



**AITKEN ROWE TESTING LABORATORIES PTY LTD**

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**LIMITED PHASE 2 SITE INVESTIGATION**

**Tony Agresta C/- MJM Consulting Engineers**

**1812A Mallinson Road, Lake Wyangan, NSW**

**GS20-081**

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## REPORT DETAILS

Report Type: Limited Phase 2 Site Investigation

Report Title: Limited Phase 2 Investigation 1812A Mallinson Road, Lake Wyangan, NSW

Client: Tony Agresta C/- MJM Consulting Engineers

Report Registration Number: GS20-081

Issue No.	Date of Issue	Author	Checked	Approved
1	August 2020	Nathan McLaren	Nathan McLaren	Nathan McLaren

Signed



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## **1. INTRODUCTION**

### **1.1 Overview**

Aitken Rowe Testing Laboratories (ARTL) was commissioned by MJM Consulting Engineers on behalf of Tony Agresta to undertake a Limited Phase 2 Site Investigation (Phase 2) to assess the potential for contamination at 1812A Mallinson Road, Lake Wyangan, NSW (the site). The site currently consists of Lot 115 in Deposited Plan 751743 in the Local Government Area of Griffith.

It is understood there are plans to subdivide the site for future residential development. It is the purpose this investigation to assess the underlying materials for contaminants of concern identified by Griffith City Council during the Development Application process. A site inspection and investigative works were undertaken on the 3<sup>rd</sup> June 2020. Access to the site in its entirety was obtained and details of this inspection and investigative works are provided in this report, together with comments on the significance of the findings.

### **1.2 Proposed Development**

ARTL has been advised that the site is to be developed with 17 residential lots.

### **1.3 Objectives**

The objectives of the investigation are:

- Briefly document the site history.
- Identify past and present potential contaminating activities;
- Assess the risk of these contaminant sources with respect to the contamination status of the site.
- Conclude whether or not the site is suitable for proposed use as zoned without further assessment, or provide recommendations for further assessment (if required) to enable such conclusions.

### **1.4 Scope of Work**

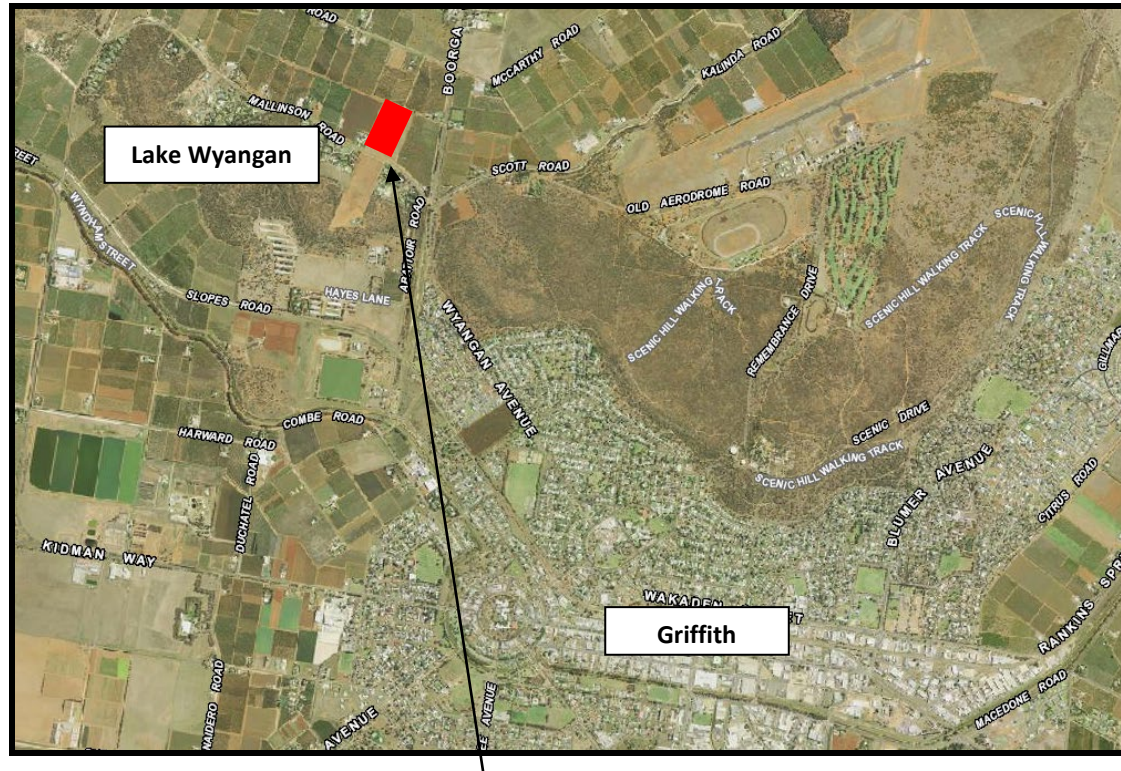
The scope of work undertaken by ARTL to meet the objectives comprised the following:

