Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

20 December 2023 Reg. No.: E23-053

Raulston Family Homes
152 Fitzmaurice Street
Wagga Wagga, NSW 2650

Attention: Mr. Troy Raulston

Dear Sir,

MATERIAL CLASSIFICATION – PROPOSED RESIDENTIAL SUBDIVISION
No. 14 JOHN POTTS DRIVE, JUNEE, NSW

This report presents the findings of a sampling and analysis program designed to classify soil material at the above site. It is understood that the site has been levelled with cut to fill to varying levels with two large sporting fields constituting the majority of the subject site. It is the purpose of this report to classify the fill material at the site. The investigation was commissioned by Raulston Family Homes. The investigation has been completed as per the following;

- Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014: The excavated natural material order 2014.

The following contaminants were tested:

- vTPH – Total Petroleum Hydrocarbons (volatile)
- TPH – Total Petroleum Hydrocarbons
- BTEX – Benzene, Toluene, Ethylbenzene and Xylene
- PAH's – Polycyclic Aromatic Hydrocarbons
- Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc
- pH
- EC

For the purpose of this validation report, an ARTL representative augered four (4) boreholes (refer to attached sample location plan) and obtained four (4) discrete samples of the underlying fill material on the 6th December 2023 and the samples were sent to EnviroLab, a NATA accredited laboratory in Sydney for analysis. The laboratory test report as received from EnviroLab is attached to this report. The results are summarised in Table 1 below.

Table 1. Analytical results summary

No. of Samples	Analyte	Absolute Maximum Concentration (mg/kg) ENM Order 2014	Min Result (mg/kg)	Max Result (mg/kg)	Comply Y/N
4	TRH C_{10}-C_{36}	500	<50	<50	Y
	Benzene	0.5	<0.2	<0.2	Y
	Toluene	65	<0.5	<0.5	Y
	Ethylbenzene	25	<1	<1	Y
	Xylene	15	<1	<1	Y
	PAH's (total)	40	<0.05	<0.05	Y
	Benzo(a)pyrene	1	<0.05	<0.05	Y
	Arsenic	40	<4	20	Y
	Cadmium	1	<0.4	<0.4	Y
	Chromium (total)	150	17	36	Y
	Copper	200	12	18	Y
	Lead	100	8	23	Y
	Mercury	1	<0.1	<0.1	Y
	Nickel	60	9	17	Y
	Zinc	300	27	49	Y
	pH (pH units)	4.5-10	7.0	8.5	Y
	EC (dS/m)	3	0.03	0.12	Y

From Table 1 above all samples comply for the contaminants analysed and the material is therefore classified as **Excavated Natural Material (ENM)**.

Should you have any queries, please do contact us.

Yours Faithfully,

Peter Forbes-Taber
Geotechnical Engineer

Attachments:

- Addendum
- Sample Location Plan
- Laboratory Test Reports as received from EnviroLab

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption 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 our investigation.
b) The results received from a NATA accredited environmental laboratory.
c) Historical information.
d) Information supplied by the client.

Should the client or their agent have omitted to supply us with the correct relevant information, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Any sketch supplied should be considered as only an approximate pictorial evidence of our work.

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: E23-053

Client: RAULSTON FAMILY HOMES – WAGGA WAGGA, NSW

Project: MATERIAL CLASSIFICATION,
PROPOSED RESIDENTIAL SUBDIVISION,
No. 14 JOHN POTTS DRIVE, JUNEE, NSW
SAMPLE LOCATION PLAN

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 339943

Client Details

Client	Aitken Rowe Testing Laboratories Pty Ltd
Attention	Peter Forbes-Taber
Address	4/2 RIEDELL ST, WAGGA WAGGA, NSW, 2650

Sample Details

Your Reference	**E23-053, 14 John Potts Drive**
Number of Samples	4 Soil
Date samples received	12/12/2023
Date completed instructions received	12/12/2023

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.

Report Details

Date results requested by	19/12/2023
Date of Issue	19/12/2023

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Dragana Tomas, Senior Chemist
Liam Timmins, Organics Supervisor
Loren Bardwell, Development Chemist
Nick Sarlamis, Assistant Operation Manager
Tim Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Date analysed	-	14/12/2023	14/12/2023	14/12/2023	14/12/2023
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	89	99	97

svTRH (C10-C40) in Soil					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Date analysed	-	14/12/2023	14/12/2023	14/12/2023	14/12/2023
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	90	87	85	86

PAHs in Soil					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Date analysed	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	107	109	104	105

Acid Extractable metals in soil					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Date analysed	-	14/12/2023	14/12/2023	14/12/2023	14/12/2023
Arsenic	mg/kg	<4	<4	<4	20
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	36	22	28	17
Copper	mg/kg	18	12	14	12
Lead	mg/kg	12	8	9	23
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	17	14	15	9
Zinc	mg/kg	27	33	39	49

Misc Inorg - Soil					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	12/12/2023	12/12/2023	12/12/2023	12/12/2023
Date analysed	-	18/12/2023	18/12/2023	18/12/2023	18/12/2023
pH 1:5 soil:water	pH Units	7.8	7.7	7.0	8.5
Electrical Conductivity 1:5 soil:water	µS/cm	70	40	30	120

Moisture					
Our Reference		339943-1	339943-2	339943-3	339943-4
Your Reference	UNITS	1A	2A	3A	4A
Depth		0.7-0.9	0.6-0.8	0.4-0.6	0.8-1.0
Date Sampled		6/12/2023	6/12/2023	6/12/2023	6/12/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	13/12/2023	13/12/2023	13/12/2023	13/12/2023
Date analysed	-	14/12/2023	14/12/2023	14/12/2023	14/12/2023
Moisture	%	13	6.9	7.8	8.9

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date extracted	-			13/12/2023	[NT]	[NT]	[NT]	[NT]	13/12/2023	[NT]
Date analysed	-			14/12/2023	[NT]	[NT]	[NT]	[NT]	14/12/2023	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	107	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	107	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/12/2023	[NT]	[NT]	[NT]	[NT]	13/12/2023	[NT]
Date analysed	-			14/12/2023	[NT]	[NT]	[NT]	[NT]	14/12/2023	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	125	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	129	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	125	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	129	[NT]
Surrogate o-Terphenyl	%		Org-020	85	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/12/2023	[NT]	[NT]	[NT]	[NT]	13/12/2023	[NT]
Date analysed	-			13/12/2023	[NT]	[NT]	[NT]	[NT]	13/12/2023	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	108	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	104	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			13/12/2023	[NT]	[NT]	[NT]	[NT]	13/12/2023	[NT]
Date analysed	-			14/12/2023	[NT]	[NT]	[NT]	[NT]	14/12/2023	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	111	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	104	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			12/12/2023	[NT]	[NT]	[NT]	[NT]	12/12/2023	[NT]
Date analysed	-			18/12/2023	[NT]	[NT]	[NT]	[NT]	18/12/2023	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]

Result Definitions

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

Quality Control Definitions

Blank	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.
Duplicate	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.
Matrix Spike	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.
LCS (Laboratory Control Sample)	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.
Surrogate Spike	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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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.