3497453) - continued									
EP2101009-001	MR-01-TOP	EG020-SD: Zinc	7440-66-6	1	mg/kg	29.7	28.9	2.63	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	417	407	2.44	0% - 20%
EP2101009-011	MR-08-0-0.5m	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	<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	8.8	7.6	14.5	0% - 50%
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	12.7	10.3	21.2	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	8.2	7.6	6.48	No Limit
		EG020-SD: Lead	7439-92-1	1	mg/kg	4.7	4.4	7.44	No Limit
		EG020-SD: Nickel	7440-02-0	1	mg/kg	12.5	11.7	7.09	0% - 50%
		EG020-SD: Zinc	7440-66-6	1	mg/kg	22.8	21.2	7.09	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	334	312	6.91	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 3503147)									
EB2103051-040	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.70	0.70	0.00	0% - 20%
EP2101009-009	MR-07-TOP	EP003: Total Organic Carbon	----	0.02	%	0.26	0.27	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3499180)									
EP2101009-014	TBS TBS 0012	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3499180)									
EP2101009-014	TBS TBS 0012	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 3499180)									
EP2101009-014	TBS TBS 0012	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 3499174)									
EP2101009-001	MR-01-TOP	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP2101009-011	MR-08-0-0.5m	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 3499179)									
EP2101009-001	MR-01-TOP	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	0% - 3%
EP2101009-011	MR-08-0-0.5m	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	0% - 3%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QC Lot: 3499174)									
EP2101009-001	MR-01-TOP	EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP2101009-011	MR-08-0-0.5m	EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QC Lot: 3499179)									
EP2101009-001	MR-01-TOP	EP080-SD: C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	0.00	0% - 3%
EP2101009-011	MR-08-0-0.5m	EP080-SD: C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	0.00	0% - 3%
EP080-SD: BTEXN (QC Lot: 3499179)									
EP2101009-001	MR-01-TOP	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Total Xylenes	----	0.2	mg/kg	<0.5	<0.5	0.00	0% - .2%
		EP080-SD: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
EP2101009-011	MR-08-0-0.5m	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Total Xylenes	----	0.2	mg/kg	<0.5	<0.5	0.00	0% - .2%
		EP080-SD: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
EP2101009-011	MR-08-0-0.5m	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Total Xylenes	----	0.2	mg/kg	<0.5	<0.5	0.00	0% - .2%
		EP080-SD: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
EP2101009-011	MR-08-0-0.5m	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: meta- & para-Xylene	108-38-3	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
			106-42-3						
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
		EP080-SD: Total Xylenes	----	0.2	mg/kg	<0.5	<0.5	0.00	0% - .2%
		EP080-SD: Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	0.00	0% - .2%
EP090: Organotin Compounds (QC Lot: 3494493)									
EM2101439-004	Anonymous	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
EP2101009-009	MR-07-TOP	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
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3499175)									
EP2101009-001	MR-01-TOP	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.00	No Limit



Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3499175) - continued									
EP2101009-001	MR-01-TOP	EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.00	No Limit
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.00	No Limit		
EP2101009-011	MR-08-0-0.5m	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.00	No Limit
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.00	No Limit		



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3499175) - continued									
EP2101009-011	MR-08-0-0.5m	EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3503833)									
EP2101009-017	RINS 1 MET	EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3503834)									
EP2101009-017	RINS 1 MET	EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.009	0.010	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.016	0.016	0.00	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.77	0.94	19.2	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.73	0.77	5.32	0% - 50%
EP2101204-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	10.8	10.1	7.33	0% - 20%
EP2101009-017	RINS 1 MET	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	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	<0.001	<0.001	0.00	No Limit
EP2101204-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.026	0.027	0.00	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.263	0.265	0.968	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.049	0.051	4.53	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.060	0.063	5.70	0% - 50%
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	8.56	9.79	13.4	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3503837)									
EP2101191-009	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3501581)									
EP2101009-018	RINS 1 VOL	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3501581)									
EP2101009-018	RINS 1 VOL	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3501581)									
EP2101009-018	RINS 1 VOL	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Page : 7 of 13
 Work Order : EP2101009
 Client : WA MARINE PTY LTD
 Project : 20WA0028



Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
EP080: BTEXN (QC Lot: 3501581) - continued									
EP2101009-018	RINS 1 VOL	EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit				LCS	Low	High
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 3497454)									
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	93.0	80.0	120	
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	81.5	80.0	120	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 3497452)									
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	2.154 mg/kg	104	80.0	120	
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 3497453)									
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	4.6 mg/kg	105	70.0	130	
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	21.7 mg/kg	103	74.0	130	
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	101	97.0	113	
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	32 mg/kg	106	76.0	116	
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	16 mg/kg	106	70.0	130	
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	40 mg/kg	98.4	74.0	124	
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	130 mg/kg	103	70.0	130	
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	55 mg/kg	99.8	81.0	135	
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	2.1 mg/kg	85.7	70.0	130	
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	60.8 mg/kg	112	81.0	143	
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 3503147)									
EP003: Total Organic Carbon	----	0.02	%	<0.02	0.56 %	98.3	70.0	130	
				<0.02	0.2 %	106	70.0	130	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3499180)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	100	66.0	122	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3499180)									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	100	66.0	122	
EP080: BTEXN (QCLot: 3499180)									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	100	72.0	122	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	100	75.0	119	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	100	73.0	121	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	4 mg/kg	100	74.0	122	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	100	75.0	121	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	100	64.0	126	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 3499174)									
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	252 mg/kg	102	75.9	145	
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	634 mg/kg	123	70.9	140	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 3499174) - continued									
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	99 mg/kg	126	60.2	132	
EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----	
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 3499179)									
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	32 mg/kg	79.6	70.0	130	
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 3499174)									
EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	404 mg/kg	109	76.1	147	
EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	567 mg/kg	123	63.4	132	
EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	33 mg/kg	105	54.9	130	
EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----	
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 3499179)									
EP080-SD: C6 - C10 Fraction	C6_C10	3	mg/kg	<3	37 mg/kg	81.1	70.0	130	
EP080-SD: BTEXN (QCLot: 3499179)									
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	95.8	70.0	130	
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	2 mg/kg	81.7	70.0	130	
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	2 mg/kg	89.9	70.0	130	
EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	4 mg/kg	94.6	70.0	130	
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	2 mg/kg	89.7	70.0	130	
EP080-SD: Total Xylenes	----	0.2	mg/kg	<0.2	----	----	----	----	
EP080-SD: Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	
EP080-SD: Naphthalene	91-20-3	0.2	mg/kg	<0.2	0.5 mg/kg	81.3	70.0	130	
EP090: Organotin Compounds (QCLot: 3494493)									
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	# 131	36.0	128	
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	117	42.0	132	
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	98.4	52.0	139	
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3499175)									
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	85.4	55.0	131	
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	----	----	----	----	
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	71.5	64.0	110	
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	88.2	62.0	112	
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	80.7	64.0	118	
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	78.9	59.0	117	
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	99.2	69.0	111	
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	96.3	66.0	118	
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	99.4	70.0	116	
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	94.6	59.0	121	
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	79.0	68.0	116	



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3499175) - continued									
EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	25 µg/kg	92.3	51.0	107	
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	102	52.0	118	
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	----	----	----	----	
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	82.6	55.0	111	
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	----	----	----	----	
EP132B-SD: Benzo(g,h,i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	92.0	62.0	106	
EP132B-SD: Dibenz(a,h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	76.8	35.0	141	
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	66.8	48.0	122	
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	----	----	----	----	
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----	

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EG020T: Total Metals by ICP-MS (QCLot: 3503833)									
EG020B-T: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	113	66.8	120	
EG020T: Total Metals by ICP-MS (QCLot: 3503834)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.5	89.7	117	
EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	0.02 mg/L	114	82.9	120	
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	89.6	118	
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.4	89.2	116	
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.5	89.0	115	
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.4	85.8	115	
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.0	88.4	111	
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.0	88.5	115	
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	87.4	116	
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	88.1	120	
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	87.1	120	
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3503837)									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	85.1	115	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3501563)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	385 µg/L	76.2	39.3	103	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	385 µg/L	82.4	47.2	122	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	380 µg/L	58.1	42.5	119	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3501581)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	99.9	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3501563)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	398 µg/L	76.3	42.0	104	