- Review of historical information including local Council information, anecdotal information and a search for previous investigations performed for the site.
- Review of geology, topography and hydrology of the site.
- Detailed site inspection and investigation including
  - Excavating 40 boreholes to depths of 0.5m
  - Collection of 10 composite soil samples for analysis
  - Undertaking visual inspection for potential onsite contamination.
- Laboratory analysis of representative soil samples for:
  - OC Pesticides – Organochlorine Pesticides, 10 composite samples
  - OP Pesticides – Organophosphorus Pesticides, 10 composite samples
  - PCB – Polychlorinated Biphenyls, 10 composite samples
  - Metals – Arsenic, Cadmium, Chromium, Copper Lead, Mercury, Nickel and Zinc, 10 composite samples
  - Asbestos – 10 composite samples
- Assessment of data collected during the investigation and analysis results.
- The completion of a formal report presenting results, contamination assessment and conclusions.

## 2 SITE IDENTIFICATION

### 2.1 Site Location

The site is located on Oakes Road less than 3km south east of the central business district of Griffith as shown in (Figure 1).



**Figure 1:** Aerial photograph displaying the site and surrounds (© Department of Lands 2020).

### 2.2 Site Inspection and Description

The site is located on Mallinson Road and consists of Lot 115 in Deposited Plan 751743 in the Local Government Area of Griffith. The surrounding land is a mixture of residential & agricultural properties. The site is currently vacant and historical aerial images show the site was once used for agriculture (orchard). The orchard trees were removed circa 2009 to 2010.

The total area of the property is approximately 8.5 hectares. A detailed site plan is attached in Appendix A.

### 2.3 Surrounding Land-use

The area immediately surrounding the site consists of residential and agricultural properties. The site is bound by Mallinson Road to the south, agricultural properties to the north, east & west and residential properties further to the south.

## 2.4 Site Details Summary

Table 1 provides a summary of site details.

**Table 1:** Site detail summary

Site Details	
Site Address	1812A Mallinson Road, Lake Wyangan, NSW
Title Identification	Lot 115 in DP 751743
Current Site Use	Vacant/agricultural
Future Site Use	Residential
Investigation Area	8.5 Hectares (approx.)

## 3 PHYSICAL SETTING

### 3.1 Site Topography and Hydrology

The site is generally flat and the elevation is approximately 125m above sea level.

The local hydrology of the area consists of both constructed irrigation channels and natural drainage systems. Any runoff from the site is likely to run into the nearby drainage reserve which forms part of the local irrigation network. The local irrigation network also forms part of the natural Mirrool Creek catchment, which flows toward the Barren Box Swamp. It is likely that in times of excessive rain, water would infiltrate the underlying soil materials and percolate toward the water table.

### 3.2 Local Geology and Soil

The topography of the wider area is generally flat. The 1:250 000 scale Geological Series sheet for Narrandera (S1 55-10) indicates that the area is underlain by quaternary sediments of Cainozoic age consisting of alluvial deposits of clays, silts and sands.

Intrusive works completed for the land capability assessment (see ARTL report ref: GS20-081A) revealed the site is generally underlain by topsoil overlying low plasticity silt which in turn is underlain by medium & high plasticity clays & sandy clays and then extremely weathered, extremely low strength sandstone bedrock extending to borehole termination depth at 2.0m.

### 3.3 Hydrogeology

It was beyond the scope of work to study the groundwater flow direction. Mobile contaminants (if any) located at the site would be expected to progress down to the groundwater surface, and migrate laterally down gradient from the source.

## 4 SITE HISTORY

### 4.1 Anecdotal Evidence

The site has been used for agricultural (citrus) purposes previously.

#### **4.2 Contaminated Land Register Search**

A search of the sites listed by the EPA under the *Contaminated Land Management Act 1997* revealed that no records have been issued against the site.

#### **4.4 Previous Investigation Reports**

No previous contamination investigative reports for the site were made available for this investigation.

