[redacted]
Environmental Engineer & Director
[redacted]
mob: [redacted]
office: (02) 66-215-123
fax: (02) 66-218-123
ABN: 82 106 758 123

Friday 13 October 2023

To [redacted]
Site Engineer, Lendlease
Tweed Valley Hospital Project

Re: Surface Water Quality Monitoring Results and Report for the Tweed Valley Hospital Project
Reporting period: 15 August 2023 to 17 September 2023

1.0 INTRODUCTION

Ecoteam is engaged to undertake monthly and event-based surface water monitoring on behalf of Lendlease Building as part of the main works for the Tweed Valley Hospital Project. This report presents results from the 51st round of monthly sampling. This report satisfies the requirements of the SSD2 conditions. No controlled or uncontrolled releases from the sediment basins occurred during the reporting period.

2.0 PROJECT AIMS AND SAMPLING OBJECTIVES

The surface water monitoring objectives for the site are to detect changes during construction in receiving water quality resulting from the project. Stormwater discharges potentially contain increased sediment loads, nutrients, total and dissolved metals, hydrocarbons, or other contaminants such as pesticides. Baseline water quality data was performed on 19 and 26 November and 19 December 2018 to record water quality conditions under the existing land use prior to construction (Lendlease Building, 2019).

3.0 WEATHER CONDITIONS

Total rainfall in the period prior to sampling (*15 August 2023 to 17 September 2023*) was 41.8 mm with the highest 24-hour rainfall occurring on 16 August, being 15.2 mm (Kingscliff BOM Station 058137).

4.0 SAMPLING LOCATIONS

Samples were collected from four of the five monthly sampling Sites (001 – 003 and 005). Site 004 has been infilled and has been removed from ongoing sampling rounds. Control samples were also collected and analysed (013 – 015). Sample codes and corresponding sampling locations are shown in **Table 1** and **Figure 1**. Site photos taken on the day of sampling are included in **Appendix A.** During sampling, Site 002 was noted to be flowing South. Therefore, Site 002 will be assessed as an upstream sample site.

Table 1. Monthly sampling sites, control samples, sample codes, and applicable WQOs.

Sample Codes	Sampling Site Name	Short Name	WQOs
001	West Creek (Downstream)	WC	Estuarine
002	North West Creek (Variable)	NWC	Estuarine
003	East Creek (Upstream)	EC	Freshwater
004	Dam (Downstream)	Dam	Freshwater
005	Dam Drain (Downstream)	DD	Freshwater
013	Trip Blank	Trip	NA
014	Field Blank	Field	NA
015	Field Duplicate	Duplicate	NA

