SEDIMENT SAMPLING PLAN

Document No: ARMS-0000-H-PRO-N-0003 Rev 1

Project Name: Nolans Rare Earths

REVISION HISTORY

Date	Description	Prepared	Reviewed	Approved	3rd Party Approval
July 2022	Rev 1 Issued to DITT	Michael Robinson, ESG Manager	Michael Robinson, ESG Manager	Stewart Watkins, GM Projects	
23/07/2021	Rev 0 Draft	Michael Robinson, ESG Manager	Brian Fowler, GM NT & Sustainability	Stewart Watkins, GM Projects	

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1.0 INTRODUCTION

1.1 Background

The Nolans Rare Earths Project (the Project) is located approximately 135 km north west of Alice Springs, Northern Territory. The Project targets the Nolans Bore mineral deposit for rare earth elements. Activities will focus on construction, mining, processing, rehabilitation and decommissioning of an open-cut, rare earth mine, and its associated infrastructure.

1.2 Purpose

The Water Management Plan (WMP) for the Nolans Project (Project) provides a framework for the management of summary of sampling requirements at the site. The WMP has been designed to collect data throughout the construction and operations phase to assess the performance of water management onsite. In order to facilitate consistency in sampling, and comply with quality assurance and control methodologies, a series of sampling procedures have been established including:

- Surface Water Sampling Procedure;
- Mine Site Groundwater Sampling Procedure; and
- Sediment Sampling Procedure (this procedure).

1.3 Objectives

Sediment sampling will be undertaken as a proxy for water quality due to the limited flows experienced at and surrounding the Project.

The primary objective of the Sediment Sampling Procedure is to obtain a sample with minimal significant alteration in sediment chemistry during sample collection. The collected sample should represent the physical, chemical and biological characteristics of sediment in the targeted drainage system as closely as possible.

1.4 Planning and Equipment

A number of factors must be considered during the field planning phase, prior to sediment sampling. These include consideration of ground condition at targeted locations and safety requirements. A summary of equipment and associated suppliers are provided in Table 1—1. All equipment in relation to sediment sampling should be ordered a minimum of four weeks prior to sampling.

Table 1—1 Summary of Planning

Timing	Details	Supplier
At least 4 weeks prior to sampling	**Order** Lab Bottles Laboratory jars and large zip lock bags Eskies and Cool Bricks	tbc
	Hire / Maintenance Check Long arm sampler	Eco Environmental 6/509-511 South Rd, Ashford SA 5031 08 8293 3355 adelaide@ecoenvironmental.com.au Thermo Fisher Scientific 5 Caribbean Dv, Scoresby Vic 3179 03 9757 4377 RentalsAU@thermofisher.com
	Purchase Nitrile gloves Decon N	Eco Environmental 6/509-511 South Rd, Ashford SA 5031 08 8293 3355 adelaide@ecoenvironmental.com.au Thermo Fisher Scientific 5 Caribbean Dv, Scoresby Vic 3179 03 9757 4377 RentalsAU@thermofisher.com

2.0 SEDIMENT WATER SAMPLING PROCEDURE

2.1 Sampling Equipment

Sediment sampling requires the following:

- Chain of Custody (Appendix A);
- Stainless steel or plastic bucket and spade;
- 3 mm stainless steel sieve
- 80 mesh sieve
- Calico sample bags, zip lock bags paper soil sample bags (capable of storing 500 gms of fine sediments);
- Nitrile gloves;
- Permeant marker.

2.2 Sampling Locations

There are a number of sediment sampling locations across the Project. The sediment sampling locations coincide with surface water / stormwater sampling locations at the Mine Site. The sampling locations are positioned to assess upstream, onsite and downstream impacts from the Project

A summary of sampling locations, frequency and suites are provided in Table 2—1 and illustrated on Figure 2—1 and Figure 2—2.