### **5 POTENTIAL CONTAMINATION TYPES AND RECEPTORS**

#### **5.1 Potential Contamination Types**

Based on the site history and site inspection the potential contaminants at the site are likely to be those associated with pesticide application and asbestos from irrigation pipework. Therefore any contamination is expected to be in the surface materials from direct application and over spray from adjacent properties which have persisted through time. It is noted that no machinery has been stored on site as well as no facilities for petrochemical storage.

### **6 Sampling and Analysis**

#### **6.1 Soil Investigation Levels**

Analysis criteria will be based upon the following:

- Health Screening Levels (HSL), Ecological Investigation Levels (EIL) and Ecological Screening Levels (ESL) presented in the National Environment Protection Council's (NEPC) National Environment Protection Measure (NEPM amended 2013).

NEPM (2013) present HSL's, ESL's and EIL's for different land uses including Industrial/commercial, residential with minimal access to soil, residential with accessible soil, recreational etc. The proposed site use is residential; therefore HIL-A (residential) will be adopted for respective contaminants of concern. The investigation levels adopted for assessing the contamination status of the underlying materials at the site are provided in Table 2.

**Table 2:** Soil investigation levels

<i>Analyte</i>	<i>Health Investigation Levels (mg/kg) HIL-A</i>
DDT + DDD + DDE	240
Aldrin & Dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
Methoxychlor	300
Chlorpyrifos	160
PCB	1
Chlordane	50
Arsenic	100
Cadmium	20
Chromium	100
Copper	6000
Lead	300
Mercury	40
Nickel	400
Zinc	7400
Asbestos	ND*

\*ND – A nil detection limit has been adopted for this investigation.

## 7 Results

The field investigation was completed on the 3<sup>rd</sup> June 2020. A total of 40 boreholes to 0.5m were excavated across the site in a grid base format. Ten (10) composite samples (4 x sub samples per composite) were taken for analysis. No obvious signs (visual/olfactory) of contamination were noted in the underlying materials during field work activities. A sample location plan is attached in Appendix A. Global Positioning System (GPS) co-ordinates were taken for each borehole (Appendix B).

A total of 10 samples were sent for various analysis by EnviroLab P/L, a NATA accredited laboratory in Sydney. The laboratory test reports are attached in Appendix C. The following sections provide a summary of the results.

### 7.1 Soil Investigation Results

A total of 10 samples from 40 boreholes to depths of between 0.0 and 0.5m were used to assess the contamination status of the underlying materials of the site. All results were found below the adopted criteria for all analytes tested. Table 3 provides a summary of the results.



**Table 3:** Results summary (*ND – Nil detection*)

<b>Number of Samples (Composite and discrete)</b>	<b>Analyte</b>	<b>Adopted Criteria (mg/kg)</b>	<b>Minimum Concentration (mg/kg)</b>	<b>Maximum Concentration (mg/kg)</b>	<b>Samples Exceeding Adopted Criteria</b>
10	DDt+DDE+DDD	240	<0.1	<0.1	Nil
10	Aldrin and dieldrin	6	<0.1	<0.1	Nil
10	Endosulfan	270	<0.1	<0.1	Nil
10	Endrin	10	<0.1	<0.1	Nil
10	Heptachlor	6	<0.1	<0.1	Nil
10	Methoxychlor	300	<0.1	<0.1	Nil
10	Chlorpyrifos	160	<0.1	<0.1	Nil
10	PCB	300	<0.05	<0.05	Nil
10	Arsenic	100	<4	<4	Nil
10	Cadmium	20	<0.4	<0.4	Nil
10	Chromium	100	21	28	Nil
10	Copper	6000	11	28	Nil
10	Lead	300	8	17	Nil
10	Mercury	40	<0.1	<0.1	Nil
10	Nickel	400	6	8	Nil
10	Zinc	7400	15	43	Nil
10	Asbestos	ND	ND	ND	Nil

## **8 CONCLUSIONS**

Based on the data and evidence collected in the course of the site inspection, site history review and sampling and analysis program, the findings of the Limited Phase 2 are as follows:

- The site was previously developed for agricultural (orchard) with trees removed circa 2009 to 2010.
- There has been no significant storage of fuels/oils or chemicals at the site.
- A 17 lot residential subdivision development is proposed for the site.
- Due to the site history the potential for significant and widespread contamination is considered low.
- The results of the sampling and analysis program showed that all samples analysed were found below the adopted criteria (Residential) for Organochlorine, Organophosphate Pesticides, Polychlorinated Biphenyls and metals. No asbestos was detected in any of the samples analysed.
- The site is therefore considered suitable for residential development.