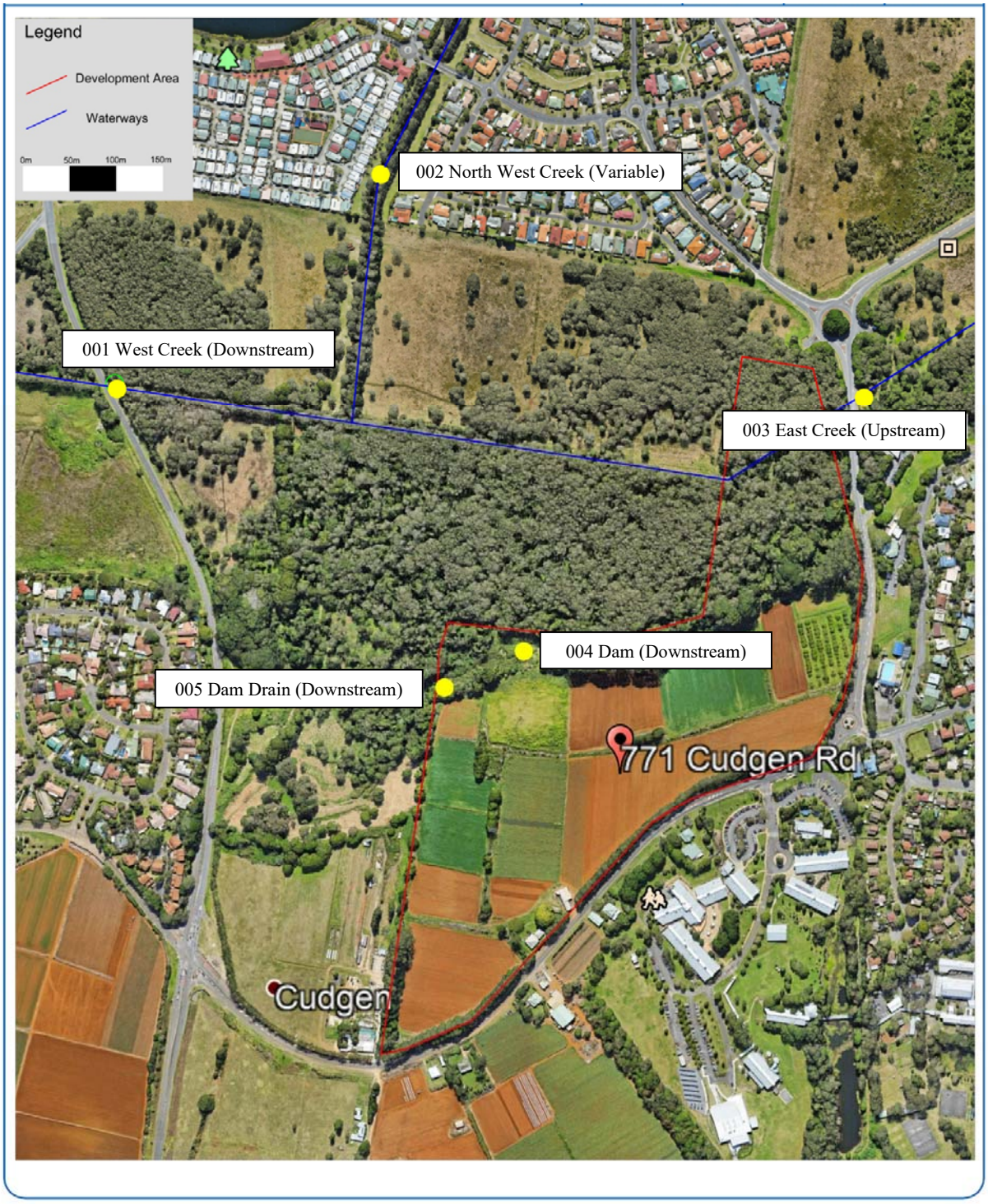

Figure 1. Map of monthly sampling sites (Source: Google Earth).

5.0 SAMPLING METHODOLOGY

Sampling was undertaken by Lise Bolton on Monday 18 September 2023. The weather was sunny. In situ, physico-chemical measurements were collected using a AquaTROLL multi-parameter probe, and Turbidity was measured using a Turbimeter Plus turbidity meter. Oil and grease were visually assessed. The calibration certificate for the AquaTROLL is included in **Appendix B**. The Turbimeter Plus is calibrated before each sampling round. Water quality samples were collected at 300 mm below the surface where possible. Samples were collected from the bank using an extension pole.

Samples were filtered and preserved on-site where necessary, stored on ice, and couriered overnight to the NATA-accredited Envirolab in Sydney. Trip blank samples (013) were sent from Envirolab and transported to all sites, then returned to Envirolab with the field samples. The field blank samples (014) were assessed at Site 002. Duplicate samples (015) were collected at Site 003 and were filtered and preserved as required. Field and trip blanks were filled with deionized water and do not represent water quality from the site. A full list of analytes for the project is included in **Appendix C**.

6.0 ASSESSMENT CRITERIA

Water quality results were compared against the Water Quality Objectives (WQO) in the following guidelines:

- *NSW Water Quality Objectives for the Tweed River Catchment for Aquatic Ecosystems* (Tweed 2006) - Trigger criteria for estuaries.
- *Australian and New Zealand guidelines for fresh and marine water quality (ANZECC 2000)* – Trigger values for freshwater (level of protection 95% species).

7.0 RESULTS

7.1 Physico-chemical Results

In situ, physico-chemical sampling results with comparison to WQOs are shown in **Table 2**. There were no surface sheens visible at any sites, therefore oil and grease were not present.

Table 2. Results of physico-chemical parameters. The results above guidelines are highlighted.

		Water Quality Objectives (WQOs)		Sample Codes and Results			
Analyte	**Units**	**Estuary**	**Fresh Water**	**WC 001 (Down)**	**NWC 002 (Down)**	**EC 003 (Up)**	**DD 005 (Down)**
pH		**7.0-8.5**	**6.5-8.5**	7.48	7.37	6.51	6.17
Turbidity	*NTU*	**0.5-10**	**6.0-50**	5.82	1.89	1.35	15.6
Electrical Conductivity (EC)	*µS/cm*	**125-2,200**	**125-2,200**	962.37	245.04	150.36	139.40
Dissolved Oxygen (DO)	*% Saturation*	**80-110**	**85-110**	36.43	59.57	32.33	26.46
Temperature	*°C*	**N/A**	**N/A**	20.87	21.73	18.79	17.79
Oxidation-Reduction Potential (ORP)	*mV*	**N/A**	**N/A**	64.85	75.69	84.40	91.98

When compared to the WQOs for freshwater and estuaries:

- pH was outside the WQO range at sample at sample Site 001, and 005 this sampling round.
- Turbidity was outside of the WQO ranges at sample Sites 003 this sampling round.
- EC concentrations were inside of the expected range at all sampling sites this sampling round.
- DO concentrations were outside of the expected range at all sample site this sampling round. DO was outside the range at comparison sites in background sampling.

7.2 Laboratory Results

Ammonia, Chlorophyll-a, Filterable Reactive Phosphorous (FRP), Oxides of Nitrogen (NOx), Total Nitrogen, and Total Phosphorus were above the WQOs for some sample sites shown in **Table 3**.