Sub-Matrix: WATER

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	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3501563) - continued									
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	597 µg/L	62.4	46.2	116	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	168 µg/L	57.1	24.7	137	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3501581)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	101	73.9	115	
EP080: BTEXN (QCLot: 3501581)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	105	84.1	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	100	81.0	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	100	84.4	113	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	105	84.3	114	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	102	86.5	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	108	77.0	118	
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3503944)									
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	# 121	60.0	120	
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	97.0	59.0	123	
EP132: 7,12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	116	36.0	144	
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	102	64.0	122	
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	102	64.0	126	
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	104	65.0	127	
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	113	64.0	130	
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	118	64.0	126	
EP132: Benzo(b+j)fluoranthene	205-99-2	0.1	µg/L	<0.1	2 µg/L	118	62.0	126	
	205-82-3								
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	116	62.0	126	
EP132: Benzo(g,h,i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	119	56.0	126	
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	113	68.0	130	
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	111	66.0	130	
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	123	35.0	133	
EP132: Dibenz(a,h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	119	58.0	128	
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	107	65.0	127	
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	104	64.0	124	
EP132: Indeno(1,2,3,cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	121	57.0	127	
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	94.9	54.0	128	
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	116	66.0	130	
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	104	65.0	129	
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	106	66.0	128	



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

Sub-Matrix: SOIL

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
					Low	High	
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 3497452)							
EP2101009-002	MR-02-TOP	EG035T-LL: Mercury	7439-97-6	1 mg/kg	75.4	70.0	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 3497453)							
EP2101009-002	MR-02-TOP	EG020-SD: Arsenic	7440-38-2	50 mg/kg	99.5	70.0	130
		EG020-SD: Cadmium	7440-43-9	12.5 mg/kg	100.0	70.0	130
		EG020-SD: Copper	7440-50-8	50 mg/kg	106	70.0	130
		EG020-SD: Lead	7439-92-1	50 mg/kg	97.8	70.0	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	104	70.0	130
		EG020-SD: Zinc	7440-66-6	50 mg/kg	117	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3499180)							
EP2101009-015	FBS TBS 0014	EP080: C6 - C9 Fraction	----	24 mg/kg	102	69.1	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3499180)							
EP2101009-015	FBS TBS 0014	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	90.2	69.1	135
EP080: BTEXN (QCLot: 3499180)							
EP2101009-015	FBS TBS 0014	EP080: Benzene	71-43-2	2 mg/kg	82.2	76.4	118
		EP080: Toluene	108-88-3	2 mg/kg	82.0	67.4	112
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 3499174)							
EP2101009-002	MR-02-TOP	EP071-SD: C10 - C14 Fraction	----	252 mg/kg	106	70.0	130
		EP071-SD: C15 - C28 Fraction	----	634 mg/kg	127	70.0	130
		EP071-SD: C29 - C36 Fraction	----	99 mg/kg	128	70.0	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 3499179)							
EP2101009-002	MR-02-TOP	EP080-SD: C6 - C9 Fraction	----	24 mg/kg	73.7	70.0	130
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 3499174)							
EP2101009-002	MR-02-TOP	EP071-SD: >C10 - C16 Fraction	----	404 mg/kg	113	70.0	130
		EP071-SD: >C16 - C34 Fraction	----	567 mg/kg	127	70.0	130
		EP071-SD: >C34 - C40 Fraction	----	33 mg/kg	100	70.0	130
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 3499179)							
EP2101009-002	MR-02-TOP	EP080-SD: C6 - C10 Fraction	C6_C10	29 mg/kg	73.1	70.0	130
EP080-SD: BTEXN (QCLot: 3499179)							
EP2101009-002	MR-02-TOP	EP080-SD: Benzene	71-43-2	2 mg/kg	95.7	70.0	130
		EP080-SD: Toluene	108-88-3	2 mg/kg	87.1	70.0	130
EP090: Organotin Compounds (QCLot: 3494493)							
EM2101460-002	Anonymous	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# 13.4	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	53.6	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	109	20.0	130