## **9 RECOMMENDATIONS**

No further investigation of the contamination of the underlying materials is considered necessary at the site. Any soil material requiring exportation from the site during future development works should be classified in accordance with the Excavated Natural Material Order (2014) and if required the Waste Classification Guidelines Part 1: Classifying Waste (2014).

## **10 ADDENDUM**

### **LIMITS OF INVESTIGATION**

The recommendations made in this report assume that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the site may differ from those said to exist, because no environmental consultant, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

The recommendations in this report are based on the following:-

- a) The information gained from this investigation
- b) The results received from a NATA accredited environmental laboratory
- c) Historical information
- d) Information supplied by the client



## APPENDIX A Site Plan



**AITKEN ROWE TESTING LABORATORIES  
PTY LTD**

**Registration Number: GS20-81**

**Client:** TONY AGRESTA C/- MJM CONSULTING ENGINEERS –  
WAGGA WAGGA, NSW  
**Project:** LIMITED PHASE 2 ASSESSMENT – PROPOSED SUBDIVISION,  
LOT 115,  
No. 1812A MALLINSON ROAD, LAKE WYANGAN, NSW  
**BOREHOLE LOCATION PLAN**



## Appendix B

### Sample GPS Co-ordinate Table

BOREHOLE CO-ORDINATES			
Borehole Number	Easting	Northing	Sample Number
1	0410549	6209196	C1
2	0410493	6209218	
3	0410421	6209248	
4	0410375	6209266	
5	0410353	6209239	C2
6	0410401	6209225	
7	0410462	6209208	
8	0410519	6209183	
9	0410511	6209140	C3
10	0410462	6209163	
11	0410411	6209187	
12	0410362	6209206	
13	0410329	6209178	C4
14	0410379	6209170	
15	0410432	6209154	
16	0410480	6209131	
17	0410501	6209087	C5
18	0410433	6209117	
19	0410392	6209130	
20	0410343	6209147	
21	0410307	6209121	C6
22	0410359	6209106	
23	0410417	6209091	
24	0410464	6209069	
25	0410476	6209027	C7
26	0410420	6209046	
27	0410366	6209063	
28	0410314	6209086	

BOREHOLE CO-ORDINATES			
Borehole Number	Easting	Northing	Sample Number
29	0410287	6209056	C8
30	0410334	6209048	
31	0410385	6209034	
32	0410447	6209005	
33	0410442	6208963	C9
34	0410396	6208985	
35	0410341	6208999	
36	0410284	6209018	
37	0410249	6208997	C10
38	0410300	6208975	
39	0410365	6208947	
40	0410412	6208925	



## Appendix C

### Laboratory Test Reports as received from EnviroLab

## CERTIFICATE OF ANALYSIS 244191

### Client Details

<b>Client</b>	Aitken Rowe Testing Laboratories Pty Ltd
<b>Attention</b>	Michael Scremin
<b>Address</b>	4/2 RIEDELL ST, WAGGA WAGGA, NSW, 2650

### Sample Details

<b>Your Reference</b>	<u>GS20-81:1812A Mallinson Rd, Lake Wyangan</u>
<b>Number of Samples</b>	10 Soil
<b>Date samples received</b>	04/06/2020
<b>Date completed instructions received</b>	04/06/2020

### Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

**Please refer to the last page of this report for any comments relating to the results.**

### Report Details

<b>Date results requested by</b>	12/06/2020
<b>Date of Issue</b>	11/06/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### Asbestos Approved By

Analysed by Asbestos Approved Identifier: Lucy Zhu  
 Authorised by Asbestos Approved Signatory: Lucy Zhu

#### Results Approved By

Jaimie Loa-Kum-Cheung, Metals Supervisor  
 Josh Williams, Senior Chemist  
 Lucy Zhu, Asbestos Supervisor

#### Authorised By



Nancy Zhang, Laboratory Manager

## Organochlorine Pesticides in soil

Our Reference		244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference	UNITS	GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	105	101	102	104

Organochlorine Pesticides in soil						
Our Reference		244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference	UNITS	GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	99	100	106	100	120

Organophosphorus Pesticides in Soil						
Our Reference		244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference	UNITS	GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	105	101	102	104

Organophosphorus Pesticides in Soil						
Our Reference		244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference	UNITS	GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	99	100	106	100	120

PCBs in Soil						
Our Reference	UNITS	244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference		GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	105	101	102	104