The chain of custody form is included in **Appendix D**. A summary of all lab results with comparison to WQOs is included in **Appendix E**. A full copy of the laboratory results is included in **Appendix F**.

Table 3. Parameters in exceedance of the trigger criteria for sampling conducted. Results above guidelines are highlighted.

		Water Quality Objectives (WQOs)								
Analyte	**Unit**	**Estuary**	**Fresh Water**	**WC 001 (Down)**	**NWC 002 (Down)**	**EC 003 (Up)**	**DD 005 (Down)**	**013 Trip**	**014 Field**	**015 Duplicate**
Ammonia	mg/L	0.015	0.02	0.019	0.21	0.086	0.022	<0.005	<0.005	0.087
Chlorophyll-a	mg/L	4	5	2	9	2	10	<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	<0.005	0.01	0.073	<0.005	<0.005	<0.005	0.073
Oxides of Nitrogen	mg/L	0.015	0.040	0.51	0.04	0.04	1.7	<0.005	<0.005	0.04
Total Nitrogen	mg/L	0.30	0.35	1.0	0.6	0.4	1.9	<0.1	<0.1	0.4
Total Phosphorus	mg/L	0.030	0.025	0.2	0.1	0.1	0.2	<0.02	<0.02	0.1

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs at all sites this sampling round. Ammonia was above the WQOs at comparison sites in background sampling. Ammonia has decreased at sample Sites 001, and 005, but increased at sample Sites 002 and 003 when compared to the previous month.
- Chlorophyll-a was above WQOs at sample Sites 002, and 005 this sampling round. Chlorophyll-a was above the WQO at comparison sites in background sampling. Chlorophyll-a has decreased at sample Sites 001, 002, and003 but increased at sample Site 005 when compared to the previous month.
- Filterable Reactive Phosphorus was above WQOs at sample Sites 002, and 00 this sampling round. Filterable Reactive Phosphorus has decreased at sample Site 001, and 005but increased at sample Sites 002 and 003 when compared to the previous month.
- NOx was above the WQOs criteria at all sites. NOx has increased at sample Site 001, and decreased at all other Sites. when compared to the previous month.

- TN was above the WQOs criteria at all sites this sampling round. TN was above the WQOs at comparison sites in background sampling. TN has increased at sample Sites 001, 002, and 003, but decreased at sample Site 005 when compared to the previous month.
- TP was above the WQOs criteria at all sample sites this sampling round. TP has remained the same at sample Site 003, but increased at sample Sites 001, 002, and 005 when compared to the previous month.
- All metals were within estuarine and freshwater criteria this month.
- Demeton was analysed and returned non-detectable results.
- TRH (C_{10}-C_{40}) was not detected at any sample site.

8.0 Quality Assurance and Quality Control

- Parameters analysed in the Trip Blank (013) and Field Blank (014) were below the laboratory detection limits for all analytes except for manganese which was found in the Trip Blank and Field Blank. The presence of manganese in the Trip Blank and Field Blank indicates this is due to laboratory procedures and not a result of contamination. Manganese levels within the water quality samples were all well below the water quality objectives and are similar to levels seen in previous sampling rounds.
- The Duplicate Sample (015) was collected at Site 003 and is within acceptable limits for all analytes.
- The laboratory QA/QC is included in the results in **Appendix F**. All laboratory QA/QC was within acceptance criteria.

9.0 Summary of Results and Recommendations

- The month had low rainfall.
- Nutrients (Ammonia, NOx, TN, and TP) and Chlorophyll-a were high and exceeded some water quality parameters for some sites. This includes upstream and downstream sites in past sampling events. Exceedances in nutrients are therefore considered of natural occurrence.
- Elevated nutrients have been observed at all sampling locations including upstream and downstream sites in previous months and during baseline sampling. Therefore, based on the assessment of the August/September water quality data, the Tweed Valley Hospital Project construction activities are unlikely to be adversely impacting the downstream water quality. As such, the current soil and erosion controls implemented on site are considered to be effective.

Kind regards,

[redacted]
Environmental Engineer & Director
[redacted]
[redacted]
office: (02) 66-215-123
fax: (02) 66-218-123
ABN: 82 106 758 123

Appendix A. Site Photos

	**Site 001 – West Creek (Downstream) (18/09/2023)**
	**Site 002 – North-west Creek (Upstream) (18/09/2023)**
	**Site 003 – East Creek (Upstream) (18/09/2023)**

	**Site 005 – Dam Drain (Downstream) (18/09/2023)**

Appendix B. Calibration certificate for Aqua troll

Calibration Report

Instrument	Aqua TROLL 400
Serial Number	1008667
Created	22/09/2023

[redacted]

Serial Number	997760
Last Calibrated	22/09/2023

Calibration Details

Slope	1.081314
Offset	-0.02 mg/L

Calibration point 100%

Concentration	8.30 mg/L
Temperature	21.35 °C
Barometric Pressure	1,024.7 mbar

Calibration point 0%

Concentration	0.02 mg/L
Temperature	21.13 °C

[redacted]