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Recovery Limits (%)		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3499175)								
EP2101009-002	MR-02-TOP	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	85.4	70.0	130	
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	78.7	70.0	130	
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	85.3	70.0	130	
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	81.7	70.0	130	
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	80.9	70.0	130	
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	82.3	70.0	130	
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	84.2	70.0	130	
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	74.5	70.0	130	
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	78.9	70.0	130	
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	80.7	70.0	130	
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2	25 µg/kg	84.5	70.0	130	
			205-82-3					
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	99.4	70.0	130	
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	78.6	70.0	130	
		EP132B-SD: Benzo(g,h,i)perylene	191-24-2	25 µg/kg	94.0	70.0	130	
EP132B-SD: Dibenzo(a,h)anthracene	53-70-3	25 µg/kg	77.3	70.0	130			
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	70.1	70.0	130			

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3503834)							
EP2101191-004	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	105	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	103	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	107	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	105	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	103	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	107	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	108	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3503837)							
EP2101191-010	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	99.3	70.0	130



CHAIN OF CUSTODY
ALS Laboratory

RELINQUISHED BY:

C. DEL DEO
DATE/TIME: 01-02-21

RECEIVED BY:

DATE/TIME:

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

DATE/TIME:

CLIENT: O2 Marine
PROJECT: 2016 AU 0028
SITE: UNSLOW MR
TURNAROUND REQUIREMENTS:
(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
 Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):
PURCHASE ORDER NO.:
PROJECT MANAGER: SEBASTIAN MORILLO CONTACT PH:
SAMPLER: CLAUDIO DEL DEO SAMPLER MOBILE: 0449065691
EMAIL REPORTS TO: claudio.deldeo@o2marine.com.au
ALS QUOTE NO.: EN222
EMAIL INVOICE TO:

FOR LABORATORY USE ONLY (Circle)

Custom Seal intact? Yes No N/A
Pac has Filter for BPA present upon receipt? Yes No N/A
Random Sample Temperature in Transit: C
Other comments:

SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS	Water(W)	MATRIX: Sub(s)	CONTAINER INFORMATION	ANALYSIS REQUIRED										Additional Information					
					CA (USEM) (ppm)	EMG7 (µg/L)	PCDD/F (M and F)	PCDD/F (S, A, O, C, H, M, P, M, N, A, B, Z)	PCDD/F (M)	PF 15-20 (µg/g)	PF 15-20 (µg/g) Trace PAH in sediment	TC (µg/kg)	EMG9 Organics	EMG10 TOC						
			2021		1x 500 ML B	1x 500 ML B														
	MR 01-TOP	Sediment	28/01-1250	S	3+3															
	MR1 MR-TMP 01		N/A	S	3+3															
	MR1 MR-TMP 02		N/A	S	3+3															
	MR 2 MR-02-TOP		29/01-800	S	3+3															
	MR 2 MR-02-BOT		29/01-800	S	3+3															
	FBS		29/01	S	1															
	MR 03 MR-03-TOP		28/01 16140	S	3+3															
	MR 04 MR-04 TOP		28/01 1500	S	3+3															
	MR 04 MR-04-0.5-1		28/01 1500	S	3+3															
	MR 05 MR-05-TOP		29/01 8:20	S	3+3															
	MR 06 MR-06-TOP		28/01 15:30	S	3+3															
	TBS		21/01 4PM	S	1															
	MR 6 MR-TMP		28/01 1530	S	3+3															
	MR 03 MR-03 TOP		28/01 1640	S	3+3															
	MR 05 MR-05 TOP		29/01 8:20	S	3+3															
	MR 07 MR-07 TOP		29/01 8:50	S	3+3															
	MR 07 MR-07-BOT		29/01 8:50	S	3+3															
	MR 08 MR-08-TOP (0-0.5m)		28/01 13:30	S	3+3															
	MR 08 MR-08-0.5-1m (0.5-1m)		28/01 13:30	S	3+3															
	MR 09 MR-09 TOP		28/01 9:00	S	3+3															
	TBS		21/1																	
	RIMS 1 MET		29/11 17:00	W	2															
	RIMS 1 VAL		29/11 17:00	W	2															
					TOTAL	78														

SAME CONT
SAME CONTAINER
1x 250 ML S
1x 150 ML S
HOLD FOR ELUTMATE IF REQUIRED
1x 250 ML SAR HOLD FOR ELUTMATE IF REQUIRED

07510
1800
M chy