2.2.1 Sediment Sample Assay Suite

The sampling suite for sediment includes photo point monitoring and laboratory measurements as follows:

- Photo point Monitoring; and
- Laboratory Analysis:
- Metals, U, Th, P and Sr
- Rare Earths element suite.

Note – the Nolans deposit has a unique geochemical signature and the above analytes will enable early detection within sediments.

2.3 Sampling Frequency

Sampling will be undertaken in accordance with the frequency identified in Table 2—1.

Table 2—1 Sediment Monitoring Locations

Site ID	Coordinates		Type	Description	Sample Frequency	
	Easting	Northing			Baseline	Operation
Surface Water						
SSW01	[redacted]	[redacted]	Control	Nolans Creek: Eastern boundary inflow of the Mine Site, upstream of the South East WRD.	Biannually	Sediment sampling frequency should be undertaken so that the combined surface water / sediment sampling meets an overall quarterly frequency. (Note: A sediment sample should only be used to infill a surface water sample event post rainfall. consecutive sediment samples are not required to be taken.)
SSW02	[redacted]	[redacted]		Schafer Creek, upstream tributary to Kerosene Camp Creek, southern border of the mine site area.		
SSW03	[redacted]	[redacted]	Control	Kerosene Creek, upstream of the LOM Pit and stage 1 and 2 diversion channels.		
SSW04	[redacted]	[redacted]	Impact	Kerosene Creek Realignment within the inlet to the creek realignment.		
SSW05	[redacted]	[redacted]	Impact	Kerosene Creek, downstream of Sediment Control		
SSW06	[redacted]	[redacted]		Nolans Creek Downstream of Sediment Control and East WRD		
Stormwater sediment retention ponds						
SSB01	[redacted]	[redacted]	Impact-	Adjacent to western sediment control	Biannually	As an alternative to when quarterly stormwater sampling cannot be undertaken.
SSB02	[redacted]	[redacted]	Impact-	Down gradient of sediment control		
SSB03	[redacted]	[redacted]	Impact-	Topsoil stockpile, up gradient of sediment control		

Site ID	Coordinates		Type	Description	Sample Frequency	
	Easting	Northing			Baseline	Operation
SSB04	[redacted]	[redacted]	Impact-	Downgradient of Eastern WRD		(Note: A sediment sample should only be used to infill a surface water sample event post rainfall. consecutive sediment samples are not required to be taken.)
SSB05	[redacted]	[redacted]	Impact-	Mine Facilities		
SSB06	[redacted]	[redacted]	Impact-	West WRD		
SSB07	[redacted]	[redacted]	Impact	East WRD		
SSB08	[redacted]	[redacted]	Impact-	TSF/RSF Event Pond		
SSB09	[redacted]	[redacted]	Impact-	Accommodation		

Notes

1: Coordinates are the same as the surface water and stormwater sampling locations, actual locations should mirror the surface water / stormwater sampling locations as sediment is used as an alternative monitoring method.

2: Sediment site IDs should be noted on the survey points in brackets for reference during sampling.

4: If concentrations are noted at boundary monitoring locations, additional down gradient locations should be assessed and installed as appropriate.

5: During the operational period, the monitoring schedule should be reviewed annually to focus on any potential trends of operationally impacts.

320,000

SSW05
SSB02
SSB01
SSB06
SSW06
SSW04
SSB04
SSB03
SSW03
SSB05
SSB07
SSW01
SSW02

West WRD
Sediment Control
Kerosene Camp Creek
Pit
East WRD
Nolans Creek
Hunt Creek
Mine Facilities
Schafer Creek

7,500,000

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

320,000

1:20,000 @ A3
0 250 500 750 1,000
Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 53

N

LEGEND

- Project Areas
- Topsoil Stockpile
- Predicted Water Surface
- Mine Infrastructure
- Mine Access Roads
- Diversion Channel Stage 1
- Diversion Channel Stage 2
- Sediment Control
- Waterways
- Sediment Sampling Location