Serial Number	1008667
Last Calibrated	22/09/2023

Calibration Details

Cell Constant	0.912
Reference Temperature	25.00 °C
TDS Conversion Factor (ppm)	0.65

[redacted]

Serial Number	996085
Last Calibrated	22/09/2023

Calibration Details

Zero Offset	-0.08 psi
Reference Depth	0.00 ft
Reference Offset	0.00 psi

[redacted]

Serial Number	22164
Last Calibrated	22/09/2023

Calibration Details

Total Calibration Points	2

Calibration Point 1

pH of Buffer	4.00 pH
pH mV	141.9 mV
Temperature	20.71 °C

Calibration Point 2

pH of Buffer	7.02 pH
pH mV	-32.4 mV
Temperature	20.66 °C

Slope and Offset 1

Slope	-57.74 mV/pH
Offset	-31.3 mV

ORP

ORP Solution	ORP Standard
Offset	34.0 mV
Temperature	20.91 °C

Appendix C. Full List of Sampling Analytes

3.7 Proposed Surface Water Quality Sampling Parameters

A summary of the proposed sampling analytes is provided below:

Field

- pH
- Turbidity
- Electrical Conductivity (EC)
- Dissolved Oxygen (DO)
- Temperature
- Oxidation Reduction Potential (ORP)
- Oil and grease

Laboratory

- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Major Cations & Hardness
- Ammonia
- Chlorophyll-a
- Filterable Reactive Phosphorus
- Nitrate
- Oxides of Nitrogen
- Total Nitrogen
- Total Phosphorus
- Aluminium (pH > 6.5) filtered
- Arsenic (filtered)
- Boron (filtered)
- Cadmium (filtered)
- Chromium (filtered)
- Copper (filtered)
- Cobalt (filtered)
- Lead (filtered)
- Manganese (filtered)
- Mercury (filtered)
- Nickel (filtered)
- Selenium (filtered)
- Silver (filtered)
- Zinc (filtered)
- Benzene
- Toluene
- Ethylbenzene
- Xylene - Total
- Naphthalene
- Total Recoverable Hydrocarbons (TRH)
- Organochlorine Pesticides (OCP)
  - 4.4'-DDE
  - 4.4'-DDT
  - Aldrin
  - g-BHC (Lindane)
  - Chlordane
  - Dieldrin
  - Endosulfan
  - Endrin
  - Heptachlor
  - Toxaphene
- Organophosphorus Pesticides (OPP)
  - Azinphos-methyl
  - Chlorpyrifos
  - Demeton-S
  - Diazinon
  - Dimethoate
  - Fenitrothion
  - Malathion

If a sample returns detectable concentrations of the analytes presented in Table 1, additional analyses may be required to enable comparison against additional trigger criteria or trace potential sources of contaminants. It is cost prohibitive to analyse these parameters unless required.

Table 1 Additional Analysis Requirements

Analyte	Additional Analysis
Total Recoverable Hydrocarbons	TRH Silica-gel Clean-up
Arsenic (filtered)	Arsenic (III) (filtered) Arsenic (V) (filtered)
Chromium (filtered)	Chromium (CrVI) (filtered)

ecoteam
natural solutions for environmental challenges

Appendix D. Chain of Custody Form

[Copyright and Confidential]

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph: 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
Ph: 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
25 Research Drive, Croydon South, VIC 3136
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph: 08 7087 6800 / adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 7, 17 Willes Rd, Berrimah, NT 0820
Ph: 08 8967 1201 / darwin@envirolab.com.au

Client: Ecotean[redacted]
Contact Person[redacted]
Project M[redacted]
Samp[redacted]
Address: 13 Ewing Street
Lismore NSW 2480
Phone: 02 6621 5123 Mob: 0428215124
Email: lise@ecoteam.com.au
Testing requirements - Chlorophyll-a <4 mg/m3, Total Phosphorus <0.025 mg/L, Silver <0.05 ug/L, Low level OCPs and OPPs- Endosulfan <0.01

Client Project Name / Number / Site etc (le report title):
SMC009.51 - Tweed Valley Hospital Project
PO No.:
Envirolab Quote No. : 19SY228_Rev 1
Date results required:
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Additional report format: esdat / equis /
Lab Comments:
Metals: :Al, As, B, Cd, Cr, Cu, Co, Pb, Mn, Hg, Ni, Se, Ag, Z. Cations: Na/K/Ca/Mg. Please hold Cr6 and AsIII/V until initial dissolved metals results are back.