PCBs in Soil						
Our Reference	UNITS	244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference		GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	06/06/2020	06/06/2020	06/06/2020	06/06/2020	06/06/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	99	100	106	100	120

Acid Extractable metals in soil						
Our Reference		244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference	UNITS	GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	21	24	23	22	28
Copper	mg/kg	21	28	18	17	13
Lead	mg/kg	8	9	8	7	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	7	8	7	7	8
Zinc	mg/kg	22	20	21	20	17

Acid Extractable metals in soil						
Our Reference		244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference	UNITS	GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	27	23	23	28	26
Copper	mg/kg	11	12	13	14	13
Lead	mg/kg	9	8	8	17	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	6	7	7	6
Zinc	mg/kg	15	17	17	43	22



Moisture						
Our Reference	UNITS	244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference		GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	09/06/2020	09/06/2020	09/06/2020	09/06/2020	09/06/2020
Moisture	%	6.6	11	10	3.0	29

Moisture						
Our Reference	UNITS	244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference		GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/06/2020	05/06/2020	05/06/2020	05/06/2020	05/06/2020
Date analysed	-	09/06/2020	09/06/2020	09/06/2020	09/06/2020	09/06/2020
Moisture	%	14	7.6	13	24	12

Asbestos ID - soils						
Our Reference	UNITS	244191-1	244191-2	244191-3	244191-4	244191-5
Your Reference		GS20-81:C1	GS20-81:C2	GS20-81:C3	GS20-81:C4	GS20-81:C5
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/06/2020	10/06/2020	10/06/2020	10/06/2020	10/06/2020
Sample mass tested	g	Approx. 50g	Approx. 40g	Approx. 35g	Approx. 40g	Approx. 25g
Sample Description	-	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
		Organic fibres detected	Organic fibres detected	Organic fibres detected	Organic fibres detected	Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference	UNITS	244191-6	244191-7	244191-8	244191-9	244191-10
Your Reference		GS20-81:C6	GS20-81:C7	GS20-81:C8	GS20-81:C9	GS20-81:C10
Depth		0-0.5m	0-0.5m	0-0.5m	0-0.5m	0-0.5m
Date Sampled		02/06/2020	02/06/2020	02/06/2020	02/06/2020	02/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/06/2020	10/06/2020	10/06/2020	10/06/2020	10/06/2020
Sample mass tested	g	Approx. 35g	Approx. 50g	Approx. 40g	Approx. 45g	Approx. 45g
Sample Description	-	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks	Red coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg  Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
<b>ASB-001</b>	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
<b>Inorg-008</b>	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Org-021</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
<b>Org-021</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PCBs" is simply a sum of the positive individual PCBs.
<b>Org-022</b>	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
<b>Org-022/025</b>	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
<b>Org-022/025</b>	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS.  Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			05/06/2020	1	05/06/2020	05/06/2020		05/06/2020	[NT]
Date analysed	-			06/06/2020	1	06/06/2020	06/06/2020		06/06/2020	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	78	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	74	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	112	1	106	105	1	99	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			05/06/2020	1	05/06/2020	05/06/2020		05/06/2020	[NT]
Date analysed	-			06/06/2020	1	06/06/2020	06/06/2020		06/06/2020	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	[NT]
Chlorpyrifos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	112	1	106	105	1	99	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			05/06/2020	1	05/06/2020	05/06/2020		05/06/2020	[NT]
Date analysed	-			06/06/2020	1	06/06/2020	06/06/2020		06/06/2020	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	130	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	112	1	106	105	1	99	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	244191-10
Date prepared	-			05/06/2020	1	05/06/2020	05/06/2020		05/06/2020	05/06/2020
Date analysed	-			05/06/2020	1	05/06/2020	05/06/2020		05/06/2020	05/06/2020
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	102	110
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	98	102
Chromium	mg/kg	1	Metals-020	<1	1	21	23	9	96	107
Copper	mg/kg	1	Metals-020	<1	1	21	25	17	94	114
Lead	mg/kg	1	Metals-020	<1	1	8	9	12	97	103
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	84	81
Nickel	mg/kg	1	Metals-020	<1	1	7	8	13	99	102
Zinc	mg/kg	1	Metals-020	<1	1	22	22	0	101	102



**Result Definitions**

<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

## Quality Control Definitions

<b>Blank</b>	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
<b>Matrix Spike</b>	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
<b>LCS (Laboratory Control Sample)</b>	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

## Report Comments

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.

Note: Samples were sub-sampled from bags provided by the client.