Note:
Total number and locations TBD through the LOM

Arafura Resources Limited
Mine Management Plan

Job Number	12515982
Revision	B
Date	22 Jul 2021

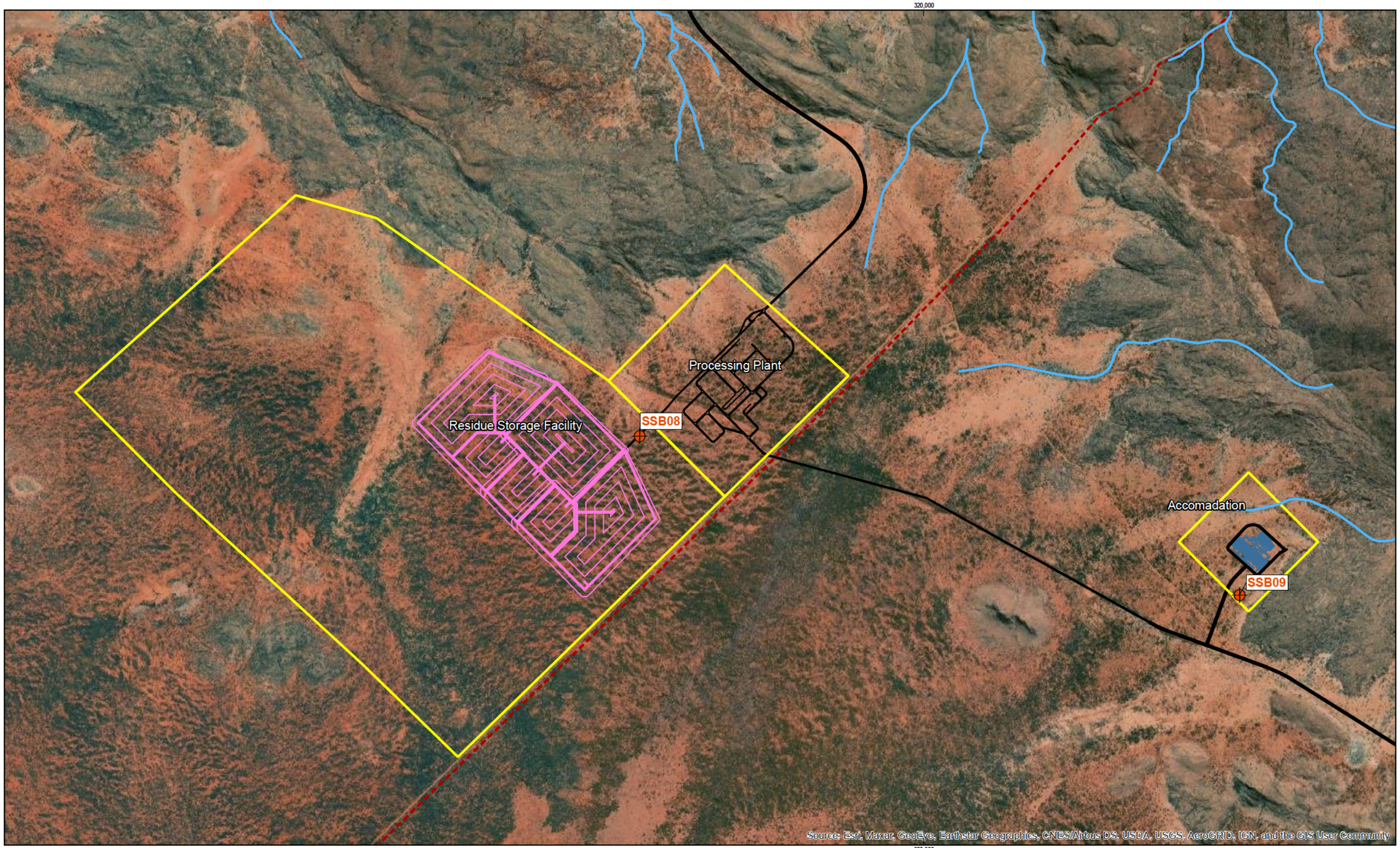
Proposed Mine Site Sediment Monitoring Locations