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	TRH/BTEXN	Dissolved Metals	OC/OP + toxaphene + demeton	TSS	TDS	Cations + Hardness	Ammonia	Cholorphyll-a	Phosphate (FRP)	Nitrate	Nox	Total N	Total P	Cr6+- HOLD	AsIII & V - HOLD	Provide as much information about the sample as you can
1	001 - USW	300 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	002 - USNW	150 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - DSE	300 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	005 - Dam Drain	150 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	013	300 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	014	300 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	015	300 mm	18/09/2023	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			

☐ *Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis*

Relinquished by (Company):	Ecoteam	Received by (Company): ECS SYD	*Lab Use Only*
Print Name: [redacted]		Print Name: [redacted]	Job number: 333467 — Cooling: Ice / Ice pack / None
Date & Time: 18/09/2023		Date & Time: 20/9/23 0900	Temperature: 18.0C — Security seal: Intact / Broken / None
Signature:		Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

333467

Form 302_V004 Issue date: 21 May 2019 Page 1 of 1

Appendix E. Summary of Lab Results compared to WQOs

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	**Unit**	**Estuary**	**Fresh Water**	WC 001	NWC 002	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Total Suspended Solids (TSS)	mg/L	N/A	N/A	48	<5	<5	34		<5	<5	<5
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	990	200	170	150		<5	<5	160
Major Cations (dissolved) and Hardness											
Sodium	mg/L	N/A	N/A	39	23	19	19		<0.5	<0.5	19
Potassium	mg/L	N/A	N/A	8.8	3	1	1		<0.5	<0.5	1
Calcium	mg/L	N/A	N/A	190	22	10	4		<0.5	<0.5	9.7
Magnesium	mg/L	N/A	N/A	28	6.2	4	5.1		<0.5	<0.5	4
Hardness mg$CaCO_3$/L		N/A	N/A	600	80	40	31		<3	<3	39
Nutrients											
Ammonia	mg/L	0.015	0.02	0.019	0.21	0.086	0.022		<0.005	<0.005	0.087
Chlorophyll-a	mg/m^3	4	5	2	9	2	10		<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	<0.005	0.01	0.073	<0.005		<0.005	<0.005	0.073
Nitrate	mg/L	N/A	N/A	0.48	0.03	0.04	1.7		<0.005	<0.005	0.04
Oxides of Nitrogen	mg/L	0.015	0.040	0.51	0.04	0.04	1.7		<0.005	<0.005	0.04
Total Nitrogen	mg/L	0.30	0.35	1.0	0.6	0.4	1.9		<0.1	<0.1	0.4
Total Phosphorus	mg/L	0.030	0.025	0.2	0.1	0.1	0.2		<0.02	<0.02	0.1
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	N/A	55	10	20	30	10		<10	<10	30
Arsenic	µg/L	N/A	13	2	<1	<1	<1		<1	<1	<1
Boron	µg/L	N/A	370	80	70	30	40		<20	<20	20
Cadmium	µg/L	5.5	0.2	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1
Chromium	µg/L	4.4	1.0	<1	1	<1	<1		<1	<1	<1
Copper	µg/L	1.3	1.4	<1	<1	<1	<1		<1	<1	2
Cobalt	µg/L	1.0	N/A	<1	<1	<1	<1		<1	<1	<1
Lead	µg/L	4.4	3.4	<1	<1	<1	<1		<1	<1	<1
Manganese	µg/L	N/A	1,900	260	100	60	25		3	3	56
Mercury	µg/L	0.4	0.6	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Nickel	µg/L	70	11	<1	<1	<1	<1		<1	<1	<1
Selenium	µg/L	N/A	11	<1	<1	<1	<1		<1	<1	<1
Silver	µg/L	1.4	0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Zinc	µg/L	15	8.0	4	1	4	6		<1	<1	3

Analyte	Unit	Water Quality Objectives (WQOs)		Sample Codes							
		Estuary	Fresh Water	WC 001	NWC 002	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Hydrocarbons											
Benzene	µg/L	950	700	<1	<1	<1	<1		<1	<1	<1
Toluene	µg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Ethylbenzene	µg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Xylene	µg/L	N/A	550	<1	<1	<1	<1		<1	<1	<1
Naphthalene	µg/L	70	16	<1	<1	<1	<1		<1	<1	<1
TRH C_6 - C_{10}	µg/L	N/A	N/A	<10	<10	<10	<10		<10	<10	<10
TRH C_{10} - C_{16}	µg/L	N/A	N/A	<50	<50	<50	<50		<50	<50	<50
TRH C_{16} - C_{34}	µg/L	N/A	N/A	<100	<100	<100	<100		<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	N/A	N/A	<100	<100	<100	<100		<100	<100	<100
TRH C_6-C_{10} less BTEX (F1)	µg/L	N/A	N/A	<10	<10	<10	<10		<10	<10	<10
TRH >C_{10}-C_{16} less Naphthalene (F2)	µg/L	N/A	N/A	<50	<50	<50	<50		<50	<50	<50
Organochlorine Pesticides (OCP)											
4.4'-DDE	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
4.4'-DDT	µg/L	N/A	0.01	<0.006	<0.006	<0.006	<0.006		<0.006	<0.006	<0.006
Aldrin	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
g-BHC	µg/L	N/A	0.2	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Chlordane	µg/L	N/A	0.08	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Dieldrin	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Endosulfan	µg/L	0.01	0.2	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
Endrin	µg/L	0.02	0.008	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Heptachlor	µg/L	N/A	0.09	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Toxaphene	µg/L	N/A	0.2	<2	<2	<2	<2		<2	<2	<2
Organophosphorus Pesticides (OPP)											
Azinphos-methyl	µg/L	N/A	0.02	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
Chlorpyriphos	µg/L	0.009	0.01	<0.009	<0.009	<0.009	<0.009		<0.009	<0.009	<0.009
Demeton-S	µg/L	N/A	N/A	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
Diazinon	µg/L	N/A	0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Dimethoate	µg/L	N/A	0.15	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Fenitrothion	µg/L	N/A	0.2	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Malathion	µg/L	N/A	0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05

Appendix F. Full Laboratory Results

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 333467

Client Details

Client	Ecoteam
Attention	[redacted]
[redacted]	[redacted]

Sample Details

Your Reference	**SMC009.51 - Tweed Valley Hospital Project**
Number of Samples	7 Water
Date samples received	20/09/2023
Date completed instructions received	20/09/2023

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.

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

Report Details

Date results requested by	27/09/2023
Date of Issue	27/09/2023

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By

[redacted] Organics Supervisor

[redacted]

vTRH(C6-C10)/BTEXN in Water						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	104	102	103	104	102
Surrogate Toluene-d8	%	98	97	98	98	97
Surrogate 4-Bromofluorobenzene	%	104	105	105	104	104

vTRH(C6-C10)/BTEXN in Water			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date extracted	-	20/09/2023	20/09/2023
Date analysed	-	21/09/2023	21/09/2023
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	103	103
Surrogate Toluene-d8	%	98	97
Surrogate 4-Bromofluorobenzene	%	103	106

svTRH (C10-C40) in Water						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	22/09/2023	22/09/2023	22/09/2023	22/09/2023	22/09/2023
Date analysed	-	23/09/2023	23/09/2023	23/09/2023	23/09/2023	23/09/2023
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	73	81	82	77	91

svTRH (C10-C40) in Water			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date extracted	-	22/09/2023	22/09/2023
Date analysed	-	23/09/2023	23/09/2023
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Surrogate o-Terphenyl	%	90	67

OCPs in Water - Low Level						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	22/09/2023	22/09/2023	22/09/2023	22/09/2023	22/09/2023
Date analysed	-	25/09/2023	25/09/2023	25/09/2023	25/09/2023	25/09/2023
alpha-BHC	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
HCB	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
beta-BHC	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDE	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan II	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
pp-DDD	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin Aldehyde	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006	<0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Methoxychlor	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Surrogate TCMX	%	78	93	94	87	105

OCPs in Water - Low Level			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date extracted	-	22/09/2023	22/09/2023
Date analysed	-	25/09/2023	25/09/2023
alpha-BHC	µg/L	<0.05	<0.05
HCB	µg/L	<0.01	<0.01
beta-BHC	µg/L	<0.05	<0.05
gamma-BHC	µg/L	<0.05	<0.05
Heptachlor	µg/L	<0.01	<0.01
delta-BHC	µg/L	<0.05	<0.05
Aldrin	µg/L	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01
Endosulfan I	µg/L	<0.02	<0.02
pp-DDE	µg/L	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01
Endosulfan II	µg/L	<0.02	<0.02
pp-DDD	µg/L	<0.01	<0.01
Endrin Aldehyde	µg/L	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.02	<0.02
Methoxychlor	µg/L	<0.02	<0.02
Surrogate TCMX	%	92	85

OP in water LL ANZECCF/ADWG						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	22/09/2023	22/09/2023	22/09/2023	22/09/2023	22/09/2023
Date analysed	-	25/09/2023	25/09/2023	25/09/2023	25/09/2023	25/09/2023
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Bromophos ethyl	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos	µg/L	<0.009	<0.009	<0.009	<0.009	<0.009
Chlorpyriphos-methyl	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorovos	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dimethoate	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Ronnel	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Parathion	µg/L	<0.004	<0.004	<0.004	<0.004	<0.004
Coumaphos	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Disulfoton	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fenamiphos	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Fenthion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Methidathion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl Parathion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Phorate	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Phosalone	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Surrogate TCMX	%	78	93	94	87	105

OP in water LL ANZECCF/ADWG			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date extracted	-	22/09/2023	22/09/2023
Date analysed	-	25/09/2023	25/09/2023
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02
Bromophos ethyl	µg/L	<0.01	<0.01
Chlorpyriphos	µg/L	<0.009	<0.009
Chlorpyriphos-methyl	µg/L	<0.01	<0.01
Diazinon	µg/L	<0.01	<0.01
Dichlorovos	µg/L	<0.01	<0.01
Dimethoate	µg/L	<0.01	<0.01
Ethion	µg/L	<0.01	<0.01
Fenitrothion	µg/L	<0.01	<0.01
Malathion	µg/L	<0.05	<0.05
Ronnel	µg/L	<0.01	<0.01
Parathion	µg/L	<0.004	<0.004
Coumaphos	µg/L	<0.01	<0.01
Disulfoton	µg/L	<0.01	<0.01
Fenamiphos	µg/L	<0.01	<0.01
Fenthion	µg/L	<0.01	<0.01
Methidathion	µg/L	<0.01	<0.01
Mevinphos	µg/L	<0.01	<0.01
Methyl Parathion	µg/L	<0.01	<0.01
Phorate	µg/L	<0.01	<0.01
Phosalone	µg/L	<0.01	<0.01
Surrogate TCMX	%	92	85