Figure 2-1

G:\43\12515982\GIS\Maps\PDF\EMP Final\12515982_2-1_MineSite_SML_RevB.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:fjohnson

2 Salamanca Square, Hobart Tasmania 7000 Australia T 61 3 6210 0600 E hbamail@ghd.com W www.ghd.com



1:30,000 @ A3

0 250 500 750 1,000

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 53

N

LEGEND

- Project Areas
- Processing Plant Roads
- Accommodation Village
- Residue Storage Facility
- Mine Access Roads
- Major Roads
- Gas Pipeline
- Sediment Sampling Location
  Note:
  Total number and locations TBD through the LOM

Arafura Resources Limited
Mine Management Plan

Job Number	12515982
Revision	B
Date	22 Jul 2021

Proposed Processing Site and Accommodation Sediment Monitoring Locations

Figure 2-2

G:\43\12515982\GIS\Maps\PDF\EMP Final\12515982_2-2_Processing_SML_RevB.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:fjohnson

2 Salamanca Square, Hobart Tasmania 7000 Australia T 61 3 6210 0600 E hbamail@ghd.com W www.ghd.com

3.0 SEDIMENT SAMPLING PROCEDURE

3.1 Field Measurements

Sediment sampling is to be undertaken in accordance with the following:

- Photographs
  - Photographs of the sample location, upstream and downstream should be taken. Photographs to be logged into a filing system indicating site location and date.
- Ground Conditions
  - Summarise all ground conditions at the sampling location including the presence or absence of water, direction and volume of flow.
  - Areas of discoloured sediments, polluted water, affected plant growth and animal populations (aquatic) and odours should be identified and mapped.
  - Undertake a qualitative assessment of sediment loss or deposition that has occurred since the previous sampling event.

3.2 Sample Collection

Sediment samples are composite samples including five sub samples across the primary drainage channel. The collection of sediment samples will be undertaken in accordance with the following:

- Rinse spade and mixing bucket with Decon N to decontaminate;
- Scrap away any organic surface matter
- Sample Collection
  - Apply nitrile gloves and collect five 2 kg subsamples across the primary drainage channel. The sample should be collected from surface to a maximum depth of 150 mm.
  - Combine and mix the subsamples thoroughly within the decontaminated bucket and sieve through a 3 mm stainless steel sieve into a second bucket.
  - If sample is dry, sieve through a -80 mesh (180µ) sieve and collect about 200-500 gms of fine material. If sample is damp it may need to go to site laboratory for drying prior to final -80 mesh sieve.
  - Place sieved sediment into sample bag, record details on bag etc. for dispatch.
- Waste Disposal
  - Excess sediment will be returned to ground at the side of the creek and all used disposable sampling equipment should be stored for disposal at the Processing Site; and
- Electronic Transfer
  - All sediment quality results, duplicate locations and Chain of Custody (CoC) are to be scanned and kept on file.

3.3 Sample Dispatch

Sediment samples have potential to deteriorate following collection. Samples are to be placed into onsite fridge pending dispatch to laboratory. At completion of the sampling round, samples are to be packaged and transferred to Alice Springs haulage depot. Samplers are to contact the haulage companies and laboratory to inform them of sample delivery.

The sampler is to inform the laboratory of sample postage and provide a completed Chain of Custody (CoC). A blank CoC is provided in Appendix A.

APPENDIX A CHAIN OF CUSTODY FORM

ALS Environmental

CHAIN OF CUSTODY
ALS Laboratory: please tick

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE:		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes No N/A
PROJECT:	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt: Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: C
PROJECT MANAGER:	**CONTACT PH:**	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER:	**SAMPLER MOBILE:**	**RELINQUISHED BY:**	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**				
Email Reports to (will default to PM if no other addresses are listed):		DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS									
														Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
				TOTAL										

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.