Miscellaneous Organics - water						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	22/09/2023	22/09/2023	22/09/2023	22/09/2023	22/09/2023
Date analysed	-	27/09/2023	27/09/2023	27/09/2023	27/09/2023	27/09/2023
Toxaphene*	µg/L	<2	<2	<2	<2	<2
Demeton-O	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-S	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d_{14}	%	75	87	92	77	97

Miscellaneous Organics - water			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date prepared	-	22/09/2023	22/09/2023
Date analysed	-	27/09/2023	27/09/2023
Toxaphene*	µg/L	<2	<2
Demeton-O	µg/L	<0.2	<0.2
Demeton-S	µg/L	<0.2	<0.2
Surrogate p-Terphenyl-d_{14}	%	92	74

HM in water - dissolved						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Aluminium-Dissolved	µg/L	10	20	30	10	<10
Arsenic-Dissolved	µg/L	2	<1	<1	<1	<1
Boron-Dissolved	µg/L	80	70	30	40	<20
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Manganese-Dissolved	µg/L	260	100	60	25	3
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1	<1	<1	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Silver-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc-Dissolved	µg/L	4	1	4	6	<1

HM in water - dissolved			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date prepared	-	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023
Aluminium-Dissolved	µg/L	<10	30
Arsenic-Dissolved	µg/L	<1	<1
Boron-Dissolved	µg/L	<20	20
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	<1	2
Cobalt-Dissolved	µg/L	<1	<1
Lead-Dissolved	µg/L	<1	<1
Manganese-Dissolved	µg/L	3	56
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1
Selenium-Dissolved	µg/L	<1	<1
Silver-Dissolved	µg/L	<0.05	<0.05
Zinc-Dissolved	µg/L	<1	3

Metals in Waters - Acid extractable						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Phosphorus - Total	mg/L	0.2	0.1	0.1	0.2	<0.02

Metals in Waters - Acid extractable			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date prepared	-	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023
Phosphorus - Total	mg/L	<0.02	0.1

Cations in water Dissolved						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date digested	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Sodium - Dissolved	mg/L	39	23	19	19	<0.5
Potassium - Dissolved	mg/L	8.8	3	1	1	<0.5
Calcium - Dissolved	mg/L	190	22	10	4	<0.5
Magnesium - Dissolved	mg/L	28	6.2	4	5.1	<0.5
Hardness	mgCaCO 3 /L	600	80	40	31	<3

Cations in water Dissolved			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date digested	-	21/09/2023	21/09/2023
Date analysed	-	21/09/2023	21/09/2023
Sodium - Dissolved	mg/L	<0.5	19
Potassium - Dissolved	mg/L	<0.5	1
Calcium - Dissolved	mg/L	<0.5	9.7
Magnesium - Dissolved	mg/L	<0.5	4
Hardness	mgCaCO 3 /L	<3	39

Miscellaneous Inorganics						
Our Reference		333467-1	333467-2	333467-3	333467-4	333467-5
Your Reference	UNITS	001-USW	002-UNSW	003-DSE	005- Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		18/09/2023	18/09/2023	18/09/2023	18/09/2023	18/09/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Date analysed	-	20/09/2023	20/09/2023	20/09/2023	20/09/2023	20/09/2023
Total Suspended Solids	mg/L	48	<5	<5	34	<5
Total Dissolved Solids (grav)	mg/L	990	220	170	150	<5
Ammonia as N in water	mg/L	0.019	0.21	0.086	0.022	<0.005
Chlorophyll a	mg/m^3	2	9	2	10	<1
Phosphate as P in water	mg/L	<0.005	0.01	0.073	<0.005	<0.005
Nitrate as N in water	mg/L	0.48	0.03	0.04	1.7	<0.005
NOx as N in water	mg/L	0.51	0.04	0.04	1.7	<0.005
Total Nitrogen in water	mg/L	1.0	0.6	0.4	1.9	<0.1

Miscellaneous Inorganics			
Our Reference		333467-6	333467-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		18/09/2023	18/09/2023
Type of sample		Water	Water
Date prepared	-	20/09/2023	20/09/2023
Date analysed	-	20/09/2023	20/09/2023
Total Suspended Solids	mg/L	<5	<5
Total Dissolved Solids (grav)	mg/L	<5	160
Ammonia as N in water	mg/L	<0.005	0.087
Chlorophyll a	mg/m^3	<1	2
Phosphate as P in water	mg/L	<0.005	0.073
Nitrate as N in water	mg/L	<0.005	0.04
NOx as N in water	mg/L	<0.005	0.04
Total Nitrogen in water	mg/L	<0.1	0.4

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
INORG-119	Chlorophyll A based on APHA 10200 H latest edition.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determinined stoichiometrically from the base metal concentration.
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-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-023	Water samples are analysed directly by purge and trap GC-MS.

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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2023	1	20/09/2023	22/09/2023		20/09/2023	[NT]
Date analysed	-			21/09/2023	1	21/09/2023	22/09/2023		21/09/2023	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	106	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	106	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	94	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	111	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	102	1	104	103	1	99	[NT]
Surrogate Toluene-d8	%		Org-023	98	1	98	97	1	102	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	106	1	104	105	1	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			22/09/2023	[NT]	[NT]	[NT]	[NT]	22/09/2023	[NT]
Date analysed	-			23/09/2023	[NT]	[NT]	[NT]	[NT]	23/09/2023	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	79	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	79	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
Surrogate o-Terphenyl	%		Org-020	96	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: OCPs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/09/2023	[NT]	[NT]	[NT]	[NT]	22/09/2023	[NT]
Date analysed	-			25/09/2023	[NT]	[NT]	[NT]	[NT]	25/09/2023	[NT]
alpha-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	74	[NT]
HCB	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	75	[NT]
gamma-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	74	[NT]
delta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	71	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	74	[NT]
gamma-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	82	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	84	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	68	[NT]
Endosulfan II	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	73	[NT]
Endrin Aldehyde	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.006	Org-022	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	67	[NT]
Methoxychlor	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	112	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/09/2023	[NT]	[NT]	[NT]	[NT]	22/09/2023	[NT]
Date analysed	-			25/09/2023	[NT]	[NT]	[NT]	[NT]	25/09/2023	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-021	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	µg/L	0.009	Org-021	<0.009	[NT]	[NT]	[NT]	[NT]	76	[NT]
Chlorpyriphos-methyl	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorovos	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Dimethoate	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	70	[NT]
Fenitrothion	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	76	[NT]
Malathion	µg/L	0.05	Org-021	<0.05	[NT]	[NT]	[NT]	[NT]	84	[NT]
Ronnel	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	73	[NT]
Parathion	µg/L	0.004	Org-021	<0.004	[NT]	[NT]	[NT]	[NT]	75	[NT]
Coumaphos	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenthion	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mevinphos	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methyl Parathion	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phosalone	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021	112	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Miscellaneous Organics - water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			22/09/2023	[NT]	[NT]	[NT]	[NT]	22/09/2023	[NT]
Date analysed	-			27/09/2023	[NT]	[NT]	[NT]	[NT]	27/09/2023	[NT]
Toxaphene*	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Demeton-O	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Demeton-S	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022/025	98	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	333467-2
Date prepared	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	21/09/2023
Date analysed	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	21/09/2023
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	10	10	0	95	105
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	2	1	67	96	97
Boron-Dissolved	µg/L	20	Metals-022	<20	1	80	80	0	83	90
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	103	97
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	93
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	96
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	102	93
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	100	90
Manganese-Dissolved	µg/L	1	Metals-022	<1	1	260	250	4	99	95
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	103	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	99	96
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	92
Silver-Dissolved	µg/L	0.05	Metals-022	<0.05	1	<0.05	<0.05	0	94	86
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	103	102

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	333467-2
Date prepared	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	21/09/2023
Date analysed	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	21/09/2023
Phosphorus - Total	mg/L	0.02	Metals-020	<0.02	1	0.2	0.2	0	93	90

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	[NT]
Date analysed	-			21/09/2023	1	21/09/2023	21/09/2023		21/09/2023	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	39	39	0	88	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	8.8	8.7	1	93	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	190	190	0	96	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	28	27	4	97	[NT]
Hardness	mgCaCO 3 /L	3	Metals-020	[NT]	1	600	590	2	[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	[NT]
Date analysed	-			20/09/2023	1	20/09/2023	20/09/2023		20/09/2023	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	48	49	2	91	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	990	960	3	108	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.019	0.019	0	[NT]	[NT]
Chlorophyll a	mg/m^3	1	INORG-119	<1	1	2	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.48	0.47	2	[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.51	0.50	2	[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	1.0	1.1	10	[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	20/09/2023	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	[NT]	[NT]	[NT]	[NT]	106	[NT]
Chlorophyll a	mg/m^3	1	INORG-119	[NT]	[NT]	[NT]	[NT]	[NT]	90	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	[NT]	[NT]	[NT]	[NT]	91	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	[NT]	[NT]	[NT]	[NT]	109	[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.

Report Comments

Miscellaneous Organics - water - The recovery of LCS and matrix spike cannot be reported due to the fact they are not in the list of analytes requested. However, the non-reported analytes within the LCS and matrix spike had acceptable recoveries.